Cat. No. W485-E1-02

**3G8F7-CRM21 (for PCI Bus)**
**3G8F8-CRM21 (for CompactPCI Bus)**

# CompoNet™ Master Board for PCI Bus / CompactPCI Bus

# USER'S MANUAL

OMRON

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# 3G8F7-CRM21 (for PCI Bus)
# 3G8F8-CRM21 (for CompactPCI Bus)

## CompoNet™ Master Board for PCI Bus / CompactPCI Bus

## User's Manual

*Revised September 2013*

# Notice:

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

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

**⚠DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.

**⚠WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.

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

# OMRON Product References

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

The abbreviation "Ch," which appears in some parts of this manual and on some displays and on OMRON products, has two meanings which must be distinguished in context. In one case, it means "word" as an aggregation of data, and is abbreviated "Wd". In other case, it refers to a physical input or output channel. In latter case, when a model has two input channels, they are referred to as Input 1 and Input 2.

The abbreviation "PC" refers to personal computers while "PLC" means Programmable Controller.

# Visual Aids

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

**Precautions for Safe Use**
Supplementary comments on what to do or avoid doing, to use the product safely

**Precautions for Correct Use**
Supplementary comments on what to do or avoid doing, to prevent failure to operate, or undesirable effect on product performance

**Note** Notes in the document refer to equivalent content to the Precautions for Correct Use or to Precautions for Safe Use.
It also 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.

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# About This Manual

This manual describes the installation and operation of the 3G8F7-CRM21 CompoNet Master Board for PCI Bus and the 3G8F8-CRM21 CompoNet Master Board for CompactPCI Bus. The CompoNet Master Board functions as the CompoNet Master Unit. There are two types: One is compatible with PCI bus (model # 3G8F7-CRM21), and the other is compatible with CompactPCI bus (model # 3G8F8-CRM21) .

Please read this manual carefully and be sure you understand the information provided before attempting to install or operate a CompoNet Master Board. Be sure to read the precautions provided in the following section. Also be sure to read the CompoNet Slave Unit Operation Manual (see following table) together with this manual.

The manual contains the following sections:

***Precautions*** provide general precautions for using the CompoNet Master Board and related devices.

***Section 1*** outlines the CompoNet and the CompoNet Master Board. Read this section carefully before you use the CompoNet Master Board for the first time.

***Section 2*** outlines the installation and setup. It includes procedures to mount a Board, to install a driver, and to connect the communications cables.

***Section 3*** describes the functions of the CompoNet Master Boards. There are basic and special functions.

***Section 4*** describes the operations by API functions to control the Board in the Windows operation systems.

***Section 5*** describes the operations by shared memory access to control the Board in operation systems, other than Windows.

***Section 6*** describes the troubleshooting. It is recommended to read them first to prevent any errors from occurring.

***Appendix A*** describes the API functions.

***Appendix B*** describes the shared memory interfaces.

***Appendix C*** explains the communications performance.

***Appendix D*** describes the sample program provided in the product package.

***Appendix E*** describes the construction of a CompoNet Network.
It includes the network specifications, the wiring procedures and the preparation of Flat Connectors.

# Related Manuals

| Cat No. | Model | Name | Description |
|---|---|---|---|
| W485<br>(this manual) | 3G8F7-CRM21<br>3G8F8-CRM21 | CompoNet™ Master Board for PCI Bus and for CompactPCI Bus Operation Manual | Provides the specifications of the CompoNet Master Board |
| W457 | CRT1 | CR1-series CompoNet™ Slave Units and Repeater Unit Operation Manual | Provides the specifications of CompoNet Slave Units and Repeater Units |
| W456 | CS1W-CRM21<br>CJ1WCRM21 | CS/CJ-series CompoNet™ Master Units Operation Manual | Provides an overview of CompoNet Networks, communications specifications, wiring methods, and CompoNet Master Unit functions |

⚠**WARNING** The 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.

# *Terms and Conditions Agreement*

## Read and understand this Manual

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

## Change in Specifications

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

## Errors and Omissions

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

# PRECAUTIONS

This section provides general precautions for use of the CompoNet Master Boards.

**The information contained in this section is important for the safe, reliable application of the CompoNet Master Board. You must read this section and understand the information contained before attempting to set up or operate a CompoNet Network using CompoNet Master Boards.**

# 1 Intended Audience

This manual is intended for the following personnel to read and use. The personnel must have knowledge of electrical systems and would therefore be electrical engineers or the equivalent:

- Personnel in charge of introducing FA systems
- Personnel in charge of designing FA systems
- Personnel in charge of managing FA systems and facilities

# 2 General Precautions

The user must operate the product according to the performance specifications described in the operation manuals. Before using the product under conditions that are not described in the manual or when applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines or safety equipment, or to other systems, machines and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Be certain the ratings and performance characteristics of the product are sufficient for the systems, machines and equipment, and be sure to provide the systems, machines and equipment with double safety mechanisms.

This manual provides information for programming and operating the Unit. Be sure to read this manual before attempting to use the Unit, and keep this manual close at hand for reference during operation.

Be sure this manual is delivered to the persons actually using the CompoNet Master Boards.

⚠**WARNING** It is extremely important that a PLC and all PLC Units be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying a PLC System to the above-mentioned applications.

# 3 Safety Precautions

⚠**WARNING** Do not attempt to take any Unit apart or touch the component inside while the power is being supplied. Doing so may result in electric shock.

⚠**WARNING** Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock.

⚠**WARNING** Fail-safe measures must be taken by the user to ensure safety in the event of incorrect, missing or abnormal signals caused by broken signal lines, momentary power interruptions or other causes. Serious accidents may result from abnormal operation if proper measures are not provided.

⚠**WARNING** Provide safety measures in external circuits (i.e., not in the personal computers) that ensure safety of the system in any event of an abnormality due to malfunction of the PC or another external factor affecting the PC operation. The failure to do so may result in serious accidents. Emergency stop circuits, interlock circuits, limit circuits and similar safety measures must be provided in external control circuits.

⚠**Caution** Confirm safety at the destination Slave Unit before changing it or transferring parameters to another node. Changing or transferring any of these without confirming safety may result in unexpected equipment operation.

⚠**Caution** A Slave Unit may change the output content if it faces a communications failure. When you use outputting devices, confirm their operation specification on an event of communications failure, and take the necessary safety measures.

# 4 Operating Environment Precautions

⚠**Caution** Do not operate the products in the following locations.

- Locations subject to direct sunlight
- Locations subject to temperatures or humidity outside the range specified in the specifications
- Locations subject to condensation as the result of severe changes in temperature
- Locations subject to corrosive or flammable gases
- Locations subject to dust (especially iron dust) or salts
- Locations subject to exposure to water, oil, or chemicals (including acids)
- Locations subject to shock or vibration

# 5 Application Precautions

Observe the following precautions when using a CompoNet Network.

- When more than one CompoNet system use Flat Cables, always separate the Flat Cables from each other by at least 5 mm regardless of whether Flat Cable I or II is used. Do not bundle the Flat Cables. This is to prevent unstable operation of the system due to interference.

- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing or abnormal signals caused by broken signal lines, momentary power interruptions or other causes.
- Configure the control circuits so that the power to the PC (near the CompoNet Master Board) will be on after the power to the I/O Slave Units. If the PC power supply is turned on first, normal operation will not be ensured, even temporarily.
- Use the Boards within the communications distance and the number of connectable Units as defined in the specifications.
- Do not attempt to disassemble, repair or modify any Units. Any attempt to do so may result in a malfunction, fire or electric shock.
- When installing the Unit, ground to 100 Ω/min.
- Be certain all screws to fix the Board to the PC, as well as the screws on connectors, cables and terminal blocks, are tightened to the torque specified in the corresponding manuals. Incorrect tightening torque may result in a malfunction.
- Be sure the Board on the PC is securely mounted.
- All installation and wiring must observe the instructions in this manual.
- Use correct wiring tools and components for wiring.
- Confirm the orientation and polarity before connecting the terminal blocks or connectors.
- Do not supply electricity while a terminal block cover is open.
- Confirm voltage specifications before wiring the communications lines, the power supplies or the I/O circuits. Incorrect specification may result in a malfunction.
- Install external breakers and take other safety measures against short-circuiting in the external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. The connection of bare stranded wires may result in burning.
- Double-check all wiring and switch settings before turning ON the power supply. Incorrect wiring may result in burning.
- Be sure no waste metal enters the PC during the installation and wiring work.
- Be certain the terminal blocks, connectors, expansion cables, communications cables and other items with locking devices are properly locked in place. Improper locking may result in a malfunction.
- Always use the power-supply voltages specified in the operation manual. A malfunction or burning may occur as the result of incorrect voltage.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in a malfunction.
- Check the user program for proper execution before actually running it on the Unit. The failure to check the program may result in unexpected operation.
- Always turn OFF the power supply to the personal computer, the Slave Units and communications before attempting any of the following. The failure to turn OFF the power supply may result in a malfunction or electric shock.

  - Mounting or removing a CompoNet Master Board
  - Assembling devices
  - Setting rotary switches
  - Connecting cables or wiring the system
  - Connecting or disconnecting the connectors
- Close the PC cover before wiring work. This is used to prevent wire waste from entering the PC.
- Before touching a CompoNet Master Board, be sure to first touch a grounded metallic object in order to discharge any static buildup. The failure to do so may result in a malfunction or damage.
- When replacing parts, be sure to confirm that the rating of the new part is correct. The failure to do so may result in a malfunction or burning.
- When transporting a CompoNet Master Board, use special packing boxes and protect it from exposure to excessive vibration or impact during transportation.
- Use the Board in the specified ambient operating temperature and humidity.
- Store the Board in the specified ambient storage temperature.
- Circuit boards have sharp edges such as leads of electric components. Do not touch the parts where such components are mounted or the backs of circuit boards by hand.
- Use only the specified communications cables.
- Do not extend connection distances beyond the ranges given in the specifications.
- Observe the given precautions when wiring the communications cable.
- Separate the communications cables from the power lines or high-tension lines.
- Do not bend the communications cables past their natural bending radius.
- Do not pull on the communications cables.
- Do not place heavy objects atop the communications cables.
- Always lay communications cables inside ducts.
- Take appropriate and sufficient countermeasures when installing systems in the following locations:
  - Locations subject to static electricity or other forms of noise
  - Locations subject to strong electromagnetic fields
  - Locations subject to possible exposure to radioactivity
  - Locations close to power supplies
- Do not use the computer's standby or sleep function while you are using the CompoNet Master Board. If the computer's standby or sleep function is activated during CompoNet Master Board usage, communications may be broken or other unexpected errors may occur.
- The CompoNet Master Board does not support computer standby or sleep functions. Do not use the computer's standby or sleep function while you are using the CompoNet Master Board.

# 6 Conformance with the EC Directives

## 6-1 Applicable Directives

- EMC Directives

## 6-2 Concepts

**EMC Directives**

The OMRON products are electric components that usually are used after being built in other machinery or manufacturing equipment. They are designed to conform to the relevant EMC Directives. This will facilitate the compliance of the final machinery or apparatus to such directives. However, the installation and configuration of such machinery and apparatus in which the OMRON products are mounted and used will differ according to their characteristics. Thus it is virtually impossible for OMRON to ensure the conformity of an entire system to the relevant EMC Directives. The users must conduct the necessary tests and ensure the conformity of the system as a whole.

The relevant EMC Directives are:

EN 61131-2 and EN 61000-6-2 for EMS, i.e., Electromagnetic susceptibility, EN 61131-2 and EN 61000-6-4 for EMI, i.e., Electromagnetic Interference, and EN61000-6-4 for Radiated emission, 10-m regulations, among EMC (Electro-Magnetic Compatibility).

## 6-3 Conformity

The OMRON products in this manual comply with the relevant EMC Directives. To ensure that the machinery or apparatus in which the OMRON products are used complies with the EC Directives, the user must follow these instructions:

***1,2,3...***

1. The OMRON product must be installed in a control panel.
2. DC power supply unit as well as DC power connected to I/O Units must have reinforced insulation or double insulation.
3. Compliance to the EC Directives means conformity to the Emission Standards (EN 61000-6-4). Radiated emission characteristics (10-m regulations) may vary, however, depending on the configuration of the control panel used, the compatibility with other devices connected to the control panel, the effects of wiring and other conditions. The user must confirm that the overall machine or equipment complies with the EC Directives.

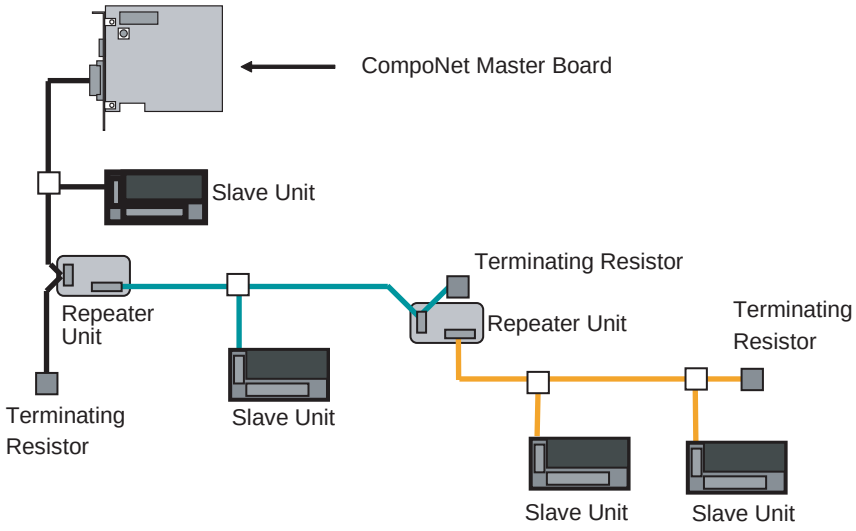
# SECTION 1
# Outline of CompoNet and CompoNet Master Board

# 1-1 Overview of the CompoNet Network

CompoNet is a field network designed for communications between the input and output components on the shop floor and a personal computer (or PC) or a PLC. CompoNet requires less wiring labor but provides high maintainability.

The PC and the CompoNet Slave Unit exchange input and/or output data cyclically through a CompoNet Master Board.

By using explicit messages, users can read data from the CompoNet Slave Unit or write data into it.




Here are the main features of CompoNet:

**High-Speed Communications of Multiple Nodes**

CompoNet can provide remote I/O communications for multiple nodes as many as maximum 2,560 points in a high speed such as 1000 points per millisecond when the data rate is 4 Mbps*. This allows integration of conventional system configuration with basic I/O Units into a CompoNet network.

* The data rate of 4 Mbps does not support T-branch connection. Thus any Slave Unit with pre-attached cables is not usable.

**Greater Flexibility with Repeater Units**

Repeater Units can expand a network installation in the following ways:

- Extending the Communications cable,
- Increasing the number of connected nodes,
- Creating a branch connection from the trunk line, and
- Converting cable types.

Repeater Units can be used to expand the trunk line for up to two layers. The lines downstream from the Repeater Units are called sub-trunk lines. The maximum number of connectable Repeater Units is 64 per Master Board and 32 per trunk line.

**Note** The power to the sub-trunk lines must be supplied from the Repeater Units.

**Bit-Level Distribution**

CompoNet is connectable with industry-standard e-CON connectors and Slave Units of clamp terminal-block type. They allow bit-level controls of conveyors or at warehouses where many sensors are placed over a wide range.

**Data Exchange by Explicit Messages**

Explicit messages are used to access from the PC to the Slave Units and Repeater Units connected to the CompoNet network. This feature facilitates the maintenance of the entire network.

**Automatic Baud Rate Detection**

By setting the baud rate on the CompoNet Master Board, the Slave Units automatically detect the baud rate of the CompoNet Master Board and follow it. There is no need to set the rate individually on the Slave Units.

## 1-2 Overview of the CompoNet Master Board

CompoNet Master Board is a board that has a mastering function to control inputs and outputs for the Slave Units connected to the CompoNet network. The Board is either compatible with PCI bus (Model # 3G8F7-CRM21) or with CompactPCI bus (Model # 3G8F8-CRM21).

Here are the main features of the CompoNet Master Board:

**Control by API Functions**

In the Windows operation systems, all functions on the CompoNet Master Board can be accessed by API functions.

**Control by Shared memory Accesses**

In operation systems other than Windows, the CompoNet Master Board is used via access to shared memory.

**Flexible Allocation of the Number of Connectable Nodes**

The number of connectable nodes can be set differently for each Word Input Slave Units, Word Output Slave Units, Bit Input Slave Units and Bit Output Slave Units.

**Registration Table Function to Control Participating Slave Units**

This function is used to pre-register the node addresses and models of Slave Units that are to participate in the network, and to check whether a Slave Unit that is actually participating is registered or not. If the Slave Unit is not registered, it is not allowed to participate. The time can also be set to monitor duration from power-on until a registered Slave Unit actually participates. Remote I/O communications can be stopped until all registered Slave Units participate in the network, but it can be started only with all Slave Units participating. The latter function is called the All Registered Slave Participation Standby Mode.

**Optimizing Communications Cycle**

When the Registration Table function is used, the communications cycle is optimized and fastened in accordance with the information in the table.

**Synchronous and Asynchronous Access to I/O Data**

Both synchronous and asynchronous types of access are supported. Synchronous access maintains synchronicity for each node, while asynchronous access does not do that but instead provides faster access. In the latter case, I/O data keeps synchronicity only within the same word.

**Other Functions**

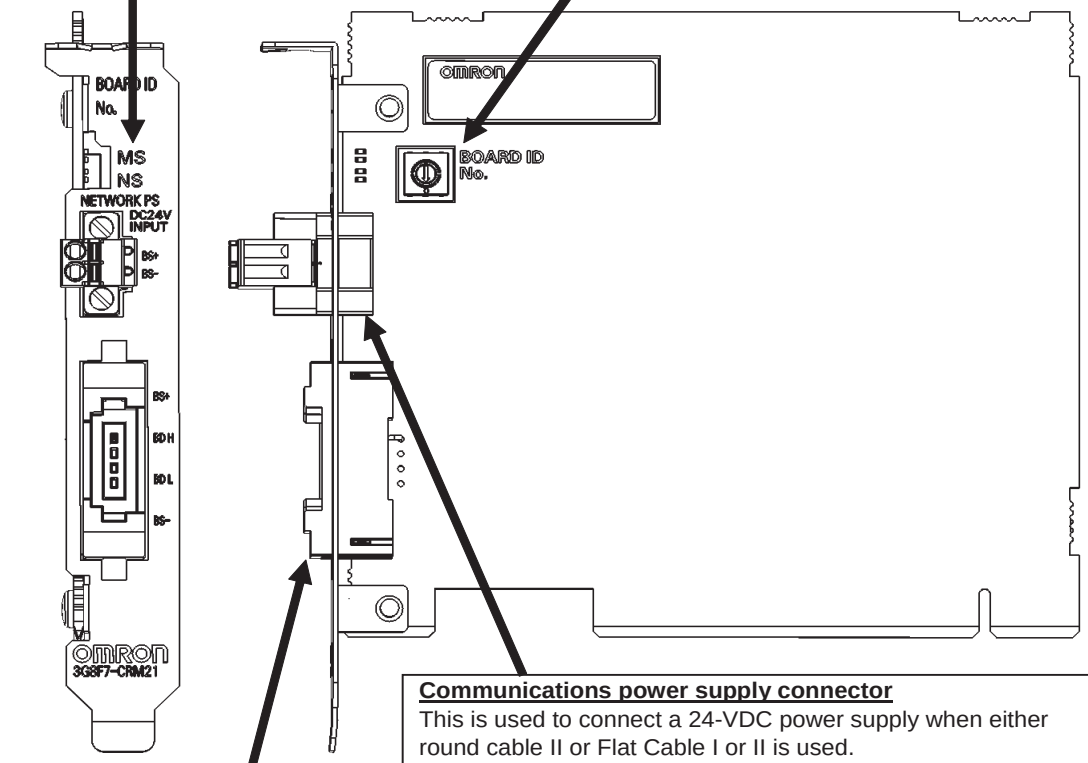
- Communications Stop Due to Communications Error function
- I/O Communications Manual Startup mode
- IN Data Zero Clear Due to Communications Error function

# 1-3 Component Name and Function

## 1-3-1 3G8F7-CRM21 (for PCI Bus)

**LED Indicators (MS and NS)**
They indicate the Module Status (MS) and Network Status (NS) that are defined in the CompoNet protocol.

**Board ID Switch**
This is used to set the board ID. It is set as a decimal number. The number must not overlap the IDs for other CompoNet Master Boards mounted on the same personal computer.



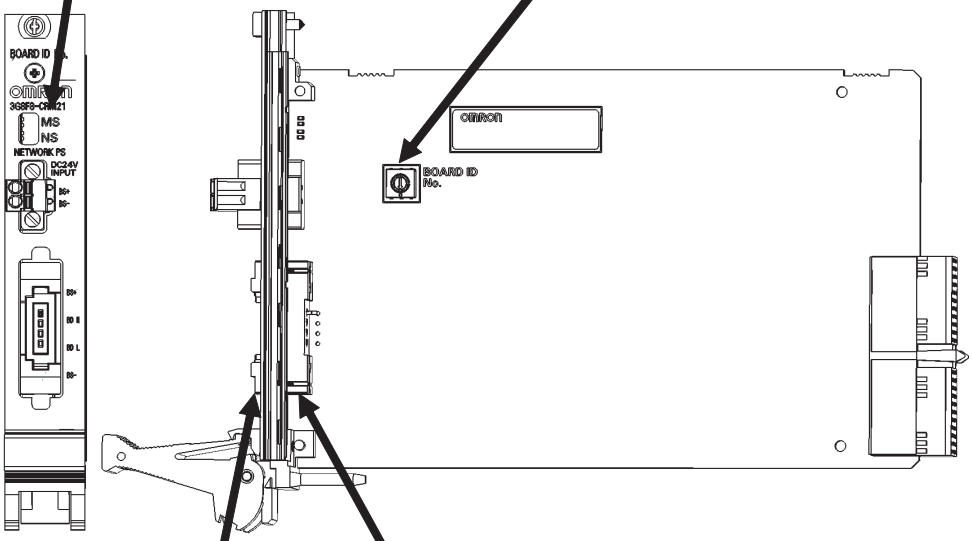

**Communications power supply connector**
This is used to connect a 24-VDC power supply when either round cable II or Flat Cable I or II is used.
The communications power is supplied through this connector and the round cable II, Flat Cable I or Flat Cable II to the Slave Units and Repeater Units on the trunk line.
Note : Do not connect anything to this connector when a round cable I is used.

**Communications connector**
This is used to connect to the communications cable.
The terminals BS+ and BS- are for communications power supply. The terminals BDH and BDL are for communications data.
The BS+ and BS- can be used only for round cable II or Flat Cable I or II. They output the communications power from the power supply connected to the communications power supply connector.
Note : By attaching an Open Type Connector for Unit connection, the communications connector can be converted to a terminal-block type.

## 1-3-2 3G8F8-CRM21 (for CompactPCI Bus)

**LED Indicators (MS and NS)**
They indicate the Module Status (MS) and Network Status (NS) that are defined in the CompoNet protocol.

**Board ID Switch**
This is used to set the board ID. It is set as a decimal number. The number must not overlap the IDs for other CompoNet Master Boards mounted on the same personal computer.




**Communications power supply connector**
This is used to connect a 24-VDC power supply when either round cable II or Flat Cable I or II is used.
The communications power is supplied through this connector and the round cable II, Flat Cable I or Flat Cable II to the Slave Units and Repeater Units on the trunk line.
Note : Do not connect anything to this connector when a round cable I is used.

**Communications connector**
This is used to connect to the communications cable.
The terminals BS+ and BS- are for communications power supply. The terminals BDH and BDL are for communications data.
The BS+ and BS- can be used only for round cable II or Flat Cable I or II. They output the communications power from the power supply connected to the communications power supply connector.
Note : By attaching an Open Type Connector for Unit connection, the communications connector can be converted to a terminal-block type.

# 1-4 LED Indication

MS (Module Status) : To indicate the node status. (green and red)

NS (Network Status) : To indicate the communications status. (green and red)

| LED Name | Indicating state | Status | Meaning |
|---|---|---|---|
| MS | Green light | Normal state | The Master Board is in normal operation. |
| | Green flash | Stand-by | It waits for a start-up by the application. |
| | Red light | Fatal error | Master Board hardware error (including Watchdog Timer (WDT) error) |
| | Red flash | Non-fatal error | EEPROM read error or PC WDT error |
| | Unlit | Power-off or in preparation | One of the following applies:<br>Power is off.<br>The system is resetting or initializing. |
| NS | Green light | Online and in remote I/O communications | All of the followings apply:<br>· Power is supplied. Remote I/O communications starts up.<br>· None of the Slave and Repeater Units has communications error.<br>· No Registration Table error exists.<br>· None of the Slave and Repeater Units has node address duplication. |
| | Green flash | Online and in preparation for remote I/O communications | It is before the remote I/O communications starts or during communication. (In any state other than the communication stop due to a communications error.) |
| | Red light | Fatal communication related error | The communications circuit has an error. |
| | Red flash | Non-fatal communication related error | One of the following applies:<br>· One or more Slaves or Repeater Units has a communications error.<br>· One or more Slaves or Repeater Units has a Registration Table error. That means a Slave Unit to participate is not participating or a non-registered Slave Unit is participating.<br>· The communications stops due to a communications error.<br>· Illegal configuration error (an error of Repeater levels)<br>· One or more Slaves or Repeater Units had node address duplications. |
| | Unlit | Power-off or in preparation | One of the following applies: Power is off. The system is resetting or initializing. |

**Note** The indicators flash in 0.5 second interval, i.e., they light for 0.5 second and become unlit for another 0.5 second.

# 1-5 Network Construction Procedure

The following is the basic flow of a network configuration.

**1) Decide the number of I/O points.**

Examine the number of inputs and outputs on the entire system.

See Appendix E: Construction of a CompoNet Network

▼

**2) Correspond the I/O points to Slave Units.**

Assign each of these inputs and outputs to a Slave Unit.

▼

**3) Decide the number of nodes.**

Decide the number of connected nodes.

▼

**4) Decide the wiring formation and installation.**

Decide following:

- Wiring formation: Trunk line - Branch line formation or Unrestricted wiring formation,
- Wiring distance,
- Methods to supply the communications power and the I/O power to the Slave Units in less wiring effort, and
- Cable type

▼

**5) Temporarily decide the number of connectable Slave Units and the data rate.**

Note The data rate of 4 Mbps does not support T-branch. Thus any Slave Unit with pre-attached cables will not be usable.

See E.1.3 Maximum Length and Maximum Number of Connectable Slave Units for Each Type of Cables

▼

**6) Decide the communications cycle.**

Decide the communications cycle in accordance with the number of connectable Slave Units and the data rate. Examine if the required I/O response time is obtained in the data rate.

See Appendix C: Communications Performance

▼

**7) Examine the distribution of CompoNet Master Boards.**

If re-examination of the communication mode number, the data rate and the use of Repeater Units does not ensure the synchronicity of communication cycle and distance, provide the CompoNet Master Boards in distributed locations.

# 1-6 Board Preparation Procedure

The following is the basic flow of a Board preparation.

**1) Set the board ID for the CompoNet Master Board.**

Select one from 0 to 9.

See Section 2: Installation and Setup

**2) Mount the Board on the PC.**

Mount the CompoNet Master Board on the PC.

**3) Install the software.**

When you use the Board in the Windows operation systems, install the driver.

**4) Create a program.**

Create a program to configure and control the CompoNet Master Board.

**5) Turn on the PC.**

**6) Start up the created program.**

See Section 4: Operation by API Functions, Section 5: Operation by Shared Memory Access, and Appendix D: Sample Program

**7) The communication starts and the Slave Units participate.**

# 1-7 Specifications

## 1-7-1 General Specifications

| Item | Specifications | |
|---|---|---|
| | **3G8F7-CRM21 (PCI)** | **3G8F8-CRM21 (CompactPCI)** |
| Bus specification | PCI bus Rev2.2<br>5 V | PICMG 2.0 R3.0<br>5 V<br>32-Bit 3U |
| Number of mountable boards | 4 pieces | 7 pieces |
| Compatible OS | Microsoft Windows 2000, Windows XP (32-bit edition), Windows Vista (32-bit edition), or Windows 7 (32-bit edition)<br>Other OS can be used, when the shared memory interface is directly accessed. | |
| Weight | 90 g max. | 150 g max. |
| Operation voltage | Internal power supply: 5 VDC±5%<br>3.3 VDC is not used. | |
| Consumption current | Internal power supply: 5 VDC and 1.5 A max<br>Communications power supply: 24 VDC and 80 mA max | |
| Vibration resistance | 10 to 57 Hz, Amplitude of 0.075 mm, 57 to 150 Hz<br>Acceleration 9.8 $m/s^2$, 80 min in each direction of X, Y and Z (8 min of each sweep time × 10 sweeps = total 80 min) | |
| Shock resistance | 147 $m/s^2$, 3 times each in X, Y and Z directions. | |
| Ambient operating temperature | 0 to 55°C | |
| Ambient operating humidity | 0% to 80% RH (with no condensation) | 0% to 90% RH (with no condensation) |
| Ambient operating atmosphere | No corrosive gas | |
| Storage temperature | -20 to +60°C | |

**Precautions for Correct Use**

The ambient operating temperature means the surrounding temperature where the CompoNet Master Board for PCI Bus is actually used.
See the PC operation manual for the appropriate ambient operating temperature for the PC.

## 1-7-2 Development Environment

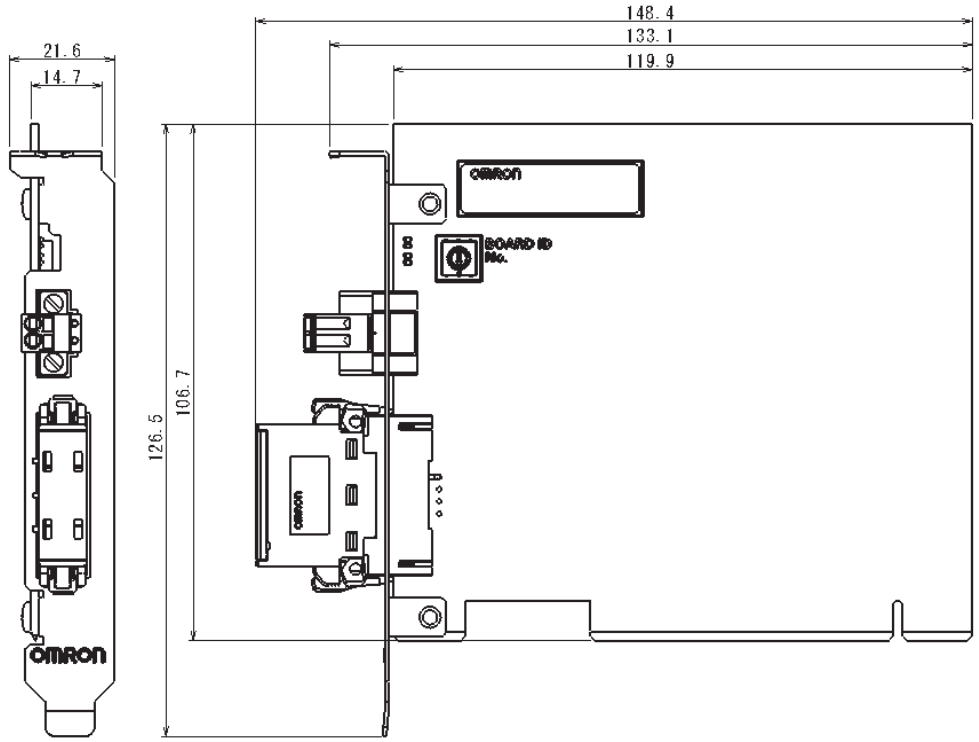
- Microsoft Visual C++ (Ver 6.0 to Ver 2008)
- Microsoft Visual Basic (Ver 6.0)
- CODEGEAR C++ Builder (Ver 5 to Ver 2009)

**Precautions for Correct Use**

When you use the Board in an OS other than Windows by directly accessing the shared memory interface, provide the development environment applicable for the OS.

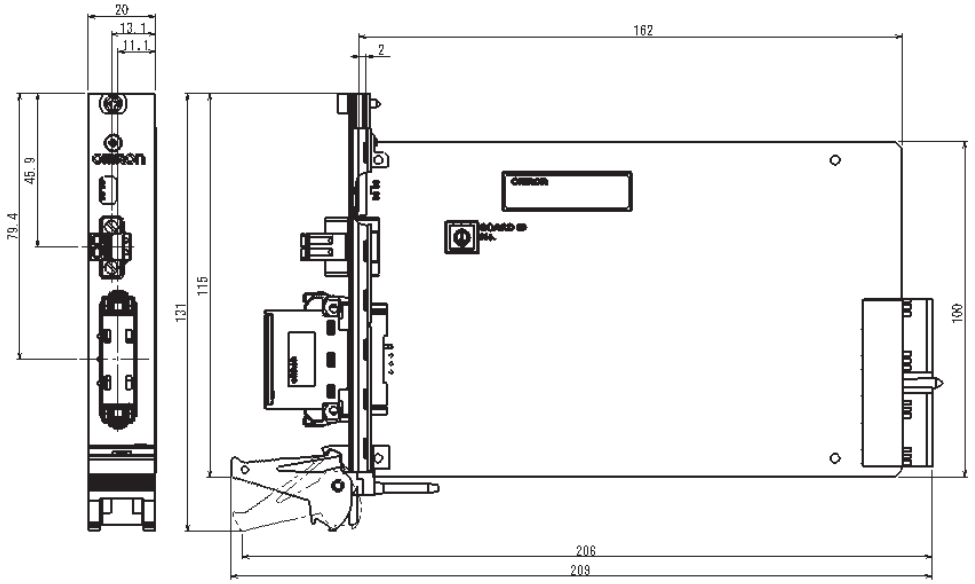
## 1-7-3 Dimensions

### 3G8F7-CRM21 (PCI)




(unit: mm)

### 3G8F8-CRM21 (CompactPCI)




(unit: mm)

# SECTION 2
# Installation and Setup

# 2-1 Mounting a Board

## 2-1-1 Confirmation

Before you mount a CompoNet Master Board on the PC, confirm the following:

**Note** CompoNet Master Boards support Windows Plug & Play.

| Item | Description |
|---|---|
| Unused PCI bus slot | Be sure that the PC you will use has an unused PCI bus slot. |
| Duplication of interrupt requests (IRQ) | CompoNet Master Boards use IRQs. IRQ are automatically allocated for PCI bus. In a PC which mounts an ISA bus, an IRQ for PCI bus may overlaps with that for ISA bus. This prevents the PC from starting up. To avoid this, take one of the following measures and be sure the IRQ for PCI bus does not overlap with the IRQ that has been used by the ISA bus.<br>· Call up the BIOS menu of the PC and set it not to use Plug & Play.<br>· Call up the BIOS menu of the PC, and on the setting step for IRQ allocation for the PCI bus set the IRQ that has been used by ISA bus to “Reserved” to prevent automatic allocation. |

**Note**

- As for the procedures to call the BIOS menu and to set the allocation, see the operation manual of the PC you are using.
- You can confirm the IRQs that have been used by ISA bus in the following procedure:

(1) Start up the PC that has no CompoNet Master Board mounted.

(2) On the Start menu of the Windows, select Start→Setting→Control Panel from the pop-up menu. Double-click the System. Select the Hardware Tab. Push the Device Manager button.

(3) Display the property of the ISA board whose IRQ is to be checked. Select the Resource Tab and check the IRQ.

## 2-1-2 Setting the Board ID

A Board ID is the ID number given to a Board. By this number the PC identifies a Board among the multiple CompoNet Master Boards mounted on it.

A small, flat-blade screwdriver is used to set IDs.

As long as no duplication occurs, any decimal number among 0 and 9 can be set.

**Precautions for Correct Use**

When you set the Board ID, be sure not to duplicate an ID for multiple CompoNet Master Boards mounted on a single PC.

**Note** In the factory setting, the Board ID is set to 0.

## 2-1-3 Mounting the Board on the PC

After setting the ID, mount the CompoNet Master Board on the PCI slot of the PC.

**Precautions for Correct Use**

- Be sure to turn off the PC and all peripheral devices, when you mount or remove a CompoNet Master Board.
- Take necessary measures to prevent static electricity before you start the procedures to mount a CompoNet Master Board. Otherwise, the electricity may break the Board or the PC.
- Be sure not to damage any memories or other components in the PC, when you work on mounting or removing a CompoNet Master Board.
- Do not touch any surface or components of the CompoNet Master Board by hand.

**Note** The procedure to mount a Board for PCI bus differs by PCs. Refer to the Operation Manual of the PC you use in order to follow the correct procedures.

Follow the mounting procedure given below:

1. Disconnect all cables from the CompoNet Master Board. This includes the communications cables and power supply cables.
2. Turn off the PC to which a Board is mounted. Disconnect the electrical cord.
3. Remove the package of the PC as instructed in the Operation Manual, and prepare it to mount or remove a CompoNet Master Board.
4. Place the PCI bus connecter on the PC and the connector on the CompoNet Master Board in the correct positions and orientations. Push the CompoNet Master Board to the end. Be sure the connector on the CompoNet Master Board is pushed evenly onto the connector on the PC.
5. Do not apply an excessive load to the Board while mounting it.
6. Pull the CompoNet Master Board lightly to confirm that it won't come out.
7. Tighten the screws on the left side of the CompoNet Master Board panel with 0.5 N·m torque, and secure the Board.

# 2-2 Installing the Drivers

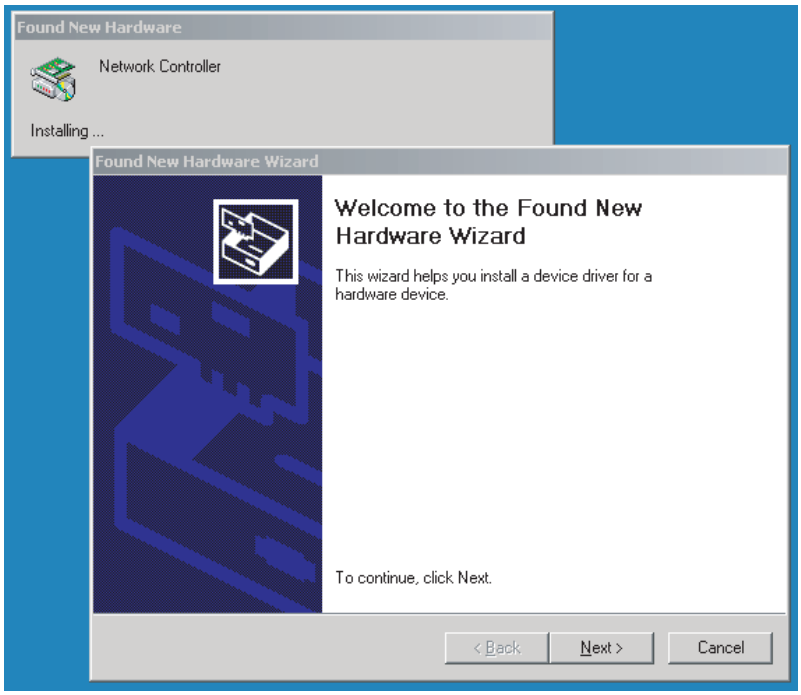
If you are using Windows 2000, Windows XP, Windows Vista, or Windows 7, use the Add New Hardware Wizard provided by the OS to install the CompoNet Master Board driver.

Procedures are provided here for Windows 2000 and Windows 7. When you use Windows XP or WindowsVista, displays and procedures differ only slightly, but you can take the similar steps.

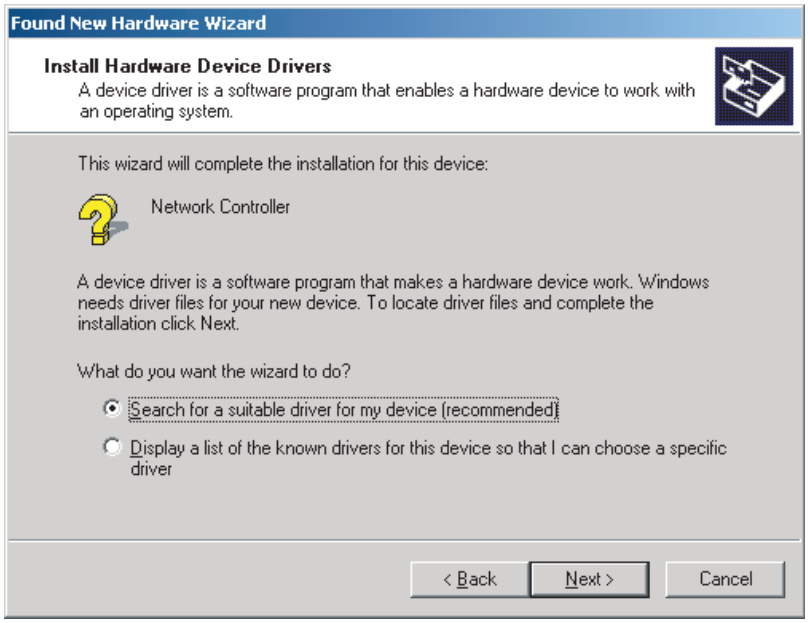
### Windows 2000

**Note** To perform the following installation steps, you must log on as the Administrator.

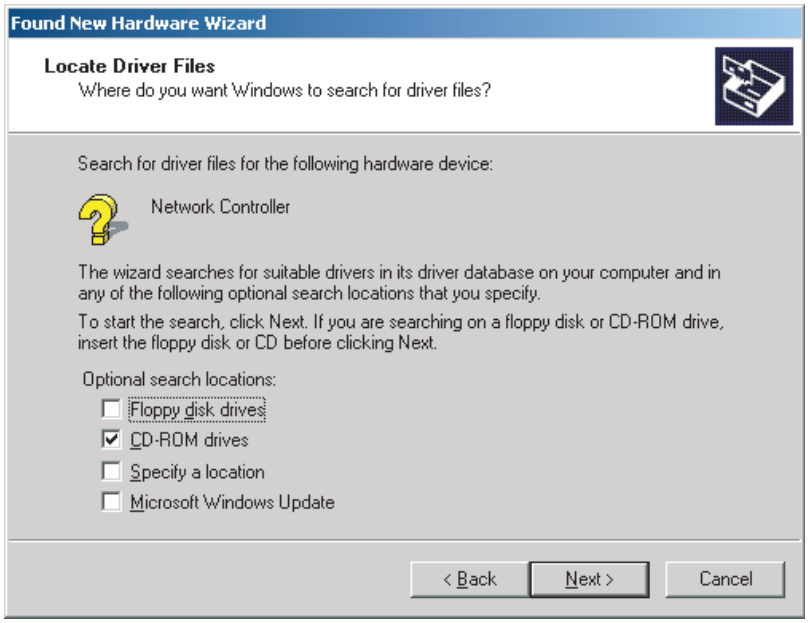
***1,2,3...*** 1. Start up the PC after you mount a CompoNet Master Board on the PC. The PC will recognizes the Board as a new hardware. The **Found New Hardware** Wizard will starts up.
Click the **Next** button.



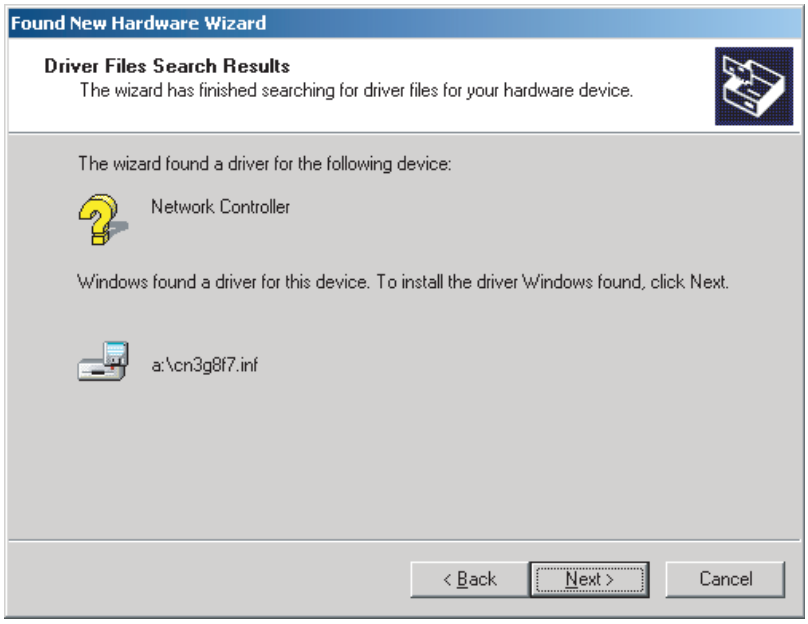
2. On the wizard page of **Install Hardware Device Drivers**, select the button for **Search for suitable driver for my device (recommended)**. Click the **Next** button.



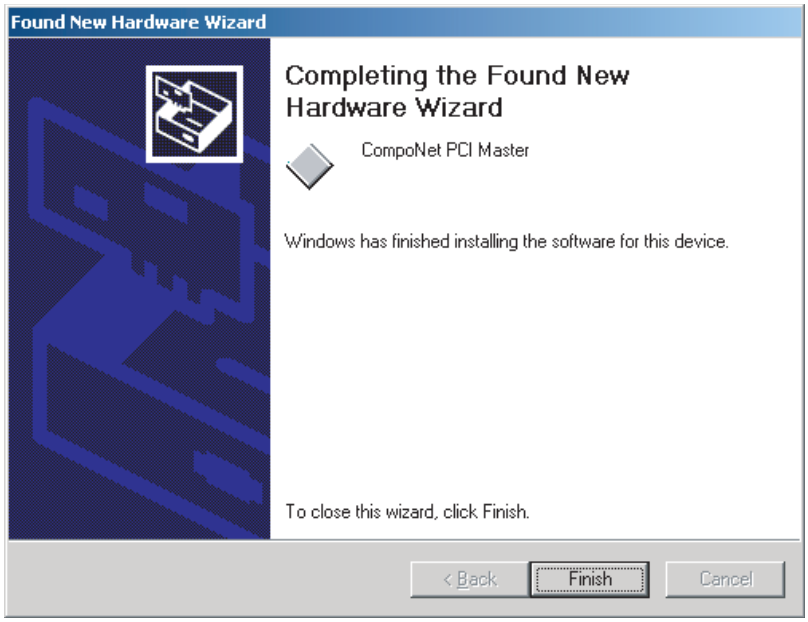

3. On the wizard page of **Locate Driver Files**, check the box for **CD-ROM drive**. Click the **Next** button.
(Be sure to insert the attached CD-ROM before you select the drive.)



4. When the required driver file is found, click the **Next** button.




5. The installation is complete when the following page is shown and the **Finish** button is clicked.

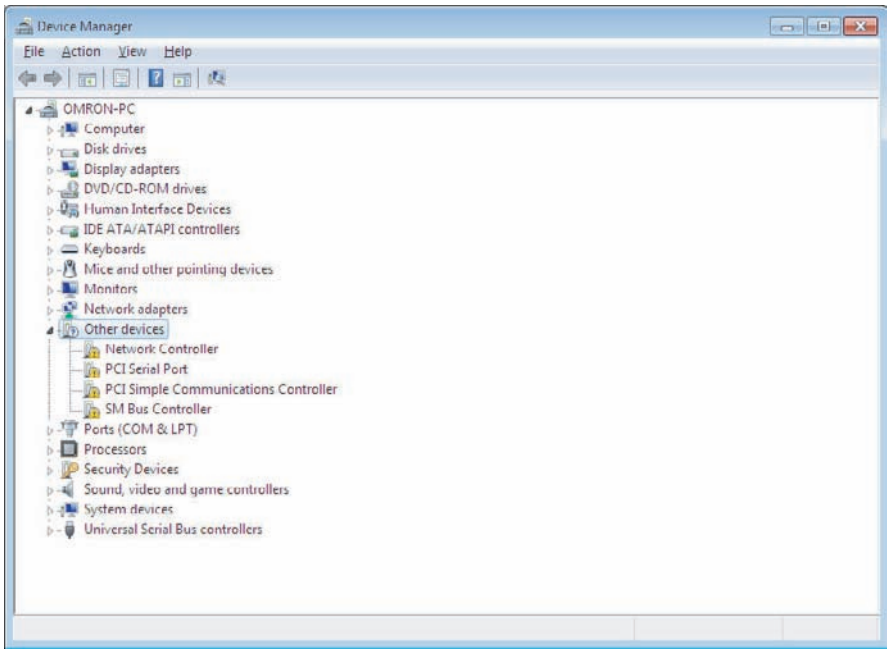


### Windows 7

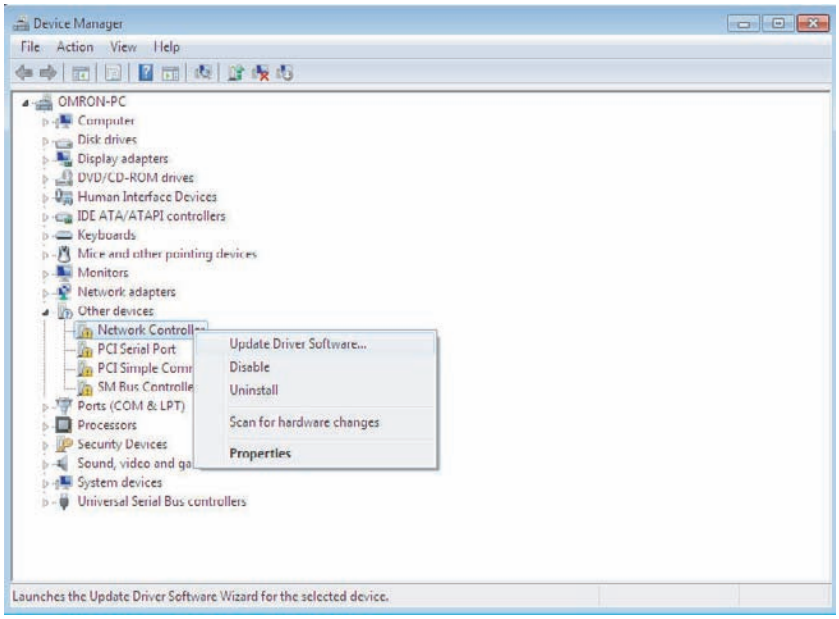
**Note** For Windows 7, you must log as the administrator to install the driver.

***1,2,3...*** 1. After the Board is installed in the computer, start the Device Manager. New hardware will be detected automatically. Open the Device Manager,*1 and double-click **Other devices**.

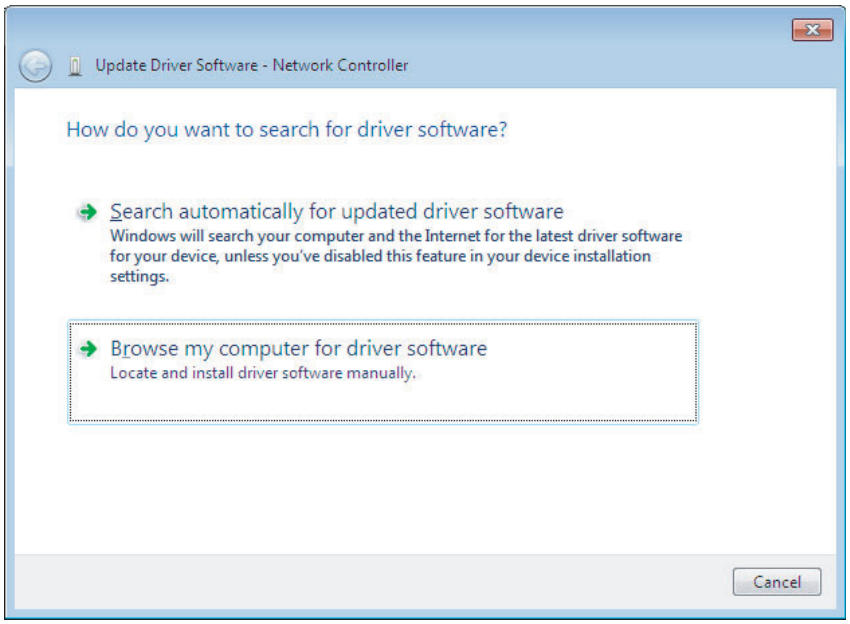
*1.To open the Device Manager, click the Windows **Start** Button and select **Control Panel, Hardware and Sound**, and **Device Manager** in that order.




2. The **Network Controller** will appear under **Other devices**. Right-click **Network Controller** and then select ***Update Driver Software*** from the menu.

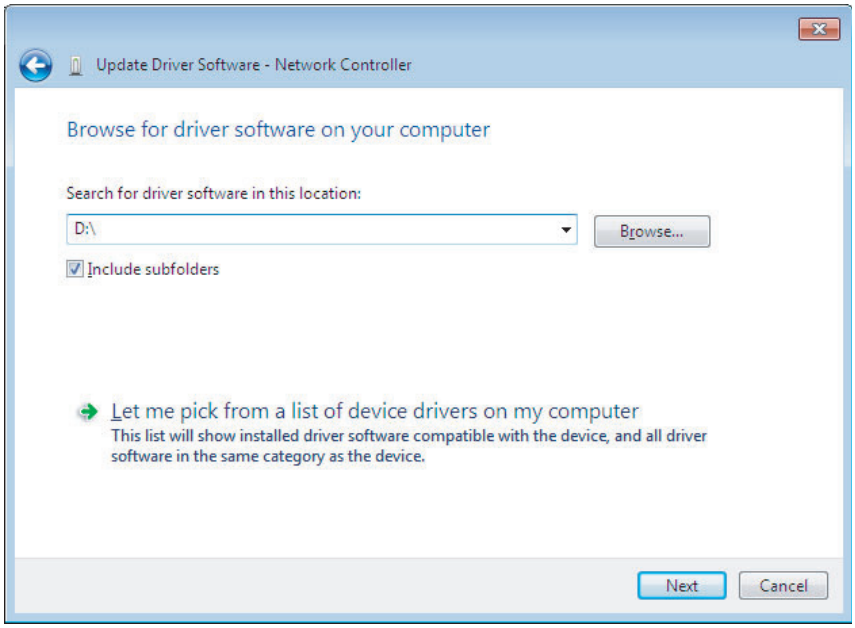


3. *How do you want to search for driver software*? will be displayed.
   Click **Browse my computer for driver software**.

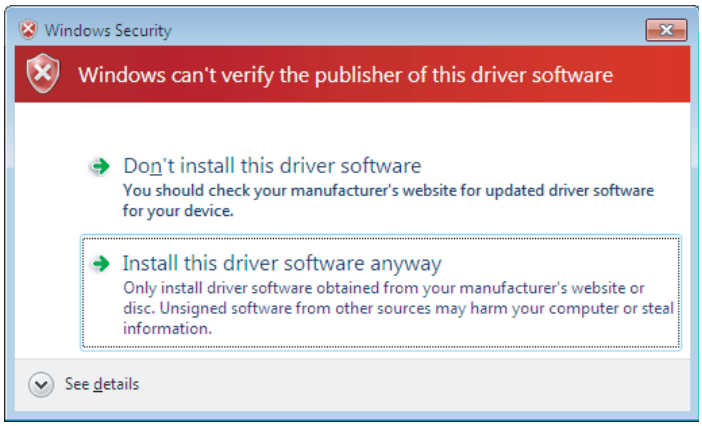



4. Place the enclosed CD-ROM into the CD-ROM drive.
5. *Browse for driver software on your computer* will be displayed.
   Click the **Browse** Button, specify the CD-ROM drive (see following figure), and click the **Next** Button

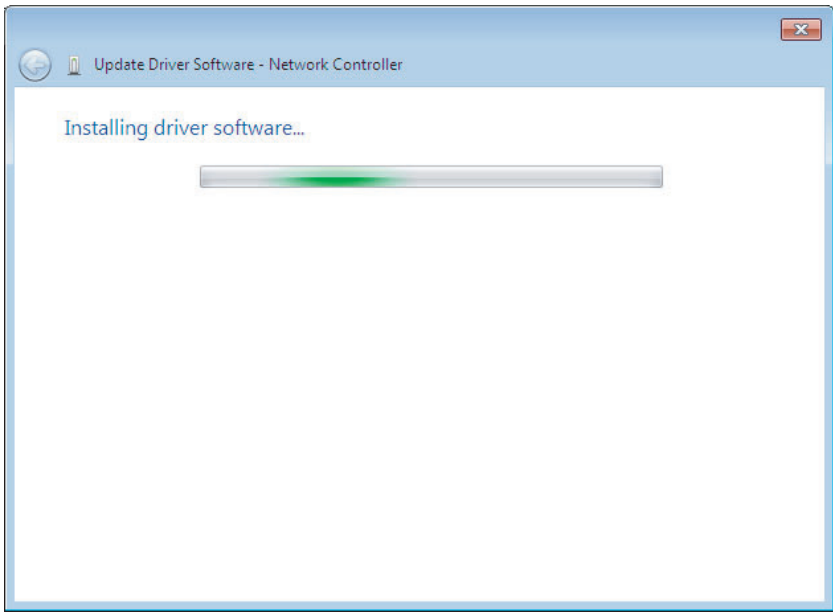
*. The following figure shows an example for which drive D is the CD-ROM drive.



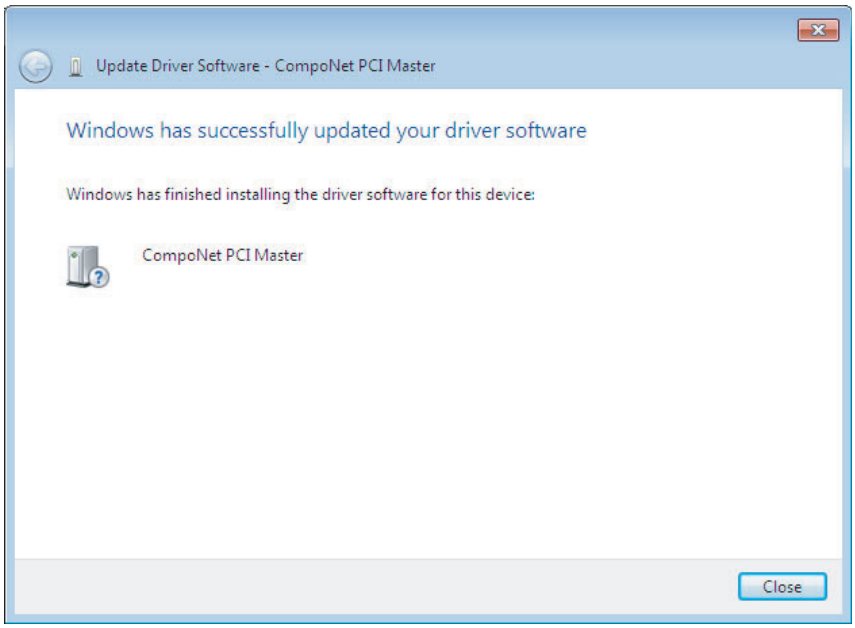
6. The following dialog box will be displayed. Click **Install this driver software anyway** to start installation.




7. The installation will start.



8. A completion message (see the following figure) is displayed after the installation process is completed.
   Click the **Close** Button to complete driver installation.

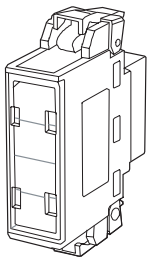


# 2-3 Connecting the Communications Cables

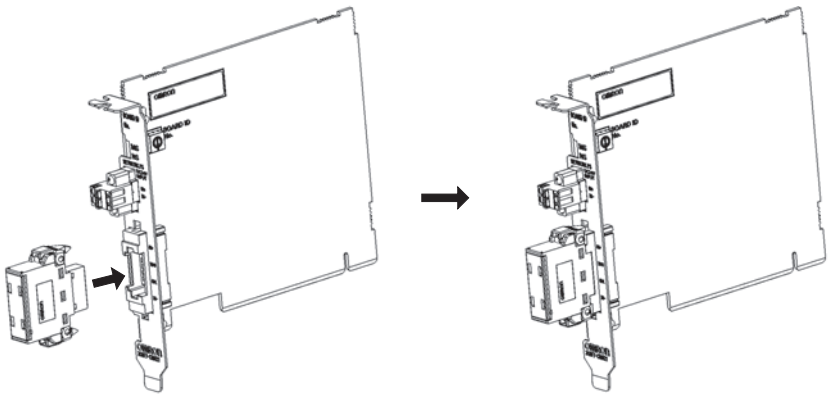
This section outlines the connection procedures in a CompoNet network system by using a round cable I or Flat Cable I.

## 2-3-1 Connecting a Round Cable

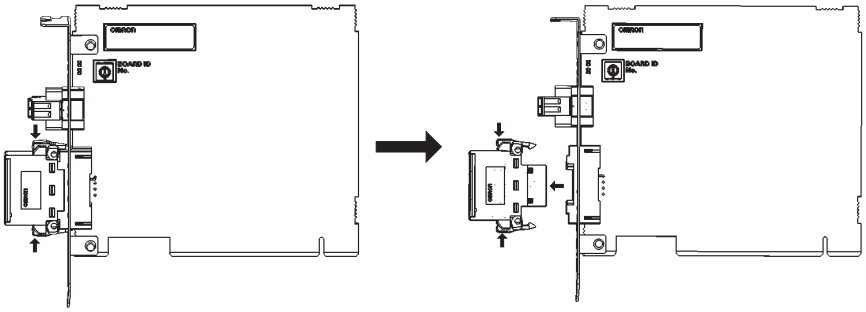
An Open Type Connector (DCN4-TB4) is used to connect a CompoNet Master Board to the trunk line of either round cable I or II.



Align the terminal signals of the Connector. Press in the Connector until it clicks into place.



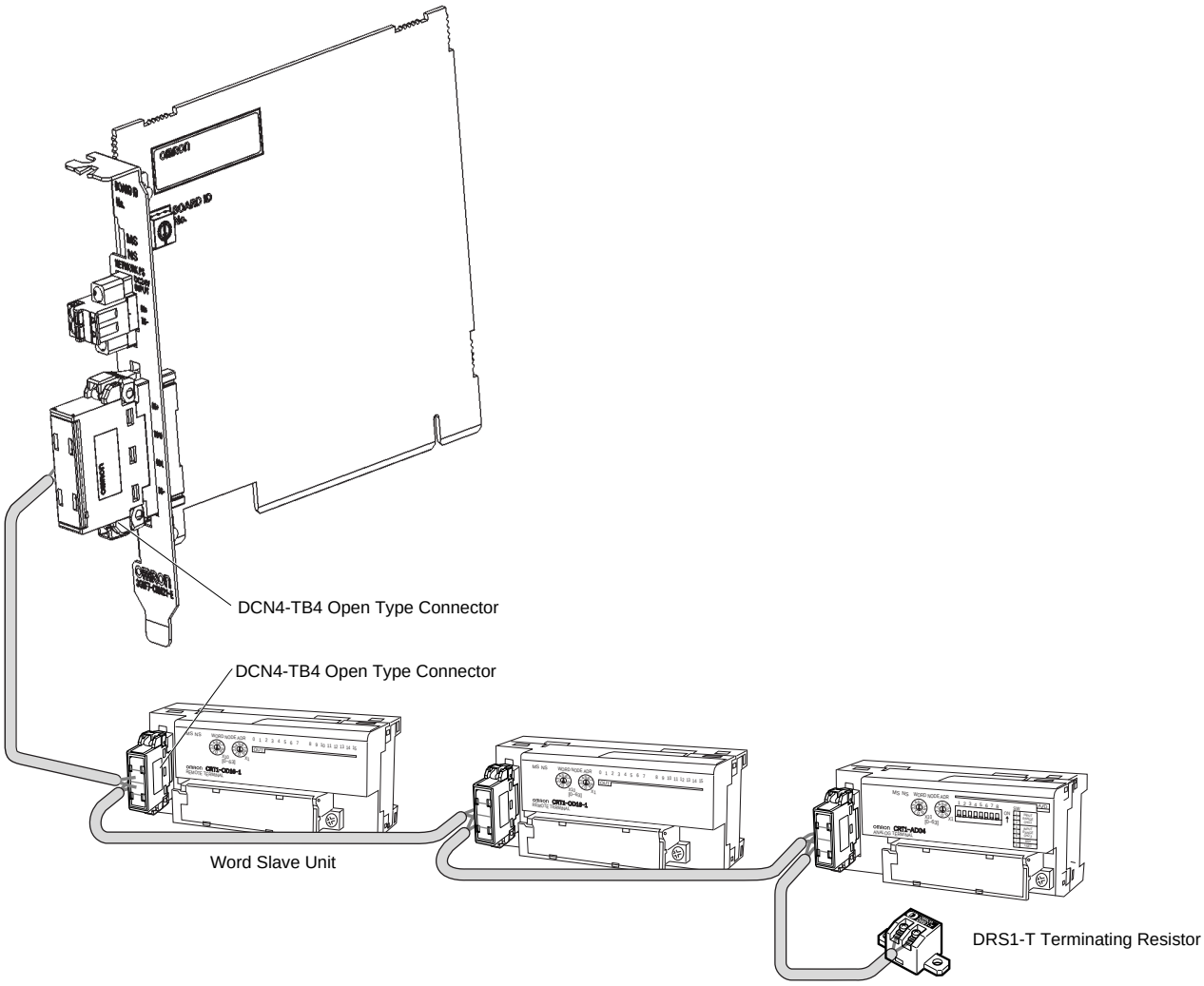
**Note** To remove the inserted Connector, hold the latches on both sides and pull out the Connector.



**Precautions for Correct Use**

Please be aware that the wiring of the Open Type Connector (DCN4-TB4) will protrude into the adjacent panel. Provide any measures to prevent it from interfering with the connector and other component of the neighboring PCI Board.

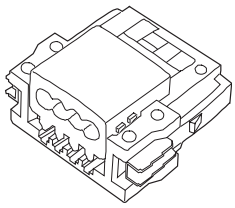
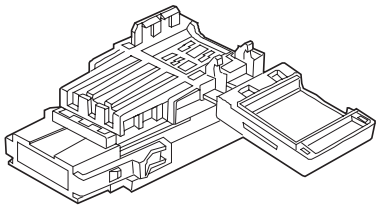
## Example of round cable I connection



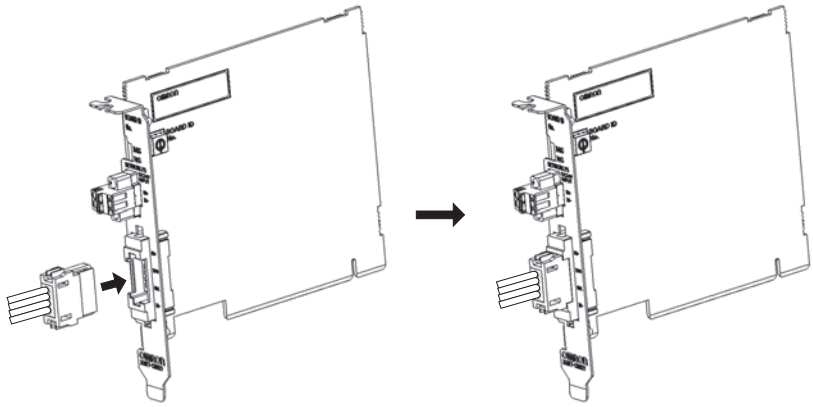

**Note** A commercially available relay terminal block can make a T-branching connection.

## 2-3-2 Connecting a Flat Cable

A Flat Connector Plug (DCN4-BR4 or DCN5-BR4) is used to connect a CompoNet Master Board to the trunk line of either Flat Cable I or II. A Flat Connector I Plug (DCN4-BR4) is used with Flat Cable I, while a Flat Connector II Plug (DCN5-BR4) is used with Flat Cable II.

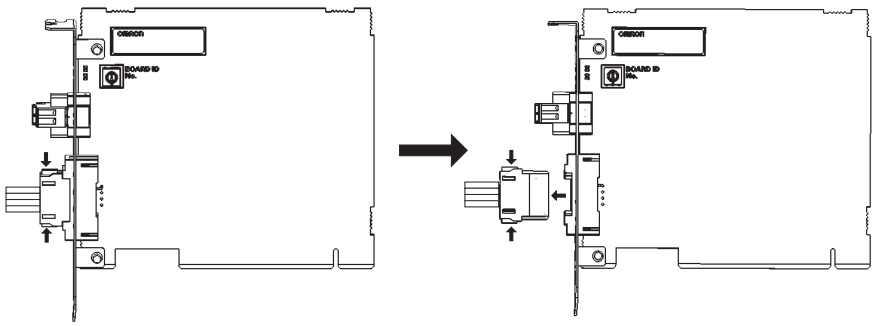
| Flat Connector I Plug (DCN4-BR4) | Flat Connector II Plug (DCN5-BR4) |
|---|---|
|  |  |

Align the Plug face with the color seals (red, white, blue and black) matching the signal names (red and BS+) on the connector. Press the plug until it clicks into place.



**Note** To remove the inserted Plug, hold the latches on both sides and pull out the Plug

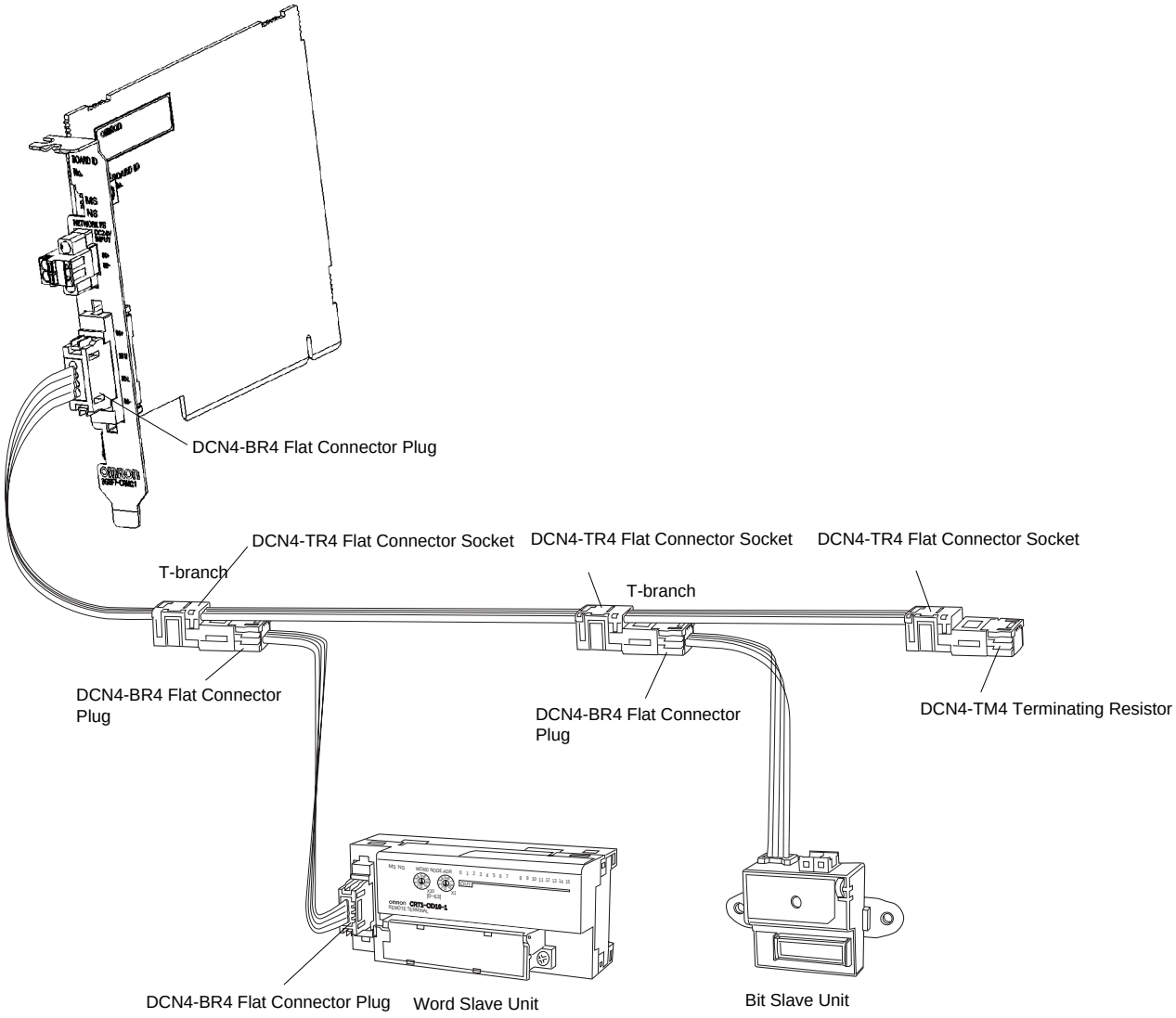
.



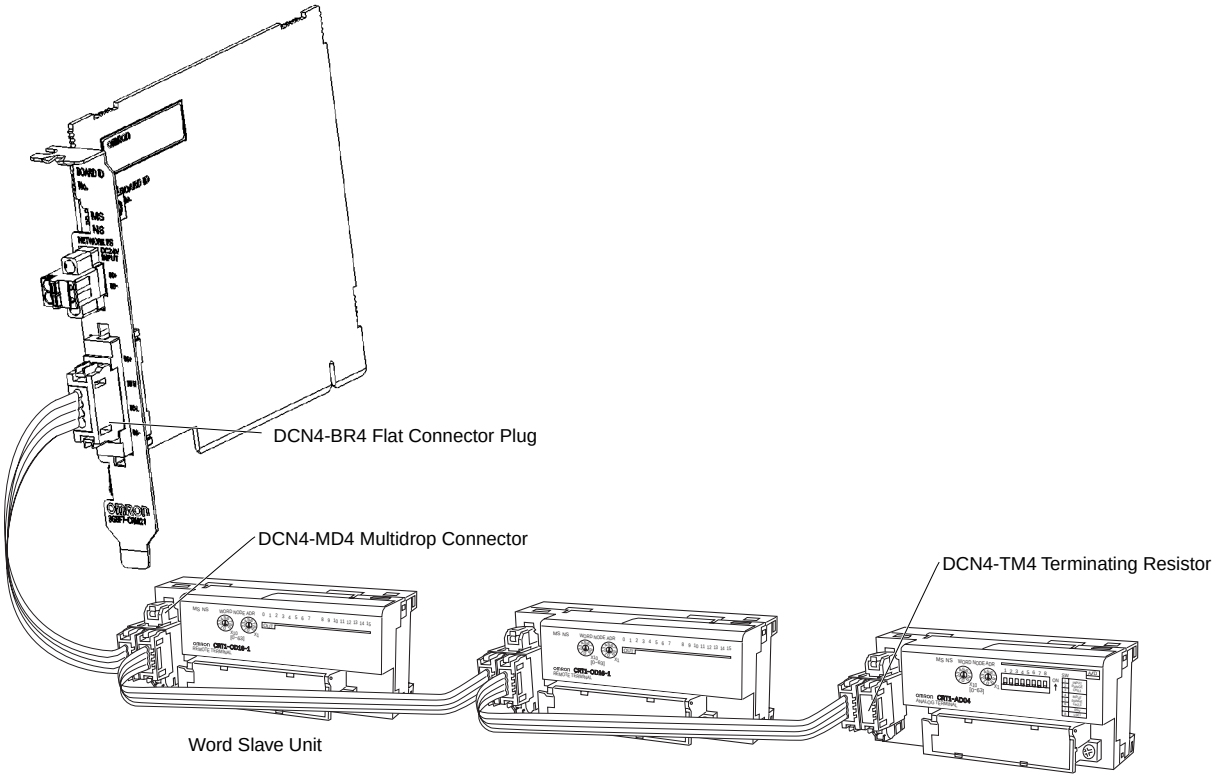
**Precautions for Correct Use**

- Please be aware that the Multidrop Connector (DCN4-MD4) will protrude into the adjacent panel. Provide any measures to prevent it from interfering with the connector and other component of the neighboring PCI Board.
- In a configuration where plural 3G8F7-CRM21 CompoNet Master Boards for PCI Bus are used, only one side of adjacent two Boards shall use a DCN4-MD4 Multidrop Connector.

## Example of T-branch connection of Flat Cable I



**Example of multidrop connection of Flat Cable I**




# 2-4 Connecting the Communications Power Supply Cables

When a round cable II, Flat Cable I or Flat Cable II is used, the Slave Units can be supplied with the communications power through the CompoNet Master Board. In this case, the communications power supply must be connected to the CompoNet Master Board.

See Appendix E.5 Wiring for Power Supply, especially E.5.2 Wiring the Communications Power Supply.

# SECTION 3
# Functions

# 3-1 Settings at Communications Cycle Startup

The function CPNT_StartCycle is used to start the communications cycles for the CompoNet Master Board from the user application. The function CPNT_StartCycle uses the data rate and the number of occupied nodes as arguments.

The command OPEN_SYSTEM is used to start the communications cycles through the shared memory access.

To enable the superior function and start the communications cycle, execute the function CPNT_StartCycleEx in Windows or the command OPEN_SYSTEMEX for shared memory access. See Section 3-5.

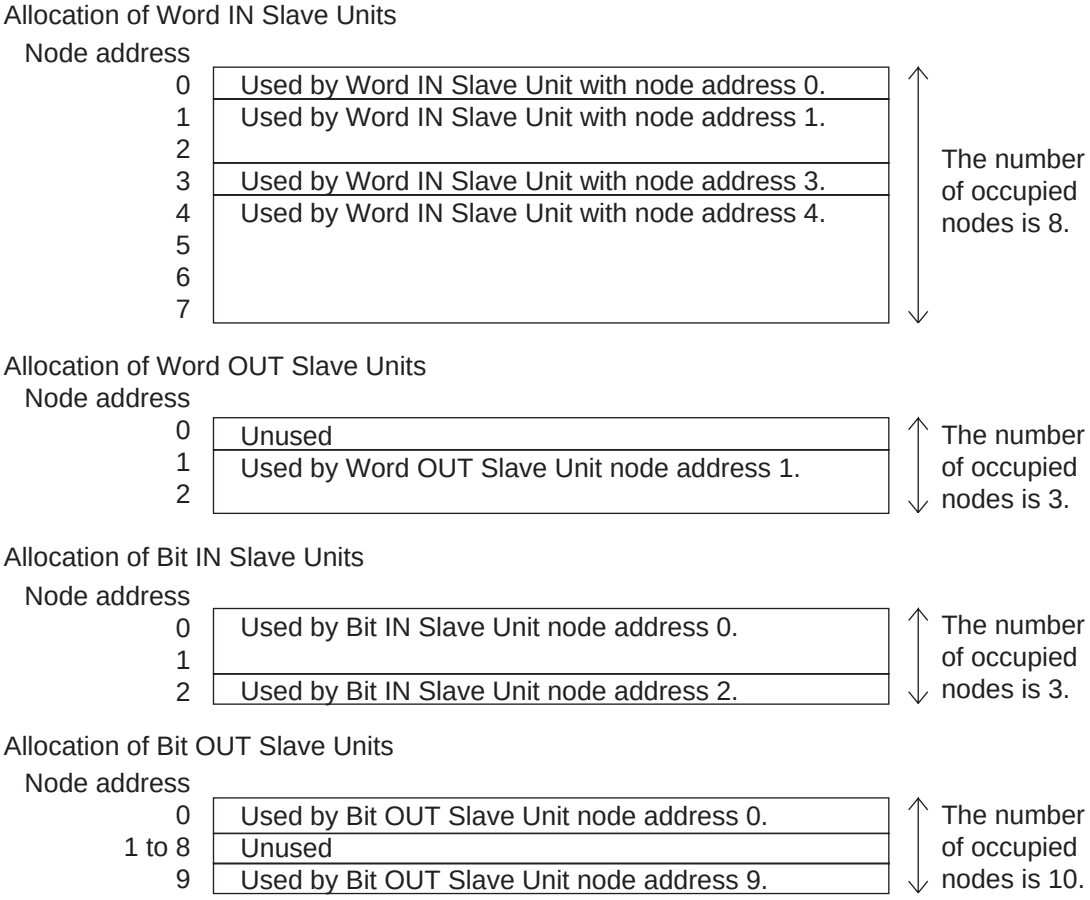
## 3-1-1 Settings Required for Starting the Communications Cycle

<table>
<tr><th>Function</th><th>Description</th></tr>
<tr><td>Data rate</td><td>This is used to set the data rate for a network.<br>The Slave Units in the same network automatically follow the data rate of the Master Board.<br>Data rate is selective among 4 Mbps, 3 Mbps, 1.5 Mbps and 93.75 kbps.</td></tr>
<tr><td>Number of occupied nodes</td><td>The number of nodes can be set individually for Word IN Slave Units, Word OUT Slave Units, Bit IN Slave Units and Bit OUT Slave Units.<br>*1. Every 16 points of a Word IN Slave Unit or a Word OUT Slave Unit occupies 1 node.<br>*2. Every 2 points of a Bit IN Slave Unit or a Bit OUT Slave Unit occupies 1 node.<br>*3. Node addresses are allocated to Slave Units in ascending order starting from #0. Unused addresses are also included in this allocation order. They cannot be skipped.<br>*4. Only the Slave Units in this set range are to participate. Not all of the occupied areas are necessarily allocated by a Slave Unit.<br><br>Example: When a system consists of Slave Units as shown in the table below, the number of nodes occupied by each type of Slave Units are:<br>8 by Word IN Slave Units,<br>3 by Word OUT Slave Unit, (*3)<br>3 by Bit IN Slave Unit,<br>10 by Bit OUT Slave Units (*3)
<table>
<tr><th>Slave type</th><th>Node address</th><th># of points</th><th>Remarks</th></tr>
<tr><td>Word IN Slave Unit</td><td>0</td><td>16</td><td></td></tr>
<tr><td>Word IN Slave Unit</td><td>1</td><td>32</td><td>(*1)</td></tr>
<tr><td>Word IN Slave Unit</td><td>3</td><td>16</td><td></td></tr>
<tr><td>Word IN Slave Unit</td><td>4</td><td>64</td><td>(*1)</td></tr>
<tr><td>Word OUT Slave Unit</td><td>1</td><td>32</td><td>(*1)</td></tr>
<tr><td>Bit IN Slave Unit</td><td>0</td><td>4</td><td>(*2)</td></tr>
<tr><td>Bit IN Slave Unit</td><td>2</td><td>2</td><td></td></tr>
<tr><td>Bit OUT Slave Unit</td><td>0</td><td>2</td><td></td></tr>
<tr><td>Bit OUT Slave Unit</td><td>9</td><td>2</td><td></td></tr>
</table>
</td></tr>
</table>

**Note**

- Every 16 points of a Word IN Slave Unit or a Word OUT Slave Unit occupies 1 node. For example, when a Word Slave Unit has 64 points and is allocated with the node address #10, it actually occupies the node address #10, #11 #12 and #13.
- Every 2 points of a Bit IN Slave Unit or a Bit OUT Slave Unit occupies 1 node. For example, when a Bit Slave Unit has 4 points and is allocated with the node address #5, it actually occupies the node address #5 and #6.

Image of the number of nodes occupied by the above Slave Units



# 3-2 Access to I/O Data

## 3-2-1 Allocation of I/O Data

In the CompoNet network system, the I/O data is allocated separately for Word IN Slave Units, Word OUT Slave Units, Bit IN Slave Units, and Bit OUT Slave Units. It is allocated in the shared memory of the CompoNet Master Board.

### Allocation for Word IN Slave Units and Word OUT Slave Units

- Every 16 points of a Word IN Slave Unit or a Word OUT Slave Unit occupies 1 word in allocation area. For example, a 32-point IN Slave Unit occupies 2 words in allocation area for Word IN Slave Units.
- The offset address that is allocated to the shared memory is determined by the node address.
- Word MIX Slave Units occupy the allocation areas for both of Word IN Slave Units and Word OUT Slave Units. For example, when a Word MIX Slave Units has 16 inputs and 64 outputs, it occupies 1 word in the allocation area for Word IN Slave Units and 4 words in the allocation area for Word OUT Slave Units.
- An 8-point Slave Unit also occupies 1 node or 1 word. It is allocated to the lower byte of the 1-word, while the upper byte remains open.

Allocation area for IN Data of a Word IN Slave Unit

| | Word address | Bit 15 Bit 0 |
|---|---|---|
| IN area | +0 | [IN data of Word IN Slave Unit with node address 0] |
| | +1 | [IN data of Word IN Slave Unit with node address 1] |
| | +2 | [IN data of Word IN Slave Unit with node address 2] |
| | : | : |
| | +62 | [IN data of Word IN Slave Unit with node address 62] |
| | +63 | [IN data of Word IN Slave Unit with node address 63] |

Allocation area for OUT Data of a Word OUT Slave Unit

| | Word address | Bit 15 Bit 0 |
|---|---|---|
| OUT area | +0 | [OUT data of Word OUT Slave Unit with node address 0] |
| | +1 | [OUT data of Word OUT Slave Unit with node address 1] |
| | +2 | [OUT data of Word OUT Slave Unit with node address 2] |
| | : | : |
| | +62 | [OUT data of Word OUT Slave Unit with node address 62] |
| | +63 | [OUT data of Word OUT Slave Unit with node address 63] |

**Note** A single allocation area shall never be occupied by plural nodes. However, as long as the same words are not allocated to more than one Unit, the Input Area and Output Area with numerically the same node address can be allocated to Slave Units with different node addresses. For example, OUT1 can be allocated to the 16 outputs for a Word OUT Slave Unit set for node address 1, and IN1can be allocated to the 16 inputs for a Word IN Slave Unit set for node address 1.

**Precautions for Correct Use**

When a Slave Unit occupies plural allocation areas, other Slave Units which have the occupied node addresses cannot participate.

Example: When a Slave Unit with node address 0 exists in a network and it occupies 2 words in the IN area and 4 words in OUT area, Word IN Slave Units whose node addresses are 0 or 1, and Word OUT Slave Units whose node addresses are 0, 1, 2 or 3 cannot participate.

**Image of the above Precautions for Correct Use**

Allocation area for IN Data of a Word IN Slave Unit

IN area

| Word address | Bit 15 Bit 0 |
|---|---|
| +0 | [IN data of Word MIX Slave Unit with node address 0] |
| +1 | |
| +2 | |
| +3 | |
| +4 | |
| : | |
| +62 | |
| +63 | |

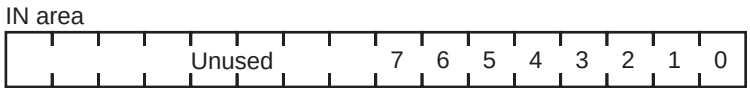
Allocation area for OUT Data of a Word OUT Slave Unit

OUT area

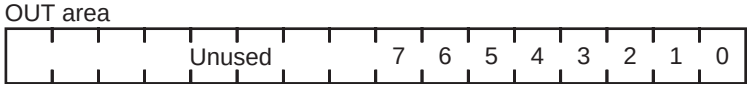
| Word address | Bit 15 Bit 0 |
|---|---|
| +0 | [OUT data of Word MIX Slave Unit with node address 0] |
| +1 | |
| +2 | |
| +3 | |
| +4 | |
| : | |
| +62 | |
| +63 | |

**Data allocation**

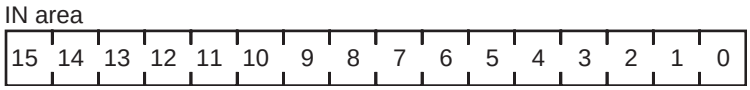
- 8-Point Word IN Slave Unit



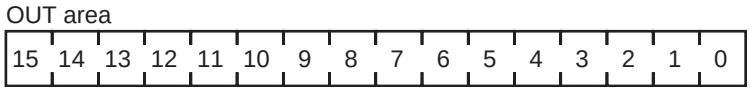

- 8-Point Word OUT Slave Unit



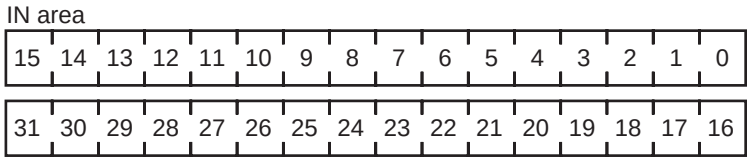
- 16-Point Word IN Slave Unit



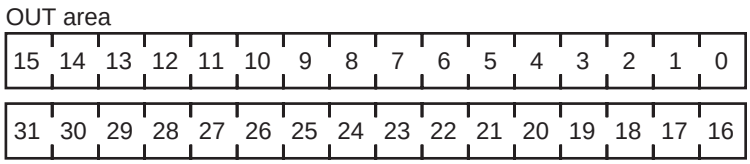

- 16-Point Word OUT Slave Unit



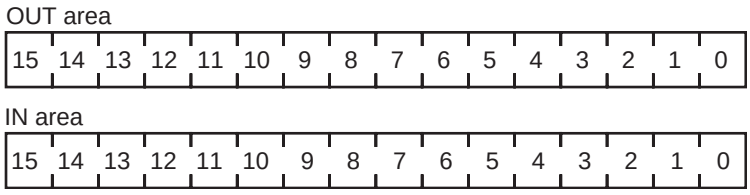

- 32-Point Word IN Slave Unit




- 32-Point Word OUT Slave Unit




- 16-Input and 16-Output Word MIX Slave Unit




## Allocation for Bit IN Slave Units and Bit OUT Slave Units

Every Bit Slave Unit occupies 2 point or 2 bits.

For example, 8 sets of 2-point Slave Units occupy 1 word. In the same manner, a combination of 4 sets of 2-point Slave Units, and 2 sets of 4-point Slave Units, occupies 1 word.

A 2-point Slave Unit occupies 2 bits as a node, which is for its own node address.

A 4-point Slave Unit occupies 4 bits as a node, which is for its own and for the next node addresses.

BIT IN Data Allocation Area

IN area

| Word address \ Bit | 15 14 | 13 12 | 11 10 | 9 8 | 7 6 | 5 4 | 3 2 | 1 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | [BIT IN 7] | [BIT IN 6] | [BIT IN 5] | [BIT IN 4] | [BIT IN 3] | [BIT IN 2] | [BIT IN 1] | [BIT IN 0] |
| +1 | [BIT IN 15] | [BIT IN 14] | [BIT IN 13] | [BIT IN 12] | [BIT IN 11] | [BIT IN 10] | [BIT IN 9] | [BIT IN 8] |
| +2 | [BIT IN 23] | [BIT IN 22] | [BIT IN 21] | [BIT IN 20] | [BIT IN 19] | [BIT IN 18] | [BIT IN 17] | [BIT IN 16] |
| +3 | [BIT IN 31] | [BIT IN 30] | [BIT IN 29] | [BIT IN 28] | [BIT IN 27] | [BIT IN 26] | [BIT IN 25] | [BIT IN 24] |
| +4 | [BIT IN 39] | [BIT IN 38] | [BIT IN 37] | [BIT IN 36] | [BIT IN 35] | [BIT IN 34] | [BIT IN 33] | [BIT IN 32] |
| +5 | [BIT IN 47] | [BIT IN 46] | [BIT IN 45] | [BIT IN 44] | [BIT IN 43] | [BIT IN 42] | [BIT IN 41] | [BIT IN 40] |
| +6 | [BIT IN 55] | [BIT IN 54] | [BIT IN 53] | [BIT IN 52] | [BIT IN 51] | [BIT IN 50] | [BIT IN 49] | [BIT IN 48] |
| +7 | [BIT IN 63] | [BIT IN 62] | [BIT IN 61] | [BIT IN 60] | [BIT IN 59] | [BIT IN 58] | [BIT IN 57] | [BIT IN 56] |
| +8 | [BIT IN 71] | [BIT IN 70] | [BIT IN 69] | [BIT IN 68] | [BIT IN 67] | [BIT IN 66] | [BIT IN 65] | [BIT IN 64] |
| +9 | [BIT IN 79] | [BIT IN 78] | [BIT IN 77] | [BIT IN 76] | [BIT IN 75] | [BIT IN 74] | [BIT IN 73] | [BIT IN 72] |
| +10 | [BIT IN 87] | [BIT IN 86] | [BIT IN 85] | [BIT IN 84] | [BIT IN 83] | [BIT IN 82] | [BIT IN 81] | [BIT IN 80] |
| +11 | [BIT IN 95] | [BIT IN 94] | [BIT IN 93] | [BIT IN 92] | [BIT IN 91] | [BIT IN 90] | [BIT IN 89] | [BIT IN 88] |
| +12 | [BIT IN 103] | [BIT IN 102] | [BIT IN 101] | [BIT IN 100] | [BIT IN 99] | [BIT IN 98] | [BIT IN 97] | [BIT IN 96] |
| +13 | [BIT IN 111] | [BIT IN 110] | [BIT IN 109] | [BIT IN 108] | [BIT IN 107] | [BIT IN 106] | [BIT IN 105] | [BIT IN 104] |
| +14 | [BIT IN 119] | [BIT IN 118] | [BIT IN 117] | [BIT IN 116] | [BIT IN 115] | [BIT IN 114] | [BIT IN 113] | [BIT IN 112] |
| +15 | [BIT IN 127] | [BIT IN 126] | [BIT IN 125] | [BIT IN 124] | [BIT IN 123] | [BIT IN 122] | [BIT IN 121] | [BIT IN 120] |

BIT OUT Data Allocation Area

OUT area

| Word address \ Bit | 15 14 | 13 12 | 11 10 | 9 8 | 7 6 | 5 4 | 3 2 | 1 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | [BIT OUT 7] | [BIT OUT 6] | [BIT OUT 5] | [BIT OUT 4] | [BIT OUT 3] | [BIT OUT 2] | [BIT OUT 1] | [BIT OUT 0] |
| +1 | [BIT OUT 15] | [BIT OUT 14] | [BIT OUT 13] | [BIT OUT 12] | [BIT OUT 11] | [BIT OUT 10] | [BIT OUT 9] | [BIT OUT 8] |
| +2 | [BIT OUT 23] | [BIT OUT 22] | [BIT OUT 21] | [BIT OUT 20] | [BIT OUT 19] | [BIT OUT 18] | [BIT OUT 17] | [BIT OUT 16] |
| +3 | [BIT OUT 31] | [BIT OUT 30] | [BIT OUT 29] | [BIT OUT 28] | [BIT OUT 27] | [BIT OUT 26] | [BIT OUT 25] | [BIT OUT 24] |
| +4 | [BIT OUT 39] | [BIT OUT 38] | [BIT OUT 37] | [BIT OUT 36] | [BIT OUT 35] | [BIT OUT 34] | [BIT OUT 33] | [BIT OUT 32] |
| +5 | [BIT OUT 47] | [BIT OUT 46] | [BIT OUT 45] | [BIT OUT 44] | [BIT OUT 43] | [BIT OUT 42] | [BIT OUT 41] | [BIT OUT 40] |
| +6 | [BIT OUT 55] | [BIT OUT 54] | [BIT OUT 53] | [BIT OUT 52] | [BIT OUT 51] | [BIT OUT 50] | [BIT OUT 49] | [BIT OUT 48] |
| +7 | [BIT OUT 63] | [BIT OUT 62] | [BIT OUT 61] | [BIT OUT 60] | [BIT OUT 59] | [BIT OUT 58] | [BIT OUT 57] | [BIT OUT 56] |
| +8 | [BIT OUT 71] | [BIT OUT 70] | [BIT OUT 69] | [BIT OUT 68] | [BIT OUT 67] | [BIT OUT 66] | [BIT OUT 65] | [BIT OUT 64] |
| +9 | [BIT OUT 79] | [BIT OUT 78] | [BIT OUT 77] | [BIT OUT 76] | [BIT OUT 75] | [BIT OUT 74] | [BIT OUT 73] | [BIT OUT 72] |
| +10 | [BIT OUT 87] | [BIT OUT 86] | [BIT OUT 85] | [BIT OUT 84] | [BIT OUT 83] | [BIT OUT 82] | [BIT OUT 81] | [BIT OUT 80] |
| +11 | [BIT OUT 95] | [BIT OUT 94] | [BIT OUT 93] | [BIT OUT 92] | [BIT OUT 91] | [BIT OUT 90] | [BIT OUT 89] | [BIT OUT 88] |
| +12 | [BIT OUT 103] | [BIT OUT 102] | [BIT OUT 101] | [BIT OUT 100] | [BIT OUT 99] | [BIT OUT 98] | [BIT OUT 97] | [BIT OUT 96] |
| +13 | [BIT OUT 111] | [BIT OUT 110] | [BIT OUT 109] | [BIT OUT 108] | [BIT OUT 107] | [BIT OUT 106] | [BIT OUT 105] | [BIT OUT 104] |
| +14 | [BIT OUT 119] | [BIT OUT 118] | [BIT OUT 117] | [BIT OUT 116] | [BIT OUT 115] | [BIT OUT 114] | [BIT OUT 113] | [BIT OUT 112] |
| +15 | [BIT OUT 127] | [BIT OUT 126] | [BIT OUT 125] | [BIT OUT 124] | [BIT OUT 123] | [BIT OUT 122] | [BIT OUT 121] | [BIT OUT 120] |

**Note** A single allocation area shall never be occupied by plural nodes. However, as long as the same words are not allocated to more than one Unit, the Bit Input Area and Bit Output Area with numerically the same node address can be allocated to Slave Units with different node addresses. For example, BIT OUT1 area can be allocated to the 2 outputs for a Bit Output Slave Unit set for node address 1, and BIT IN1 can be allocated to the 2 inputs for a Bit Input Slave Unit set for node address 1.

**Precautions for Correct Use**

When a Slave Unit occupies plural allocation areas, other Slave Units which have the occupied node addresses cannot participate.

Example: When a Slave Unit with node address #0 exists in a network and it occupies 2 bits in the Bit IN area and 4 bits in Bit OUT area, Bit IN Slave Unit whose node address is 0, and Bit OUT Slave Units whose node address is either 0 or 1 cannot participate.

**Image of the above Precautions for Correct Use**

BIT IN Data Allocation Area

| Word address \ Bit | 15 14 | 13 12 | 11 10 | 9 8 | 7 6 | 5 4 | 3 2 | 1 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | | | | | | | | [BIT IN 0] |
| +1 | | | | | | | | |
| : | : | : | : | : | : | : | : | : |
| +15 | | | | | | | | |

BIT OUT Data Allocation Area

| Word address \ Bit | 15 14 | 13 12 | 11 10 | 9 8 | 7 6 | 5 4 | 3 2 | 1 0 |
|---|---|---|---|---|---|---|---|---|
| +0 | | | | | | | [BIT OUT 0] | |
| +1 | | | | | | | | |
| : | : | : | : | : | : | : | : | : |
| +15 | | | | | | | | |

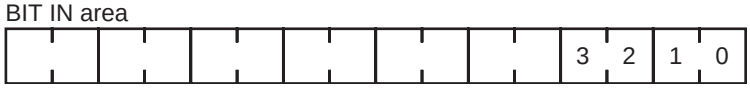
**Data allocation**

- 2-Point Bit IN Slave Unit

BIT IN area


- 4-Point Bit IN Slave Unit

BIT IN area

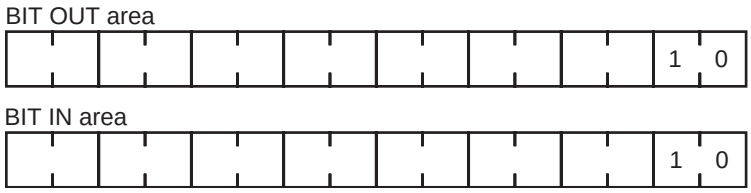



- 2-Point Bit OUT Slave Unit

BIT OUT area

- 4-Point Bit OUT Slave Unit


- 2-Input and 2-Output Bit MIX Slave Unit




## 3-2-2 Access to I/O Data

There are two methods for access to I/O data: synchronous and asynchronous.

**Synchronous access**

Synchronous access uses access rights and ensures node-by-node synchronicity.

It requires a waiting time of maximum one communications cycle in order to obtain an access right.

See Section 4-1-2 for the access procedure.

**Asynchronous access**

Asynchronous access does not use access rights. Thus it enables high speed access to I/O data.

This type of access, however, ensures the synchronicity of every 16 bits of I/O data.

See Section 4-1-1 for the access procedures.

# 3-3 Status

Status comprises two general categories: One is the Basic Status Group, which is constantly updated in the shared memory, while the other is the Detailed Status Group. The statuses in the latter group are read by the application whenever necessary. The PC application issues a read request to the CompoNet Master Board, and read the status.

## 3-3-1 Basic Status Group

To access to the Basic status group in the Windows operation systems, the function CPNT_GetStatus is used.

In an OS other than Windows, the status group can be read directly from the shared memory access.

| Status | Description |
|---|---|
| Participation flag | When a Slave Unit participates in the network, the bit corresponding to the node address will be on.<br>Once the target Slave Unit is participating, the bit remains on. It stays on even the Slave Unit separates due to a communications error. |
| Communications error flag | The bit will be on if a communications error occurs to the once participated Slave Unit whose participation flag is on, and its communications with the CompoNet Master Board is prevented. The bit will be off when the error is resolved. |
| State Status | It shows the entire network status and the CompoNet Master Board status.<br>See Appendix B.3.3. |

**Precautions for Correct Use**

For a Word Mixed Slave Unit, use the status for the node address of the Word Input Slave Unit. For a Bit Mixed Slave Unit, use the status for the node address of the Bit Input Slave Unit.

## 3-3-2 Detailed Status Group

To access to the detailed status group in the Windows operation systems, the functions CPNT_GetStatusEx is used.

To read the detailed status group from accessing the shared memory area, the command REQUEST_STATUS is used and a read request is issued.

See Appendix B.3.6 for the procedures.

| Status | Description |
|---|---|
| Duplication error flag | It shows a duplication error for each applicable node.<br>The error occurs not only due to duplication but also if the Slave Unit stops by unstable communications. |
| Registration error (Registered Slave not participating) flag | It shows a registration error (i.e., The registered Slave Unit has not participated) for each applicable node. |
| Registration error (Non- registered Slave participating) flag | It shows a registration error (i.e., A non-registered Slave Unit is to participate) for each applicable node. |
| Repeater configuration error | It shows a Repeater configuration error for each applicable node. |
| Event Only (EO) Slave Unit | It means the Slave Unit cannot participate but can only use explicit messages. |
| Master status | It stores detailed status of the mastering functions. |
| Error counter | It is the error counter for the CompoNet Master Board. |
| Network power state | It shows the state of network power supply. |
| Participated Slave Unit identity table | It stores the identity information of participating Slave Units. |
| Repeater configuration information | It stores the Repeater configuration information. |
| Alarm information | It stores the alarm information collected by each applicable Slave Unit. |

| Status | Description |
|---|---|
| Error log | It stores the error log. |
| Registration table example | It stores the registration table example made from the information of the Slave Units currently participating. |

**Precautions for Correct Use**

For a Word Mixed Slave Unit, use the status for the node address of the Word Input Slave Unit. For a Bit Mixed Slave Unit, use the status for the node address of the Bit Input Slave Unit.

# 3-4 Explicit Messages

Explicit messages are general-purpose messages specified by CompoNet protocol.

The messages are used to rewrite a Slave Unit parameter or to read out any data from a Slave Unit.

In the Windows operation systems, explicit messages are used by functions CPNT_SendExplicit, CPNT_PeekExplicit and CPNT_ReceiveExplicit.

To use the message by accessing the shared memory area, see Section 4-3.

# 3-5 Detailed Settings at Communications Cycle Startup

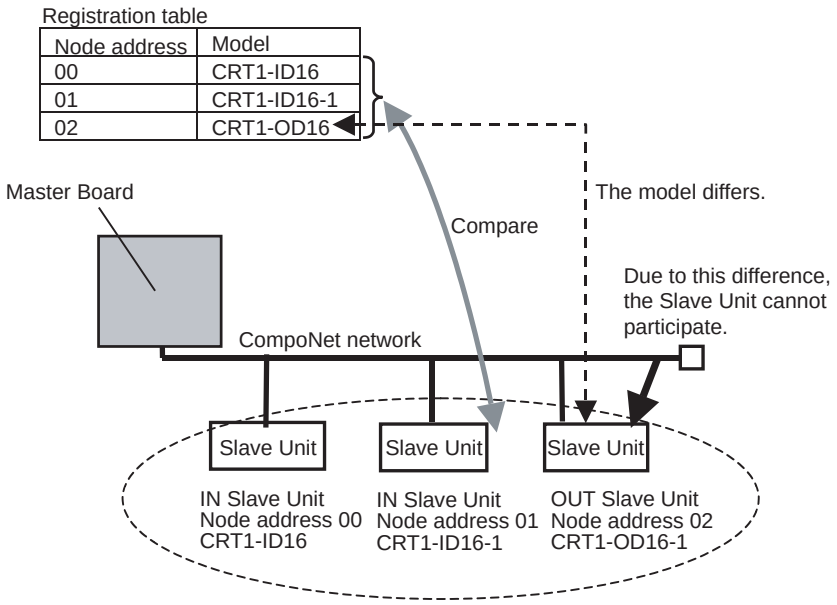
## 3-5-1 Registration Table Function

**Outline**

This is the function used to register the model of a Slave Unit to participate along with the corresponding node address, and to check whether a Slave Unit that is actually participating is registered or not. It identifies any Slave Unit that is not on the list or whose allocated node address or model differs from the information on the list, and prevents it from participating in the network.

In the Windows operation systems, the function CPNT_StartCycleEx enables the Registration Table function. To access the shared memory area, the command OPEN_SYSTEMEX is used.

Example




If the comparison finds out any non-conforming Slave Unit, the Registration Table comparison error occurrence flag (i.e., the Bit 01 of the StateStatus in the Basic status group) comes on.

When the All Registered Slave Participation Standby Mode (as described later) is then disabled, the remote I/O communications starts. If it is enabled, the remote I/O communications will not start.

**Behavior**

Here is the behavior in each case.

- When all registered Slave Units participate within the Registered Slave Unit Participation Time *1 *2 after a power-on *3, the All Registered Slave Units participating flag, i.e., the bit 06 of the StateStatus in the Basic status group, comes on.
  If no non-registered Slave Unit participates then, the Registration Table comparison error occurrence flag will be off.
- If any non-registered Slave Unit participates then, it is a registration error (a Non-registered Slave is participating), and the Registration Table comparison error occurrence flag comes on. At the same time, the NS indicator on the CompoNet Master Board flashes red.
- If not all of the registered Slave Unit participate within the Registered Slave Unit Participation Time *1 *2 after a power-on *3, it is a registration error (Registered Slave in not participated), and the Registration Table comparison error occurrence flag comes on. At the same time, the NS indicator on the CompoNet Master Board flashes red. The Registration Table comparison error occurrence flag and the error indication turn off as soon as the applicable Slave Unit participates.

*1 The Registered Slave Unit Participation Time is disabled when the All Registered Slave Participation Standby Mode (as described later), is enabled.

*2 In default, the Registered Slave Unit Participation Time is 30 seconds in the data rate of 93.75 kbps, but it is 10 seconds in other data rates.

*3 When the I/O communications manual startup mode is used, it is not after the power-on but after the remote I/O communications startup switch is started.

**Setting the Registered Slave Unit Participation Time**

This is the time from when the communication cycles for CompoNet Master Board starts until when a registered Slave Unit is determined to have participated.

In default, the Registered Slave Unit Participation Time is 30 second in the data rate of 93.75 kbps but it is 10 seconds in other data rates. It can be set to an other time.

This setting is disabled when the All Registered Slave Participation Standby Mode is enabled.

**All Registered Slave Participation Standby Mode**

In this mode, the remote I/O communications is stopped until all the registered Slave Units participate in the network, i.e., while the All Registered Slave Unit Participating Flag is off. The remote I/O communications starts once all of the registered Slave Unit participate, i.e., when the All Registered Slave Unit Participating Flag comes on. All Slave Units can participate in a lesser time than they do in normal mode or when this mode is disabled.

However, user must be aware that the remote I/O communications does not start unless all of the registered Slave Units participate.

While this mode is enabled, any settings (including the default of 10 seconds) based on the Registered Slave Unit Participation Time are disabled.

**Communication Cycle Optimization Function**

This function is used to disregard any unused communications parts based on the information on the Registration table, and to optimize the communications cycle.

## 3-5-2 Communications Stop Due to Communications Error Function

This function is used to stop entire communications, both I/O communications and explicit messages, when any one of participating Slave Units has a communications error. Then the Communications stop due to communications error occurrence flag, (i.e., the Bit 02 of the StateStatus in the Basic status group) comes on.

To recover the communications, the CompoNet Master Board must be reset.

This function is enabled by the function CPNT_StartCycleEx in the Windows operation systems and by the command OPEN_SYSTEMEX for shared memory access.

## 3-5-3 I/O Communications Manual Startup Function

This function is used to manually start up the I/O communications.

Slave Units can participate even while the I/O communications stop.

The function is used when one wants to start exchanging I/O data explicitly from the application.

The function is enabled by the function CPNT_StartCycleEx in the Windows operation systems and by the command OPEN_SYSTEMEX for shared memory access.

The I/O communications can be started by the function CPNT_ChangeToRunState in the Windows operation systems and by the command START_IOCYCLE for shared memory access.

## 3-5-4 IN Data Zero Clear Due to Communications Error Function

This function is used to clear (to zero) all the input data or IN data of any IN or MIX Slave Units that have communications error.

When the IN Data Zero Clear Due to Communications Error mode is not selected, the input data or IN data of a Slave Unit that has a communications error is retained.

The function can restrain triggered behaviors due to a communications error in any systems where the "on" of IN data can be a trigger.

The function is enabled by the function CPNT_StartCycleEx in the Windows operation systems and by the command OPEN_SYSTEMEX for shared memory access.

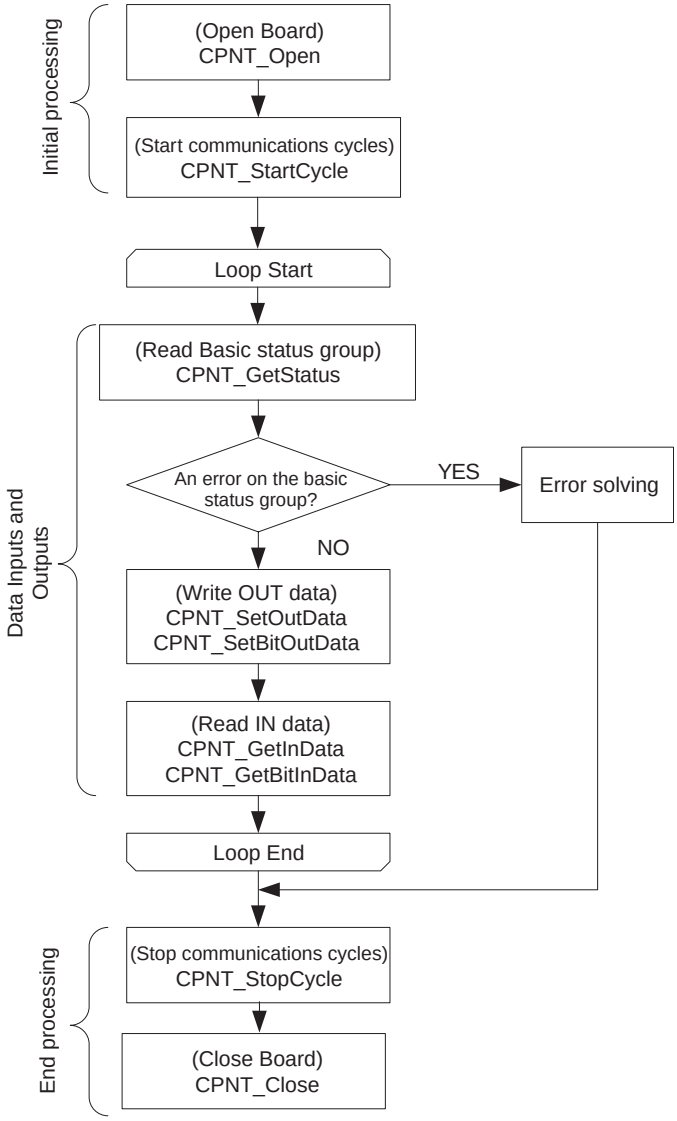
# SECTION 4
# Operation by API Functions

(Procedures used in WindowsOS)

# 4-1 Access to I/O Data

## 4-1-1 General Access to I/O Data

This is the procedure by which to use the API functions and access the I/O data. Read the Basic status group, and confirm that the expected Slave Unit is participating and that no communications error has occurred.

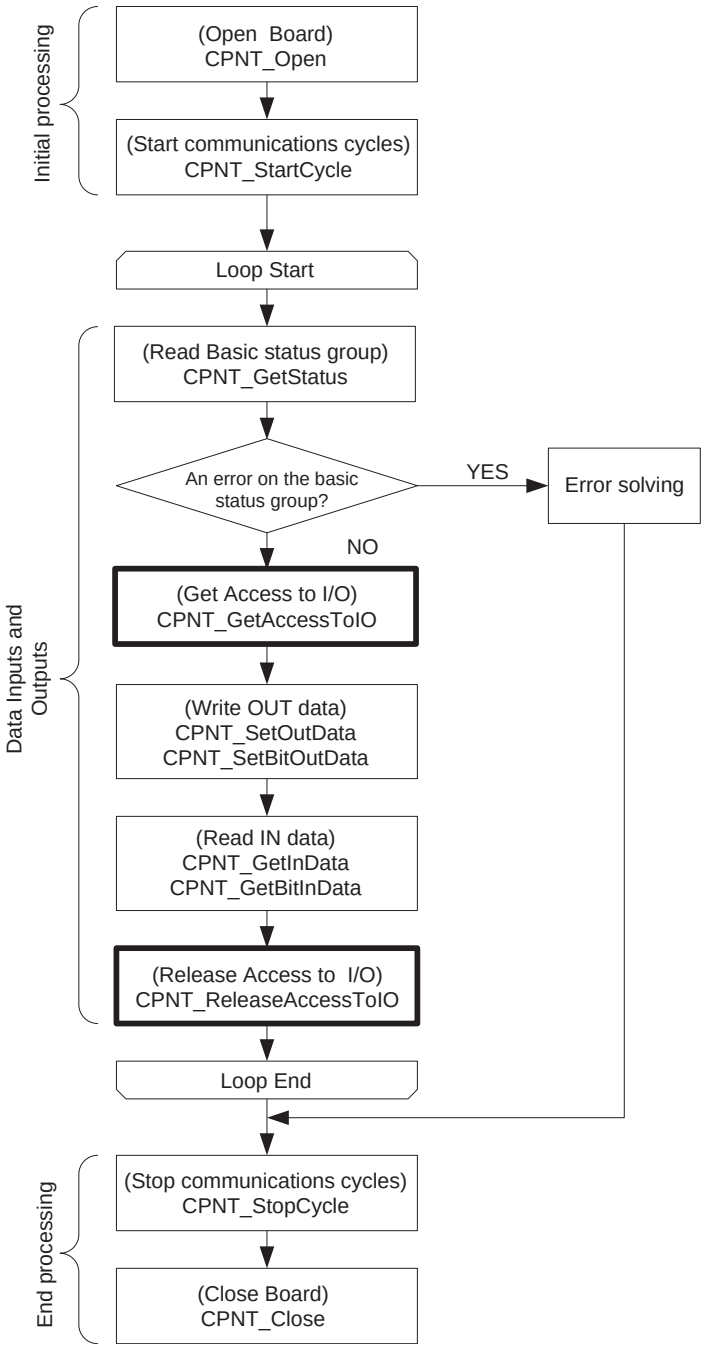



**Precautions for Correct Use**

The program must be made to implement accesses to I/O data in a single thread. If multiple threads access I/O data, processes may collide and the functions may fail.

## 4-1-2 I/O Data Access Synchronous with CompoNet Communications

This is the procedure by which to use the API functions and access the I/O data while maintaining node-by-node synchronicity.



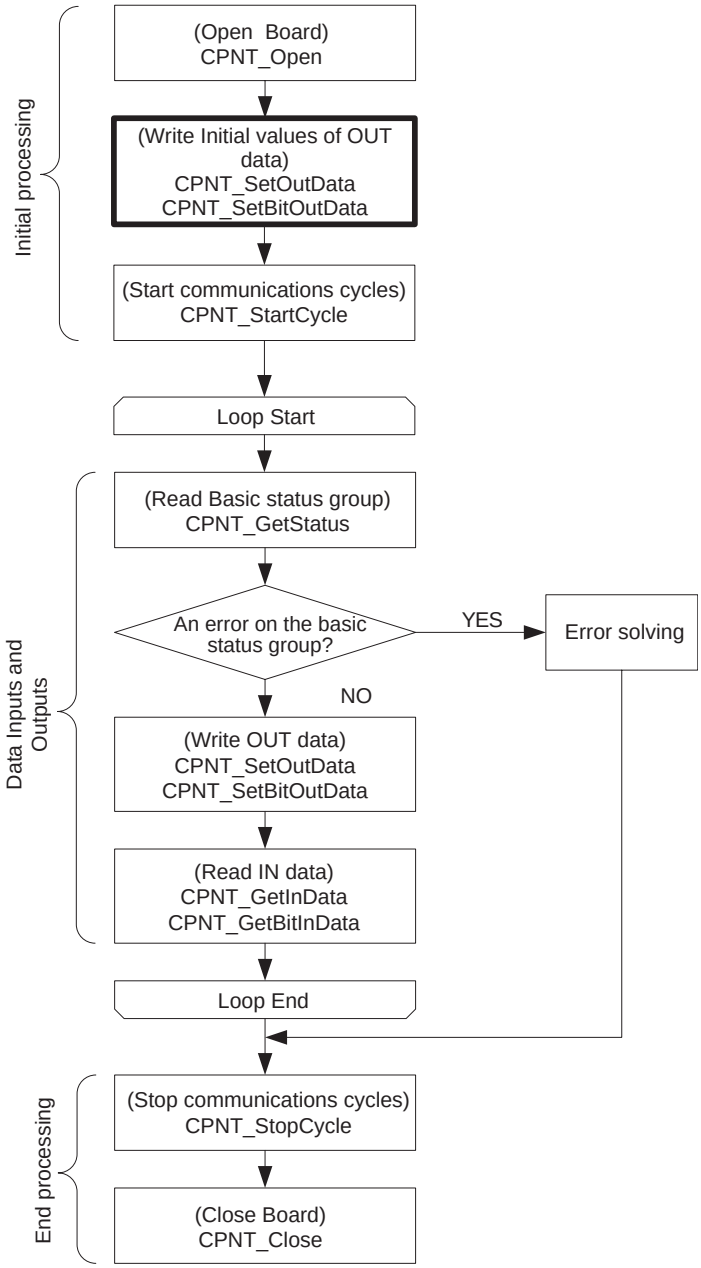

**Precautions for Correct Use**

The program must be made to implement accesses to I/O data in a single thread. This includes getting and releasing an access right. If multiple threads access to I/O data, processes may collide and the functions may fail.

## 4-1-3 Access to I/O Data (with Initial OUT Data-Value Setting Function)

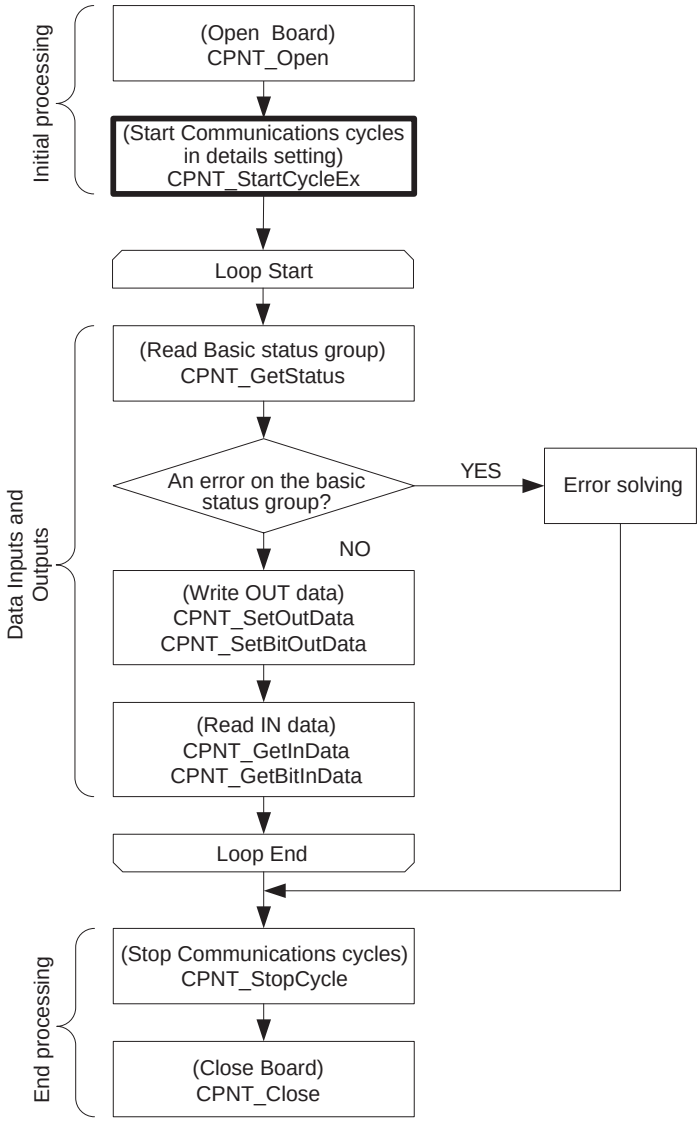
When the communications cycle is started without making any initial setting for the OUT data, it keeps sending 0 data until the OUT write function is executed.

Take these steps to set the initial value as the OUT data and to start the communications data from the user application.



# 4-2 Detailed Setting at Communications Cycle Startup

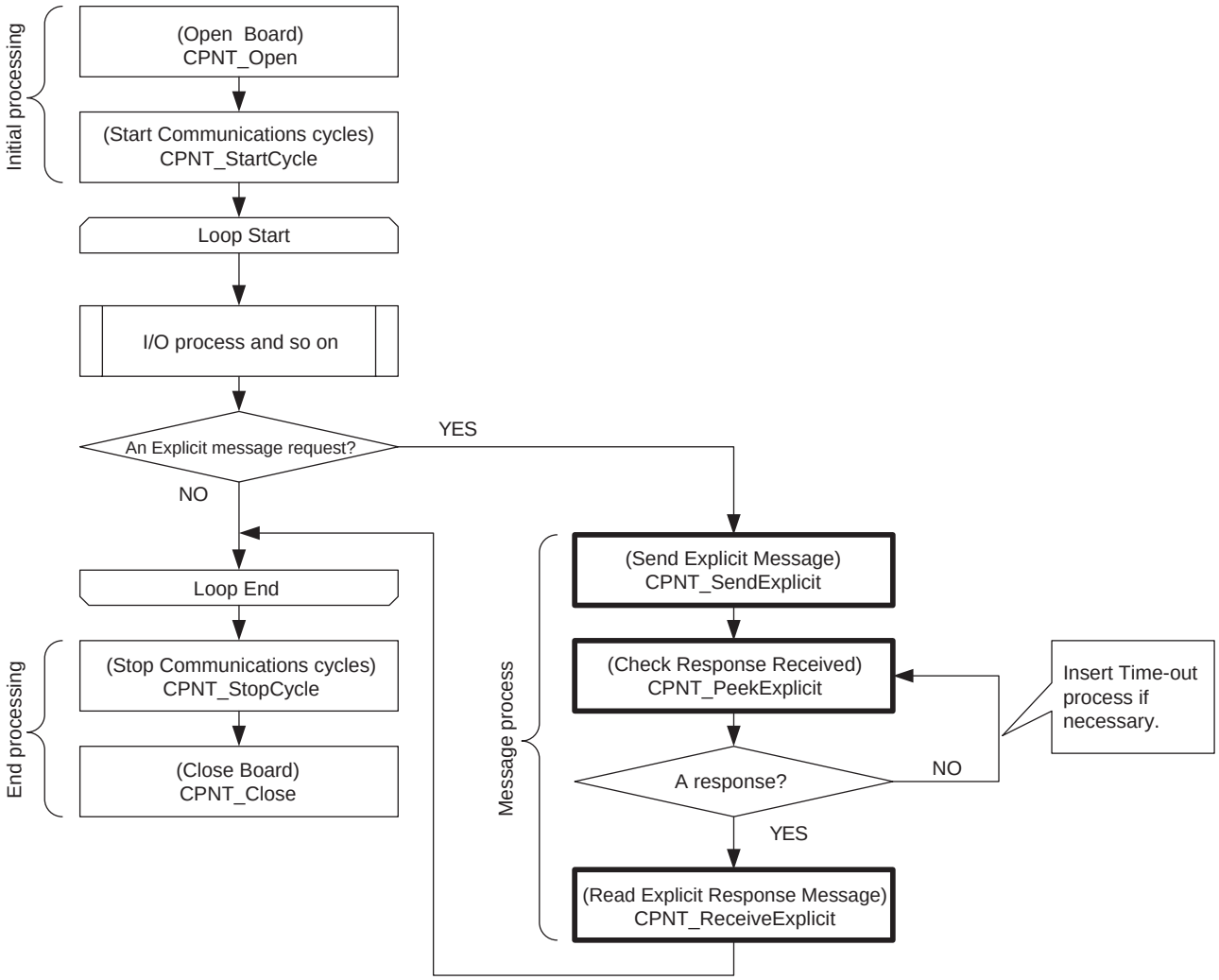
This is the procedure by which to use the detailed setting functions such as the Registration table, and to start the communications. Use the function CPNT_StartCycleEx and notify the CompoNet Master Board of the detailed settings.



# 4-3 Explicit Messaging

## 4-3-1 Explicit Messaging

This is the procedure by which to use periodic polling from the user application, execute explicit messaging, and confirm the response.

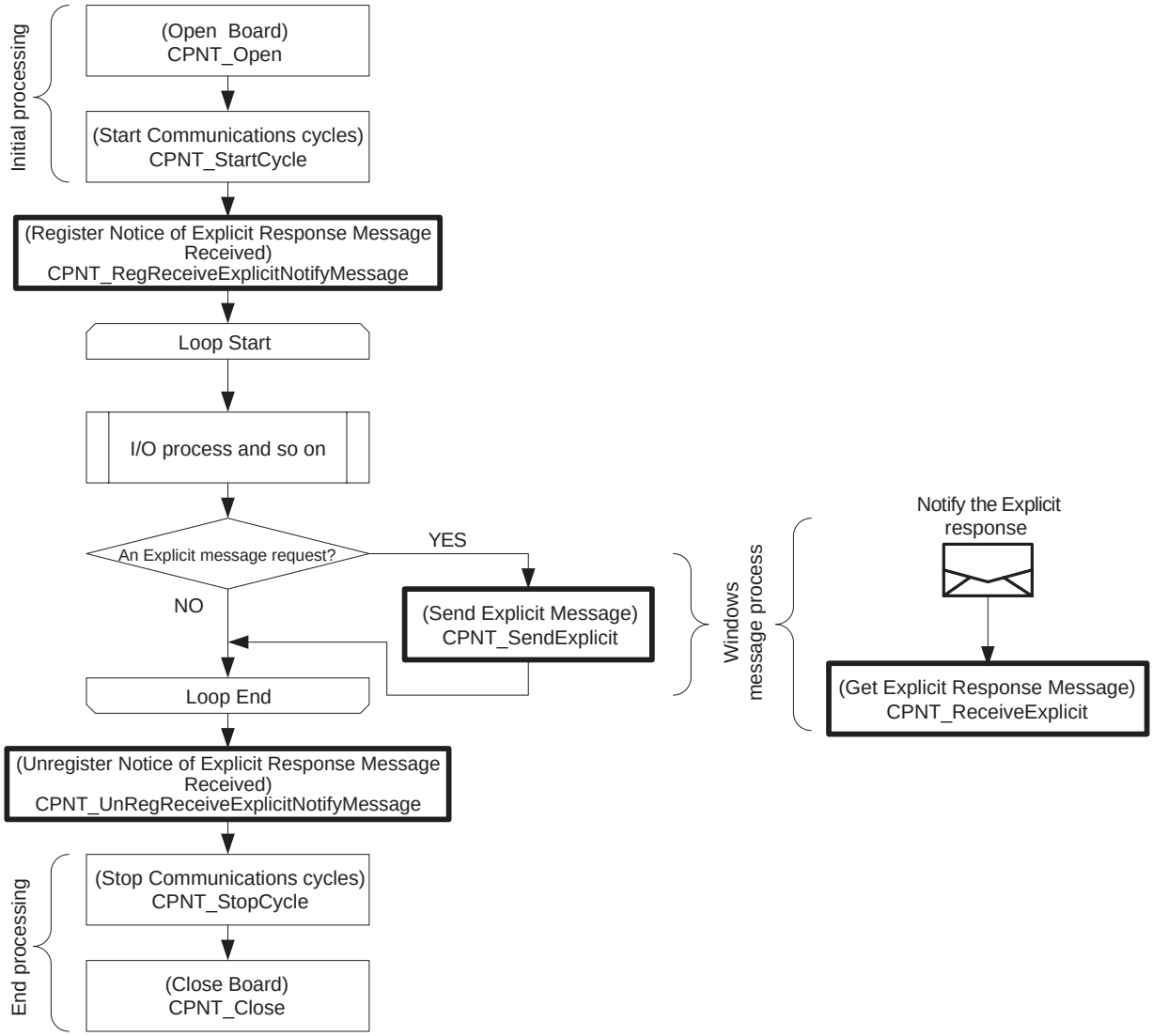



**Precautions for Correct Use**

Explicit messaging may require some time to get a response. Therefore it must be operated in any timing where no I/O process is required or in threads other than for I/O process.

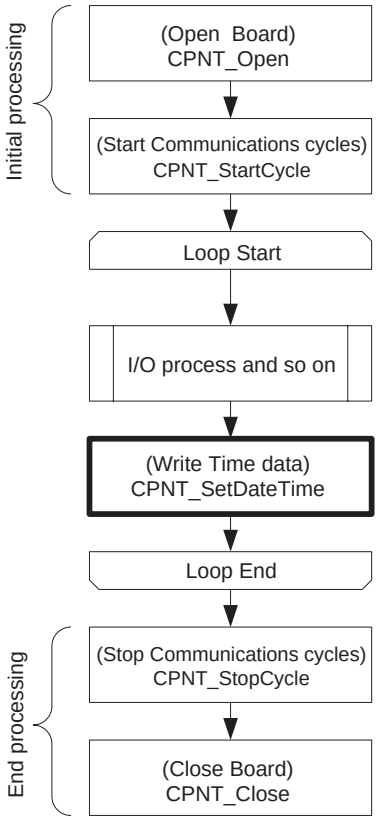
## 4-3-2 Explicit Messaging by Windows Messages

This is the procedure by which to use the Windows messages, execute explicit messaging and confirm the response.



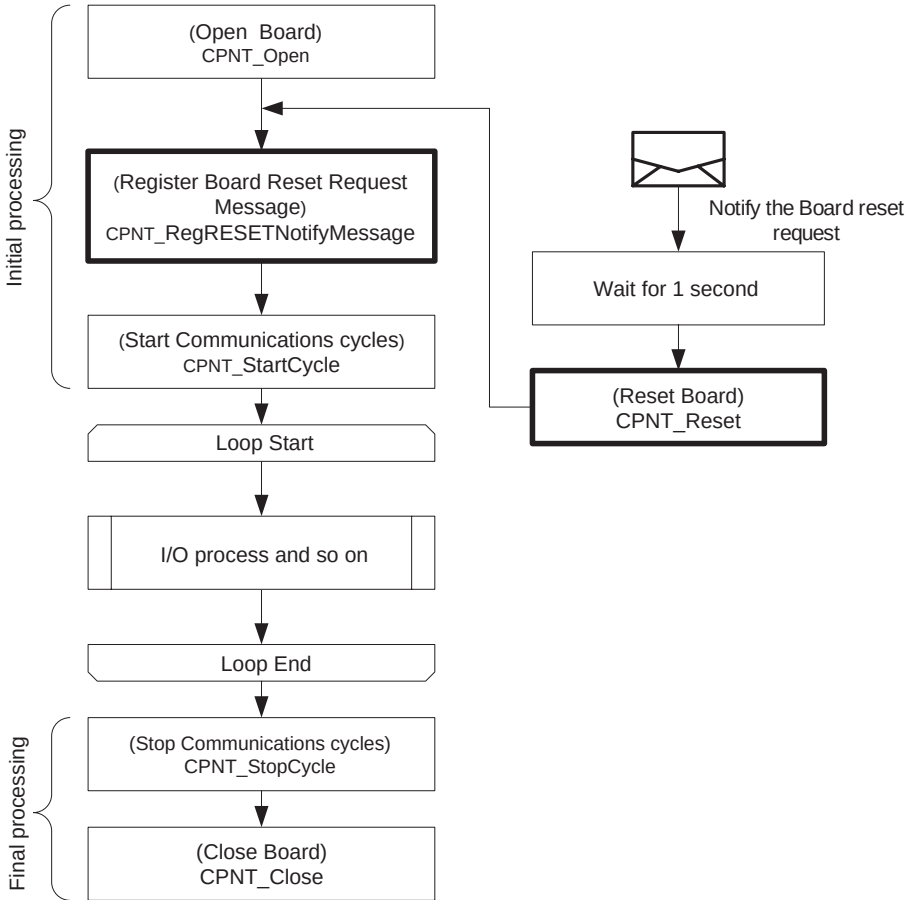
# 4-4 Setting the Time Information

The CompoNet Master Board saves the error occurrence time at the same time when it saves the error history in the internal non-volatile memory. Time data must be notified periodically from the user application to the Board so that the correct time is recorded.



# 4-5 Implementing the Reset Request

To use the Reset service of Identity Objects, a logic must be programmed so that the CompoNet Master Board requests a reset and the user application resets the Board. (The logic is not required if you do not use the Reset service of Identity Objects.)



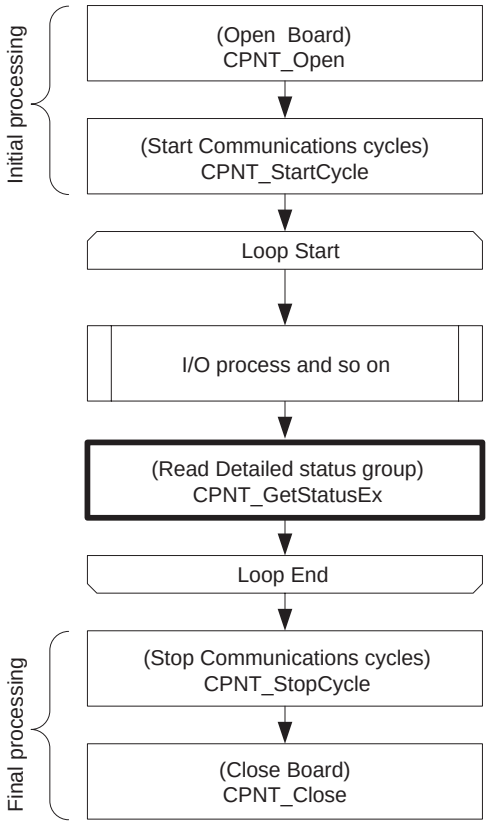

**Precautions for Correct Use**

A program must ensure that the Board is reset no earlier than 1 second after a Board reset request is received.

# 4-6 Access to Detailed Status Group

## 4-6-1 Reading the Detailed Status Group

The function CPNT_GetStatusEx is used to read out the detailed status group.

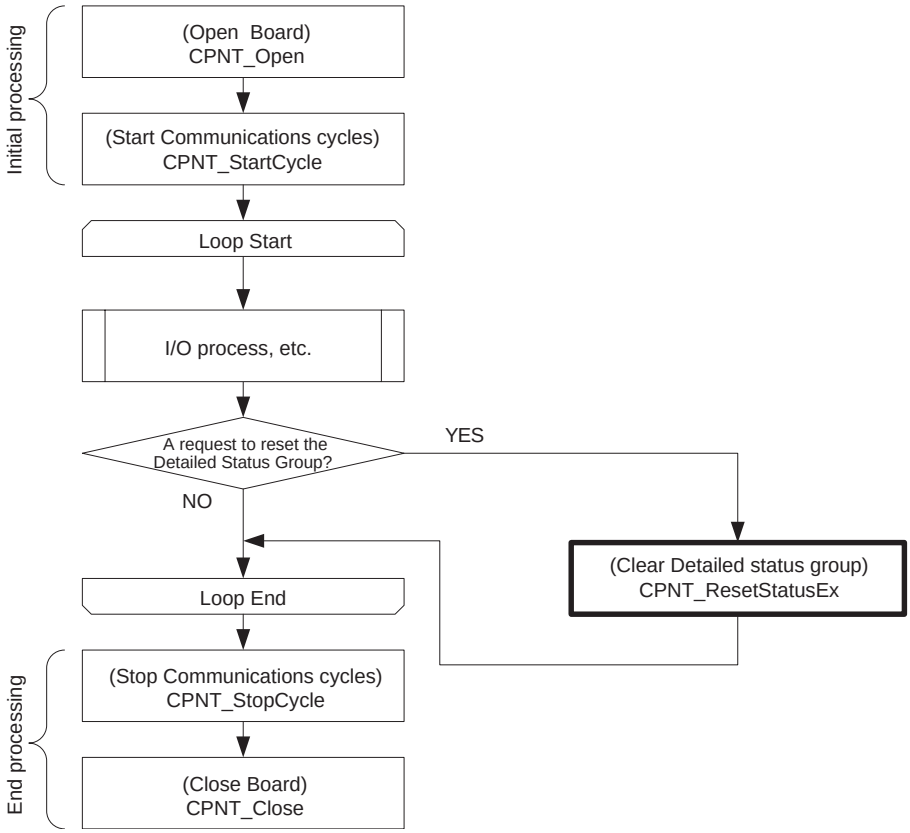



**Precautions for Correct Use**

The function CPNT_GetStatusEx may take a long time to be processed. It must be operated in any timing when no I/O processing is required or in threads other than where the I/O process is implemented.

## 4-6-2 Clearing the Detailed Status Group

The Master Status, Error Counter and Error Log in the Detailed Status Group can be cleared or reset. This is the procedure by which to clear them.



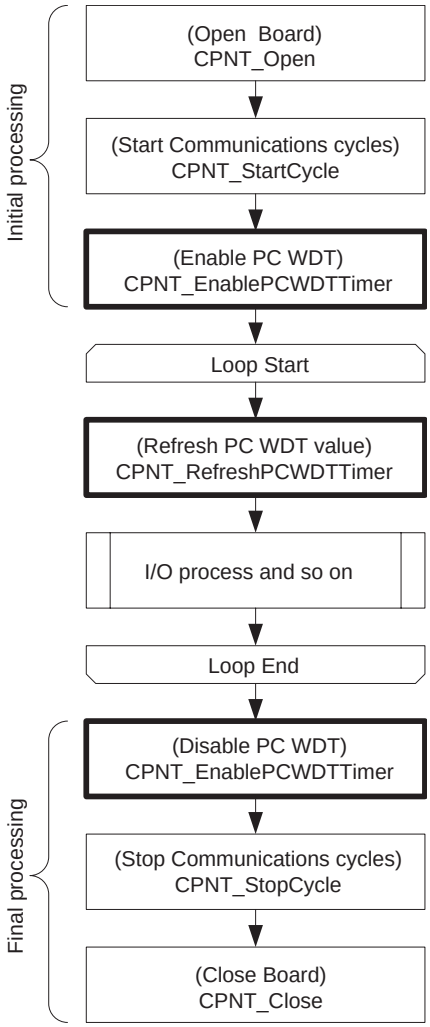

**Precautions for Correct Use**

The function CPNT_ResetStatusEx may take a long time to process. It must be operated in any timing when no I/O processing is required or in threads other than where the I/O process is implemented.

# 4-7 PC Watchdog Timer

The CompoNet Master Board has the PC Watchdog Timer (PC WDT) function. This is used to stop the communications automatically whenever the user application, by which the Board is controlled, stops. While the PC WDT function is enabled, the communications automatically stops unless the user application updates the timer value within a specified timeframe. The user application must be set so that the timer value for the PC WDT is refreshed periodically, and the correct operation is notified to the Board.

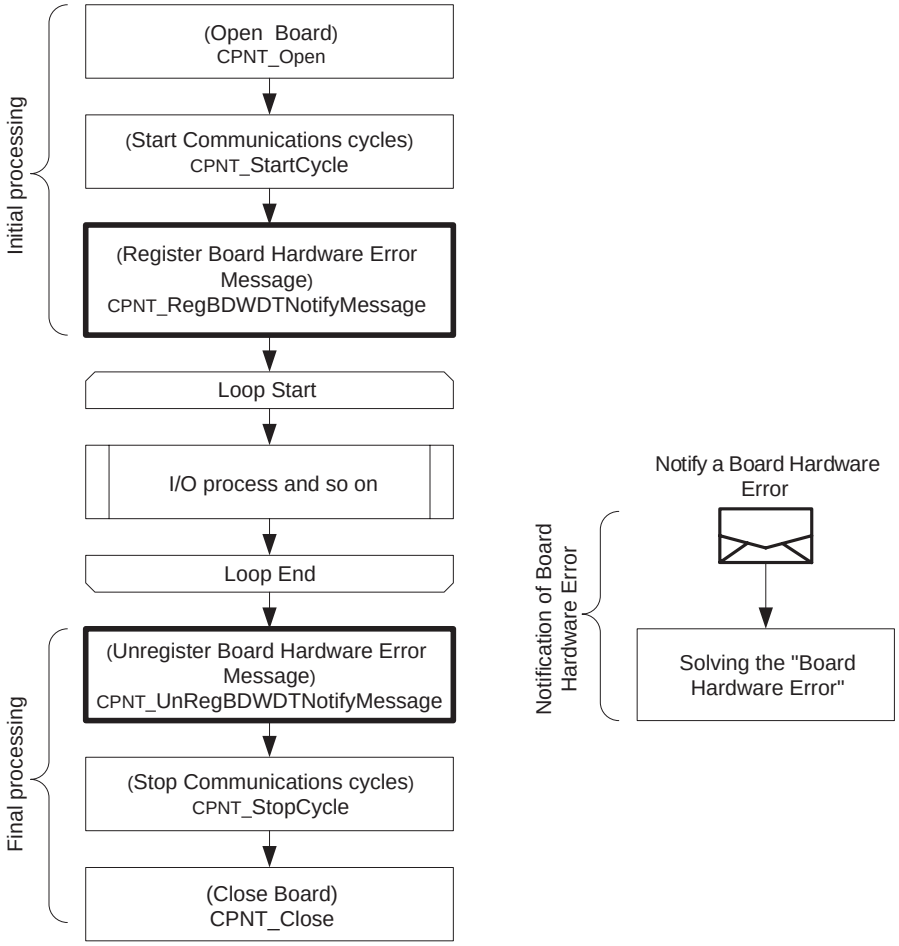
Here is the procedure by which to use the API function and enable the PC WDT on the Board.



# 4-8 Board Hardware Error Notification

This is the function by which to notify the user application of the error when the CompoNet Master Board has stopped due to a hardware error.

Here is the procedure by which to use the function:



# SECTION 5
# Operation by Accessing to Shared Memory

(Operation procedures in other environments other than Windows OS)

# 5-1 Basic Procedures

## 5-1-1 Outline of Board Control

In addition to reading from and writing to the Shared memory, these functions are used to control the CompoNet Master Board:

| Function | Description |
|---|---|
| Interrupt<br>(PCI interrupt) | It is used for these processes:<br>[Interrupt by the PC to the Board]<br>● Notify an Event transmission<br>● Acknowledge (ACK) the Event transmission from the Board.<br>● Notify a command transmission<br>● Request to get an access right to I/O area<br>● Notify a release of the access right to I/O area<br>● Refresh the PC WDT<br>[Interrupt by the Board to the PC]<br>● Notify an Event transmission<br>● Acknowledge (ACK) the Event transmission from the PC<br>● Notify the command acknowledgment<br>● Request to reset the Board<br>● Notify the completion of Board initialization<br>● Notify the completion of getting an access right to I/O area<br>● Notify the WDT time-out |
| Command<br>(to the Board) | It is used for these processes:<br>● Start the communications cycle<br>● Start the communications cycle in the detailed setting<br>● Start or stop the I/O communications<br>● Stop the communications cycle<br>● Request to read the detailed status group<br>● Clear the detailed status group |

## 5-1-2 Control of the Interrupt from PC to Board

Here is the procedure for the user application to interrupt the CompoNet Master Board.

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the interrupt cause.<br>(Generate an interrupt.) | In the Interrupt Trigger register (0x0002), set a flag of interrupt cause to have into 1. |
| 2. | Confirm the completion of interrupt process.<br>(Confirm the Board completes the interrupt process.) | In the Interrupt Request Confirmation register (0x0003), confirm that the interrupt cause flag which was set to 1 in Step 1 turns to 0. (It remains 1 during interrupt but turns to 0 when the interrupt completes.) |

## 5-1-3 Control of the Interrupt from Board to PC

Here is the procedure by which to process interrupts from the CompoNet Master Board to the user application:

[Initial process]

Before you start the communications (or you issue the command OPEN_SYSTEM/OPEN_SYSTEMEX), set the Interrupt Mask (or select to notify the interrupt by causes or to confirm it by polling).

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the Interrupt Mask. | In the Interrupt Mask register (0x0004), set 1 to cause an interrupt, or set 0 not to cause it. |

[Process when an interrupt is made]

When an interrupt is made, you can confirm the interrupt cause and clear the cause.

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Confirm the interrupt cause. | In the Interrupt Cause Indication register (0x0005), confirm the interrupt cause. |
| 2. | Clear the interrupt cause. | In the Interrupt Clear register (0x0006), set the flags corresponding to the generated interrupt causes into 1, and clear the causes. When all interrupt causes are cleared, the interrupt itself is cleared. |

[Process to confirm the interrupt cause by polling]

Confirm the interrupt causes periodically.

Set the bits in the Interrupt Mask corresponding to the causes to be confirmed by the polling into 0.

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Confirm the interrupt causes periodically. | In the Interrupt Cause Indication register (0x0005), confirm the interrupt cause periodically. |
| 2. | Clear the interrupt causes after confirming them. | In the Interrupt Clear register (0x0006), set the flag corresponding to the generated interrupt causes into 1, and clear the causes. |

### 5-1-4 Command Access Control

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the command. | Set the command to notify to the CompoNet Master Board in the Command Area (PC → BD) (0x3200). |
| 2. | Notify the command set. | In the Interrupt Trigger register (0x0002), set the CMD flag to 1. |
| 3. | Confirm that the command set has been notified. | In the Interrupt Request Confirmation register (0x0003), confirm that the CMD flag turns to 0. |
| 4. | Wait for a command acknowledgment (ACK). | In the Interrupt Request Indication register (0x0005), confirm that the CMD_ACK flag turns to 1. (Confirm it by an interrupt or by polling.) |
| 5. | Read the command response. | In the Command Area (BD → PC) (0x3210), the command response from the CompoNet Master Board is stored. Read the response. |
| 6. | Release the command acknowledgment interrupt. | In the Interrupt Clear register (0x0006), set the CMD_ACK flag into 1, and clear the interrupt cause. |

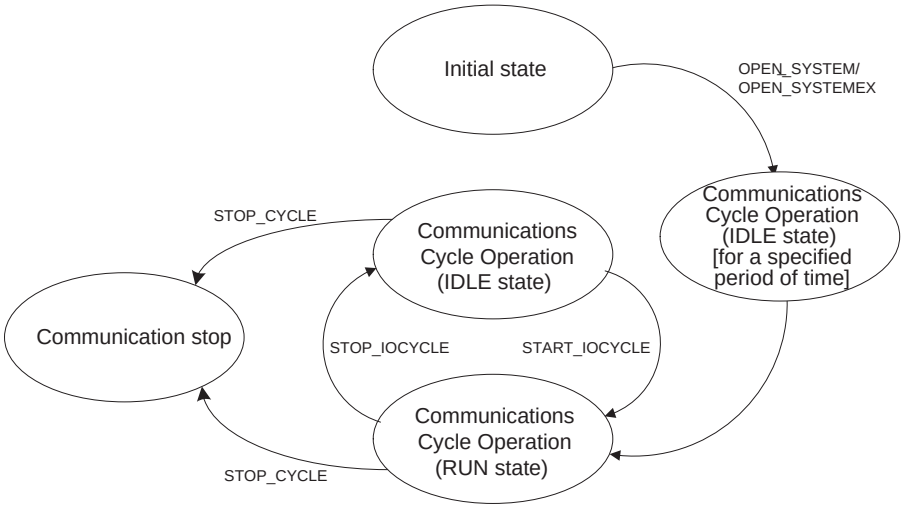
## 5-2 Communications Cycle Control Procedures

### 5-2-1 Outline of the Communications Cycle

CompoNet communications cycles involve exchanges of I/O data and Events.

The state where only Events are exchanged without any transactions of I/O data is called the IDLE state (or the state where I/O communications is stopped and in idle). The state where both I/O data and Events are exchanged is called the RUN state (or the state where I/O communications is running.) The phrase "Communications Cycle Operation" is the general term where the communication is performed in either the IDLE state or the RUN state.

Operation of the CompoNet Master Board makes the state transition as illustrated in below. When you execute the command OPEN_SYSTEM or OPEN_SYSTEMEX, the Board turns from the initial state to the IDLE state, and after some time it changes to the RUN state automatically. (The IDLE state is provided for a certain duration after the Board recognize the Slave Units so that the participation of Slave Units is facilitated.)




These functions are used during the communications cycle operation.

| Function | Description |
|---|---|
| Communications Cycle Control | It is used to control start and stop of communications cycles. |
| Access to I/O Data | Through asynchronous access it merely reads or writes the I/O data area in the shared memory.<br>Through synchronous access it uses an interrupt, controls the access rights and reads or writes the I/O data area. |
| Access to Status | When it accesses to the Basic status group, it merely reads or writes the basic status area in the shared memory. To obtain the basic status synchronous with the I/O data, the access right is controlled at the same time when the I/O data area is accessed.<br>When it accesses to the Detailed status group, it uses the command Request to Read the Detailed Status Group to read it. |
| Access to Event Area | It is to transmit and receive Explicit messages.<br>It uses interrupts as access procedure. |

## 5-2-2 Controls from the Initial Process to Communications Cycle Startup

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Confirm the PCI resources. | Get the base address of shared memory space and the Interrupt line from the Board ID and the contents in the PCI configuration register. |
| 2. | Set the interrupt mask. | Write 0x0000 in the Interrupt Mask (0x0004) of "Board → PC Interrupt", to prevent any interrupts. |
| 3. | Confirm the INIEND (or Notification of Initial process ends) | Poll the Interrupt Cause (0x0005) in "Board → PC Interrupt", and wait until INIEND is 1. After it is confirmed, write 1 in INIEND of the Interrupt Clear register (0x0006) to clear the interrupt cause. |
| 4. | Confirm the initializing ends. | Confirm 0x1703 is stored in the Initialization end notification (0x0010) of the shared memory.<br>If 0x0905 (RAM error) is stored, there may be a hardware error. |
| 5. | Confirm the operation mode. | Check the Running program ID (0x0012) in the shared memory, and confirm the 0xFFFF (OPEN_SYSTEM command wait state) is stored.<br>If any other value is stored, reset the Board by the Board reset (0x0001), and redo from the Step 1. |
| 6. | Set the software table and the data rate. | Set the Software Table (0x3900) and the Data Rate (0x3908) in the setting area group. |
| 7. | Make the detailed settings when the OPEN_SYSTEMEX is used. | When the OPEN_SYSTEMEX is used, set the Logic Error Check Item (0x390A), the Registration Table (0x390C), the Network Parameter (0x4692) and/or the Slave Unit Parameter (0x469C), if any of them is required. |
| 8. | Set the initial value for OUT data if necessary. | To set the initial values in the OUT data, write them in the OUT Data (0x0200) and the Bit OUT Data (0x0280).<br>When no initial values are set, 0 is assigned as the initial value. |
| 9. | Set the commands for OPEN_SYSTEM or OPEN_SYSTEMEX. | Set the command OPEN_SYSTEM or OPEN_SYSTEMEX in the Command area (PC → BD) (0x3200). |
| 10. | Notify the command is set. | Set the CMD flag of the Interrupt Trigger register (0x0002) to 1. |
| 11. | Confirm the command set has been notified. | Confirm the CMD flag of the Interrupt Request Confirmation register (0x0003) changes to 0. |
| 12. | Wait for a command acknowledgment. | Confirm the CMD_ACK flag of the Interrupt Cause register (0x0005) changes to 1. (Check it by an interrupt or polling.) |
| 13. | Read a command response. | Read a command response from the CompoNet Master board, which is stored in the Command area (BD → PC) (0x3210). |
| 14. | Release a command acknowledgment interrupt. | Release the Interrupt cause by setting the CMD_ACK flag of the Interrupt Clear register (0x0006). |

## 5-2-3 Control of I/O Data Access

[Asynchronous access]

Constant reads and writes to and from the I/O Data Group (0x0100) are supported in the normal communications cycles.

[Synchronous access]

Follow these steps in order to use synchronous access:

.

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Notify an access right request. | Set the REQ_ACC flag in the Interrupt Trigger register (0x0002) to 1. |
| 2. | Confirm the REQ_ACC completes the process for this Board. | Confirm, by polling, the REQ_ACC flag in the Interrupt Request Confirmation register (0x0003) changes to 0. |
| 3. | Wait for getting an access right.(This is the case when the REQ_ACC_ACK is confirmed by polling.) | Wait for the REQ_ACC_ACK Interrupt Cause in the Interrupt Cause Indication register (0x0005) to be 1 periodically. |
| 4. | Clear the Interrupt cause after confirming it. | Set the REQ_ACC_ACK flag of the Interrupt Clear register (0x0006) to 1 and clear the interrupt cause. |
| 5. | Read and write I/O data. | Read and write I/O data from and to the I/O Data Group (0x0100). |
| 6. | Notify a release of the access right. | Set the REQ_REF flag in the Interrupt Trigger register (0x0002) to 1. |
| 7. | Confirm the REQ_REF completes the process for this Board. | Confirm the REQ_REF flag in the Interrupt Request Confirmation register (0x0003) turns to 0. |

## 5-2-4 Control of Status Access

[Access to Basic Status Group]

Constant reads and writes to and from the Basic Status Group (0x0042) are supported in the normal communications cycles.

[Access to Detailed Status Group]

Follow these steps in order to read the Detailed Status Group:

.

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the command REQUEST_STATUS. | Select the status to read into the CompoNet Master Board as the argument of Command area (PC → BD) (0x3200). Set the command REQUEST_STATUS. |
| 2. | Notify the command is set. | Set the CMD flag of the Interrupt Trigger register (0x0002) to 1. |
| 3. | Confirm the command set has been notified. | Confirm the CMD flag of the Interrupt Request Confirmation register (0x0003) changes to 0. |
| 4. | Wait for a command acknowledgment. | Confirm the CMD_ACK flag of the Interrupt Request Indication register (0x0005) changes to 1. (Check it by an interrupt or polling.) |

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 5. | Read a response for the command REQUEST_STATUS. | The REQUEST_STATUS command response from the CompoNet Master Board is stored in the Command area (BD → PC) (0x3210). Read it. |
| 6. | Release the command acknowledgment interrupt. | Set the CMD_ACK flag of the Interrupt Clear register (0x0006) to 1, to clear the interrupt cause. |
| 7. | Read the Detailed status group. | The statuses (0x0300 and following) that are requested to read are stored in the shared memory. Read them. |

[Clear the Detailed Status Group]

Among the statuses in the Detailed status group, the error log, the error counter and the Master status can be reset to clear. (The Master status here refers to the maximum communication cycle time, the cumulative CRC reception error and the cumulative code reception error.)

Follow these steps to clear them:

.

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the command REQUEST_ RESETSTATUS. | Select the item to clear from the CompoNet Master Board as the argument of Command area (PC → BD) (0x3200). Set the command REQUEST_RESETSTATUS. |
| 2. | Notify the command is set. | Set the CMD flag of the Interrupt Trigger register (0x0002) to 1. |
| 3. | Confirm the command set has been notified. | Confirm the CMD flag of the Interrupt Request Confirmation register (0x0003) changes to 0. |
| 4. | Wait for a command acknowledgment. | Confirm the CMD_ACK flag of the Interrupt Request Indication register (0x0005) changes to 1. (Check it by an interrupt or polling.) |
| 5. | Read a command response REQUEST_ RESETSTATUS. | The REQUEST_RESETSTATUS command response from the CompoNet Master Board is stored in the Command area (BD → PC) (0x3210). Read it. |
| 6. | Release the command acknowledgment interrupt. | Set the CMD_ACK flag of the Interrupt Clear register (0x0006) to 1, to clear the interrupt cause. |

## 5-2-5 Control of Event Access

Follow these steps to transmit and/or receive Explicit messages.

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set an Explicit message. | Store an Explicit message in the Event area (PC → BD) (0x3300). |
| 2. | Notify an event transmission. | Set the SND flag of the Interrupt Trigger register (0x0002) to 1. |
| 3. | Confirm the SND completes the process for this Board. | Confirm, by polling, the SND flag of the Interrupt Request Confirmation register (0x0003) changes to 0. |

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 4. | Wait the notice to tell event capturing completes. (This is the case when the SND_ACK is confirmed by polling.) | Wait that the SND_ACK Interrupt cause of the Interrupt Cause Indication register (0x0005) changes to 1 periodically. |
| 5. | Clear the Interrupt cause after confirming it. | Set the SND_ACK flag of the Interrupt Clear register (0x0006) to 1, to clear the interrupt cause. |
| 6. | Wait for an Explicit message response. (This is the case when the BD_SND is confirmed by polling.) | Confirm, by polling, the BD_SND Interrupt cause of the Interrupt Cause Indication register (0x0005) changes to 1 periodically. |
| 7. | Clear the Interrupt cause after confirming it. | Set the BD_SND flag of the Interrupt Clear register (0x0006) to 1, to clear the interrupt cause. |
| 8. | Notify the reception completed. | Set the BD_SND_ACK flag of the Interrupt Trigger register (0x0002) to 1. |
| 9. | Confirm the BD_SND_ACK has been completely processed on this Board. | Confirm, by polling, the BD_SND_ACK flag of Interrupt Request Confirmation register (0x0003) changes to 0. |
| 10. | Read the Explicit message response. | Explicit message response is stored in the Event areas (BD → PC) (0x3600). Read it. |

# 5-3 Setting the Time Information

CompoNet Master Board can save the error occurrence time at the same time when it saves the error log in its internal nonvolatile memory. To keep the correct time, the time information must be notified from the user application to the Board periodically. The time information can be written at any time.

# 5-4 Implementing the Reset Request

To use the Reset service of Identity Objects, a logic must be programmed so that the user application can reset the Board after the CompoNet Master Board requests a reset. (The logic is not required if you do not use the Reset service of Identity Objects.)

[Initial Process]

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the Interrupt mask. | Set the REQ_RES flag of the Interrupt Mask register (0x0004) to 1. (Set it to 0 when the REQ_RES is confirmed by polling periodically.) |

[REQ_RES by interrupts]

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Confirm the Interrupt cause. | Confirm the cause of REQ_RES interrupt in the Interrupt Request Indication register (0x0005). |
| 2. | Clear the Interrupt cause. | Set the REQ_RES flag of the Interrupt Clear register (0x0006) to 1. |
| 3. | Wait for 1 second. | Have a WAIT for 1 second. |
| 4. | Reset the Board. | Write 1 in the Board Reset (0x0001) and reset the Board. |
| 5. | Process after the reset. | Redo the steps in Section 5-2-2. |

**Precautions for Correct Use**

A program must be made to reset the Board no earlier than 1 second after a Board reset request is received.

# 5-5 PC Watchdog Timer

The PC Watchdog Timer enables the Board communications to stop automatically following the stop of the user application that controls the Board. When the Timer is enabled, the communications stops automatically if the user application does not update the Timer value for a certain time period. In other word, you have to be sure the user application updates the Timer value periodically so that the normal operation is notified to the Board.

[Enabling the PC Watchdog Timer]

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the command SET_PC_WDT. | Set the time-out value for CompoNet Master Board in the Command area (PC → BD) (0x3200) to set the command SET_PC_WDT. |
| 2. | Notify that the command is set. | Set the CMD flag of the Interrupt Trigger register (0x0002) to 1. |
| 3. | Confirm that the command set has been notified. | Confirm the CMD flag of the Interrupt Request Confirmation register (0x0003) changes to 0. |
| 4. | Wait for a command acknowledgment. | Confirm the CMD_ACK flag of the Interrupt Request Indication register (0x0005) changes to 1. (Confirm by an interrupt or by polling.) |
| 5. | Read the command response SET_PC_WDT. | The command response SET_PC_WDT from CompoNet Master Board is stored in Command area (BD → PC) (0x3210). Read it. |
| 6. | Release the command acknowledgment interrupt. | Set the CMD_ACK flag in Interrupt Clear register (0x0006) to 1, to clear the interrupt cause. |

[Disabling the PC Watchdog Timer]

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the command SET_PC_WDT. | Set the time-out value for CompoNet Master Board in the Command area (PC → BD) (0x3200) to 0. This is used to set the command SET_PC_WDT. |
| 2. | Notify that the command is set. | Set the CMD flag of the Interrupt Trigger register (0x0002) to 1. |
| 3. | Confirm that the command set has been notified. | Confirm the CMD flag of the Interrupt Request Confirmation register (0x0003) changes to 0. |
| 4. | Wait for a command acknowledgment. | Confirm the CMD_ACK flag of the Interrupt Request Indication register (0x0005) changes to 1. (Confirm it by an interrupt or by polling.) |
| 5. | Read the command response SET_PC_WDT. | The command response SET_PC_WDT form CompoNet Master Board is stored in Command (BD → PC) (0x3210). Read it. |
| 6. | Release the command acknowledgment interrupt. | Set the CMD_ACK flag of the Interrupt Clear register (0x0006) to 1, to clear the interrupt cause. |

[Refreshing the PC Watchdog Timer]

The PC Watchdog Timer must be refreshed within the certain time interval set in the Timer.

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the PC_WDT interrupt. | Set the PC_WDT flag of the Interrupt Trigger register (0x0002) to 1. |
| 2. | Confirm that the interrupt completes.(This step can be skipped without causing a problem.) | Confirm the PC_WDT flag of interrupt Request Confirmation register (0x0003) changes to 0. |

## 5-6 Board Hardware Error Notification

The Board Hardware Error Notification is intended to notify the user application of an operation stop due to a hardware error on the CompoNet Master Board.

[Initial process]

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Set the Interrupt Mask. | Set the BD_WDT of the Interrupt Mask register (0x0004) to 1.<br>(Set it to 0 when the BD_WDT is confirmed by polling periodically.) |

[BD_WDT by an interrupt]

| Step | Operation procedure | Access to Shared Memory |
|---|---|---|
| 1. | Confirm the interrupt cause. | Confirm the BD_WDT interrupt cause in Interrupt Cause Indication register (0x0005). |
| 2. | Clear the interrupt cause. | Set the BD_WDT flag of the Interrupt Clear register (0x0006) to 1. |
| 3. | Error solution process | Implement the solution of the error by the user application. |

# SECTION 6
# Troubleshooting

# 6-1 LED Indications and Error Handling

CompoNet Master Board has two LED indicators: MS LED for Board status and NS LED for network status. They indicate an error occurrence and the error content.

This section explains the LED indicators and how to handle the errors. The explanation assumes that the CompoNet Master Board has been set up properly.

## 6-1-1 Identifying Errors

An error is identified in the following sequence:

1. Knowing the error

   Monitor the lightning pattern of the LED Indicators. Know whether the error is on the CompoNet Master Board (MS LED) or the Network (NS LED).

   ↓

2. Identifying the error content

   Read the Basic status group and the Detailed status group in the CompoNet Master Board. Identify the error location and the content.
   In the Windows operation systems, use the API functions to read the status groups.
   In other environments, access to the Shared memory area.

   ↓

3. Detecting the error cause

   Compare the Error occurrence factors and the on-site situation. Detect and eliminate the cause.

   ↓

4. Solving the error.

   Confirm the system state on the Board operation after detecting an error and the required operation for solving the error on the Action to be taken. Reset the system operation to normal.

The subsequent sections explain the error identifying function on the CompoNet Master Board, the operation after detecting an error and the actions to be taken.

## 6-1-2 LED Indication During Normal Operation

| MS | NS | State | Meaning |
|---|---|---|---|
| ● | ● | Power not supplied | The power is not supplied. |
| ◎ Green | ● | Wait for startup | It waits for a startup by the user application. |
| ○ Green | ● | Communications stopped | The communications stops.<br>The state is achieved when the user application explicitly requests a communications stop. |
| ○ Green | ◎ Green | Idle state | The communications has been started, but the I/O communications stops. (Can have explicit messaging.) The state is achieved when the Slave Unit participation is prioritized to the I/O communications at the communications startup or when the user application explicitly requests an idle state. |
| ○ Green | ○ Green | I/O communications | The I/O communications is active. (It can have explicit messaging as well.) |

LED indication: ○ Light, ◎ Flash, ● Unlit

## 6-1-3 LED Indication at Errors and Actions to Be Taken

| MS | NS | Error | Possible cause | Board operation after error detection | Action to be taken |
|---|---|---|---|---|---|
| ○ Red | ● | Hardware error | One of the following occurs<br>• Self-diagnosis at power-on had a hardware error.<br>• A Board WDT error occurs. | CompoNet Master Board stops operation and is in standby. | If the same error persists even it is connected to other PC, replace the CompoNet Master Board. |
| ◎ Red | ● | PC Watchdog Timer error | PC WDT function detects a PC WDT error.<br>(PC application stops.) | CompoNet Master Board stops communications. | Restart the PC application or the PC itself. |
| ◎ Red | - | EEPROM error | Reading EEPROM failed. | Board starts up with all data of Identity Objects in 0. | Replace the CompoNet Master Board. |
| - | ○ Red | Network error | One of the following occurs<br>• Duplication error on Slave Units,<br>• Slave Unit has an failure stop due to unstable communications. | All system operations continue. | Identify which error it is among the StateStatus of the Basic status group. |
| - | ◎ Red | Communications error | One of the following occurs<br>• Communications error on Slave Unit,<br>• Configuration error on Repeater Unit,<br>• Registration comparison error,<br>• Communications stop due to communications error | All system operations continue.<br>Communications stops only when a communications stop due to communications error occurs. | Identify which error it is among the StateStatus of the Basic status group. |

LED indication: ○ Light, ◎ Flash, ● Unlit, -- Not applicable

### 6-1-4 Error Identification by StateStatus

The errors monitored by NS Indicator lighting or flashing are identifiable by StateStatus of the Basic status group.

In the Windows operation systems, use the function CPNT_GetStatus to access the Basic status group.

In other environment, access to the shared memory area directly.

| LED | StateStatus | | How to identify the errors |
|---|---|---|---|
| | Bit | Error | |
| NS Red light | 3 | Slave duplication error occurred | Identify the erroneous Slave or Repeater Unit by the Duplication error flag of Detailed status group.<br>Note : This error occurs not only due to a duplication but also when a Slave Unit stops because of unstable communications. If the address duplication is not the cause, check the wiring or the terminators around the erroneous Slave Unit. |
| | 5 | Repeater duplication error occurred | |
| NS Red flash | 0 | Communications error occurred on a Slave Unit | Identify the erroneous Slave or Repeater Unit by the Communications error flag of the Basic status group. |
| | 4 | Communications error occurred on a Repeater Unit | |
| | 1 | Registration Table comparison error occurred | Identify the erroneous Slave Unit by the Registration error (Registered Slave not participating) flag or the Registration error (Non-registered Slave participating) flag in the Detailed status group. |
| | 2 | Communications stop due to communications error occurred | Identify the erroneous Slave Unit by the Node causing a communications stop of the Master status in the Detailed status group. |

## 6-2 Error Log

The Error log keeps record of the errors and occurrence time when the CompoNet Master Board detects an error. The records (or error log) can be read or cleared by the Detailed status group.

### 6-2-1 Error Log Table

**Error Log Table**

Errors are saved in the Error Log Table in the CompoNet Master Board RAM. One error is counted as one record in the table. A maximum of 64 records can be saved. When the table is full with 64 records, the oldest error record is discarded to replace it with the next coming error.

The Error Log Table saves the following information:

- Error code,
- Detailed code, and
- Date when the error occurred (this data uses the time information notified by the user application)

**Error Log Saving Area**

When an error is detected, it is saved, along with the time when the error occurred, as an error in the CompoNet Master Board RAM.

Some errors are fatal and they are also saved in the EEPROM. Those error logs saved in the EEPROM are retained even after the CompoNet Master Board is shutdown or reset. The logs in the EEPROM are copied in the RAM, when the CompoNet Master Board is started up.
The logs in the EEPROM are copied in the RAM, when the CompoNet Master Board is started up.

It is only the error logs in RAM that can be read by reading function. But the error logs both in RAM and in the EEPROM are cleared by clearing function.

**Reading or Clearing the Error Log Table**

The Error Log Tables can be read or cleared by the Detailed status group.

**Precautions for Correct Use**

To keep the time of error occurrence, the Board uses the time information notified periodically by the user application.
When no time information is given by the user application, 0 is entered as the time of error occurrence in the error log.

## 6-2-2 Error Code and Description List

| Error Code | Description | Detailed Information | | EEPROM |
|---|---|---|---|---|
| | | 1st byte | 2nd byte | |
| 0x0001 | PC_WDT Error<br>[Cause]<br>PC WDT is timed out. | 0x00 | 0x00 | Yes |
| 0x0370 | Registration Error (Registered Slave not participating)<br>[Cause]<br>A Slave Unit that was registered to the Registration table has not participated yet. | 0x00 | 0x00 | No |
| 0x0372 | Registration Error (Non-registered Slave participating)<br>[Cause]<br>A Slave Unit that was not registered to the Registration table is now on the network. | 0x10: Word IN Slave Unit<br>Word MIX Slave Unit<br>0x20: Word OUT Slave Unit<br>0x40: Bit IN Slave Unit<br>Bit MIX Slave Unit<br>0x50: Bit OUT Slave Unit | Node address (Hex) | No |
| 0x0374 | Communications Error<br>[Cause]<br>A Slave Unit or Repeater Unit has separated. | 0x10: Word IN Slave Unit<br>Word MIX Slave Unit<br>0x20: Word OUT Slave Unit<br>0x40: Bit IN Slave Unit<br>Bit MIX Slave Unit<br>0x50: Bit OUT Slave Unit<br>0x70: Repeater Unit | Node address (Hex) | No |

| Error Code | Description | Detailed Information | | EEPROM |
|---|---|---|---|---|
| | | 1st byte | 2nd byte | |
| 0x0375 | Communication Stop due to a Communications Error<br>[Cause]<br>A communications error occurs when the Communications Stop due to Communications Error Function is enabled. | 0x10: Word IN Slave Unit<br>Word MIX Slave Unit<br>0x20: Word OUT Slave Unit<br>0x40: Bit IN Slave Unit<br>Bit MIX Slave Unit<br>0x50: Bit OUT Slave Unit | Node address (Hex) | Yes |
| 0x0376 | Address Duplication Error<br>[Cause]<br>There are plural Slave Units on the network whose addresses duplicate.<br>Or the communications is unstable and Slave Units are in the state of communications fault | 0x10: Word IN Slave Unit<br>Word MIX Slave Unit<br>0x20: Word OUT Slave Unit<br>0x40: Bit IN Slave Unit<br>Bit MIX Slave Unit<br>0x50: Bit OUT SlaveUnit<br>0x70: Repeater Unit | Node address (Hex) | No |
| 0x0378 | Illegal Repeater or Configuration error<br>[Cause]<br>Repeater Unit requesting to participate in the network exceed the permitted number of Repeater Unit segments, which is 2. | 0x10: Word IN Slave Unit<br>Word MIX Slave Unit<br>0x20: Word OUT Slave Unit<br>0x40: Bit IN Slave Unit<br>Bit MIX Slave Unit<br>0x50: Bit OUT Slave Unit<br>0x70: Repeater Unit | Node address (Hex) | No |
| 0x0601 | Illegal Interrupt<br>[Cause]<br>A hardware error occurs. | 0x00 | Indefinite value | Yes |
| 0x0602 | Memory Error<br>[Cause]<br>An error occurs in access to EEPROM. | 0x01: Read error<br>0x02: Write error | 0x06: Error log<br>0x09: Identity information | Yes<br>(No for Error log only) |

# APPENDIX A
# API Function Reference

# A-1 Function List

This section describes API functions provided by DLL.

## A-1-1 Board Control API Functions

They provide the initial and final processing for CompoNet Master Board. This includes opening or closing a specified board.

| API function | Description |
|---|---|
| CPNT_Open | To open a specified board |
| CPNT_Close | To close a specified board |
| CPNT_Reset | To reset a specified board |
| CPNT_IsExistBoard | To check whether a specified board is installed |

## A-1-2 Communications Control API Functions

They provide communications functions such as starting or stopping the communications cycle and changing the communications state (i.e., starting or stopping the I/O cycles).

| API function | Description |
|---|---|
| CPNT_StartCycle | To start the communications cycle |
| CPNT_StartCycleEx | To start the communications cycle (in detailed setting) |
| CPNT_StopCycle | To stop the communications cycle |
| CPNT_ChangeToRunState | To make a transit to RUN state.<br>(Or to start the I/O cycle) |
| CPNT_ChangeToIdleState | To make a transit to IDLE state.<br>(Or to stop the I/O cycle) |

## A-1-3 Status Access API Functions

They confirm the version of CompoNet Master Board and the driver, and to read status, and to write time information.

| API function | Description |
|---|---|
| CPNT_GetBoardVersion | To get the board version |
| CPNT_GetDriverVersion | To get the driver version |
| CPNT_GetStatus | To read the Basic status group |
| CPNT_GetStatusEx | To read the Detailed status group |
| CPNT_ResetStatusEx | To clear the Detailed status group |
| CPNT_SetDateTime | To write the time information |

## A-1-4 I/O Data Access API Functions

These access the I/O data.

| API function | Description |
|---|---|
| CPNT_GetAccessToIO | To get an access right to I/O data |
| CPNT_ReleaseAccessToIO | To release the access right to I/O data |
| CPNT_GetInData | To read the IN data from IN Slave Unit |
| CPNT_GetBitInData | To read the Bit IN data from Bit IN Slave Unit |
| CPNT_SetOutData | To set the OUT data in OUT Slave Unit |
| CPNT_SetBitOutData | To set the Bit OUT data in Bit OUT Slave Unit |

## A-1-5 Explicit Messaging API Functions

These provide Explicit messaging services.

| API function | Description |
|---|---|
| CPNT_SendExplicit | To send an Explicit message |
| CPNT_PeekExplicit | To confirm an Explicit message response |
| CPNT_RegReceiveExplicitNotifyMessage | To register the notice that an Explicit response message is received |
| CPNT_UnRegReceiveExplicitNotifyMessage | To unregister the notice that an Explicit response message is received |
| CPNT_ReceiveExplicit | To read the Explicit response message |

## A-1-6 PC Watchdog Timer API Functions

These provide the PC Watchdog Timer function.

| API function | Description |
|---|---|
| CPNT_EnablePCWDTTimer | To enable or disable the PC Watchdog Timer |
| CPNT_RefreshPCWDTTimer | To refresh the PC Watchdog Timer value |

## A-1-7 Board Request Notification API Functions

These notify messages from CompoNet Master Board.

| API function | Description |
|---|---|
| CPNT_RegBDWDTNotifyMessage | To set that a hardware error of the Board is notified via a Windows message |
| CPNT_UnRegBDWDTNotifyMessage | To release the setting where a hardware error of the Board is notified via a Windows message |
| CPNT_RegRESETNotifyMessage | To set that a reset request made by the Board is notified via Windows message |
| CPNT_UnRegRESETNotifyMessage | To release the setting where a reset request made by the Board is notified via Windows message |

# A-2 Board Control API

## A-2-1 CPNT_Open (Open Board)

**Purpose**

Open the Board that has the specified ID, and enable it for use.

**Call Format**

HANDLE CPNT_Open(WORD BoardId) ;

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| WORD | BoardId | IN | ID of Board to be opened Specified range: 0x0 to 0x9 (0 to 9) |

**Returned value**

When the function succeeds, the open device handle is returned.
If it fails or when no Board with the specified ID exists, INVALID_HANDLE_VALUE is returned.
Then use the function GetLastError to obtain detailed error content.

**Remarks**

- The Board must be opened first in order to be used.
- One Board can be opened only by one application or one process.
- The Board ID is the value set by the rotary switch on the Board.

## A-2-2 CPNT_Close (Close Board)

**Purpose**

Close the Board which has the specified ID, and disable it to use.

**Call Format**

BOOL CPNT_Close(HANDLE Handle) ;

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

With this function, the Board is reset at the same time when the device handle is closed.
All data that has been set is cleared.
Be sure to complete any processes required for the application prior to this function.

## A-2-3 CPNT_Reset (Reset Board)

**Purpose**

Rest the Board of the specified device handle.

**Call Format**

BOOL CPNT_Reset(HANDLE Handle) ;

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

- With this function, the Board is reset. All data that has been set is cleared. Handle is not closed.
- With this function, the communications cycles have stopped. To resume the communications, execute the function CPNT_StartCycle or CPNT_StartCycleEx.

## A-2-4 CPNT_IsExistBoard (Check Board Existence)

**Purpose**

Check if the Board which has the specified Board ID is installed.

**Call Format**

BOOL CPNT_IsExistBoard(WORD BoardId) ;

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| WORD | BoardId | IN | ID of Board whose existence is checked<br>Specified range: 0x0 to 0x9 (0 to 9) |

**Returned value**

It returns TRUE when the Board of specified ID exists.

It returns FALSE when an error occurs, when no Board with specified ID exists or when the Board of specified ID is opened by other process.

The error details can be obtained with the function GetLastError.

**Remarks**

- This function is used to check the IDs of mounted Boards.
- The Board ID is set by the rotary switch on the Board.

# A-3 Communications Control API

## A-3-1 CPNT_StartCycle (Start Communications Cycles)

**Purpose**

Start the communications cycles.

**Call Format**

```
BOOL CPNT_StartCycle(
        HANDLE Handle,
        CPNT_SOFTWARE_TABLE *SoftwareTable,
        WORD DataRate
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| CPNT_SOFTWARE_TABLE | *SoftwareTable | IN | Specify the number of occupied nodes. |
| WORD | DataRate | IN | Specify the data rate.<br>0: 4 Mbps<br>1: 3 Mbps<br>2: 1.5 Mbps<br>3: 93.75 kbps |

**Returned value**

It returns TRUE when the function succeeds.

It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

This function is used to start the communications cycles.

The function cannot be executed while the communications cycles are running.

CPNT_SOFTWARE_TABLE structure

| Type | Parameter | Description |
|---|---|---|
| WORD | OutNode | Specify the maximum number of occupied Word OUT Slave Units.<br>Settable range: 0 to 64 |
| WORD | InNode | Specified the maximum number of occupied Word IN Slave Units.<br>Settable range: 0 to 64 |
| WORD | BitOutNode | Specified the maximum number of occupied Bit OUT Slave Units.<br>Settable range: 0 to 128 |
| WORD | BitInNode | Specified the maximum number of occupied Bit IN Slave Units.<br>Settable range: 0 to 128 |

## A-3-2 CPNT_StartCycleEx (Start Communications Cycles in the Detailed Setting)

**Purpose**

Start the communications cycles in the detailed setting.

**Call Format**

```
BOOL CPNT_StartCycleEx(
        HANDLE Handle,
        CPNT_SOFTWARE_TABLE*SoftwareTable,
        WORD DataRate,
        CPNT_EX_TABLE *ExTable,
        WORD EnableList
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| CPNT_SOFTWARE_TABLE | *SoftwareTable | IN | Specify the number of occupied nodes. |
| WORD | DataRate | IN | Specify the data rate.<br>0: 4 Mbps<br>1: 3 Mbps<br>2: 1.5 Mbps<br>3: 93.75 kbps |
| CPNT_EX_TABLE | *ExTable | IN | Specify the detailed setting table. |
| WORD | EnableList | IN | Specify the detailed setting to be used. |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

This function is used to start the communications in the detailed setting.
The function cannot be executed during the communications cycles.

Enable List

| Bit | Flag | Description |
|---|---|---|
| 0 | Communications stop due to communications error function flag | 0 (OFF): Disabled<br>1 (ON): Enabled |
| 1 | I/O communications manual startup function flag | 0 (OFF): Disabled<br>1 (ON): Enabled |
| 2 | IN data zero clear due to communications error function flag | 0 (OFF): Disabled<br>1 (ON): Enabled |
| 3 to 7 | Reserved area | Always set to 0 (OFF) |
| 8 | Registration table function flag | 0 (OFF): Disabled<br>1 (ON): Enabled<br>When it is enabled, set the necessary data to the structure CPNT_EX_TABLE. |

| Bit | Flag | Description |
|---|---|---|
| 9 | Logical error checking item flag | 0 (OFF): Disabled<br>1 (ON): Enabled<br>This is used to set the items to be checked when a Slave Unit re-participates after a communications error.<br>When it is enabled, set the necessary data to the structure CPNT_EX_TABLE. When it is disabled, all items are checked. |
| 10 | Network parameter function flag | 0 (OFF): Disabled<br>1 (ON): Enabled<br>This is the network setting for CompoNet Master Board. When it is enabled, set the necessary data to the structure CPNT_EX_TABLE. |
| 11 | Slave Unit parameter function flag | 0 (OFF): Disabled<br>1 (ON): Enabled<br>This is used to set the notification to a Slave Unit, when it participates. When it is enabled, set the necessary data to the structure CPNT_EX_TABLE. |
| 12 to 15 | Reserved area | Always set 0 (OFF). |

CPNT_SOFTWARE_TABLE structure

| Type | Parameter | Description |
|---|---|---|
| WORD | OutNode | Specify the maximum number of occupied Word OUT Slave Units.<br>Settable range: 0 to 64 |
| WORD | InNode | Specify the maximum number of occupied Word IN Slave Units.<br>Settable range: 0 to 64 |
| WORD | BitOutNode | Specify the maximum number of occupied Bit OUT Slave Units.<br>Settable range: 0 to 128 |
| WORD | BitInNode | Specify the maximum number of occupied Bit IN Slave Units.<br>Settable range: 0 to 128 |

CPNT_EX_TABLE structure

| Type | Parameter | Description |
|---|---|---|
| CPNT_REGIST_TABLE | RegTable | Set it when the Registration table function is enabled. |
| WORD | LogicalCheck | Set it when the Logical error checking item flag is enabled. |
| CPNT_NET_PARAM | NetParam | Set it when the Network parameter function flag is enabled. |
| CPNT_SLAVE_PARAM | SlaveParam | Set it when the Slave Unit parameter function flag is enabled. |

LogicalCheck

| Bit | Flag | Description |
|---|---|---|
| 0 | VendorCode | 0 (OFF): Not Checked<br>1 (ON): Checked |
| 1 | DeviceType | |
| 2 | ProductCode | |
| 3 | MajorRevision | |
| 4 to 15 | Reserved area | Always set 0 (OFF). |

CPNT_NET_PARAM structure

| Type | Parameter | Description |
|---|---|---|
| WORD | EventEnable | 0x0000: Event enabled<br>0x0001: Event disabled<br>When the event function is disabled, the communications cycle becomes shorter. Explicit messages, however, cannot be sent to Slave Units or Repeater Units. |
| WORD | SlaveEveTime | This is the time to monitor events forwarded to Slave Units.<br>Settable range: 0 to 65535 ms<br>(0 is to select the default (2000ms)) |

CPNT_SLAVE_PARAM structure

| Type | Parameter | Description |
|---|---|---|
| WORD | PollTimeOut | This is the time for the Slave Unit to monitor the event.<br>The Master Board notifies the Slave Unit when a Slave Unit participates.<br>Settable range: 0 to 65535 s (0 is to select the default (2s).) |
| WORD | IoTimeOut | This is the time for the Slave Unit to time out the communications.<br>The Master Board notifies the Slave Unit when a Slave Unit participates.<br>Settable range: 0 to 65535 ms<br>(Setting it to 0 will select the default.)<br>Default: 50 ms (163 ms at the data rate of 93.75 K) |

CPNT_REGIST_TABLE structure

<table>
<tr><th>Type</th><th>Parameter</th><th>Description</th></tr>
<tr><td>WORD</td><td>RunSet</td><td>This is used to set the Registration table function.
<table>
<tr><th>Bit</th><th>Flag</th><th>Description</th></tr>
<tr><td>0</td><td>Registration table enabled flag</td><td>Always set it to 1 (ON) when the Registration table is used.</td></tr>
<tr><td>1</td><td>All Registered Slave Participation Standby flag</td><td>0 (OFF): Disabled<br>1 (ON): Enabled</td></tr>
<tr><td>2 to 7</td><td>Reserved area</td><td>Set 0 (OFF).</td></tr>
<tr><td>8</td><td>Communications cycle optimization flag</td><td>0 (OFF): Disabled<br>1 (ON): Enabled</td></tr>
<tr><td>9 to 15</td><td>Reserved area</td><td>Set 0 (OFF).</td></tr>
</table></td></tr>
<tr><td>WORD</td><td>RegTim</td><td>This is the time to monitor participation of registered Slave Units.<br>Set value in units of 10 ms,<br>Settable range: 1 to 65535<br>Setting it to 0 will select the default of 1000 (10000ms).</td></tr>
<tr><td>WORD</td><td>RegSet</td><td>Checking items for the Registration Table
<table>
<tr><th>Bit</th><th>Flag</th><th>Description</th></tr>
<tr><td>0</td><td>VendorCode</td><td rowspan="4">0 (OFF) : Not checked.<br>1 (ON) : Checked.</td></tr>
<tr><td>1</td><td>DeviceType</td></tr>
<tr><td>2</td><td>ProductCode</td></tr>
<tr><td>3</td><td>MajorRevision</td></tr>
<tr><td>4 to 5</td><td>Reserved area</td><td>Set 0 (OFF).</td></tr>
</table></td></tr>
<tr><td>WORD</td><td>IoUnitInfo[384]</td><td>Set the I/O size information.<br>See the "I/O size information format" on the next page for the setting items.
<table>
<tr><td>+0</td><td>Set Word IN0 size (1W)</td></tr>
<tr><td></td><td>to</td></tr>
<tr><td>+63</td><td>Set Word IN63 size (1W)</td></tr>
<tr><td>+64</td><td>Set Word OUT0 size (1W)</td></tr>
<tr><td></td><td>to</td></tr>
<tr><td>+127</td><td>Set Word OUT63 size (1W)</td></tr>
<tr><td>+128</td><td>Set Bit IN0 size (1W)</td></tr>
<tr><td></td><td>to</td></tr>
<tr><td>+255</td><td>Set Bit IN127 size (1W)</td></tr>
<tr><td>+256</td><td>Set Bit OUT0 size (1W)</td></tr>
<tr><td></td><td>to</td></tr>
<tr><td>+383</td><td>Set Bit OUT127 size (1W)</td></tr>
</table></td></tr>
</table>

| Type | Parameter | Description |
|---|---|---|
| WORD | VendorCode[384] | These items must be set when the relevant flags for RegSet are selected to check.<br>Set the values of Slave Unit Identity object information. |
| WORD | DeviceType[384] | |
| WORD | ProductCode[384] | |
| BYTE | MajorRevision[384] | |

I/O size information format

| Bit | Flag | Description |
|---|---|---|
| 0 to 4 | Number of IN channels (points) | Set the number of IN points of Slave Units.<br>Set the Bits 0 to 5 to 0 (OFF), when the number of IN points is zero.<br>=00000: 2 points, =00001: 4 points,<br>=00010: 8 points, =00011: 16 points,<br>=00100: 32 points, =00101: 48 points,<br>=00110: 64 points, =00111: 80 points,<br>=01000: 96 points, =01001: 112 points,<br>=01010: 128 points, =01011: 144 points,<br>=01100: 160 points, =01101: 176 points,<br>=01110: 192 points, =01111: 208 points,<br>=10000: 224 points, =10001: 240 points,<br>=10010: 256 points, others: prohibited |
| 5 | IN setting enabling flag | 0: Disabling IN number setting<br>1: Enabling IN number setting |
| 6 to 7 | Reserved area | Set 0 (OFF). |
| 8 to 12 | Number of OUT channels | Set the number of OUT points for Slave Units.<br>Set the Bits 8 to 13 to 0 (OFF), when the number of OUT points is zero.<br>=00000: 2 points, =00001: 4 points,<br>=00010: 8 points, =00011: 16 points,<br>=00100: 32 points, =00101: 48 points,<br>=00110: 64 points, =00111: 80 points,<br>=01000: 96 points, =01001: 112 points,<br>=01010: 128 points, =01011: 144 points,<br>=01100: 160 points, =01101: 176 points,<br>=01110: 192 points, =01111: 208 points,<br>=10000: 224 points, =10001: 240 points,<br>=10010: 256 points, others: prohibited |
| 13 | Out setting enabling flag | 0: Disabling OUT number setting<br>1: Enabling OUT number setting |
| 14 | Reserved area | Don't care |
| 15 | Slave-Unit enabling flag | Enable the relevant flag, when a Slave Unit is registered.<br>0: All setting is invalid. (No Slave Unit is registered.)<br>1: All setting is valid. (The Slave is registered.) |

## A-3-3 CPNT_StopCycle (Stop Communications Cycles)

**Purpose** Stop the communications cycles.

**Call Format** BOOL CPNT_StopCycle(HANDLE Handle);

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

It stops the communications cycles.

The function cannot be executed while the communications cycle stops.

There are two ways to resume the communications cycle after it stops once. One is to reset the Board with the function CPNT_Reset and then execute the function CPNT_StartCycle. The other is to close it with the function CPNT_Close and open it again with the function CPNT_Open.

## A-3-4 CPNT_ChangeToRunState (Transition to RUN)

**Purpose**

Make a transition to RUN state.

**Call Format**

BOOL CPNT_ChangeToRunState (HANDLE Handle) ;

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

This is used to start the I/O cycle when it has stopped.
The communications cycles must be running, when this function is executed.
The function cannot be executed while the I/O cycles are running.

## A-3-5 CPNT_ChangeToIdleState (Transition to IDLE)

**Purpose**

Make a transition to IDLE state.

**Call Format**

BOOL CPNT_ChangeToIdleState (HANDLE Handle) ;

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

This is used to stop the I/O cycles while it is running.
The communications cycles must be running, when this function is executed.
The function cannot be executed while the I/O cycle stops.

# A-4 Status Access API

## A-4-1 CPNT_GetBoardVersion (Get Board Version)

**Purpose**

Get the Board version.

**Call Format**

```
BOOL CPNT_GetBoardVersion (
        HANDLE Handle,
        BOARD_VERSION_INFO *VersionInfo
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| BOARD_VERSION_INFO | *VersionInfo | OUT | Pointer to store the version information |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

This is used to read the Identity object information of CompoNet Master Board.

BOARD_VERSION_INFO structure

| Type | Parameter | Description |
|---|---|---|
| WORD | VendorCode | Company code of the Board manufacture,<br>It is 0x002F. |
| WORD | DeviceType | Device type of the Board,<br>It is 0x000C. |
| WORD | ProductCode | Product code of the Board.<br>It is 0x0015 for the product 3G8F7-CRM21.<br>It is 0x0016 for the product 3G8F8-CRM21. |
| BYTE | MajorVersion | Major board revision |
| BYTE | MinorVersion | Minor board revision |
| DWORD | SerialNumber | Board serial number |
| CHAR | ProductName[32] | Name of the Board,<br>It is 3G8F7-CRM21 for the product 3G8F7-CRM21.<br>It is 3G8F8-CRM21 for the product 3G8F8-CRM21. |

## A-4-2 CPNT_GetDriverVersion (Get Driver Version)

**Purpose**

Get the device driver version.

**Call Format**

```
BOOL CPNT_GetDriverVersion (
        HANDLE Handle,
        DRIVER_VERSION_INFO *VersionInfo
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| DRIVER_VERSION_INFO | *VersionInfo | OUT | Pointer to store the version information |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

This is used to get the version of the Device driver.

DRIVER_VERSION_INFO structure

| Type | Parameter | Description |
|---|---|---|
| WORD | MajorVersion | Major revision of the Device driver |
| WORD | MinorVersion | Minor revision of the Device driver |

## A-4-3 CPNT_GetStatus (Read Basic Status Group)

**Purpose**

Read the Basic status group.

**Call Format**

```
BOOL CPNT_GetStatus (
        HANDLE Handle,
        CPNT_STATUS *Status
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| CPNT_STATUS | * Status | OUT | Pointer to store the basic status |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

This is used to get the Basic status group.
See Section 3-3-1 for the group.
The communications cycles must be running when this function is executed.

CPNT_STATUS structure

| Type | Parameter | Description |
|---|---|---|
| WORD | JoinList[28] | Participation flag |
| WORD | AwayList[28] | Communications error flag |
| WORD | State | StateStatus |

See Appendix B.3.3 for the data format.

## A-4-4 CPNT_GetStatusEx (Read Detailed Status Group)

**Purpose**

Read the Detailed status group.

**Call Format**

```
BOOL CPNT_GetStatusEx (
        HANDLE Handle,
        CPNT_STATUSEX *StatusEx,
        WORD StatusExInfo
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| CPNT_STATUSEX | *StatusEx | OUT | Pointer to store the detailed status |
| WORD | StatusExInfo | IN | Specify the detailed status to read. |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

This is used to read the Detailed status group.
See Section 3.3.2 for the group.
To execute this function, the communications cycles must be running.

CPNT_STATUSEX structure

| Type | Parameter | Description |
|---|---|---|
| WORD | CommunicationFault[28] | Duplication error flag |
| WORD | NonExistentError[24] | Registration error (Registered Slave not participating) flag |
| WORD | UnRegisteredError[24] | Registration error (Non-registered Slave participating) flag |
| WORD | RepeaterError[28] | Repeater configuration error |
| WORD | EventOnly[28] | EO Slave Unit |
| WORD | MasterStatus[9] | Master status |
| WORD | ErrorCounter[224] | Error counter |
| WORD | NetworkPower[1] | Network power state |
| WORD | JoinIdentityTable[2912] | Participated Slave Unit identity table |
| WORD | RepeaterStructure[448] | Repeater configuration information |
| WORD | Alarm[112] | Alarm information |
| WORD | ErrorLog[321] | Error log |
| WORD | Tmp[7] | Reserved area (Content is indefinite) |
| WORD | RegistrationTableSample[1731] | Registration table example |

See Appendix B.3.6 for the data format.

StatusExInfo

| Bit | Flag | Parameter |
|---|---|---|
| 0 | Duplication error flag | 0 (OFF): Not the item to read among the Detailed status group,<br>1 (ON): Item to read among the Detailed status group |
| 1 | Registration error (Registered Slave not participating) flag | |
| 2 | Registration error (Non-registered Slave participating) flag | |
| 3 | Repeater configuration error | |
| 4 | EO Slave Unit | |
| 5 | Master status | |
| 6 | Error counter | |
| 7 | Network power state | |
| 8 | Participated Slave Unit identity table | |
| 9 | Repeater configuration information | |
| 10 | Alarm information | |
| 11 | Error log | |
| 12 to 13 | Reserved area | Set 0 (OFF). |
| 14 | Registration table example | 0 (OFF): Not the item to read among the Detailed status group,<br>1 (ON): Item to read among the Detailed status group |
| 15 | Reserved area | Set 0 (OFF). |

## A-4-5 CPNT_ResetStatusEx (Clear Detailed Status Group)

**Purpose**

Clear the Detailed status group.

**Call Format**

```
BOOL CPNT_ResetStatusEx (
        HANDLE Handle,
        WORD StatusExInfo
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| WORD | StatusExInfo | IN | Specify the items of Detailed status group to clear |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

This is used to request to clear an item in the Detailed status group, which can be cleared.

StatusExInfo

| Bit | Flag | Description |
|---|---|---|
| 0 | Duplication error flag | These statuses cannot be cleared.<br>Set 0 (OFF). |
| 1 | Registration error (Registered Slave not participating) flag | |
| 2 | Registration error (Non-registered Slave participating) flag | |
| 3 | Repeater configuration error | |
| 4 | EO Slave Unit | |
| 5 | Master status | 0 (OFF): Not the item to clear among the Detailed status group,<br>1 (ON): Item to clear among the Detailed status group<br>When the Master status is set to clear, the Maximum communication cycle time, the Cumulative CRC reception errors and the Cumulative code reception error among the Master status are cleared. |
| 6 | Error counter | |
| 7 | Network power state | These statuses cannot be cleared.<br>Set 0 (OFF). |
| 8 | Participated Slave Unit identity table | |
| 9 | Repeater configuration information | |
| 10 | Alarm information | |
| 11 | Error log | 0 (OFF): Not the item to clear among the Detailed status group,<br>1 (ON): Item to clear among the Detailed status group |
| 12 to 13 | Reserved area | Set 0 (OFF). |
| 14 | Registration table example | This status cannot be cleared.<br>Set 0 (OFF). |
| 15 | Reserved area | Set 0 (OFF). |

## A-4-6 CPNT_SetDateTime (Write Time Data)

**Purpose**

Write the time information.

**Call Format**

```
BOOL CPNT_SetDateTime (
        HANDLE Handle,
        CPNT_DATETIME *DateTime
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| CPNT_DATETIME | * DateTime | IN | Set the time data. |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

To execute this function, the communications cycles must be running.

CPNT_DATETIME structure

| Type | Parameter | Description |
|---|---|---|
| BYTE | Sec | Second<br>Settable range: 00 to 59 |
| BYTE | Min | Minute<br>Settable range: 00 to 59 |
| BYTE | Hour | Hour<br>Settable range: 00 to 23 |
| BYTE | Day | Date<br>Settable range: 01 to 31 |
| BYTE | Mon | Month<br>Settable range: 01 to 12 |
| BYTE | Year | Year (The lower two digits in the Western calendar)<br>Settable range: 00 to 99 |

# A-5 I/O Data Access API

## A-5-1 CPNT_GetAccessToIO (Get Access to I/O)

**Purpose**

Get the access right to I/O.

**Call Format**

BOOL CPNT_GetAccessToIO (HANDLE Handle);

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

To execute this function, the I/O communications must be running.
It takes a maximum of one communications cycle to exit this function.

## A-5-2 CPNT_ReleaseAccessToIO (Release Access to I/O)

**Purpose**

Release the access right to I/O.

**Call Format**

BOOL CPNT_ReleaseAccessToIO (HANDLE Handle);

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

To execute this function, the I/O communications must be running.

## A-5-3 CPNT_GetInData (Get IN Data from Word IN Slave Unit)

**Purpose**

Read the IN data from Word IN Slave Units.

**Call Format**

```
BOOL CPNT_GetInData(
        HANDLE Handle,
        WORD *IN,
        WORD WordOffset,
        WORD WordSize
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open. |
| WORD | *IN | OUT | Specify the pointer to store the IN data.<br>Requires the area equivalent to Word size (128 bytes max) |
| WORD | WordOffset | IN | Specify the Word offset for the IN Slave Unit from which the IN data is started to read.<br>Settable range: 0 to 63 |
| WORD | WordSize | IN | Specify the Word size of the IN data to read.<br>Observe the condition for the set value:<br>(WordOffset + WordSize) $\leq$ 64<br>Settable range: 1 to 64 |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

To execute this function, the I/O communications must be running.
See Appendix B.3.5 for the content of IN data.

## A-5-4 CPNT_GetBitInData (Get Bit IN Data from Bit IN Slave Unit)

**Purpose**

Read the Bit IN data from Bit IN Slave Units.

**Call Format**

```
BOOL CPNT_GetBitInData(
        HANDLE Handle,
        WORD *BitIN,
        WORD WordOffset,
        WORD WordSize
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| WORD | *BitIN | OUT | Specify the pointer to store Bit IN data.<br>Requires the area equivalent to Word size (32 bytes max) |
| WORD | WordOffset | IN | Specify the Word offset for the Bit IN Slave Unit from which the reading of Bit IN data will start.<br>Settable range: 0 to 16 |
| WORD | WordSize | IN | Specify the Word size of the Bit IN data to read.<br>Observe the condition for the set value: (WordOffset + WordSize) ≤ 16.<br>Settable range: 1 to 16 |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

To execute this function, the I/O communications must be running.
See Appendix B.3.5 for the content of Bit IN data.

## A-5-5 CPNT_SetOutData (Set OUT Data in Word OUT Slave Unit)

**Purpose**

Set the OUT data in Word OUT Slave Units.

**Call Format**

```
BOOL CPNT_SetOutData (
        HANDLE Handle,
        WORD *OUT,
        WORD WordOffset,
        WORD WordSize
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| WORD | *OUT | IN | Set the OUT data.<br>Set the data equivalent to Word size. |
| WORD | WordOffset | IN | Specify the Word offset for the OUT Slave Unit to which the OUT data is written.<br>Settable range: 0 to 63 |
| WORD | WordSize | IN | Specify the Word size of the OUT data to write.Observe the condition for the set value:<br>(WordOffset + WordSize) ≤ 64<br>Settable range: 1 to 64 |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

See Appendix B.3.5 for the content of OUT data.

### A-5-6 CPNT_SetBitOutData (Set Bit OUT Data to Bit OUT Slave Unit)

**Purpose**

Set the Bit Out data in Bit OUT Slave Units.

**Call Format**

```
BOOL CPNT_SetBitOutData (
                HANDLE Handle,
                WORD *BitOUT,
                WORD WordOffset,
                WORD WordSize
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| WORD | *BitOUT | IN | Set the Bit OUT data.<br>Set the data equivalent to Word size. |
| WORD | WordOffset | IN | Specify the Word offset for the Bit OUT Slave Unit to which the OUT data is written.<br>Settable range: 0 to 15 |
| WORD | WordSize | IN | Specify the Word size of the Bit OUT data to write.Observe the condition for the set value:<br>(WordOffset + WordSize) ≤ 16<br>Settable range: 1 to 16 |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

See Appendix B.3.5 for the content of Bit OUT data.

## A-6 Explicit Messaging API

### A-6-1 CPNT_SendExplicit (Send Explicit Message)

**Purpose**

Send Explicit Messages.

**Call Format**

```
BOOL CPNT_SendExplicit (
        HANDLE Handle,
        CPNT_EXPLICIT_REQ *ExplicitReq
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| CPNT_EXPLICIT_REQ | *ExplicitReq | IN | Set the message to send. |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks** To execute this function, the communications cycles must be running.

CPNT_EXPLICIT_REQ structure

| Type | Parameter | Description |
|---|---|---|
| BYTE | Sid | This is used to identify to which explicit message a response is addressed. The same value is added to the response of a sent explicit message.<br>Set a certain value for the user application.<br>Settable range: 0 to 255 |
| BYTE | Rsv | Reserved area. Set 0. |
| WORD | DstMacId | MAC address (or the address over CompoNet protocol) of the destination Slave Unit,<br>[For Word IN Slave Unit]<br>MAC address=Node address<br>[For Word OUT Slave Unit]<br>MAC address=64+Node address<br>[For Bit IN Slave Unit]<br>MAC address=128+Node address<br>[For Bit OUT Slave Unit]<br>MAC address=256+Node address<br>[For Repeater]<br>MAC address=384+Node address<br>[For Master]<br>MAC address=448 |
| WORD | ServiceCode | Set the service code of the explicit message. |
| WORD | ClassId | Set the Class ID of the explicit message. |
| WORD | InstanceId | Set the Instance ID of the explicit message. |
| WORD | ServiceDataSize | Set the Service data size (in bytes) of the explicit message.<br>Specified range: 0x0000 to 0x0214 (0 to 532) |
| BYTE | ServiceData[532] | Set the Service data of the explicit message. |

## A-6-2 CPNT_PeekExplicit (Check Response Received)

**Purpose** Check Explicit message responses.

**Call Format** BOOL CPNT_PeekExplicit (HANDLE Handle) ;

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value** It returns TRUE when there is an explicit message response.
It returns FALSE when an error occurs or when there is no response. The error details can be obtained with the function GetLastError.

**Remarks** The function CPNT_SendExplicit must be executed prior to this function.

## A-6-3 CPNT_RegReceiveExplicitNotifyMessage (Register Notice of Explicit Response Message Received)

**Purpose** Register the Windows message which notifies that an Explicit response message is received.

**Call Format**

```
BOOL CPNT_RegReceiveExplicitNotifyMessage(
                HANDLE Handle,
                DWORD ThreadId,
                HWND hWnd,
                UINT Msg
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| DWORD | ThreadId | IN | ID of the thread to notify (No setting: NULL) |
| HWND | hWNd | IN | Window handle to notify (No setting: NULL) |
| UINT | Msg | IN | Notification message (Event ID) |

**Returned value**

It returns TRUE when the message has been successfully registered.
It returns FALSE when both the thread ID and the window handle are null or when an error occurs. Detailed error content can be obtained with GetLastError( ).

**Remarks**

- The value 0 is stored in both of WPARAM and LPARAM of the notified message.
- Set either the thread ID or the window handle. If both are set, an error will be returned and the message will not be registered.

## A-6-4 CPNT_UnRegReceiveExplicitNotifyMessage (Unregister Notice of Explicit Response Message Received)

**Purpose**

Unregister the message to notify when an Explicit response message is received.

**Call Format**

```
BOOL CPNT_UnRegReceiveExplicitNotifyMessage (HANDLE Handle) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the notification message has been successfully unregistered.
It returns FALSE, when an error occurs. Detailed error content can be obtained with GetLastError( ).

**Remarks**

The function CPNT_SendExplicit must be executed in prior to this function.

## A-6-5 CPNT_ReceiveExplicit (Get Explicit Response Message)

**Purpose**

Read the Explicit response message.

**Call Format**

```
BOOL CPNT_ReceiveExplicit (
        HANDLE Handle,
        CPNT_EXPLICIT_RES *ExplicitRes
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| CPNT_EXPLICIT_RES | *ExplicitRes | OUT | Set the pointer to store the response. |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

The function CPNT_SendExplicit must be executed prior to this function.

CPNT_EXPLICIT_RES structure

| Type | Parameter | Description |
|---|---|---|
| BYTE | Sid | Stores the same value as set for Sid of a request. |
| BYTE | Rsv | Reserved area |
| WORD | SrcMacId | MAC address (or the address over CompoNet protocol) of the source Unit of a response,<br>[For Word IN Slave Unit]<br>MAC address=Node address<br>[For Word OUT Slave Unit]<br>MAC address=64+Node address<br>[For Bit IN Slave Unit]<br>MAC address=128+Node address<br>[For Bit OUT Slave Unit]<br>MAC address=256+Node address<br>[Repeater Unit]<br>MAC address=384+Node address<br>[For Master]<br>MAC address=448 |
| WORD | ServiceCode | Stores the Service code of an explicit message. |
| WORD | ServiceDataSize | Stores the Service data size (in bytes) of an explicit message. |
| BYTE | ServiceData[532] | Store the Service data of an explicit message. |

# A-7 PC Watchdog Timer API

## A-7-1 CPNT_EnablePCWDTTimer (Enable PC WDT)

**Purpose**

Enable or disable the PC Watchdog Timer.

**Call Format**

```
BOOL CPNT_EnablePCWDTTimer (
        HANDLE Handle,
        WORD Timer
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| WORD | Timer | IN | Monitoring time:<br>0x0: Disabled the PC WDT.<br>0x1 to 0xFFFF(1 to 65535): Enabled the PC WDT.<br>Monitoring time = The value written on the left x 10 ms |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

See Section 4-7 for the PC WDT function.

## A-7-2 CPNT_RefreshPCWDTTimer (Refresh PC WDT)

**Purpose**

Refresh the PC Watchdog Timer value.

**Call Format**

```
BOOL CPNT_RefreshPCWDTTimer (HANDLE Handle) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

- When the PC WDT function is in use, execute this function to refresh the timer value within a value smaller than the set timer value. If the timer is out without refreshing, the communications cycle stops.
- See Section 4-7 for the PC WDT function.

# A-8 Board Request Notification API

## A-8-1 CPNT_RegBDWDTNotifyMessage (Register Board Hardware Error Message)

**Purpose**

Register the Windows message to notify a Board hardware error.

**Call Format**

```
BOOL CPNT_RegBDWDTNotifyMessage (
                HANDLE Handle,
                DWORD ThreadId,
                HWND hWnd,
                UINT Msg
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| DWORD | ThreadId | IN | ID of the thread to notify (No setting: NULL) |
| HWND | hWnd | IN | Window handle to notify (No setting: NULL) |
| UINT | Msg | IN | Notification message (Event ID) |

**Returned value**

It returns TRUE when the message has been successfully registered.
It returns FALSE when both the thread ID and the window handle are null or when an error occurs. Detailed error content can be obtained with GetLastError( ).

**Remarks**

- This is used to notify the user application of a hardware error when it occurs on the CompoNet Master Board and stops the operation.
- See Section 4-8 for the Board hardware error notification function.
- The value 0 is stored in both of WPARAM and LPARAM of the notified message.
- Set either the thread ID or the window handle. If both are set, an error is returned and the message is not registered.

## A-8-2 CPNT_UnRegBDWDTNotifyMessage (Unregister Board Hardware Error Message)

**Purpose**

Unregister the Windows message to notify a Board hardware error.

**Call Format**

```
BOOL CPNT_UnRegBDWDTNotifyMessage (HANDLE Handle) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the message has been successfully unregistered.
It returns FALSE when an error occurs.
Detailed error content can be obtained with GetLastError( ).

## A-8-3 CPNT_RegRESETNotifyMessage (Register Board Reset Request Message)

**Purpose**

Register the Windows message to request a Board reset.

**Call Format**

```
BOOL CPNT_RegRESETNotifyMessage (
        HANDLE Handle,
        DWORD ThreadId,
        HWND hWnd,
        UINT Msg
) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |
| DWORD | ThreadId | IN | ID of the thread to notify (No setting: NULL) |
| HWND | hWNd | IN | Window handle to notify (No setting: NULL) |
| UINT | Msg | IN | Notification message (Event ID) |

**Returned value**

It returns TRUE when the message has been successfully registered.
It returns FALSE when both the thread ID and the window handle are null or when an error occurs. Detailed error content can be obtained with GetLastError( ).

**Remarks**

- A Board reset request is generated by sending a reset service to the Identity object on the CompoNet Master Board.
- See Section 4-5 for Board rest requests.
- The value 0 is stored in both of WPARAM and LPARAM of the notified message.
- Set either the thread ID or the window handle. If both are set, an error will be returned and the message will not be registered.

## A-8-4 CPNT_UnRegRESETNotifyMessage (Unregister Board Reset Request Message)

**Purpose**

Unregister the Windows message to request a Board reset.

**Call Format**

```
BOOL CPNT_UnRegRESETNotifyMessage (HANDLE Handle) ;
```

**Argument**

| Type | Parameter | Direction | Description |
|---|---|---|---|
| HANDLE | Handle | IN | Device handle obtained with the function CPNT_Open |

**Returned value**

It returns TRUE when the function succeeds.
It returns FALSE when an error occurs. The error details can be obtained with the function GetLastError.

**Remarks**

It returns TRUE when the message has been successfully unregistered.
It returns FALSE when an error occurs.
Detailed error content can be obtained with GetLastError( ).

# A-9 Errors Detectable by Functions

If an error occurs while an API function is executed, details of the error can be obtained with the function GetLastError.

| Error code | Value | Error content and Action to be taken |
|---|---|---|
| CPNT_INVALID_HANDLE | 0x20000001 | Driver handle value is invalid. Specify the correct driver handle and redo the operation. |
| CPNT_NOT_OPEN_DRIVER | 0x20000003 | Driver handle value is invalid. Specify the correct driver handle and redo the operation. |
| CPNT_NOT_EXIST_DEVICE | 0x20000004 | Board of specified ID does not exist.<br>A board with an identical Board ID does exist.<br>Specify a correct Board ID. |
| CPNT_CMD_TIMEOUT | 0x20000005 | The command times out. Reset the Board and redo the operation. |
| CPNT_EVENT_TIMEOUT | 0x20000006 | The explicit message times out. Set the time to monitor the events addressed to Slave Units longer. The monitoring time is one of the network parameter. |
| CPNT_SOFTWARETABLE_ERROR | 0x20000007 | Format error in software tables. Check the content of the software table. |
| CPNT_RATE_ERROR | 0x20000008 | Format error in data rate. Check the set value as the data rate. |
| CPNT_REGTABLE_ERROR | 0x20000009 | Format error in registration tables. Check the content of the registration table. |
| CPNT_LOGICALPARAM_ERROR | 0x2000000A | Format error in logical error checking items. Check the set value in the checking items. |
| CPNT_NETPARAM_ERROR | 0x2000000B | Format error in network parameters. Check the set value for the network parameters. |
| CPNT_SLAVEPARAM_ERROR | 0x2000000C | Format error in Slave Unit parameters. Check the set value for the Slave Unit parameters. |
| CPNT_EXNETPARAM_ERROR | 0x2000000D | Illegal parameter is set. Check the set parameters. |
| CPNT_INVALID_BOARDID | 0x2000000E | Illegal Board ID is specified. Set the Board ID with a number between 0 and 9. |
| CPNT_NOT_SYSTEM | 0x2000000F | Communications cycle stops. This API cannot be used unless the communications cycles are in operation. |
| CPNT_SYSTEM | 0x20000010 | Communications cycle is in operation. This API cannot be used unless the communications cycle stops. |
| CPNT_BOARD_RAMERROR | 0x20000011 | RAM checking found an error. Replace the Board. |
| CPNT_BOARD_ERROR | 0x20000012 | Hardware error is found. Replace the Board. |
| CPNT_ENABLELIST_ERROR | 0x20000013 | Invalid EnableList is specified by the function CPNT_StartCycleEx. Check the set value for EnableList. |
| CPNT_STATE_ERROR | 0x20000014 | Cannot change the state. |
| CPNT_PARAM_ERROR | 0x20001000 | Argument is out of the range. Specify a correct argument. |
| CPNT_RES_NOT_RECEIVED | 0x20001001 | No response |
| CPNT_RES_SIZEOVER | 0x20001002 | Response message size is over the limit. |
| CPNT_REQ_SIZEOVER | 0x20001003 | Request message size is over the limit. |
| CPNT_BUSY | 0x20001004 | The destination is in the state that cannot receive an explicit message. |
| CPNT_OTHER_ERROR | 0x20020000 | Other error |

# APPENDIX B
# Shared Memory Interface

# B-1 PCI Resources

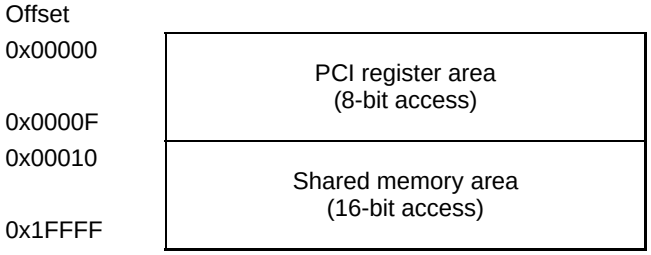
## B-1-1 PCI Configuration Register Information

| Register | Value | Description |
|---|---|---|
| Vendor ID | 0x10CB | Omron |
| Device ID | 0x0024 | CompoNet |
| Revision ID | 0x01 | 1 |
| Class code | 0x028000 | Other network controller |
| Header type | 0x00 | Basic header type |
| Base address | --- | Set by PC BIOS |
| Interrupt line | --- | Set by PC BIOS |
| Interrupt pin | 0x01 | Uses the interrupt pin INTA#. |

## B-1-2 Memory Area

The CompoNet Master Board has a the memory area of 128 KB, and the memory is allocated as PCI memory area.

The PCI register areas are used to notify the Board ID, reset the CompoNet Master Board and control the interrupts.




**Precautions for Correct Use**

- The PCI register area must be accessed by 8-bit.
- The Shared memory area must be accessed by 16-bit.
- No access is possible to these areas by 32-bit.

# B-2 PCI Register Specifications

## B-2-1 PCI Register Map

| Offset | Name | | Access rule |
|---|---|---|---|
| 0x0000 | Board ID | | Read |
| 0x0001 | Board reset | | Write |
| 0x0002 | Interrupt control register (Interrupt from PC to Board) | Interrupt trigger | Write |
| 0x0003 | | Interrupt request confirmation | Read |
| 0x0004 | Interrupt control register (Interrupt from Board to PC) | Interrupt mask | Read / Write |
| 0x0005 | | Interrupt cause indication | Read |
| 0x0006 | | Interrupt clear | Write |
| 0x0007 to 0x000F | (Reserved) | | |

## B-2-2 Board ID (Offset 0x0000)

| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|---|---|---|---|---|---|---|---|---|
| Flag | Reserved | Reserved | Reserved | Reserved | BD_ID | | | |
| Access rule | - | - | - | - | R | | | |
| Initial value | - | - | - | - | The value set by the rotary switch | | | |

BD_ID (bit0 to bit3)

The Board ID set by the rotary switch on the Board is read.

A value from 0 to 9 can be read.

Board ID = $(bit3 \times 2^3) + (bit2 \times 2^2) + (bit1 \times 2^1) + (bit0 \times 2^0)$

## B-2-3 Board Reset (Offset 0x0001)

| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|---|---|---|---|---|---|---|---|---|
| Flag | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | BD_RST |
| Access rule | - | - | - | - | - | - | - | W |
| Initial value | - | - | - | - | - | - | - | - |

BD_RST (bit0)

When you set this flag to 1, you can have a hardware reset on the CompoNet Master Board.

## B-2-4 Interrupt Control Register (Interrupt from PC to Board)

This register is used to make an interrupt request from the PC to the Board.

When you use the Interrupt Trigger register and set the flag to cause into 1, an interrupt occurs on the Board.

The Interrupt Request Confirmation register causes an interrupt. The flag of the cause remains 1, until the interrupt cause is cleared by the Board.

When you use the Interrupt Trigger register to have an interrupt, be sure the interrupt cause flag to have in the Interrupt Request Confirmation register is 0. This must be 0 before an interrupt is triggered.

### Flags of "Interrupt from PC to Board"

| Flag | Bit | Description |
|---|---|---|
| CMD | 0 | The PC issues a command request to the Board. |
| BD_SND_ACK | 1 | The PC gives an acknowledgment to an event transmission request made by the Board to the PC. |
| SND | 2 | The PC notifies the Board of an event transmission. |
| REQ_REF | 5 | The PC instructs the Board to release an access right to cyclic area. |
| REQ_ACC | 6 | The PC requests the Board for an access right to the cyclic area. |
| PC_WDT | 7 | When the Board firmware monitors normal operation of PC by PC_WDT, the PC refreshes the WDT. |

### Interrupt Trigger (Offset 0x0002)

| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|---|---|---|---|---|---|---|---|---|
| Flag | PC_WDT | REQ_ACC | REQ_REF | Unused | Unused | SND | BD_SND_ACK | CMD |
| Access rule | W | W | W | W | W | W | W | W |
| Initial value | - | - | - | - | - | - | - | - |

### Interrupt Request confirmation (Offset 0x0003)

| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|---|---|---|---|---|---|---|---|---|
| Flag | PC_WDT | REQ_ACC | REQ_REF | Unused | Unused | SND | BD_SND_ACK | CMD |
| Access rule | R | R | R | R | R | R | R | R |
| Initial value | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## B-2-5 Interrupt Control Register (Interrupt from Board to PC)

This register is used to control interrupts from the Board to the PC.

The Interrupt Mask register is used to specify the generation of an interrupt by a certain cause. The cause that is 1 in the Interrupt Mask register will generate an interrupt. The applicable flag in the Interrupt Mask register must be set to 0 when you want to confirm the cause not by an interrupt but by polling.

When an interrupt occurs, the interrupt cause can be confirmed in the Interrupt Cause Indication register.

The cause of the interrupt can be cleared by setting the relevant flag in the Interrupt Clear register to 1. When all interrupt causes are cleared, the interrupt itself is cleared.

### Flags of "Interrupt from Board to PC"

| Flag | Bit | Description |
|---|---|---|
| CMD_ACK | 0 | The acknowledgment made by the Board against the command request made by the PC to the Board |
| BD_SND | 1 | Used when the Board notifies the PC of an event transmission |
| SND_ACK | 2 | The acknowledgment made by the Board against the event transmission request made by PC to the Board |
| REQ_RES | 3 | Used when the Board requests the PC of a Board reset |
| Reserved | 4 | - |
| INIEND | 5 | The Board notifies the PC that the firmware initialization has been completed.<br>The completion cause is stored in the Initialization completion notification of the shared memory area. |
| REQ_ACC_ACK | 6 | The acknowledgment made by the Board against the cyclic area access right request made by the PC to the Board (a notification that the access right has been successfully obtained) |
| BD_WDT | 7 | The interrupt cause that is generated when the Board WDT times out |

### Interrupt Mask (Offset 0x0004)

| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|---|---|---|---|---|---|---|---|---|
| Flag | BD_WDT | REQ_ACC_ACK | INIEND | Unused | REQ_RES | SND_ACK | BD_SND | CMD_ACK |
| Access rule | R/W | R/W | R/W | R/W | R/W | R/W | R/W | R/W |
| Initial value | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Interrupt Request Indication (Offset 0x0005)

| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|---|---|---|---|---|---|---|---|---|
| Flag | BD_WDT | REQ_ACC _ACK | INIEND | Unused | REQ_RES | SND_ACK | BD_SND | CMD_ACK |
| Access rule | R | R | R | R | R | R | R | R |
| Initial value | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Interrupt Clear (Offset 0x0006)

| | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|---|---|---|---|---|---|---|---|---|
| Flag | BD_WDT | REQ_ACC _ACK | INIEND | Unused | REQ_RES | SND_ACK | BD_SND | CMD_ACK |
| Access rule | W | W | W | W | W | W | W | W |
| Initial value | - | - | - | - | - | - | - | - |

# B-3 Shared Memory Area Specifications

## B-3-1 Shared Memory Area Map

| Offset address | Group | Name | Word size (Byte size) | Access | Update timing |
|---|---|---|---|---|---|
| 0x0010 to 0x0011 | Board information group | Initialization end notification | 1 (2) | R | Initialization |
| 0x0012 to 0x0013 | | Running program ID | 1 (2) | R | Initialization |
| 0x0014 to 0x0041 | | Identity information | 23 (46) | R | Initialization |
| 0x0042 to 0x0079 | Basic status group | Participation flag | 28 (56) | R | As needed |
| 0x007A to 0x00B1 | | Communications error flag | 28 (56) | R | As needed |
| 0x00B2 to 0x00B3 | | StateStatus | 1 (2) | R | As needed |
| 0x00B4 to 0x00BF | Clock group | Clock data | 6 (12) | R/W | As needed |
| 0x0100 to 0x017F | I/O data group | IN data | 64 (128) | R | As needed |
| 0x0180 to 0x019F | | Bit IN data | 16 (32) | R | As needed |
| 0x0200 to 0x027F | | OUT data | 64 (128) | R/W | As needed |
| 0x0280 to 0x029F | | Bit OUT data | 16 (32) | R/W | As needed |
| 0x0300 to 0x0337 | Detailed status group | Duplication error flag | 28 (56) | R | As requested |
| 0x0338 to 0x0367 | | Registration error (Registered Slave not participated) flag | 24 (48) | R | As requested |
| 0x0368 to 0x0397 | | Registration error (Non-registered Slave Unit Participating) flag | 24 (48) | R | As requested |
| 0x0398 to 0x03CF | | Repeater configuration error | 28 (56) | R | As requested |
| 0x03D0 to 0x0407 | | EO Slave Unit | 28 (56) | R | As requested |
| 0x0408 to 0x0419 | | Master status | 9 (18) | R | As requested |
| 0x041A to 0x05D9 | Detailed status group | Error counter | 224 (448) | R | As requested |
| 0x05DA to 0x05DB | | Network power state | 1 (2) | R | As requested |
| 0x05DC to 0x1C9B | | Participated Slave Unit Identity table | 2912 (5824) | R | As requested |
| 0x1C9C to 0x201B | | Repeater configuration information | 448 (896) | R | As requested |
| 0x201C to 0x20FB | | Alarm information | 112 (224) | R | As requested |
| 0x20FC to 0x237D | | Error log | 321 (642) | R | As requested |
| 0x237E to 0x238B | | Reserved | 7 (14) | R | - |
| 0x238C to 0x3111 | | Registration table example | 1731 (3462) | R | As requested |

| Offset address | Group | Name | Word size (Byte size) | Access | Update timing |
|---|---|---|---|---|---|
| 0x3200 to 0x3203 | CMDarea group | CMD area (PC → BD) | 2 (4) | R/W | CMD |
| 0x3210 to 0x3213 | | CMD area (BD → PC) | 2 (4) | R | CMD |
| 0x3300 to 0x3521 | Event area group | Event area (PC → BD) | 273 (546) | R/W | Explicit Message |
| 0x3600 to 0x3821 | | Event area (BD → PC) | 273 (546) | R | Explicit Message |
| 0x3900 to 0x3907 | Setting area group | Software table | 4 (8) | R/W | OPEN |
| 0x3908 to 0x3909 | | Data rate | 1 (2) | R/W | OPEN |
| 0x390A to 0x390B | | Logical error checking item | 1 (2) | R/W | OPENEX |
| 0x390C to 0x4691 | | Registration table | 1731 (3462) | R/W | OPENEX |
| 0x4692 to 0x469B | | Network parameter | 5 (10) | R/W | OPENEX |
| 0x469C to 0x469D | | Slave Unit parameter | 2 (4) | R/W | OPENEX |
| 0x469E to 0x1FFFF | | Reserved | | | |

## B-3-2 Board Information

### Initialization end notification

This specifies the Board state after a power-on.

Data format

Offsetaddress: 0x0010

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | IniEndCode | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| IniEndCode | Read | 0x1703: Normal operation<br>Others: Before the Board is started up |

### Running program ID

This specifies the mode of the firmware to be run.

Data format

Offsetaddress: 0x0012

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | ProgId | | | | | | | | | | | | | | | |

Data in detail

| Name | Access | Description |
|---|---|---|
| ProgId | Read | 0xFFFF: Waits for the command OPEN_SYSTEM.<br>0x0001: The system firmware is running.<br>0xEEEE: The PC WDT is out and stops. |

## Identity information

This is the Identity Object information of the CompoNet Master Board.

Data format

Offset address: 0x0014

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Vendor Code | | | | | | | | | | | | | | | |
| +1 | Device Type | | | | | | | | | | | | | | | |
| +2 | Product Code | | | | | | | | | | | | | | | |
| +3 | Minor Revision | | | | | | | | Major Revision | | | | | | | |
| +4 | SerialNumberL (D0-D15) | | | | | | | | | | | | | | | |
| +5 | SerialNumberH (D16-D31) | | | | | | | | | | | | | | | |
| +6 | ProductName[0] | | | | | | | | ProductName Size | | | | | | | |
| +7 | ProductName[2] | | | | | | | | ProductName[1] | | | | | | | |
| +8 | ProductName[4] | | | | | | | | ProductName[3] | | | | | | | |
| +9 | ProductName[6] | | | | | | | | ProductName[5] | | | | | | | |
| +10 | ProductName[8] | | | | | | | | ProductName[7] | | | | | | | |
| +11 | ProductName[10] | | | | | | | | ProductName[9] | | | | | | | |
| +12 | ProductName[12] | | | | | | | | ProductName[11] | | | | | | | |
| +13 | ProductName[14] | | | | | | | | ProductName[13] | | | | | | | |
| +14 | ProductName[16] | | | | | | | | ProductName[15] | | | | | | | |
| +15 | ProductName[18] | | | | | | | | ProductName[17] | | | | | | | |
| +16 | ProductName[20] | | | | | | | | ProductName[19] | | | | | | | |
| +17 | ProductName[22] | | | | | | | | ProductName[21] | | | | | | | |
| +18 | ProductName[24] | | | | | | | | ProductName[23] | | | | | | | |
| +19 | ProductName[26] | | | | | | | | ProductName[25] | | | | | | | |
| +20 | ProductName[28] | | | | | | | | ProductName[27] | | | | | | | |
| +21 | ProductName[30] | | | | | | | | ProductName[29] | | | | | | | |
| +22 | Reserved (0x00) | | | | | | | | ProductName[31] | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Vendor Code | Read | Specify the vendor code. |
| Device Type | Read | Specify the device type. |
| Product Code | Read | Specify the product code. |
| Major Revision | Read | Specify the major revision. |
| Minor Revision | Read | Specify the minor revision. |
| Serial Number | Read | Specify the serial number. |
| ProductName Size | Read | Specify the size of the product name in bytes. |
| ProductName | Read | Specify the product name. |

## B-3-3 Basic Status Group in Detail

### Participation Flag

This indicates the participation flag of each node.

Data format

Offset address: 0x0042

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| | Word IN/MIX Slave Unit Participating Flags (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +0 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +2 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +3 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Participation flag for Word OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +4 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +5 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +6 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +7 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Bit IN/MIX Slave Unit Participating Flags (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +8 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +9 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +10 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +11 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +12 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +13 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +14 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +15 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Participation flag for BIT OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +17 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +18 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +19 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +20 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +21 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +22 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +23 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Participation flag for Repeater Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +24 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +25 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +26 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +27 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |

Detailed format

| Name | Access | Description |
|---|---|---|
| Participation flag | Read | ON: It participates in the network.<br>OFF: It does not participate in the network. |

## Communications Error Flag

This indicates the communications error flag of each node.

Data format

Offset address: 0x007A

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| | Word IN/MIX Slave Unit Communications Error Flags (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +0 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +2 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +3 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Communications error flag for Word OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +4 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +5 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +6 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +7 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Bit IN/MIX Slave Unit Communications Error Flags (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +8 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +9 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +10 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +11 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +12 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +13 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +14 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +15 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Communications error flag for BIT OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +17 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +18 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +19 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +20 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +21 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +22 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +23 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Communications error flag for Repeater Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +24 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +25 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +26 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +27 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |

Detailed format

| Name | Access | Description |
|---|---|---|
| Communications error flag | Read | ON: A node that has participated in the network has a communications error.<br>OFF: The nodes that have participated in the network have no communications error. |

## StateStatus

Data format

Offset address: 0x00B2

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | StateStatus | | | | | | | | | | | | | | | |

Detailed format

| Bit | Name | Access | Description |
|---|---|---|---|
| 00 | Communications error occurred on a Slave Unit | Read | 0 (OFF): Normal<br>1 (ON): An error occurred.<br>The bit will be 1 (or “on”) even if one of the participating Slave Units has a communications error. |
| 01 | Registration Table comparison error occurred | Read | 0 (OFF): Normal<br>1 (ON): An error occurred.<br>The flag can be on only when the Registration table function is enabled.<br>The flag will be on if any one of the Slave Units (i.e. a node address and model combination of a Slave Unit) that participated in the network while the power is on does not conform to the Registration table (i.e., a table that registered the node addresses and the models of the Slave Units) or if a non-registered Slave Unit is found to have participated. |
| 02 | Communications stop due to communications error occurred | Read | 0 (OFF): Normal<br>1 (ON): An error occurred.<br>This flag can be on only when the Communications stop due to communications error function is enabled. The bit will be 1 (or “on”) even if one of the participating Slave Units has a communications error. |
| 03 | Slave duplication error occurred | Read | 0 (OFF): Normal<br>1 (ON): An error occurred.<br>The bit will be 1 (or “on”) if the Slave duplication error occurs or if a Slave Unit has an error due to unstable communications. |
| 04 | Communications error occurred on a Repeater Unit | Read | 0 (OFF): Normal<br>1 (ON): An error occurred.<br>The bit will be 1 (or “on”) even one of the participating Slave Units has a communications error. |
| 05 | Repeater duplication error occurred | Read | 0 (OFF): Normal<br>1 (ON): An error occurred.<br>The bit will be 1 (or “on”) if the Repeater duplication error occurs or if a Repeater Unit has an error due to unstable communications. |
| 06 | All registered Slave Units participating | Read | 0 (OFF): Not all of the registered Slave Units have participated,<br>1 (ON): All of the registered Slave Units have participated.<br>This bit will be on only when the Registration table function is enabled. |
| 07 | I/O communications started | Read | 0 (OFF): I/O communications stops<br>1 (ON): I/O communications is running |

| Bit | Name | Access | Description |
|---|---|---|---|
| 08 | Operation monitoring ((!D0)&D6&D7) | Read | 0 (OFF): One of the following: an error occurred, the I/O communications not started or a non-registered Slave Unit is participating.<br>1 (ON): All of the following: in normal communications and I/O communications, and all of the registered Slave Units have participated.<br>The content is ((not Bit 0) and Bit 6 and Bit 7). You can operate the user application when this flag is on in the condition whereby the Registration Table function is enabled. |
| 09 | Error counter WARNING | Read | 0 (OFF): No warning<br>1 (ON): A warning<br>The bit will be 1 (or “on”) if the error counter exceeds the threshold. |
| 10 | Registration table function state | Read | 0 (OFF): Registration table function is disabled.<br>1 (ON): Registration table function is enabled. |
| 11 | Reserved area | Read | 0 |
| 12 | Representative warning status flag | Read | "OR" condition of the warning status flags of all Slave Units |
| 13 | Representative alarm status flag | Read | "OR" condition of the alarming status flags of all Slave Units |
| 14 to 15 | Reserved area | Read | 0 |

## B-3-4 Clock in Details

### Clock information

This is the area in which to set the clock information from the PC to the Board.

Data format

Offset address: 0x00B4

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Minute (00 to 59) | | | | | | | | Second (00 to 59) | | | | | | | |
| +1 | Day (01 to 31) | | | | | | | | Hour (00 to 23) | | | | | | | |
| +2 | Year (00 to 99) | | | | | | | | Month (01 to 12) | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Second | Read/Write | Set the second between 00 to 59. |
| Minute | Read/Write | Set the minute between 00 to 59. |
| Hour | Read/Write | Set the hour between 00 to 23. |
| Day | Read/Write | Set the day between 01 to 31. |
| Month | Read/Write | Set the month between 01 to 12. |
| Year | Read/Write | Set the lower two digits of the year between 00 to 99. |

## B-3-5 I/O Data in Details

### Word IN Data

This stores the IN data from a Word IN Slave Unit.

Data format

Offset address: 0x0100

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | IN data of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| +1 | IN data of Word IN/MIX Slave Unit #1 | | | | | | | | | | | | | | | |
| +2 | IN data of Word IN/MIX Slave Unit #2 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +62 | IN data of Word IN/MIX Slave Unit #62 | | | | | | | | | | | | | | | |
| +63 | IN data of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| IN Data | Read/Write | Stores the word input data from the Word Input/ Mixed Slave Unit. |

### Bit IN Data

This stores the Bit IN data from a Bit IN Slave Unit.

Data format

Offset address: 0x0180

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Node 7 | | Node 6 | | Node 5 | | Node 4 | | Node 3 | | Node 2 | | Node 1 | | Node 0 | |
| +1 | Node 15 | | Node 14 | | Node 13 | | Node 12 | | Node 11 | | Node 10 | | Node 9 | | Node 8 | |
| +2 | Node 23 | | Node 22 | | Node 21 | | Node 20 | | Node 19 | | Node 18 | | Node 17 | | Node 16 | |
| +3 | Node 31 | | Node 30 | | Node 29 | | Node 28 | | Node 27 | | Node 26 | | Node 25 | | Node 24 | |
| +4 | Node 39 | | Node 38 | | Node 37 | | Node 36 | | Node 35 | | Node 34 | | Node 33 | | Node 32 | |
| +5 | Node 47 | | Node 46 | | Node 45 | | Node 44 | | Node 43 | | Node 42 | | Node 41 | | Node 40 | |
| +6 | Node 55 | | Node 54 | | Node 53 | | Node 52 | | Node 51 | | Node 50 | | Node 49 | | Node 48 | |
| +7 | Node 63 | | Node 62 | | Node 61 | | Node 60 | | Node 59 | | Node 58 | | Node 57 | | Node 56 | |
| +8 | Node 71 | | Node 70 | | Node 69 | | Node 68 | | Node 67 | | Node 66 | | Node 65 | | Node 64 | |
| +9 | Node 79 | | Node 78 | | Node 77 | | Node 76 | | Node 75 | | Node 74 | | Node 73 | | Node 72 | |
| +10 | Node 87 | | Node 86 | | Node 85 | | Node 84 | | Node 83 | | Node 82 | | Node 81 | | Node 80 | |
| +11 | Node 95 | | Node 94 | | Node 93 | | Node 92 | | Node 91 | | Node 90 | | Node 89 | | Node 88 | |

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +12 | Node 103 | | Node 102 | | Node 101 | | Node 100 | | Node 99 | | Node 98 | | Node 97 | | Node 96 | |
| +13 | Node 111 | | Node 110 | | Node 109 | | Node 108 | | Node 107 | | Node 106 | | Node 105 | | Node 104 | |
| +14 | Node 119 | | Node 118 | | Node 117 | | Node 116 | | Node 115 | | Node 114 | | Node 113 | | Node 112 | |
| +15 | Node 127 | | Node 126 | | Node 125 | | Node 124 | | Node 123 | | Node 122 | | Node 121 | | Node 120 | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Number of the node | Read/Write | It stores Bit IN data from a Bit IN Slave Unit. |

## Word OUT Data

This stores the Word OUT data given to a Word OUT Slave Unit.

Data format

Offset address: 0x0200

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | OUT data for the Word OUT Slave #0 | | | | | | | | | | | | | | | |
| +1 | OUT data for the Word OUT Slave #1 | | | | | | | | | | | | | | | |
| +2 | OUT data for the Word OUT Slave #2 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +62 | OUT data for the Word OUT Slave #62 | | | | | | | | | | | | | | | |
| +63 | OUT data for the Word OUT Slave #63 | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Word OUT data | Read/Write | It stores the OUT data given to a Word OUT Slave Unit. |

## Bit OUT Data

This stores the Bit OUT data given to a Bit OUT Slave Unit.

Data format

Offset address: 0x0280

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Node 7 | | Node 6 | | Node 5 | | Node 4 | | Node 3 | | Node 2 | | Node 1 | | Node 0 | |
| +1 | Node 15 | | Node 14 | | Node 13 | | Node 12 | | Node 11 | | Node 10 | | Node 9 | | Node 8 | |
| +2 | Node 23 | | Node 22 | | Node 21 | | Node 20 | | Node 19 | | Node 18 | | Node 17 | | Node 16 | |
| +3 | Node 31 | | Node 30 | | Node 29 | | Node 28 | | Node 27 | | Node 26 | | Node 25 | | Node 24 | |
| +4 | Node 39 | | Node 38 | | Node 37 | | Node 36 | | Node 35 | | Node 34 | | Node 33 | | Node 32 | |
| +5 | Node 47 | | Node 46 | | Node 45 | | Node 44 | | Node 43 | | Node 42 | | Node 41 | | Node 40 | |
| +6 | Node 55 | | Node 54 | | Node 53 | | Node 52 | | Node 51 | | Node 50 | | Node 49 | | Node 48 | |
| +7 | Node 63 | | Node 62 | | Node 61 | | Node 60 | | Node 59 | | Node 58 | | Node 57 | | Node 56 | |
| +8 | Node 71 | | Node 70 | | Node 69 | | Node 68 | | Node 67 | | Node 66 | | Node 65 | | Node 64 | |
| +9 | Node 79 | | Node 78 | | Node 77 | | Node 76 | | Node 75 | | Node 74 | | Node 73 | | Node 72 | |
| +10 | Node 87 | | Node 86 | | Node 85 | | Node 84 | | Node 83 | | Node 82 | | Node 81 | | Node 80 | |
| +11 | Node 95 | | Node 94 | | Node 93 | | Node 92 | | Node 91 | | Node 90 | | Node 89 | | Node 88 | |
| +12 | Node 103 | | Node 102 | | Node 101 | | Node 100 | | Node 99 | | Node 98 | | Node 97 | | Node 96 | |
| +13 | Node 111 | | Node 110 | | Node 109 | | Node 108 | | Node 107 | | Node 106 | | Node 105 | | Node 104 | |
| +14 | Node 119 | | Node 118 | | Node 117 | | Node 116 | | Node 115 | | Node 114 | | Node 113 | | Node 112 | |
| +15 | Node 127 | | Node 126 | | Node 125 | | Node 124 | | Node 123 | | Node 122 | | Node 121 | | Node 120 | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Number of the node | Read/Write | It stores the Bit OUT data of a Bit OUT Slave Unit. |

## B-3-6 Detailed Status Group in Details

### Duplication Error Flag

This is the duplication error flag for a node.

This error occurs not only due to a duplication but also when a Slave Unit stops because of unstable communications.

Data format

Offset address: 0x0300

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| | Flags for Word IN/MIX Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +0 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +2 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +3 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Duplication Error flags for Word OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +4 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +5 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +6 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +7 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Flags for Bit IN/MIX Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +8 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +9 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +10 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +11 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +12 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +13 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +14 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +15 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Duplication Error flags for BIT OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +17 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +18 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +19 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +20 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +21 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +22 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +23 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Duplication Error flags for Repeater Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +24 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +25 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +26 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +27 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |

Detailed format

| Name | Access | Description |
|---|---|---|
| Duplication error flag | Read | ON: Duplication error occurs<br>OFF: Normal |

## Registration Error (Registered Slave Not Participating) Flag

This is the Registration error flag (Registered Slave not participating) for each node.

Data format

Offset address: 0x0338

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| | Flags for Word IN/MIX Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +0 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +2 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +3 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Flags for Word OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +4 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +5 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +6 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +7 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Flags for Bit IN/MIX Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +8 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +9 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +10 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +11 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +12 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +13 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +14 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +15 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Flags for Bit OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +17 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +18 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +19 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +20 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +21 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +22 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +23 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |

Detailed format

| Name | Access | Description |
|---|---|---|
| Registration error (Registered Slave not participating) flag | Read | ON: A Registration error (Registered Slave not participating) occurs.<br>OFF: Normal |

## Registration Error (Non-registered Slave Participating) Flag

This is the Registration error (Non-registered Slave participating) flag for each node.

Data format

Offset address: 0x0368

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| | Flags for Word IN/MIX Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +0 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +2 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +3 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Flags for Word OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +4 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +5 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +6 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +7 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Flags for Bit IN/MIX Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +8 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +9 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +10 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +11 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +12 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +13 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +14 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +15 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Flags for Bit OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +17 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +18 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +19 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +20 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +21 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +22 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +23 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |

Detailed format

| Name | Access | Description |
|---|---|---|
| Registration error (Non-registered Slave participating) flag | Read | ON: A Registration error (Non-registered Slave participating) occurs.<br>OFF: Normal |

## Repeater Configuration Error

This is the Repeater configuration error flag for each node.

Data format

Offset address: 0x0398

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| | Flags for Word IN/MIX Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +0 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +2 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +3 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Flags for Word OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +4 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +5 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +6 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +7 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Flags for Bit IN/MIX Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +8 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +9 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +10 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +11 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +12 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +13 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +14 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +15 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Flags for Bit OUT Slave Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +17 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +18 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +19 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +20 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +21 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +22 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +23 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Flags for Repeater Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +24 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +25 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| +26 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +27 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |

Detailed format

| Name | Access | Description |
|---|---|---|
| Repeater configuration error flag | Read | ON: A Repeater configuration error occurs.<br>OFF: Normal |

## EO Slave Unit

This indicates the list of Slave Units that cannot participate due to a reason, such as being a non-registered Slave Unit when the Registration table function is enabled, but it can send explicit messages.

Data format

Offset address: 0x03D0

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| | Flags for Word IN/MIX Slave Units<br>(These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +0 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +2 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +3 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Flags for Word OUT Slave Units<br>(These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +4 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +5 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +6 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +7 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| | Flags for Bit IN/MIX Slave Units<br>(These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +8 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +9 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +10 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +11 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +12 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |
| +13 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +14 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +15 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| | Flags for Bit OUT Slave Units<br>(These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | |
| +16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +17 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +18 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +19 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |
| +20 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 |

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| +21 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| +22 | 111 | 110 | 109 | 108 | 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 |
| +23 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 117 | 116 | 115 | 114 | 113 | 112 |
| Flags for Repeater Units (These values are the corresponding part of each node address.) | | | | | | | | | | | | | | | | |
| +24 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| +25 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 |
| +26 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |
| +27 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 |

Detailed format

| Name | Access | Description |
|---|---|---|
| Event only SlaveUnit flag | Read | ON: A node that can use event only<br>OFF: Normal |

## Master Status

This stores the status of the CompoNet Master Board.

Data format

Offset address: 0x0408

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| +0 | Node causing a communications stop | | | | | | | | | | | | | | | |
| +1 | StateStatus | | | | | | | | | | | | | | | |
| +2 | Data rate | | | | | | | | | | | | | | | |
| +3 | Communication cycle time | | | | | | | | | | | | | | | |
| +4 | Maximum communications cycle time | | | | | | | | | | | | | | | |
| +5 | Cumulative CRC reception errors | | | | | | | | | | | | | | | |
| +6 | Cumulative code reception errors | | | | | | | | | | | | | | | |
| +7 | Communication State | | | | | | | | | | | | | | | |
| +8 | Communication stop mode | | | | | | | | Registration table mode | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Node causing a communications stop | Read | It stores the MAC address (or the address on CompoNet protocol) of the Slave Unit or the Repeater Unit that caused a communications stop due to communications error.<br>[For Word IN/MIX Slave Unit]<br>MAC address = Node address<br>[For Word OUT Slave Unit]<br>MAC address = 64 + Node address<br>[For Bit IN/MIX Slave Unit]<br>MAC address = 128 + Node address<br>[For Bit OUT Slave Unit]<br>MAC address = 256 + Node address<br>[For Repeater Unit]<br>MAC address = 384 + Node address |
| StateStatus | Read | It stores the same content as ones in StateStatus of the Basic status group. |
| Data rate | Read | It stores the data rate.<br>0: 4 Mbps<br>1: 3 Mbps<br>2: 1.5 Mbps<br>3: 93.75 kbps |
| Communications cycle time | Read | It stores the present value for the communication cycle time in units of 0.1 ms. |
| Maximum communications cycle time | Read | It stores the maximum value as the communications cycle time in units of 0.1 ms. The maximum communications cycle time must be cleared first in order to measure the maximum network cycle time. |
| Cumulative CRC reception error | Read | It is the cumulative count of CRC errors.<br>It stops counting at 0xFFFF. |
| Cumulative code reception error | Read | It is the cumulative count of Manchester encoding errors.<br>It stops counting at 0xFFFF. |
| Communication State | Read | Indicates the communications state.<br>0 to 2: Initial processing after participation,<br>3 to 4: IDLE state,<br>5: RUN state,<br>7: Communications stop state |
| Communications stop mode | Read | It stores 0x0001 when the Communications stop due to Communications Error Function is enabled.<br>It stores 0x0000 when the Function is disabled. |
| Registration table mode | Read | It stores 0x0001 when the Registration Table Function is enabled.<br>It stores 0x0000 when the Function is disabled. |

## Error Counter

It is the error counter of the CompoNet Master Board.

The CompoNet Master Board processes retries, when it observes a communications error on a Slave or Repeater Unit.

If the error counter value exceeds the threshold, the CompoNet Master Board will deem the relevant Slave or Repeater Unit to have a communications error. The error counter can also be used to determine the network quality, even when there is no communications error.

Data format

Offset address: 0x041A

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Error counter value for Word IN/MIX Slave Unit #1 | | | | | | | | Error counter value for Word IN/MIX Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +31 | Error counter value for Word IN/MIX Slave Unit #63 | | | | | | | | Error counter value for Word IN/MIX Slave Unit #62 | | | | | | | |
| +32 | Error counter value for Word OUT Slave Unit #1 | | | | | | | | Error counter value for Word OUT Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +63 | Error counter value for Word OUT Slave Unit #63 | | | | | | | | Error counter value for Word OUT Slave Unit #62 | | | | | | | |
| +64 | Error counter value for Bit IN/MIX Slave Unit #1 | | | | | | | | Error counter value for Bit IN/MIX Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +127 | Error counter value for Bit IN/MIX Slave Unit #127 | | | | | | | | Error counter value for Bit IN/MIX Slave Unit #126 | | | | | | | |
| +128 | Error counter value for Bit OUT Slave Unit #1 | | | | | | | | Error counter value for Bit OUT Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +191 | Error counter value for Bit OUT Slave Unit #127 | | | | | | | | Error counter value for Bit OUT Slave Unit #126 | | | | | | | |
| +192 | Error counter value for Repeater Unit #1 | | | | | | | | Error counter value for Repeater Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +223 | Error counter value for Repeater Unit #63 | | | | | | | | Error counter value for Repeater Unit #62 | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Error counter value | Read | The error counter is incremented each time an error occurs. It increments among the range specified for each data rate. What you can read by this counter is the highest counter value among the counter counts by the time you read the counter value.<br>When it reaches the maximum, it indicates a communications error.<br>In data rate of 4 Mbps: 0 to 24<br>3 Mbps: 0 to 22<br>1.5 Mbps: 0 to 14<br>93.75 kbps: 0 to 3 |

## Network Power State

This can be used to confirm whether network power is being supplied to the CompoNet Master Board.

Data format

Offset address: 0x05DA

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | 0 | | | | | | | | | | | | | | | NetPower |

StateStatusDetailed format

| Name | Access | Description |
|---|---|---|
| NetPower | Read | 0: Network power is not supplied.<br>1: Network power is supplied. |

**Note** The CompoNet Master Board does not use the network power but only supplies the network power to the network. No network power supply is required in a network installation where Flat Cable I is used.

## Participated Slave Unit Identity Table

This stores the Identity object information of the participating Slave Units.

Data format

Offset address: 0x05DC

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | I/O information of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +63 | I/O information of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |
| +64 | I/O information of Word OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +127 | I/O information of Word OUT Slave Unit #63 | | | | | | | | | | | | | | | |
| +128 | I/O information of Bit IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +255 | I/O information of Bit IN/MIX Slave Unit #127 | | | | | | | | | | | | | | | |
| +256 | I/O information of Bit OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +383 | I/O information of Bit OUT Slave Unit #127 | | | | | | | | | | | | | | | |
| +384 | I/O information of Repeater Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +447 | I/O information of Repeater Unit #63 | | | | | | | | | | | | | | | |
| +448 | Vendor Code of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +511 | Vendor Code of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |
| +512 | Vendor Code of Word OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +575 | Vendor Code of Word OUT Slave Unit #63 | | | | | | | | | | | | | | | |
| +576 | Vendor Code of Bit IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +703 | Vendor Code of Bit IN/MIX Slave Unit #127 | | | | | | | | | | | | | | | |
| +704 | Vendor Code of Bit OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +831 | Vendor Code of Bit OUT Slave Unit #127 | | | | | | | | | | | | | | | |
| +832 | Vendor Code of Repeater Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +895 | Vendor Code of Repeater Unit #63 | | | | | | | | | | | | | | | |
| +896 | Device Type of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +959 | Device Type of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |
| +960 | Device Type of Word OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1023 | Device Type of Word OUT Slave Unit #63 | | | | | | | | | | | | | | | |
| +1024 | Device Type of Bit IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1151 | Device Type of Bit IN/MIX Slave Unit #127 | | | | | | | | | | | | | | | |
| +1152 | Device Type of Bit OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1279 | Device Type of Bit OUT Slave Unit #127 | | | | | | | | | | | | | | | |
| +1280 | Device Type of Repeater Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1343 | Device Type of Repeater Unit #63 | | | | | | | | | | | | | | | |
| +1344 | Product Code of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1407 | Product Code of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |
| +1408 | Product Code of Word OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1471 | Product Code of Word OUT Slave Unit #63 | | | | | | | | | | | | | | | |
| +1472 | Product Code of Bit IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1599 | Product Code of Bit IN/MIX Slave Unit #127 | | | | | | | | | | | | | | | |
| +1600 | Product Code of Bit OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1727 | Product Code of Bit OUT Slave Unit #127 | | | | | | | | | | | | | | | |
| +1728 | Product Code of Repeater Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1791 | Product Code of Repeater Unit #63 | | | | | | | | | | | | | | | |
| +1792 | Major Revision of Word IN/MIX Slave Unit #1 | | | | | | | | Major Revision of Word IN/MIX Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +1823 | Major Revision of Word IN/MIX Slave Unit #63 | | | | | | | | Major Revision of Word IN/MIX Slave Unit #62 | | | | | | | |
| +1824 | Major Revision of Word OUT Slave Unit #1 | | | | | | | | Major Revision of Word OUT Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +1855 | Major Revision of Word OUT Slave Unit #63 | | | | | | | | Major Revision of Word OUT Slave Unit #62 | | | | | | | |
| +1856 | Major Revision of Bit IN/MIX Slave Unit #1 | | | | | | | | Major Revision of Bit IN/MIX Slave Unit #0 | | | | | | | |

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| to | to | | | | | | | | to | | | | | | | |
| +1919 | Major Revision of Bit IN/MIX Slave Unit #63 | | | | | | | | Major Revision of Bit IN/MIX Slave Unit #62 | | | | | | | |
| +1920 | Major Revision of Bit OUT Slave Unit #1 | | | | | | | | Major Revision of Bit OUT Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +1983 | Major Revision of Bit OUT Slave Unit #63 | | | | | | | | Major Revision of Bit OUT Slave Unit #62 | | | | | | | |
| +1984 | Major Revision of Repeater Unit #1 | | | | | | | | Major Revision of Repeater Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +2015 | Major Revision of Repeater Unit #63 | | | | | | | | Major Revision of Repeater Unit #62 | | | | | | | |
| +2016 | Serial Number of Word IN/MIX Slave Unit #0 (Bit0-15) | | | | | | | | | | | | | | | |
| +2017 | Serial Number of Word IN/MIX Slave Unit #0 (Bit15-31) | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +2142 | Serial Number of Word IN/MIX Slave Unit #63 (Bit0-15) | | | | | | | | | | | | | | | |
| +2143 | Serial Number of Word IN/MIX Slave Unit #63 (Bit16-31) | | | | | | | | | | | | | | | |
| +2144 | Serial Number of Word OUT Slave Unit #0 (Bit0-15) | | | | | | | | | | | | | | | |
| +2145 | Serial Number of Word OUT Slave Unit #0 (Bit16-31) | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +2270 | Serial Number of Word OUT Slave Unit #63 (Bit0-15) | | | | | | | | | | | | | | | |
| +2271 | Serial Number of Word OUT Slave Unit #63 (Bit16-31) | | | | | | | | | | | | | | | |
| +2272 | Serial Number of Bit IN/MIX Slave Unit #0 (Bit0-15) | | | | | | | | | | | | | | | |
| +2273 | Serial Number of Bit IN/MIX Slave Unit #0 (Bit16-31) | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +2526 | Serial Number of Bit IN/MIX Slave Unit #127 (Bit0-15) | | | | | | | | | | | | | | | |
| +2527 | Serial Number of Bit IN/MIX Slave Unit #127 (Bit16-31) | | | | | | | | | | | | | | | |
| +2528 | Serial Number of Bit OUT Slave Unit #0 (Bit0-15) | | | | | | | | | | | | | | | |
| +2529 | Serial Number of Bit OUT Slave Unit #0 (Bit16-31) | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +2782 | Serial Number of Bit OUT Slave Unit #127 (Bit0-15) | | | | | | | | | | | | | | | |
| +2783 | Serial Number of Bit OUT Slave Unit #127 (Bit16-31) | | | | | | | | | | | | | | | |
| +2784 | Serial Number of Repeater Unit #0 (Bit0-15) | | | | | | | | | | | | | | | |
| +2785 | Serial Number of Repeater Unit #0 (Bit16-31) | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +2910 | Serial Number of Repeater Unit #63 (Bit0-15) | | | | | | | | | | | | | | | |
| +2911 | Serial Number of Repeater Unit #63 (Bit16-31) | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| IO information | Read | I/O size |
| VendorCode | Read | Vendor code |
| DeviceType | Read | Device type |
| ProductCode | Read | Product code |
| MajorRevision | Read | Major revision |
| SerialNumber | Read | Serial number |

I/O size information format

| Bit | Flag | Description |
|---|---|---|
| 0 to 4 | Number of IN channels (points) | Set the number of IN points of Slave Units.<br>Set the Bits 0 to 5 to 0 (OFF), when the number of IN points is zero.<br>=00000: 2 points, =00001: 4 points,<br>=00010: 8 points, =00011: 16 points,<br>=00100: 32 points, =00101: 48 points,<br>=00110: 64 points, =00111: 80 points,<br>=01000: 96 points, =01001: 112 points,<br>=01010: 128 points, =01011: 144 points,<br>=01100: 160 points, =01101: 176 points,<br>=01110: 192 points, =01111: 208 points,<br>=10000: 224 points, =10001: 240 points,<br>=10010: 256 points, others: prohibited |
| 5 | IN-setting enabling flag | 0: Disabling IN number setting<br>1: Enabling IN number setting |
| 6 to 7 | Reserved area | Set 0 (OFF). |
| 8 to 12 | Number of OUT channels | Set the number of OUT points for Slave Units.<br>Set the Bits 8 to 13 to 0 (OFF), when the number of OUT points is zero.<br>=00000: 2 points, =00001: 4 points,<br>=00010: 8 points, =00011: 16 points,<br>=00100: 32 points, =00101: 48 points,<br>=00110: 64 points, =00111: 80 points,<br>=01000: 96 points, =01001: 112 points,<br>=01010: 128 points, =01011: 144 points,<br>=01100: 160 points, =01101: 176 points,<br>=01110: 192 points, =01111: 208 points,<br>=10000: 224 points, =10001: 240 points,<br>=10010: 256 points, others: prohibited |
| 13 | Out-setting enabling flag | 0: Disabling OUT number setting<br>1: Enabling OUT number setting |
| 14 | Reserved area | Don't care |
| 15 | Slave enabling flag | 0: No Slave or Repeater Unit exists.<br>1: Slave or Repeater Unit does exist. |

## Repeater Configuration Information

When the communications of a Slave Unit or a Repeater Unit to and from the Master Board is regarded upstream, the Repeater configuration information helps understand the node address of the immediate upstream Repeater Unit from the Slave Unit or Repeater Unit and the number of levels from the Master Board. This information is used to understand the network configuration.
That is, you can understand under which Repeater a target Slave Unit or a Repeater Unit is connected.

Data format

Offset address: 0x1C9C

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Repeater configuration info of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +63 | Repeater configuration info of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |
| +64 | Repeater configuration info of Word OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +127 | Repeater configuration info of Word OUT Slave Unit #63 | | | | | | | | | | | | | | | |
| +128 | Repeater configuration info of Bit IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +255 | Repeater configuration info of Bit IN/MIX Slave Unit #127 | | | | | | | | | | | | | | | |
| +256 | Repeater configuration info of Bit OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +383 | Repeater configuration info of it Bit OUT Slave Unit #127 | | | | | | | | | | | | | | | |
| +384 | Repeater configuration info of Repeater Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +447 | Repeater configuration info of Repeater Unit #63 | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Repeater configuration information | Read | Bits 0 to 7: Node address of immediate upstream Repeater Unit from a Slave or another Repeater Unit<br>Bits 8 to 15: Number of levels by Repeater Units |

## Alarm Information

This is the list of alarm information notified by Slave Units.

Data format

Offset address: 0x201C

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Alarm information of Word IN/MIX Slave Unit #3 | | | | Alarm information of Word IN/MIX Slave Unit #2 | | | | Alarm information of Word IN/MIX Slave Unit #1 | | | | Alarm information of Word IN/MIX Slave Unit #0 | | | |
| to | to | | | | to | | | | to | | | | to | | | |
| +15 | Alarm information of Word IN/MIX Slave Unit #63 | | | | Alarm information of Word IN/MIX Slave Unit #62 | | | | Alarm information of Word IN/MIX Slave Unit #61 | | | | Alarm information of Word IN/MIX Slave Unit #60 | | | |
| +16 | Alarm information of Word OUT Slave Unit #3 | | | | Alarm information of Word OUT Slave Unit #2 | | | | Alarm information of Word OUT Slave Unit #1 | | | | Alarm information of Word OUT Slave Unit #0 | | | |
| to | to | | | | to | | | | to | | | | to | | | |
| +31 | Alarm information of Word OUT Slave Unit #63 | | | | Alarm information of Word OUT Slave Unit #62 | | | | Alarm information of Word OUT Slave Unit #61 | | | | Alarm information of Word OUT Slave Unit #60 | | | |

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +32 | Alarm information of Bit IN/MIX Slave Unit #3 | | | | Alarm information of Bit IN/MIX Slave Unit #2 | | | | Alarm information of Bit IN/MIX Slave Unit #1 | | | | Alarm information of Bit IN/MIX Slave Unit #0 | | | |
| to | to | | | | to | | | | to | | | | to | | | |
| +63 | Alarm information of Bit IN/MIX Slave Unit #127 | | | | Alarm information of Bit IN/MIX Slave Unit #126 | | | | Alarm information of Bit IN/MIX Slave Unit #125 | | | | Alarm information of Bit IN/MIX Slave Unit #124 | | | |
| +64 | Alarm information of Bit OUT Slave Unit #3 | | | | Alarm information of Bit OUT Slave Unit #2 | | | | Alarm information of Bit OUT Slave Unit #1 | | | | Alarm information of Bit OUT Slave Unit #0 | | | |
| to | to | | | | to | | | | to | | | | to | | | |
| +95 | Alarm information of Bit OUT Slave Unit #127 | | | | Alarm information of Bit OUT Slave Unit #126 | | | | Alarm information of Bit OUT Slave Unit #125 | | | | Alarm information of Bit OUT Slave Unit #124 | | | |
| +96 | Alarm information of Repeater Unit #3 | | | | Alarm information of Repeater Unit #2 | | | | Alarm information of Repeater Unit #1 | | | | Alarm information of Repeater Unit #0 | | | |
| to | to | | | | to | | | | to | | | | to | | | |
| +111 | Alarm information of Repeater Unit #63 | | | | Alarm information of Repeater Unit #62 | | | | Alarm information of Repeater Unit #61 | | | | Alarm information of Repeater Unit #60 | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Alarm information | Read | Alarm information<br>The format for all alarm information is as follows:<br>Bit 0: Warning status flag<br>Bit 1: Alarm status flag<br>Bit 2: Reserved bit<br>Bit 3: Reserved bit |

## Error Log

This is used to read the stored error records.

Errors for the number of error logs in Offset+0 are stored from the head.

Data format

Offset address: 0x20FC

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Number of error logs | | | | | | | | | | | | | | | |
| +1 | 1st error code | | | | | | | | | | | | | | | |
| +2 | 1st detailed code | | | | | | | | | | | | | | | |
| +3 | Minute of the 1st error occurrence (0 to 59) | | | | | | | | Second of the 1st error occurrence (0 to 59) | | | | | | | |
| +4 | Day of the 1st error occurrence (1 to 31) | | | | | | | | Hour of the 1st error occurrence (0 to 23) | | | | | | | |
| +5 | Year of the 1st error occurrence (00 to 99) | | | | | | | | Month of the 1st error occurrence (1 to 12) | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +316 | 64th error code | | | | | | | | | | | | | | | |
| +317 | 64th detailed code | | | | | | | | | | | | | | | |
| +318 | Minute of the 64th error occurrence (0 to 59) | | | | | | | | Second of the 64th error occurrence (0 to 59) | | | | | | | |
| +319 | Day of the 64th error occurrence (1 to 31) | | | | | | | | Hour of the 64th error occurrence (1 to 23) | | | | | | | |
| +320 | Year of the 64th error occurrence (00 to 99) | | | | | | | | Month of the 64th error occurrence (1 to 12) | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Number of error logs | Read | Number of stored error logs |
| Error code | Read | Error code of an error log<br>see Section 6.2. |
| Detailed code | Read | Detailed code of an error log<br>see Section 6.2. |
| Second | Read | It stores the time at which an error occurred |
| Minute | Read | |
| Hour | Read | |
| Day | Read | |
| Month | Read | |
| Year | Read | |

**Precautions for Correct Use**

To keep the time of an error occurrence, the error log uses the clock information that is periodically indicated by the user application.
The time information of error logs will be all 0 if no clock information is given by the user application.

## Registration Table Example

Based on the information of the Slave Units that have already participated, you can create an example of the Registration table.

Data format

Offset address: 0x238C

See Appendix B.3.9 for the content of the Registration table.

## B-3-7 CMD Area in Detail

### CMD area (PC→BD)

A request command made by the PC to the CompoNet Master Board has the following format. The data size is fixed. If a command has no argument, 0x0000 will be stored.

Data format

Offset address: 0x3200

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | CMD | | | | | | | | | | | | | | | |
| +1 | Argument | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| CMD | Read/Write | It sets the command code. |
| Argument | Read/Write | It sets the argument. |

### CMD area (BD→PC)

A response command made by the CompoNet Master Board to the PC has the following format. The data size is fixed.

Data format

Offset address: 0x3210

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | 1 | CMD | | | | | | | | | | | | | | |
| +1 | Response code | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| CMD | Read | It returns the respond command. |
| Response code | Read | For a normal response: 0x0000<br>Upon an error: Anything besides 0x0000 (defined by command) |

## B-3-8 Event Area in Detail

### Event area (PC→BD)

This area is used when an explicit request message is sent by the PC to the CompoNet Master Board or to a Slave or Repeater Unit.

Data format

Offset address: 0x3300

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Byte length size after Offset+1 (2 to 542) | | | | | | | | | | | | | | | |
| +1 | Reserved (0x00) | | | | | | | | SID | | | | | | | |
| +2 | 0x02 | | | | | | | | 0x28 | | | | | | | |
| +3 | Low of Node address with attributes | | | | | | | | High of Node address with attributes | | | | | | | |
| +4 | Low of ServiceCode | | | | | | | | High of ServiceCode | | | | | | | |
| +5 | Low of ClassID | | | | | | | | High of ClassID | | | | | | | |
| +6 | Low InstanceID | | | | | | | | High of InstanceID | | | | | | | |
| +7 | ServiceData[1] | | | | | | | | ServiceData[0] | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +272 | ServiceData [531] | | | | | | | | ServiceData [530] | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| SID | Read/Write | The same value is added to the response of a sent explicit message. It is used to identify to which request the response pertains.<br>Set a certain value by the user application.<br>Settable range: 0x00 to 0xFF |
| Node address with attributes | Read/Write | It specifies the destination node address with attributes. See the following page for the node address with attributes. |
| ServiceCode | Read/Write | It specifies the service code defined by the explicit message.<br>Settable range: 0x0000 to 0x00FF |
| ClassID | Read/Write | It specifies the Class ID from which an explicit message is requested.<br>Settable range: 0x0000 to 0x00FF |
| InstanceID | Read/Write | It specifies the Instance ID from which an explicit message is requested.<br>Settable range: 0x0000 to 0x00FF |
| ServiceData | Read/Write | It specifies the data defined by a service code.<br>Number of effective bytes: 0 to 532 bytes |

Definition of a node address with attributes

| D15 | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type<br>0x0: Master Board<br>0x1: Normal IN or MIX Slave<br>0x2: Word OUT Slave<br>0x4: Bit IN or MIX Slave<br>0x5: Bit OUT Slave<br>0x7: Repeater | | | | 0 | 0 | 0 | 0 | Master Board: Fixed to 0<br>Word Slave Unit: 0 to 0x3F<br>Bit Slave Unit: 0 to 0x7F<br>Repeater: 0 to 0x3F | | | | | | | |

## Event Area (BD→PC)

This is the area in which to store an explicit response message for the explicit request message.

Data format

Offset address: 0x3600

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Byte length size after Offset+1 (2 to 542) | | | | | | | | | | | | | | | |
| +1 | Reserved (0x00) | | | | | | | | SID | | | | | | | |
| +2 | 0x02 | | | | | | | | 0x28 | | | | | | | |
| +3 | SRES | | | | | | | | MRES | | | | | | | |
| +4 | Low of Byte length size after a node address with attributes | | | | | | | | High of Byte length size after a node address with attributes | | | | | | | |
| +5 | Low of Node address with attributes | | | | | | | | High of Node address with attributes | | | | | | | |
| +6 | Low of ServiceCode | | | | | | | | High of ServiceCode | | | | | | | |
| +7 | ServiceData[1] | | | | | | | | ServiceData[0] | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +272 | ServiceData [531] | | | | | | | | ServiceData [530] | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| SID | Read/Write | It stores the SID set by an explicit request message. |
| MRES (End code) | Read/Write | It stores the corresponding error code when an error occurs. Stores 0x00 during the normal state. |
| SRES (End code) | Read/Write | It stores the corresponding detailed errorcode when an error occurs. Stores 0x00 during the normal state. |
| Byte length size after a node address with attributes | Read/Write | It stores the byte size after the node address with attributes. (8 to 542) |
| Node address with attributes | Read/Write | It stores the node address with attributes of the responder.<br>See the previous pages for the node address with attributes. |
| ServiceCode | Read/Write | This specifies the service code defined by an explicit message.<br>Settable range: 0x0000 to 0x00FF |
| ServiceData | Read/Write | It stores the data defined by the service code.<br>Effective byte size: 0 to 532 |

End code (MRES/SRES)

| End code (hex) | | Description |
|---|---|---|
| MRES | SRES | |
| 00 | 00 | Normal end |
| 01 | 01 | The destination has not participated. |
| 02 | 05 | The counterpart station does not respond: the monitoring timer has timed out. |
| 10 | 01 | The command exceeds the maximum length. |
| 10 | 02 | The command is shorter than the minimum length. |

| End code (hex) | | Description |
|---|---|---|
| MRES | SRES | |
| 10 | 04 | The command is not in the specified format. |
| 10 | 05 | Header error |
| 11 | 0B | The response exceeds the maximum length. |
| 22 | 11 | The destination is in the state that cannot receive an explicit message. |
| 26 | 06 | CompoNet Master Board is in initialization process. The service cannot be executed. |
| 26 | 09 | It is in a state where no event can be used |

## B-3-9 Setting Area in Detail

This is the area in which to set the information to be notified to the CompoNet Master Board when a command OPEN_SYSTEM or OPEN_SYSTEMEX is issued.

### Software Table

This table is used to set the number of nodes each for Word IN Slave Units, Word OUT Slave Unit, Bit IN Slave Units and Bit OUT Slave Units. See Section 3-1-1 for the setting items.

Data format

Offset address: 0x3900

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Number of Word OUT nodes | | | | | | | | | | | | | | | |
| +1 | Number of Word IN nodes | | | | | | | | | | | | | | | |
| +2 | Number of Bit OUT nodes | | | | | | | | | | | | | | | |
| +3 | Number of Bit IN nodes | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Number of Word OUT nodes | Read/Write | Settable range: 0x00 to 0x40 (0 to 64) |
| Number of Word IN nodes | Read/Write | Settable range: 0x00 to 0x40 (0 to 64) |
| Number of Bit OUT nodes | Read/Write | Settable range: 0x00 to 0x80 (0 to 128) |
| Number of Bit IN nodes | Read/Write | Settable range: 0x00 to 0x80 (0 to 128) |

### Data Rate

This is used to set the data rate used in the network.
The Slave Units automatically follow the data rate of the Master Board.
The data rate is selected from 4 Mbps, 3 Mbps, 1.5 Mbps and 93.75 kbps.

Data format

Offset address: 0x3908

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Data rate | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Data rate | Read/Write | 0: 4 Mbps<br>1: 3 Mbps<br>2: 1.5 Mbps<br>3: 93.75 kbps |

## Logical Error Checking Items

These are the items used to check when a Slave Unit participates again after having a communications error.
They are set when the Logical error checking item function is enabled.
The command OPEN_SYSTEMEX is used to enable the function as well as the checking items.

Data format

Offset address: 0x390A

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Logical error checking items | | | | | | | | | | | | | | | |

Detailed format of Logical error checking items

| Bit | Name | Access | Description |
|---|---|---|---|
| 00 | Vendor Code | Read/ Write | 0: Not checked<br>1: Checked |
| 01 | Device Type | Read/ Write | 0: Not checked<br>1: Checked |
| 02 | Product Code | Read/ Write | 0: Not checked<br>1: Checked |
| 03 | Major Revision | Read/ Write | 0: Not checked<br>1: Checked |
| 04 to 15 | Reserved area | Read/ Write | 0 |

## Registration Table

The table is set when the Registration Table function is enabled. The command OPEN_SYSTEMEX is used to make the setting. See Section 3-5-1 for information on the table function.

Data format

Offset address: 0x390C

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| +0 | Function setting | | | | | | | | | | | | | | | |
| +1 | Time to wait for a registered Slave Unit to participate | | | | | | | | | | | | | | | |
| +2 | Reserved (0x00) | | | | | | | | Checking items for the Registration Table | | | | | | | |
| +3 | I/O size information of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +66 | I/O size information of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |
| +67 | I/O size information of Word OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +130 | I/O size information of Word OUT Slave Unit #63 | | | | | | | | | | | | | | | |
| +131 | I/O size information of Bit IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| +to | to | | | | | | | | | | | | | | | |
| +258 | I/O size information of Bit IN/MIX Slave Unit #127 | | | | | | | | | | | | | | | |
| +259 | I/O size information of Bit OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +386 | I/O size information of Bit OUT Slave Unit #127 | | | | | | | | | | | | | | | |
| +387 | Vendor Code of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +450 | Vendor Code of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |
| +451 | Vendor Code of Word OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +514 | Vendor Code of Word OUT Slave Unit #63 | | | | | | | | | | | | | | | |
| +515 | Vendor Code of Bit IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +642 | Vendor Code of Bit IN/MIX Slave Unit #127 | | | | | | | | | | | | | | | |
| +643 | Vendor Code of Bit OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +770 | Vendor Code of Bit OUT Slave Unit #127 | | | | | | | | | | | | | | | |
| +771 | Device Type of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +834 | Device Type of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |
| +835 | Device Type of Word OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +898 | Device Type of Word OUT Slave Unit #63 | | | | | | | | | | | | | | | |
| +899 | Device Type of Bit IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1026 | Device Type of Bit IN/MIX Slave Unit #127 | | | | | | | | | | | | | | | |
| +1027 | Device Type of Bit OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1154 | Device Type of Bit OUT Slave Unit #127 | | | | | | | | | | | | | | | |
| +1155 | Product Code of Word IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1218 | Product Code of Word IN/MIX Slave Unit #63 | | | | | | | | | | | | | | | |
| +1219 | Product Code of Word OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **15** | **14** | **13** | **12** | **11** | **10** | **09** | **08** | **07** | **06** | **05** | **04** | **03** | **02** | **01** | **00** |
| +1282 | Product Code of Word OUT Slave Unit #63 | | | | | | | | | | | | | | | |
| +1283 | Product Code of Bit IN/MIX Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1410 | Product Code of Bit IN/MIX Slave Unit #127 | | | | | | | | | | | | | | | |
| +1411 | Product Code of Bit OUT Slave Unit #0 | | | | | | | | | | | | | | | |
| to | to | | | | | | | | | | | | | | | |
| +1538 | Product Code of Bit OUT Slave Unit #127 | | | | | | | | | | | | | | | |
| +1539 | Major Revision of Word IN/MIX Slave Unit #1 | | | | | | | | Major Revision of Word IN/MIX Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +1570 | Major Revision of Word IN/MIX Slave Unit #63 | | | | | | | | Major Revision of Word IN/MIX Slave Unit #62 | | | | | | | |
| +1571 | Major Revision of Word OUT Slave Unit #1 | | | | | | | | Major Revision of Word OUT Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +1602 | Major Revision of Word OUT Slave Unit #63 | | | | | | | | Major Revision of Word OUT Slave Unit #62 | | | | | | | |
| +1603 | Major Revision of Bit IN/MIX Slave Unit #1 | | | | | | | | Major Revision of Bit IN/MIX Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +1666 | Major Revision of Bit IN/MIX Slave Unit #127 | | | | | | | | Major Revision of Bit IN/MIX Slave Unit #126 | | | | | | | |
| +1667 | Major Revision of Bit OUT Slave Unit #1 | | | | | | | | Major Revision of Bit OUT Slave Unit #0 | | | | | | | |
| to | to | | | | | | | | to | | | | | | | |
| +1730 | Major Revision of Bit OUT Slave Unit #127 | | | | | | | | Major Revision of Bit OUT Slave Unit #126 | | | | | | | |

Detailed format

<table>
<tr><th>Name</th><th>Access</th><th>Description</th></tr>
<tr><td>Function setting</td><td>Read/Write</td><td>Sets the Registration table function.
<table>
<tr><th>Bit</th><th>Flag</th><th>Description</th></tr>
<tr><td>0</td><td>Registration table enabled flag</td><td>Set it to 1 (ON) when the Registration tables are used.</td></tr>
<tr><td>1</td><td>All Registered Slave Participation Standby flag</td><td>0 (OFF): Disabled<br>1 (ON): Enabled</td></tr>
<tr><td>2 to 7</td><td>Reserved area</td><td>Set 0 (OFF).</td></tr>
<tr><td>8</td><td>Communications cycle optimization flag</td><td>0 (OFF): Disabled<br>1 (ON): Enabled</td></tr>
<tr><td>9 to 15</td><td>Reserved area</td><td>Set 0 (OFF).</td></tr>
</table></td></tr>
<tr><td>Registered Slave participation time</td><td>Read/Write</td><td>This is the time in which to monitor the participation of registered Slave Units. The value can be set in units of 10 ms.<br>Settable range: 1 to 65535<br>Setting it to 0 will select the default of 1000 (10000ms).</td></tr>
<tr><td>Checking items for the Registration Table</td><td>Read/Write</td><td>Sets the items to check in the Registration table.
<table>
<tr><th>Bit</th><th>Flag</th><th>Description</th></tr>
<tr><td>0</td><td>VendorCode</td><td rowspan="4">0 (OFF) : Not checked.<br>1 (ON) : Checked.</td></tr>
<tr><td>1</td><td>DeviceType</td></tr>
<tr><td>2</td><td>ProductCode</td></tr>
<tr><td>3</td><td>MajorRevision</td></tr>
<tr><td>4 to 5</td><td>Reserved area</td><td></td></tr>
</table></td></tr>
<tr><td>I/O size information</td><td>Read/Write</td><td>Sets the I/O size information.<br>See the I/O size information format in the following page for the set content.</td></tr>
<tr><td>Vendor Code</td><td>Read/Write</td><td rowspan="4">Sets these flags when the relevant flag of the Registration table is set to check.<br>The values to be set are the ones in the Slave Unit Identity object information.</td></tr>
<tr><td>Device Type</td><td>Read/Write</td></tr>
<tr><td>Product Code</td><td>Read/Write</td></tr>
<tr><td>Major Revision</td><td>Read/Write</td></tr>
</table>

I/O size information format

| Bit | Flag | Description |
|---|---|---|
| 0 to 4 | Number of IN channels (points) | Set the number of IN channels of Slave Units.<br>Set the Bits 0 to 5 to 0 (OFF), when the number of IN channels is zero.<br>=00000: 2 points, =00001: 4 points,<br>=00010: 8 points, =00011: 16 points,<br>=00100: 32 points, =00101: 48 points,<br>=00110: 64 points, =00111: 80 points,<br>=01000: 96 points, =01001: 112 points,<br>=01010: 128 points, =01011: 144 points,<br>=01100: 160 points, =01101: 176 points,<br>=01110: 192 points, =01111: 208 points,<br>=10000: 224 points, =10001: 240 points,<br>=10010: 256 points, others: prohibited |
| 5 | IN-setting enabled flag | 0: Disabled IN number setting<br>1: Enabled IN number setting |
| 6 to 7 | Reserved area | Set 0 (OFF). |
| 8 to 12 | Number of OUT channels | Set the number of OUT channels for Slave Units.<br>Set the Bits 8 to 13 to 0 (OFF), when the number of OUT channels is zero.<br>=00000: 2 points, =00001: 4 points,<br>=00010: 8 points, =00011: 16 points,<br>=00100: 32 points, =00101: 48 points,<br>=00110: 64 points, =00111: 80 points,<br>=01000: 96 points, =01001: 112 points,<br>=01010: 128 points, =01011: 144 points,<br>=01100: 160 points, =01101: 176 points,<br>=01110: 192 points, =01111: 208 points,<br>=10000: 224 points, =10001: 240 points,<br>=10010: 256 points, others: prohibited |
| 13 | Out-setting enabled flag | 0: Disabled OUT number setting<br>1: Enabled OUT number setting |
| 14 | Reserved area | Don't care |
| 15 | Slave Unit Enabled flag | Enable the relevant flag when a Slave Unit is registered.<br>0: The “All” setting is invalid. (No Slave Unit is registered.)<br>1: The “All” setting is valid. (The Slave is registered.) |

## Network Parameter

This is the network setting for the CompoNet Master Board.

Normally, no setting is required. It is set when the network parameter is enabled. The command is used to make the setting.

Data format

Offset address: 0x4692

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Event function enabling | | | | | | | | | | | | | | | |
| +1 | Monitoring time of event addressed to Slave Units | | | | | | | | | | | | | | | |
| +2 to +4 | Reserved | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Event function enabling | Read/Write | 0x0000: Enabled<br>0x0001: Disabled<br>The communications cycle becomes shorter when the Event function is not used. In that case, explicit messages cannot be sent to Slave Units or Repeater Units. |
| Monitoring time of event addressed to Slave Units | Read/Write | This is the time to monitor events addressed to Slave Units.<br>Settable range: 0 to 65535ms<br>(Setting it to 0 will select the default of 2000ms.) |

## Slave Parameter

The parameter is indicated by the Master Board to the participating Slave Units.

The parameter is used by the Slave Units.

Normally, no setting is required; however, it is set when the Slave Unit parameter is enabled. The command OPEN_SYSTEMEX is used to make the setting.

Data format

Offsetaddress: 0x469C

| Offset (Word) | Bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +0 | Monitoring time of Slave Unit making a request | | | | | | | | | | | | | | | |
| +1 | I/O time-out value | | | | | | | | | | | | | | | |

Detailed format

| Name | Access | Description |
|---|---|---|
| Monitoring time of Slave Unit making a request | Read/Write | This is the time to monitor events when a Slave Unit sends an explicit message.<br>Settable range: 0 to 65535 ms<br>(Setting it to 0 will select the default of 2000ms.) |
| I/O time-out value | Read/Write | This is the OUT frame monitoring time for a Slave Unit to detect a communications error. For Slave Units, the actual I/O time-out value is four times of the set value.<br>Settable range:<br>0 to 50 ms in data rate of 4 M, 3 M or 1.5 Mbps,<br>0 to 163 ms in data rate of 93.75 kbps:<br>(When 0 or a value beyond the settable range is set, it operates at the maximum value of the settable range.) |

# B-4 Command Specifications

## B-4-1 Command List

See Appendix B.3.7 for the command format.

| Group | Command name | Code | Description |
|---|---|---|---|
| Common | OPEN_SYSTEM | 0x0001 | This starts the system with the basic setting of data rate and number of occupied nodes. Then it starts the communications cycles. |
| | OPEN_SYSTEMEX | 0x0002 | It starts the system with the detailed setting and starts the communications cycles. |
| Communications control | START_IOCYCLE | 0x1001 | It starts the I/O communications. (It is used to start the I/O communications, when the I/O Communications Manual Startup function is enabled or after the I/O communications is explicitedly stopped.) |
| | STOP_IOCYCLE | 0x1002 | It stops the I/O communications. |
| | STOP_CYCLE | 0x1003 | It stops the communications cycles.<br>To resume the communications, the CompoNet Master Board must be reset. |
| Status | REQUEST_STATUS | 0x2001 | It issues a request to read the Detailed status group. |
| | REQUEST_RESET STATUS | 0x2002 | It issues a request to clear the Detailed status group. |
| Maintenance | SET_PC_WDT | 0x3001 | It sets the PC WDT. |

## B-4-2 Command in Detail

**Command**
**OPEN_SYSTEM**

**Purpose** Open the CompoNet Master Board, and let it be ready to be used.

**Code** 0x0001

**Argument** None
Set 0x0000.

**Response code** Normal end: 0x0000
At an error:
Hardware error: 0x8101 to 0x8109

Error of argument data format: 0xC000+ Bit location of an error

| Bit | Error location |
|---|---|
| 0 | Software table |
| 1 | Data rate |
| 2 to 15 | Reserved area, 0 (OFF) |

Errors in argument data format refer to the format errors in the relevant setting area.

**Remarks**

- To issue this command, the setting areas of the software table and data rate must be set.

## Command OPEN_SYSTEMEX

**Purpose**

Open the CompoNet Master Board, and let it be ready to be used.

**Code**

0x0002

**Argument**

Function specification: 1-WORD data,
Set 1 (ON) to enable or 0 (OFF) to disable.

| Bit | Description |
|---|---|
| 0 | Communications stop due to communications error function |
| 1 | I/O communications manual startup function |
| 2 | IN data zero clear due to communications error function |
| 3 to 7 | Reserved area, Set 0 (OFF). |
| 8 | Registration Table function |
| 9 | Logical error checking item function |
| 10 | Network parameter function |
| 11 | Slave-Unit parameter function |
| 12 to 15 | Reserved area, Set 0 (OFF). |

**Response code**

Normal end: 0x0000

At an error:
Hardware error: 0x8101 to 0x8109

Error of argument data format: 0xC000+Bit location of an error

| Bit | Error location |
|---|---|
| 0 | Software table |
| 1 | Data rate |
| 2 to 7 | Reserved area, Set 0 (OFF) |
| 8 | Registration Table function |
| 9 | Logical error checking item function |
| 10 | Network parameter function |
| 11 | Slave-Unit parameter function |
| 12 to 15 | Reserved area, Set 0 (OFF) |

Errors in argument data format refer to the format errors in the relevant setting area.

**Remarks**

- To issue this command, the following setting areas must be set:

[Mandatory]

- Software table
- Data rate

[Required when the relevant function is enabled or when the relevant function needs the setting]

- Logical error checking item
- Registration Table

- Network parameter
- Slave Unit parameter

## Command START_IOCYCLE

**Purpose**

Start the I/O communications.

**Code**

0x1001

**Argument**

None

Set 0x0000.

**Response code**

Normal end: 0x0000

At an error:

Status change not allowed: 0x8101

**Remarks**

- This command is used to start the I/O communications, when the I/O communications manual startup function is enabled or after the I/O communications is explicitly stopped.
- These are the possible causes of having a situation in which no status change is allowed.
  - The I/O communications has already started.
  - The communications cycles have stopped.

## Command STOP_IOCYCLE

**Purpose**

Stop the I/O communications.

**Code**

0x1002

**Argument**

None

Set 0x0000.

**Response code**

Normal end: 0x0000

At an error:
Status change not allowed: 0x8101

**Remarks**

- These are the possible causes of having a situation in which no status change is allowed.
  - The I/O communications has already stopped.
  - The communications cycles have stopped.

## Command STOP_CYCLE

**Purpose** Stop the communications cycles.

**Code** 0x1003

**Argument** None
Set 0x0000.

**Response code** Normal end: 0x0000
At an error:
Status change not allowed: 0x8101

**Remarks**
- To resume the communications, the CompoNet Master Board must be reset.
- These are the possible causes of having a situation in which no status change is allowed.
- The communications cycles have stopped.

## Command REQUEST_STATUS

**Purpose** Issue a request to read the Detailed status group.

**Code** 0x2001

**Argument** Reading status items: 1-WORD data,
Set the bits to read to 1 (ON) and the bits not to read to 0 (OFF).

| Bit | Flag name |
|---|---|
| 0 | Duplication error flag |
| 1 | Registration error (Registered Slave not participated) flag |
| 2 | Registration error (Non- registered Slave participating) flag |
| 3 | Repeater configuration error |
| 4 | EO Slave Unit |
| 5 | Master status |
| 6 | Error counter |
| 7 | Network power state |
| 8 | Participating Slave Unit identity table |
| 9 | Repeater configuration information |
| 10 | Alarm information |
| 11 | Error log |
| 12 to 13 | Reserved area, Set 0 (OFF). |
| 14 | Registration table example |
| 15 | Reserved area, Set 0 (OFF). |

**Response code** Normal end: 0x0000

**Remarks**
- The Detailed status in the shared memory that has been requested to read is reflected at the time a normal end is the response.

## Command REQUEST_RESETSTATUS

**Purpose** Issue a request to clear the Detailed status group.

**Code** 0x2002

**Argument** Clearing status items: 1-WORD data, Set the bits to clear to 1 (ON) and the bits not to clear to 0 (OFF).

| Bit | Flag name |
|---|---|
| 0 to 4 | Reserved area, Set 0 (OFF). |
| 5 | Master status |
| 6 | Error counter |
| 7 to 10 | Reserved area, Set 0 (OFF). |
| 11 | Error log |
| 12 to 15 | Reserved area, Set 0 (OFF). |

**Response code** Normal end: 0x0000

**Remarks**

- It is cleared at the time a normal end is the response.
- When the Master status is set to be cleared, the Maximum communication cycle time, the Cumulative CRC reception error and the Cumulative code reception error in the Master status are cleared.

## Command SET_PC_WDT

**Purpose** Set the PC Watchdog Timer.

**Code** 0x3001

**Argument** Timer value: 1-WORD data,
Unit: 10 ms
Range: 0x0000, 0x0001 to 0xFFFF (1 to 655350 ms)
(Setting 0x0000 will disable the PC WDT function.)

**Response code** Normal end: 0x0000

**Remarks**

- When the PC WDT is enabled, be sure to refresh it before it times out.
- See Section 5-5 for the usage of PC WDT.

# APPENDIX C
# Communications Performance

# C-1 Remote I/O Communications Performance

This section explains the remote I/O communications performance of the CompoNet Master Board.

## C-1-1 Input time (Slave Unit → Master Board)

This is the input time for the CompoNet network. The input time refers to the time until the input signal of an IN Slave Unit is captured by the Master Board application.

The calculation formula for input time differs according to the type of Slave Unit and the access method.

| Access method | Slave Unit Type | Input time calculation formula (ms) |
|---|---|---|
| Asynchronous access | Word Input Unit | $T_{IN} + T_{NetCyc} + 0.1 + T_{CrmIn} + T_{PC}$ |
| | Bit Input Unit | $T_{IN} + T_{NetIn} + T_{NetCyc} + T_{CrmIn} + T_{RelAcc} + T_{PC}$ |
| Synchronous access | Word Input Unit | |
| | Bit Input Unit | |

## C-1-2 Output time (Master Board → Slave Unit)

This is the output time for the CompoNet network. The output time refers to the time until the output signal from the Master Board application is outputted to an OUT Slave Unit.

The calculation formula for input time differs according to the type of Slave Unit and the access method.

| Access method | Slave Unit Type | Output time calculation formula (ms) |
|---|---|---|
| Asynchronous access | Word Output Unit | $T_{PC} + T_{CrmOut} + T_{NetCyc} + T_{NetOut} + T_{OUT}$ |
| | Bit Output Unit | |
| Synchronous access | Word Output Unit | $T_{PC} + T_{CrmOut} + T_{NetCyc} \times 2 + T_{NetOut} + T_{RelAcc} + T_{OUT}$ |
| | Bit Output Unit | |

## C-1-3 Descriptions of Parameters

| | |
|---|---|
| $T_{IN}$ | Input Slave Unit input delay time |
| $T_{OUT}$ | Output Slave Unit output delay time |
| $T_{NetCyc}$ | Communications cycle time |
| $T_{NetIn}$ | Time allotted for IN frames in communications cycle time |
| $T_{NetOut}$ | Time allotted for OUT frame in communications cycle time |
| $T_{CrmIn}$ | Input processing time at the Master Board |
| $T_{CrmOut}$ | Output processing time at the Master Board |
| $T_{RelAcc}$ | Processing time to release an access right |
| $T_{PC}$ | Time for a PC to process the application |

**Precautions for Correct Use**

When you calculate the parameters, do not use the actual numbers of Units for values such as the number of Word Output Slave Units connected. Rather, use the number of occupied nodes that is specified when the communications cycle is started.

### $T_{IN}$ (Input Slave Unit Input Delay Time)

### $T_{OUT}$ (Output Slave Unit Output Delay Time)

For details on input/output delay times for individual Slave Units, refer to the input specifications for individual Slave Units in the CompoNet Slave Unit Operation Manual (Cat. No. W457).

### $T_{NetCyc}$ (Communications Cycle Time)

| Data rate | 4.0 Mbit/s | 3.0 Mbit/s | 1.5 Mbit/s | 93.75 kbit/s |
|---|---|---|---|---|
| Communications cycle time | 0.74 ms + G + S1 + S2 (0.57ms + G + S1 + S2) | 0.78 ms + G + S1 + S2 (0.57ms + G + S1 + S2) | 1.80 ms + G + S1 + S2 (1.40ms + G + S1 + S2) | 23.82 ms+ G + S1 + S2 (16.11ms + G + S1 + S2) |

The figures in parentheses are when message communications are not used.

G = (Number of Word Output Slave Units connected × additional time per Word Output Slave Unit)
+ (Number of Word Input Slave Units × additional time per Word Input Slave Unit)
+ (Number of Bit Output Slave Units × additional time per Bit Output Slave Unit)
+ (Number of Bit Input Slave Units × additional time per Bit Input Slave Unit)

Additional Time per Unit by Slave Unit Type

| Data rate / Slave Unit Type | 4.0 Mbit/s | 3.0 Mbit/s | 1.5 Mbit/s | 93.75 kbit/s |
|---|---|---|---|---|
| Word Output Unit | 4.06 μs | 5.37 μs | 10.88 μs | 170.93 μs |
| Word Input Unit | 11.81 μs | 22.56 μs | 51.53 μs | 657.50 μs |
| Bit Output Unit | 0.57 μs | 0.74 μs | 1.42 μs | 21.25 μs |
| Bit Input Unit | 10.25 μs | 20.64 μs | 44.37 μs | 531.09 μs |

G Calculation Example

Conditions

| Data rate | Word Outputs | Word Inputs | Bit outputs | Bit inputs |
|---|---|---|---|---|
| 4.0 Mbit/s | 16 Units | 32 Units | 64 Units | 32 Units |

$G = (16 \times 4.06\ \mu s) + (32 \times 11.81\ \mu s) + (64 \times 0.57\ \mu s) + (32 \times 10.25\ \mu s) \approx 0.81ms$

S1 is the correction coefficient that is used when more than 32 Word IN Slave Units are connected.

S1 = Number of connected Word IN Slave Units × Correction coefficient for each Word IN Slave Unit

| Slave Unit Type | 4.0Mbps | 3.0Mbps | 1.5Mbps | 93.75kbps |
|---|---|---|---|---|
| Word IN Slave | 3.38 μs | 0.35 μs | 3.13 μs | - |

S1 Calculation Example

Conditions

| Data rate | Word Inputs |
|---|---|
| 4.0Mbps | 60 Units |

S1 = 60 × 3.38 μs ≈ 0.202 ms

S2 is the correction coefficient that is used when more than 64 Bit IN Slave Units are connected.

S2 = Number of connected Bit IN Slave Units × Correction coefficient for each Bit IN Slave Unit

| Slave Unit Type | 4.0Mbps | 3.0Mbps | 1.5Mbps | 93.75kbps |
|---|---|---|---|---|
| Bit IN Slave | 7.47 μs | 0.40 μs | 4.46 μs | - |

S2 Calculation Example

Conditions

| Data rate | Bit Inputs |
|---|---|
| 3.0Mbps | 120 Units |

S2 = 120 × 0.4 μs ≈ 0.048 ms

## $T_{NetIn}$ (Time Allotted for IN Frames in Communications Cycle Time)

| Data rate | $T_{NetIn}$ |
|---|---|
| 4.0 Mbps | 0.010 ms × (Number of Bit Input Slave Units) + S2 + 0.011 ms × (Number of Word Input Slave Units) + S1 |
| 3.0 Mbps | 0.020 ms × (Number of Bit Input Slave Units) + S2 + 0.022 ms × (Number of Word Input Slave Units) + S1 |
| 1.5 Mbps | 0.044 ms × (Number of Bit Input Slave Units) + S2 + 0.051 ms × (Number of Word Input Slave Units) + S1 |
| 93.75 kbps | 0.531 ms × (Number of Bit Input Slave Units) + 0.657 ms × (Number of Word Input Slave Units) |

## $T_{NetOut}$ (Time Allotted for OUT Frame in Communications Cycle Time)

| Data rate | 4.0 Mbit/s | 3.0 Mbit/s | 1.5 Mbit/s | 93.75 kbit/s |
|---|---|---|---|---|
| $T_{NetOut}$ | 0.013 ms + K | 0.018 ms + K | 0.035 ms + K | 0.567 ms + K |

K = (Number of Word Output Slave Units connected × additional time per Word Output Slave Unit)

+ ((Number of Bit Output Slave Units + 7) ÷ 8) × additional time per 8 Bit Output Slave Units)

Additional time per Word Output Slave Unit / Additional time per 8 Bit Output

Slave Units

| Data rate / Slave Unit Type | 4.0 Mbit/s | 3.0 Mbit/s | 1.5 Mbit/s | 93.75 kbit/s |
|---|---|---|---|---|
| Word Output Unit | 4.06 μs | 5.37 μs | 10.88 μs | 170.93 μs |
| Bit Output Unit | 4.06 μs | 5.37 μs | 10.88 μs | 170.93 μs |

K Calculation Example

Conditions

| Data rate | Word Outputs | Word Inputs | Bit outputs | Bit inputs |
|---|---|---|---|---|
| 3.0 Mbit/s | 7 Units | 8 Units | 9 Units | 10 Units |

$K = (7 \times 5.37\ \mu s) + (2 \times 5.37\ \mu s) \approx 0.048$ ms

## $T_{CrmIn}$ (Input Processing Time at Master Board)

| Data rate | 4.0 Mbit/s | 3.0 Mbit/s | 1.5 Mbit/s | 93.75 kbit/s |
|---|---|---|---|---|
| $T_{CrmIn}$ | 0.47 ms + M | 0.52 ms + M | 0.77 ms + M | 7.32 ms + M |

M = (Number of Word Output Slave Units connected × 1.09 μs)
+ (Number of Word Input Slave Units connected × 4.53 μs)
+ (Number of Bit Output Slave Units connected × 0.56 μs)
+ (Number of Bit Input Slave Units connected × 5.23 μs)

M Calculation Example

Conditions

| Data rate | Word Outputs | Word Inputs | Bit outputs | Bit inputs |
|---|---|---|---|---|
| 3.0 Mbps | 8 Units | 16 Units | 16 Units | 8 Units |

$M = (8 \times 1.09\ \mu s) + (16 \times 4.53\ \mu s) + (16 \times 0.56\ \mu s) + (8 \times 5.23\ \mu s) \approx 0.132$ ms

## $T_{CrmOut}$ (Output Processing Time at Master Board)

$T_{CrmOut}$ = 24.74 μs + (Number of Word Output Slave Units × 0.46 μs)
+ (((Number of Bit Output Slave Units + 7) ÷ 8) × 0.55 μs)

## $T_{RelAcc}$ (Processing Time to Release an Access Right)

$T_{RelAcc}$ = 6.91 μs + (Number of Word Output Slave Units × 0.46 μs)
+ (((Number of Bit Output Slave Units + 7) ÷ 8) × 0.55 μs)

## $T_{PC}$ (Time for a PC to Process the Application)

Measure the process time for an actual application.

# APPENDIX D
# Sample Program

# D-1 Sample Program

The CD packaged with the product contains the sample program. The program corresponds to the descriptions in Section 4 and 5.

Read the text document, Readme.txt, in the CD to understand the sample program in detail.

The program is created to explain the API and the shared memory access. It is not intended for operational use. It must be used as a reference, because there is no guarantee of proper operation.

# APPENDIX E
# Installation and Setup

# E-1 CompoNet Network Specifications

## E-1-1 Communications Specifications

| Item | Specifications |
|---|---|
| Communications protocol | CompoNet Network protocol |
| Types of communications | Remote I/O communications, i.e., program-less, constant data sharing with Slave Units; and message communications, i.e., occasional (as required) explicit message communications with Slave Units and occasional (as required) Explicit message communications with PLC |
| Data rate | 4 Mbps *1, 3 Mbps, 1.5 Mbps or 93.75 kbps |
| Modulation | Base band |
| Coding | Manchester code |
| Error control | Manchester code rules, CRC |
| Communications media *2 | Round cable I (2-conductor cable) and Round cable II (4-conductor cable), Flat Cable I (DCA4-4F10) and Flat Cable II (DCA5-4F10) |
| Communications distance and wiring | See Appendix E.1.3. |
| Connectable Slave Units | CompoNet Slave Units |
| Maximum I/O capacity | Word Slave Units: 1,024 inputs and 1,024 outputs, 2,048 points in total;<br>Bit Slave Units: 256 inputs and 256 outputs, 512 points in total |
| Maximum number of nodes | Word Slave Units: 64 input nodes and 64 output nodes;<br>Bit Slave Units: 128 input nodes and 128 output nodes;<br>Repeater Units: 64 nodes |
| Bits allocated per node address | Word Slave Units: 16 bits;<br>Bit Slave Units: 2 bits |
| Maximum number of nodes per trunk line or sub-trunk line | 32 nodes including Repeater Units |
| Applicable node addresses *3 | Word Slave Units: IN0 to IN63 and OUT0 to OUT63;<br>Bit Slave Units: BIT IN0 to IN127 and BIT OUT0 to OUT127;<br>Repeater Units: 0 to 63 |
| Condition to use Repeater Units | Up to 64 Repeater Units can be connected per network or Master Board. (Up to 32 Repeater Units can be connected per trunk line or sub-trunk line.)<br>Repeater Units can be connected to create a maximum of 2 segment layers from the Master Board. |
| Signal lines | Two lines: BDH (communications data high) and BDL (communications data low) |
| Power lines | Two lines: BS+ and BS− (power for communications and for internal circuits of Slave Unit supplied from the Master Board or a Repeater Unit) |
| Communications power voltage | 24 VDC±10% |
| Connection forms | When either Round cable II or Flat Cable I or II is used at data rate setting in 93.75 kbps: No restriction<br>Other cables or other data rates: Trunk line-branch line formation |
| | Connections for Slave Units and Repeater Units: T-branch or multidrop connections |

*1: Slave Units that are pre-connected with cables are not usable at this data rate. Because the data rate does not support T-branch connection, which is the only possible connection for the Slave Units with pre-connected cables.

*2: Round cable I, round cable II, Flat Cable I, and Flat Cable II are all different in cable type. When two or more of them are to be wired in a network, a Repeater Unit must be used to separate the cable for the trunk line and for a sub-trunk line.

*3: Use the node address of the Word Input Slave Unit for a Word Mixed Slave Unit. Use the node address of the Bit Input Slave Unit for a Bit Mixed Slave Unit.

## E-1-2 Communications Cables

### Cable types

The following four types of cables can be used in a CompoNet network: round cable I, round cable II, Flat Cable I and Flat Cable II.

Do not use other types of cables.

| Cable type | Major applications | | With or without a communications power supply | BDH (signal high) | BDL (signal low) | BS+ (positive side of communications power supply) | BS– (negative side of communications power supply ) |
|---|---|---|---|---|---|---|---|
| **Round cable I (2-conductor cable)** | • Wiring between the Master Board and a Repeater Unit,<br>• Wiring between a Repeater Units and a downstream Slave Unit | • To wire with a commercially available cable<br>• To supply power separately from the communications power<br>• Not to use a Bit Slave Unit | without | white | black or blue | None | None |
| **Round cable II (4-conductor cable)** | | • To wire with a commercially available cable<br>• To use the communications cable to supply the communications power to all Slave Units | with | white | green or blue | red | black |
| **Flat Cable I (standard cable)** | | • To use the communications cable to supply the communications power to all Slave Units<br>• To use one or more Bit Slave Units | with | white | blue | red | black |
| **Flat Cable II (sheathed cable)** | | • To use the communications cable to supply the communications power to all Slave Units<br>• To use one or more Bit Slave Units<br>• To use in an environment conforming to IP54; splash-proof and drip-proof | with | white | blue | red | black |

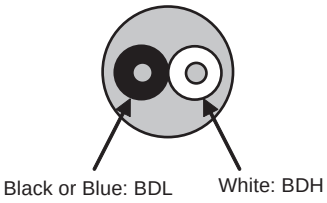
### Recommended CompoNet Cables

| Model number | Specification | Available from |
|---|---|---|
| TCN-F1 | Flat Cable I | SWCC Showa Cable Systems Co., Ltd. |
| TCN-F2 | Flat Cable II | |
| TCN-R1 | Round Cable I | |
| FCN-R1 | Round Cable I | Fuji Electric Wire Industries Co., Ltd. |
| FCN-R2 | Round Cable II | |
| KOMP-F I | Flat Cable I | Kuramo Electric Co., Ltd. |
| KOMP-F II | Flat Cable II | |
| KOMP-R I | Round Cable I | |
| KOMP-R II | Round Cable II | |

| Model number | Specification | Available from |
|---|---|---|
| UNICOMPO FC I-T | Flat Cable I | Nichigoh Communication Electric Wire Co., Ltd. |
| UNICOMPO FC II-T | Flat Cable II | |
| UNICOMPO RC I-T | Round Cable I | |
| UNICOMPO RC II-T | Round Cable II | |
| CNS-F I | Round Cable I (stationary use) | Dyden Corporation |
| CNS-F II | Round Cable II (stationary use) | |
| CNM- I | Round Cable I (robot use) | |
| CNM- II | Round Cable II (robot use) | |
| KCNF (manufactured by Daiko Denkosha Corporation) | Flat Cable I | Kanetsu Co., Ltd. |
| KCNF-J (manufactured by Taiyo Cabletec Corporation) | Flat Cable II | |
| MRC-4 (manufactured by Hanshin Electric Wire & Cable Co., Ltd.) | Round Cable II (resists oil and bending) | |
| VCTF0.75-2C (manufactured by Onamba Co., Ltd.) | Round Cable I | |
| VCTF0.75-4C (manufactured by Onamba Co., Ltd.) | Round Cable II | |
| VCTF0.75-2C (manufactured by Kawai Cable.) | Round Cable I | |
| VCTF0.75-4C (manufactured by Kawai Cable.) | Round Cable II | |

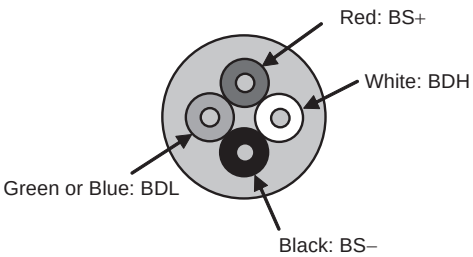
**Round cable I**

Use commercially available round cables, each with two 0.75-mm$^2$ thick conductors that meet the CompoNet specifications. Ask the cable manufacturer for information on which products are applicable to CompoNet. .

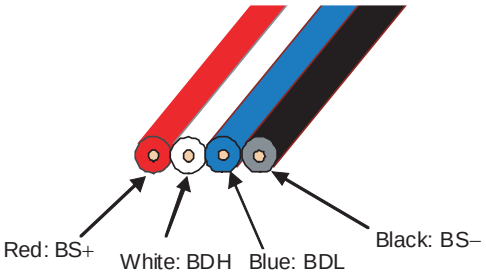



**Round cable II**

Use commercially available round cables each with four 0.75-mm$^2$ thick conductors that meet the CompoNet specifications. Ask the cable manufacturer for information on which products are applicable to CompoNet.



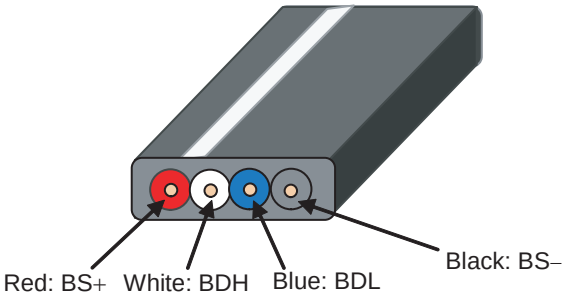
### Flat Cable I (DCA4-4F10 Standard Flat Cable)




| Conductor No. | Insulation color | Application | Nominal cross-section ($mm^2$) | Allowable current (A) |
|---|---|---|---|---|
| 1 | Red | BS + (positive side of communications power supply) | 0.75 | 5 max. |
| 2 | White | BDH (signal high) | 0.5 | – |
| 3 | Blue | BDL (signal low) | 0.5 | – |
| 4 | Black | BS – (negative side of communications power supply) | 0.75 | 5 max. |

Types of Flat Cable I other than DCA4-4F10 can be used as long as they conform to the CompoNet specifications. Ask the cable manufacturer for information on which products are applicable to CompoNet.

### Flat Cable II (DCA5-4F10 Sheathed Flat Cable)




| Conductor No. | Insulation color | Application | Nominal cross-section ($mm^2$) | Allowable current (A) |
|---|---|---|---|---|
| 1 | Red | BS + (positive side of communications power supply) | 0.75 | 5 max. |
| 2 | White | BDH (signal high) | 0.5 | – |
| 3 | Blue | BDL (signal low) | 0.5 | – |
| 4 | Black | BS – (negative side of communications power supply) | 0.75 | 5 max. |

Types of Flat Cable II other than DCA5-4F10 can be used as long as they conform to the CompoNet specifications. Ask the cable manufacturer for information on which products are applicable to CompoNet.

**Precautions for Correct Use**

- As for the products conforming the CompoNet specifications and their manufacturers, check the ODVA website at the following address: http: // www.odva.org/
- The characteristics of each conductor in Flat Cable I and Flat Cable II have been adjusted to the respective application as listed in the table. Check the line insulator colors, and use them only for the specified application only.

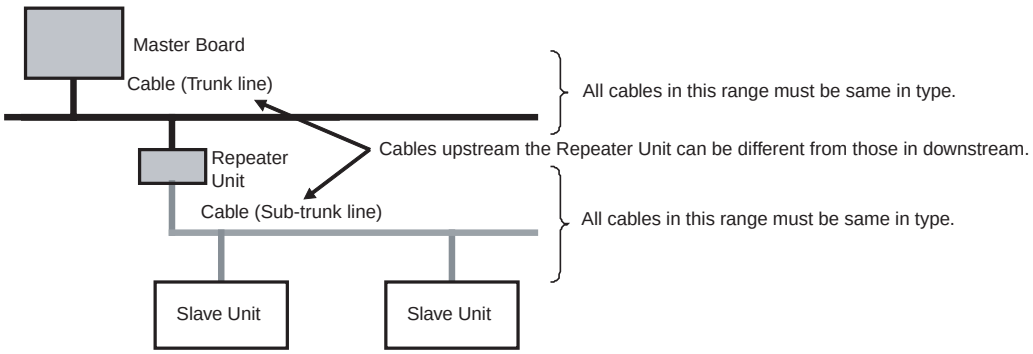
## Selecting applicable cable types

See the above description regarding cable types and select those that are appropriate for the purpose.

## Using Different Cable Types

All cables downstream from the Master Board must be of the same type. This means the same type of cable must be used for the trunk line and branch lines, for sub-trunk lines and branch lines, and for branch lines and their sub-branch lines.

However, when a Repeater Unit is used the cables can be different upstream and downstream from the Repeater Unit, i.e., for the trunk line and sub-trunk lines, and for a sub-trunk line and another sub-trunk line.



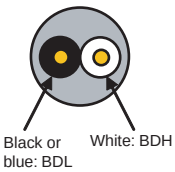
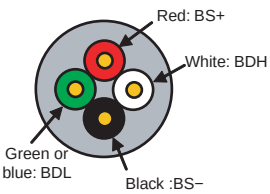
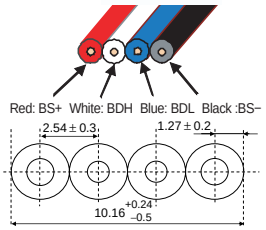
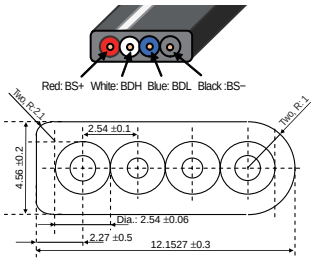

**Precautions for Correct Use**

Round cable I, round cable II, Flat Cable I and Flat Cable II are all treated as different types of cables.

## Separating Cables of a CompoNet System from Others for Another System

When plural adjacent CompoNet systems use Flat Cables I or II, electrical interference may disturb stable system operation. To prevent this, do not bundle Flat Cables for different CompoNet systems. Instead, separate the Cable for one network by a distance of at least 5 mm from the cable other for another network.

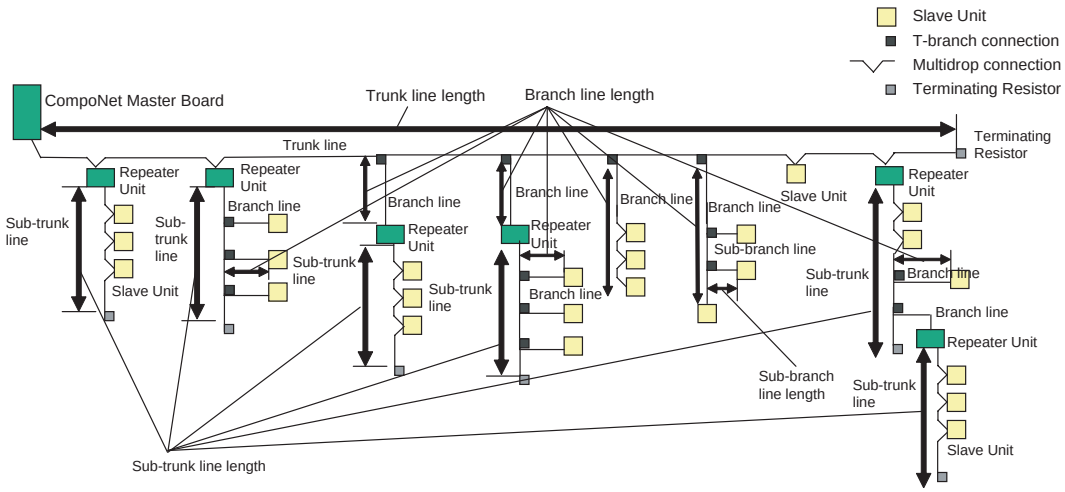
## Component Cable Specifications

| | Round Cable I | Round Cable II | | Flat Cable I | | Flat Cable II | |
|---|---|---|---|---|---|---|---|
| Type | Signal | Signal | Power | Signal | Power | Signal | Power |
| Conductors | 0.75 $mm^2$ × 2 | 0.75 $mm^2$ × 2 | 0.75 $mm^2$ × 2 | 0.5 $mm^2$ × 2 (twenty, 0.18-mm strands twisted at least once to 25 mm) | 0.75 $mm^2$ × 2 (thirty, 0.18-mm strands twisted at least once to 30 mm) | 0.5 $mm^2$ × 2 (twenty, 0.18-mm strands twisted at least once to 25 mm) | 0.75 $mm^2$ × 2 (thirty, 0.18-mm strands twisted at least once to 30 mm) |
| Maximum DCR (at 20°C) | 25.1 Ω/km | 25.1 Ω/km | | 37.5 Ω/km | 25.1 Ω/km | 37.5 Ω/km | 25.1 Ω/km |
| Characteristic impedance (at 1 MHz, 20°C) | 97 Ω ±15% | 120 Ω +10%/ –15% | – | 120 Ω ±10%/ | – | 120 Ω +10%/ –20% | – |
| Maximum attenuation (at 4 MHz, 20°C) | 60 db/km | 60 db/km | – | 55 db/km | – | 59 db/km | – |
| Maximum propagation delay (6 to 40 MHz, 20°C) | 6.5 ns/m | 6.5 ns/m | – | 5.9 ns/m | – | 6.3 ns/m | – |
| Structure | Finish OD: Approx. 6.6 mm   | Finish OD: Approx. 7.6 mm   | |   | |   | |

Refer to the ODVA website for applicable products and manufacturers with CompoNet specifications.
http://www.odva.org/

## E-1-3 Maximum Length and Maximum Number of Connectable Slave Units for Each Type of Cable

There are restrictions on the maximum lengths of each cable and the maximum number of connectable Slave Units. Do not exceed these limits.




## In Data Rate of 4 Mbps (No T-branching allowed, *)

| Item | Round cable I or II | Flat Cable I or II |
|---|---|---|
| Length of a trunk line or a sub-trunk line (Maximum length when two Repeater Units are used) | 30 m (90 m) | 30 m (90 m) |
| Length of a branch line | No T-branch connection on the trunk line is allowed.<br>Only multidrop connections are possible from the trunk line and sub-trunk lines. | |
| Total length of branch lines | | |
| Branching restriction | | |
| Number of connectable Slave and Repeater Units altogether per trunk line or sub-trunk line | 32 | 32 |

* Slave Units that are pre-connected with cables. do not support multidrop connection. Therefore, they cannot be used at this data rate.

## In Data Rate of 3 Mbps

| Item | Round cable I or II | Flat Cable I or II |
|---|---|---|
| Length of a trunk line or a sub-trunk line (Maximum length when two Repeater Units are used) | 30 m (90 m) | 30 m (90 m) |
| Length of a branch line | 0.5 m | 0.5 m |
| Total length of branch lines | 8 m | 8 m |
| Branching restriction | 3 branches / m | 3 branches / m |
| Number of connectable Units and Units per branch line * | 1 | 1 |
| Maximum length of a sub-branch line | Not allowed | Not allowed |
| Total length of sub-branch lines | Not allowed | Not allowed |
| Number of connectable Slave and Repeater Units altogether per trunk line or sub-trunk line | 32 | 32 |

* This is the maximum number of Slave and Repeater Units that can be connected to a branch line through the use of multidrop connections or T-branch connections. The purpose of T-branching here is to have a sub-branch line.

## In Data Rate of 1.5 Mbps

| Item | Round cable I | | Round cable II, Flat Cable I or II |
|---|---|---|---|
| | Without branch lines | With branch lines | |
| Length of a trunk line or a sub-trunk line (Maximum length when two Repeater Units are used) | 100 m (300 m) | 30 m (90 m) | 30 m (90 m) |
| Length of a branch line | Not supported *2 | 2.5 m | 2.5 m |
| Total length of branch lines | Not supported *2 | 25 m | 25 m |
| Branching restriction | – | 3 branches / m | 3 branches / m |
| Number of connectable Units per branch line *1 | | 3 | 3 |
| Maximum length of a sub-branch line | | Not supported | 0.1 m *3 |
| Total length of sub-branch lines | | Not supported | 2 m |
| Number of connectable Slave Units and Repeater Units altogether per trunk line or sub-trunk line | 32 | 32 | 32 |

*1 This is the maximum number of Slave and Repeater Units that can be connected to a branch line through the use of multidrop connections or T-branch connections. The purpose of T-branching here is to have a sub-branch line.

*2 The trunk line does not support T-branch connections. The trunk line and sub-trunk lines support only multidrop connections.

*3 Branch lines support T-branch connections.

### In Data Rate of 93.75 kbps

| Item | Round cable I | Round cable II Flat Cable I or II |
|---|---|---|
| Length of a trunk line or a sub-trunk line (Maximum length when two Repeater Units are used) | 500 m (1500 m) | Unrestricted wiring can be done for a total length of 200 m per segment |
| Length of a branch line | 6 m | |
| Total length of branch lines | 120 m | |
| Branching restriction | 3 branches / m | |
| Number of connectable Units per branch line * | 1 | |
| Maximum length of a sub-branch line | – | |
| Total length of sub-branch lines | – | |
| Number of connectable Slave Units and Repeater Units altogether per trunk line or sub-trunk line | 32 | 32 |

* This is the maximum number of Slave and Repeater Units that can be connected to a branch line through the use of multidrop connections or T-branch connections. The purpose of T-branching here is to have a sub-branch line.

## E-1-4 Types of CompoNet Network Addresses

The types of node address that are set on a CompoNet network are given in the following table.

| Type of node address | Address range | Applicable Slave Units |
|---|---|---|
| Word IN Slave Unit<br>Word MIX Slave Unit | 0 to 63 | Input Slave Unit or I/O Slave Unit that is allocated memory in increments of 16 bits |
| Word OUT Slave Unit | 0 to 63 | Output Slave Unit that is allocated memory in increments of 16 bits |
| Bit IN Slave Unit<br>Bit MIX Slave Unit | 0 to 127 | Input Slave Unit or I/O Slave Unit that is allocated memory in increments of 2 bits |
| Bit OUT Slave Unit | 0 to 127 | Output Slave Unit that is allocated memory in increments of 2 bits |
| Repeater Unit | 0 to 63 | Repeater Unit |

### IN Slave Unit Node Addresses Are Used for Mixed Slave Units

- For Word Mixed Slave Units, use the same node address type as for a Word Input Slave Unit.
- For Bit Mixed Slave Units, use the same node address type as for a Bit Input Slave Unit.
- If you connect a Word Input Expansion Unit (such as the XWT-ID16 or XWT-ID08) to a Word Output Slave Unit, the result is treated as a Mixed Slave Unit. Therefore, the node address type is a Word MIX Slave Unit instead of a Word OUT Slave Unit.

**The Same Address Can Be Used for Different Node Address Types**

You can use the same node address again for different node address types as long as long as the same areas are not allocated.

You cannot use the same address for a Word Mixed Slave Unit and Word Output Slave Unit because the same areas would be allocated. The same is true for a Bit Mixed Slave Unit and Bit Output Slave Unit.

Example 1: You can use a Word Input Slave Unit with node address 0 and a Word Output Slave Unit with node address 0.

Example 2: You can use a Word Mixed Slave Unit with node address 1 and a Bit Mixed Slave Unit with node address 1.

Example 3: You can use a Word Input Slave Unit with node address 2 and a Repeater Unit with node address 2.

**The Same Address Cannot Be Used for the Same Node Address Type**

Example 1: You cannot use two Word Input Slave Units with node address 1.

Example 2: You cannot use a Bit Input Slave Unit with node address 2 and a Bit Mixed Slave Unit with node address 2.

**You Cannot Use Nodes That Are Allocated the Same Areas at the Same Time**

Refer to *3-1-1 Settings Required for Starting the Communications Cycle* and *3-2-1 Allocation of I/O Data* for information on allocated areas.

Example 1: A 64-point Word Output Slave Unit with node address 2 uses node addresses 2, 3, 4, and 5 for the Word OUT Slave Unit node address type. Therefore, you cannot use node addresses 2 to 5 for any other Word Output Slave Unit at the same time.

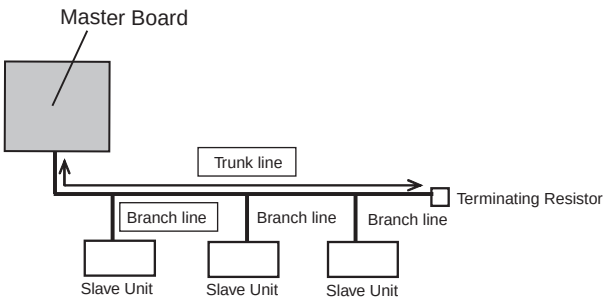
Example 2: A Word Mixed Slave Unit with 32 inputs and 32 outputs with node address 0 uses node addresses 0 and 1 for the Word MIX Slave Unit the Word OUT Slave Unit node address types. Therefore, you cannot use node addresses 0 or 1 for any other Word Input or Mixed Slave Unit at the same time.

# E-2 Wiring Formations

A CompoNet Network can employ either of two possible wiring formations.

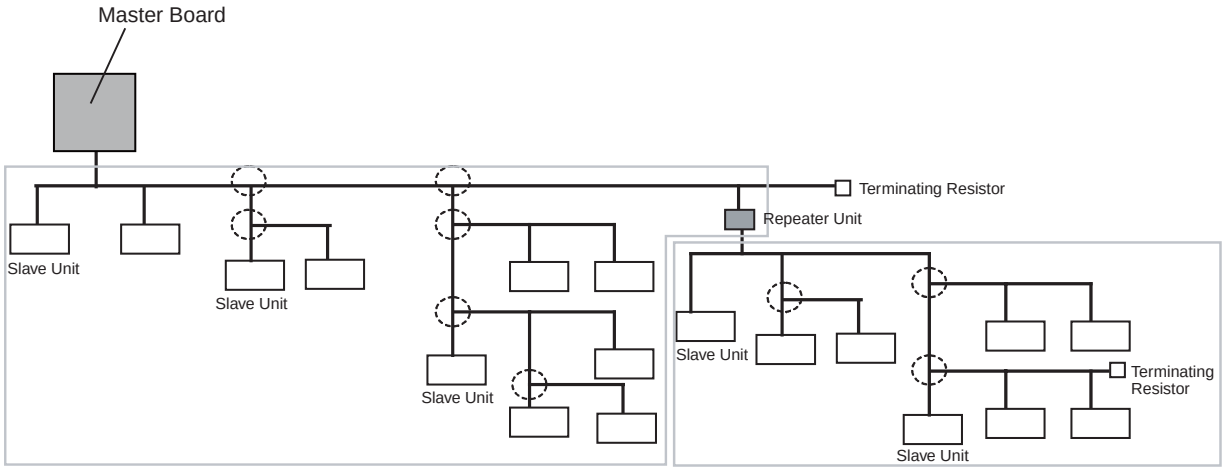
## E-2-1 Trunk Line-Branch Line Formation

In this wiring formation, the trunk line is differentiated from the branch lines. There are restrictions on the number of branches and the number of connecting Units.



## E-2-2 Unrestricted Wiring Formation

In this formation, there is no distinction between the trunk line and branch lines. There are no wiring restrictions as long as the total cable length per segment does not exceed 200 m.
There is also no limit in the number of branches.




The formation to be used is determined automatically by the type of cable used and the required data rate.

| Cable type | Data rate | | | |
|---|---|---|---|---|
| | 4 Mbps | 3 Mbps | 1.5 Mbps | 93.75 kbps |
| Round cable I | Trunk-Branch * | Trunk-Branch | Trunk-Branch | Trunk-Branch |
| Round cable II<br>Flat Cable I and II | Trunk-Branch * | Trunk-Branch | Trunk-Branch | Unrestricted |

* Trunk lines cannot have T-branch connections when the data rate is 4 Mbps. Only multidrop connections can be used.

The following table shows the conditions and restrictions for each formation.

| Item | Wiring formation | |
|---|---|---|
| | Trunk line-branch line formation | Unrestricted wiring formation |
| Master Board location | End of network | Anywhere in network (not necessarily at the end) |
| Maximum number of Slave Units connectable to a single branched line | 1 or 3 depending on the cable type and data rate | No restrictions |
| Terminating Resistor location | On the opposite end of the trunk line or a sub-trunk line from the Master Board or a Repeater Unit respectively | On the most remote end from the Master Board or a Repeater Unit |

# E-3 Wiring for a CompoNet Network

A CompoNet Network requires wiring of following lines.

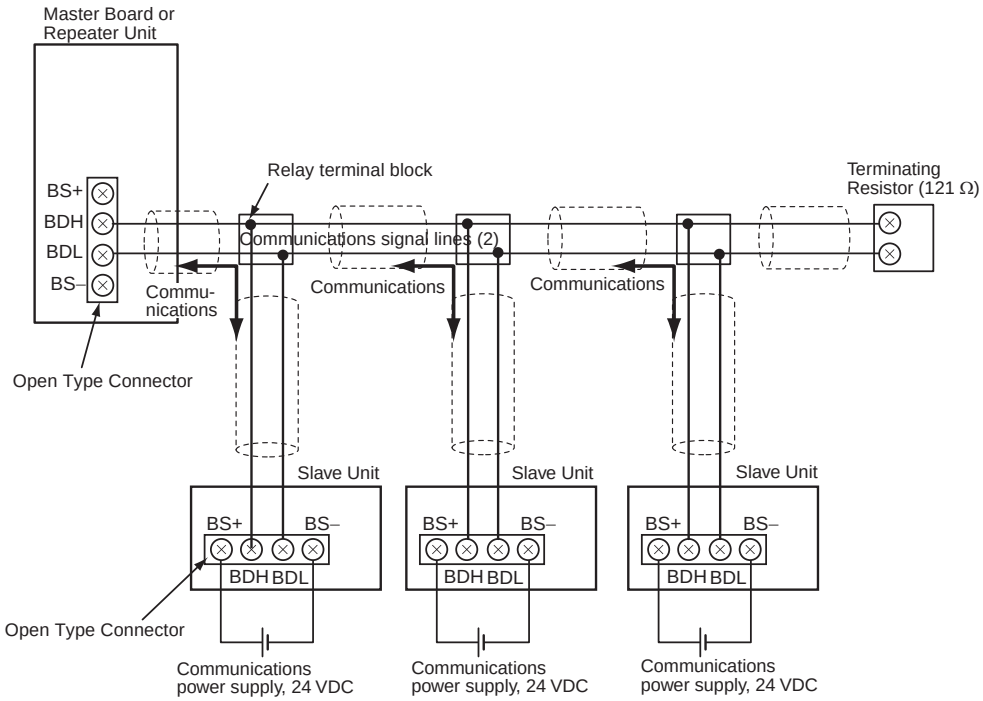
- Two communications signal lines:
  BDH (or communications data high) and BDL (or communications data low),
- Two communications power supply lines:
  one for communications and the other for internal circuits of Slave Units. The terminals are BS+ (or positive side of communications power supply) and BS– (or negative side of communications power supply).

Wiring method differs by the type of used cables.

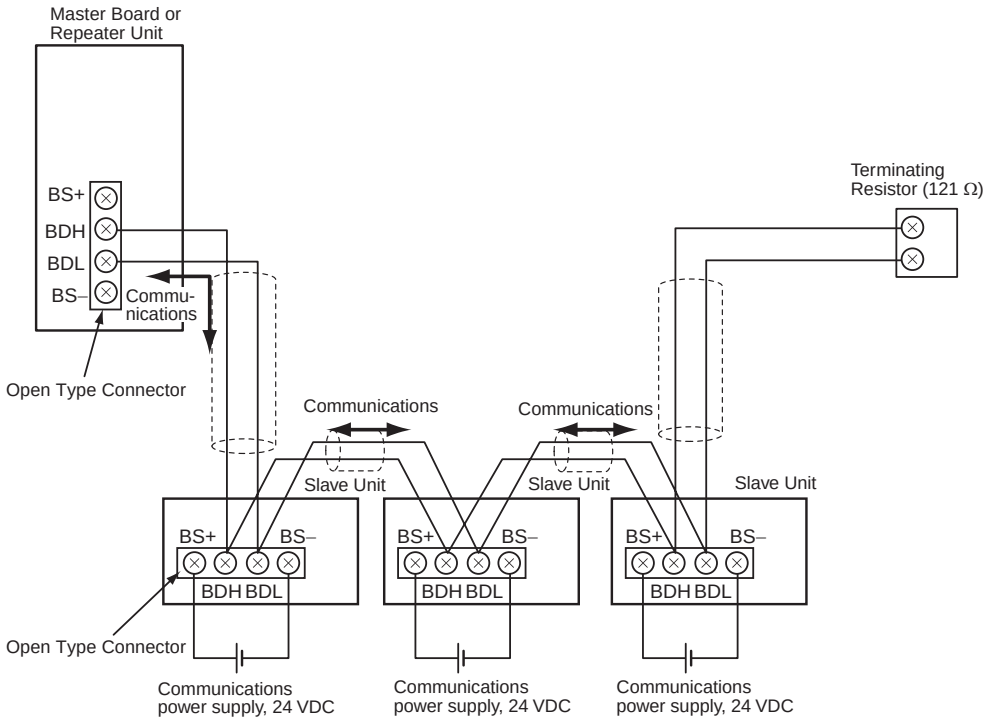
## E-3-1 Wiring Round Cable I

The two communications signal lines are connected in parallel between the Master Board or a Repeater Unit and multiple Slave Units.

- A DCN4-TB4 Open Type Connector is used to connect communications cables to the Master Board or a Repeater Unit and to the Slave Units.
- The two communications power supply lines are connected to each Slave Unit. They are different cables from the communications lines. The communications power supply lines are to supply 24-VDC communications power.
- No power line is connected to the Master Board or a Repeater Unit.
- A DRS1-T Terminating Resistor must be connected at the end of the network.

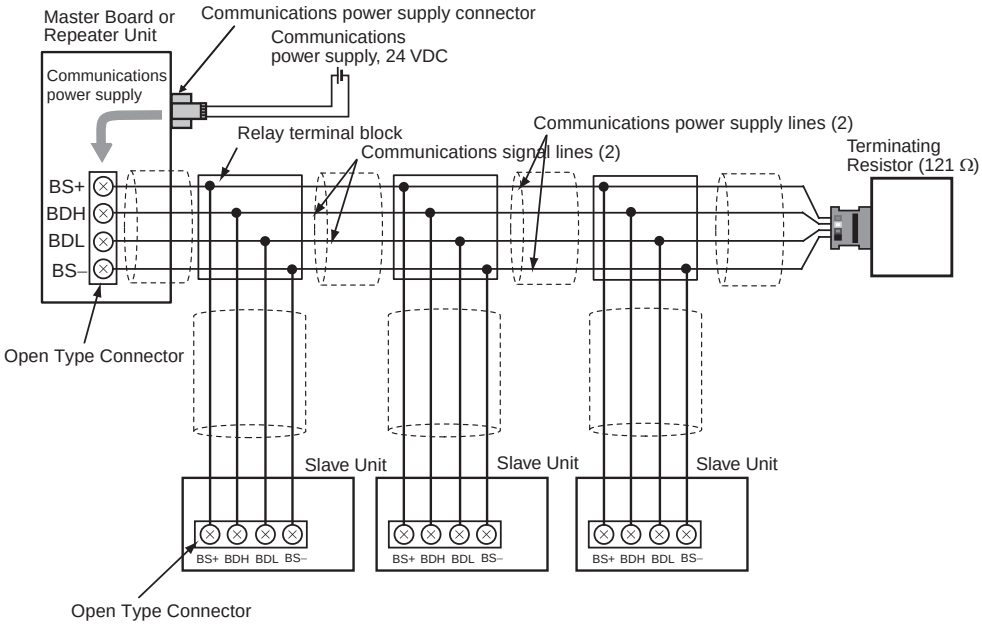


Multidrop Connectors can also be used to connect the Slave Units in parallel.

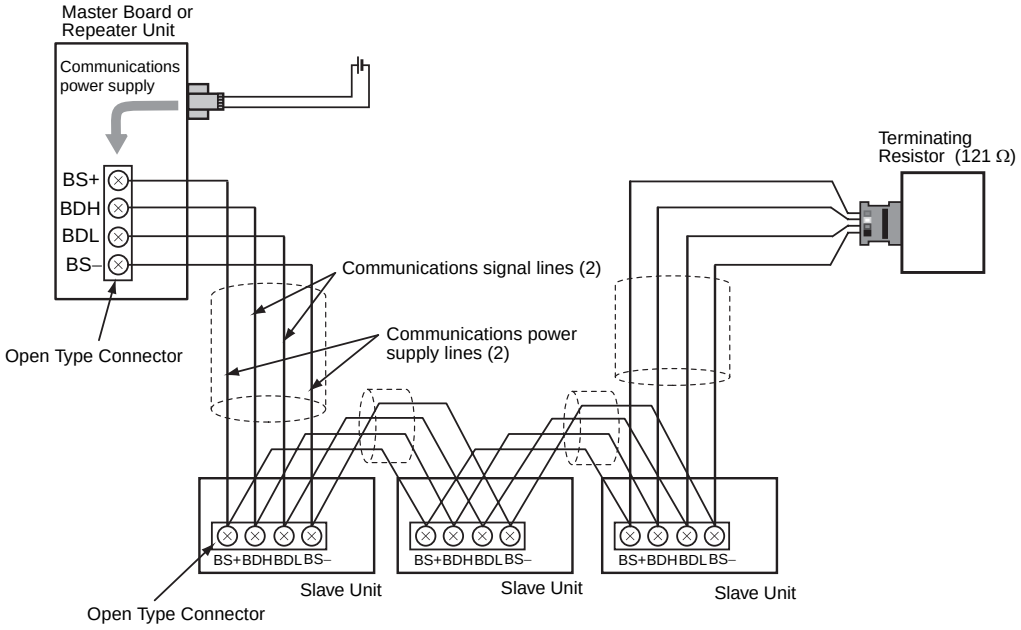


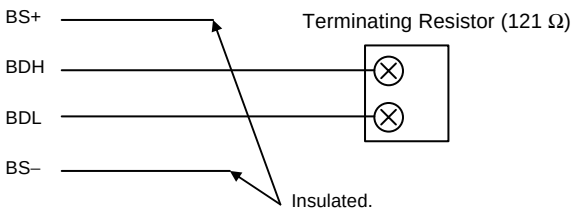

## E-3-2 Wiring Round Cable II

- The two communications signal lines and the two communications power lines are connected in parallel between the Master Board or a Repeater Unit and multiple Slave Units.
- A DCN4-TB4 Open Type Connector is used to connect the communications cables to the Master Board or a Repeater Unit and to the Slave Units.
- A 24-VDC communications power supply is connected to the communications power supply connector on the Master Board or the Repeater Unit.
- At the end of the network line, you must connect either a DCN4-TR4 Flat Connector Socket with a DCN4-TM4 Terminating Resistor attached to it, or a DRS1-T Terminating Resistor.




Multidrop Connectors can also be used to connect the Slave Units in parallel.

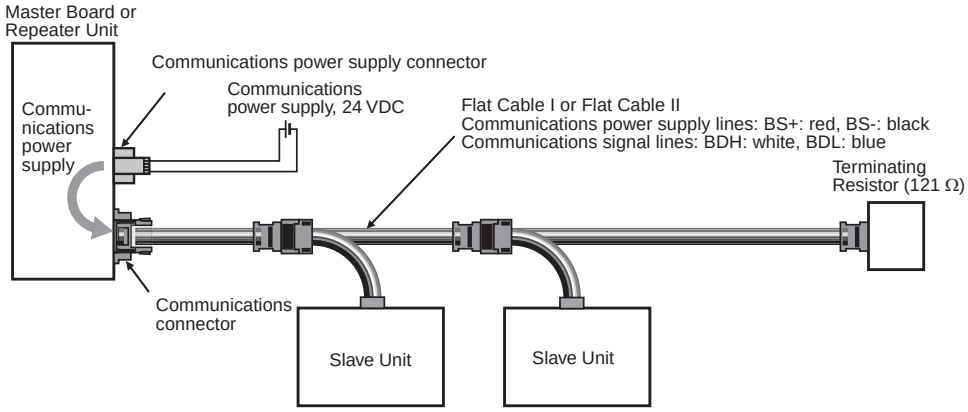


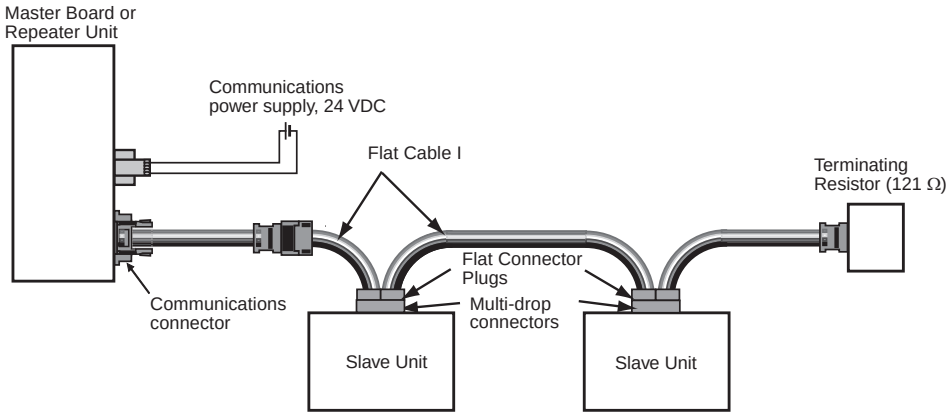

You can also use the DRS1-T Terminating Resistor for termination.
If you do, insulate the ends of the BS+ and BS− lines.

## E-3-3 Wiring Flat Cable I or II

- Flat Cables are used as the two communications signal lines and the two communications power supply lines that connect the Master Board or a Repeater Unit with the Slave Units.
- A 24-VDC communications power supply is connected to the communications power supply connector on the Master Board or Repeater Unit.
- At the end of the network line, there must be a DCN4-TM4 Terminating Resistor attached with a DCN4-TR4 Flat Connector I Socket.

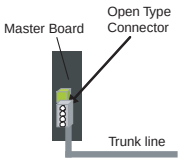
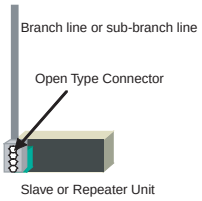
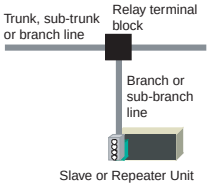
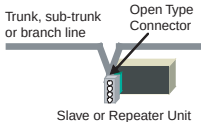



When Flat Cable I is used, Slave Units can be connected in parallel also by multidrop connections. A DCN4-MD4 Multidrop Connector is used for this connection.

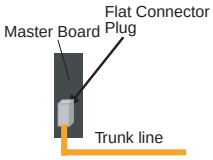
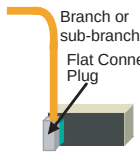
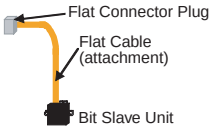
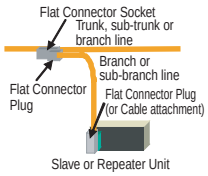
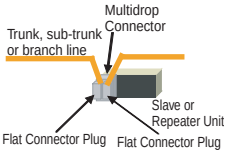


# E-3-4 Connectors

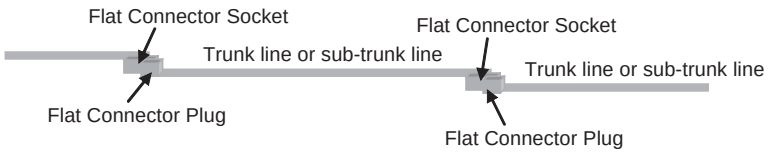
## Round cable I or II

| Master Board connections | Slave Unit/ Repeater Unit connections | Cable branches | |
|---|---|---|---|
| | | T-branch connections | Multidrop connections |
| Open Type Connector<br>  | Open Type Connector<br>  <br>**Note** Open Type Connectors cannot be used for Bit Slave Units. | Commercially available relay terminal block<br>  | Open Type Connector<br>  |

## Flat Cable I or II

| Master Board connections | Slave Unit/ Repeater Unit connections | Cable branches | |
|---|---|---|---|
| | | T-branch connections | Multidrop connections |
| Flat Connector Plug<br>  | Flat Connector Plug<br>• Word Slave Unit or Repeater Unit<br>  <br>• Bit Slave Unit<br>  <br>**Note** As a standard delivery style, Flat Cable is pre-attached to a Bit Slave Unit. | Flat Connector Socket + Flat Connector Plug<br>  | Multidrop Connector<br>  <br>**Note** Flat Cable II does not support multidrop connection or Mutlidrop Connectors. |

| Cable extension |
| --- |
| Flat Connector Socket + Flat Connector Plug |




## E-3-5 Connecting Nodes

This section explains the procedures to connect Units that compose a CompoNet network. Below is the representative case of connecting the Master Board and cables.

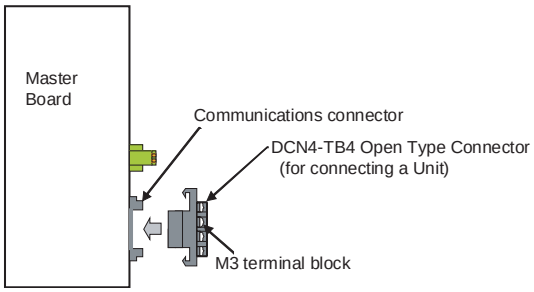
### Connecting the Master Board

The Master Board must be connected and located at the end of the trunk line, unless the network uses the unrestricted wiring formation. The Master Board is connected with the communications cable via the communications connector provided on the Master Board. Cable connectors differ by the type of cable used as the communications cable.

### When Using Round Cable I or II with Open Type Connectors

Use a DCN4-TB4 Open Type Connector to connect a round cable I or II to the Master Board. The Open Type Connector converts the communications connector of the Master Board to a terminal block. The terminal block for this purpose must have M3 crimp terminals.

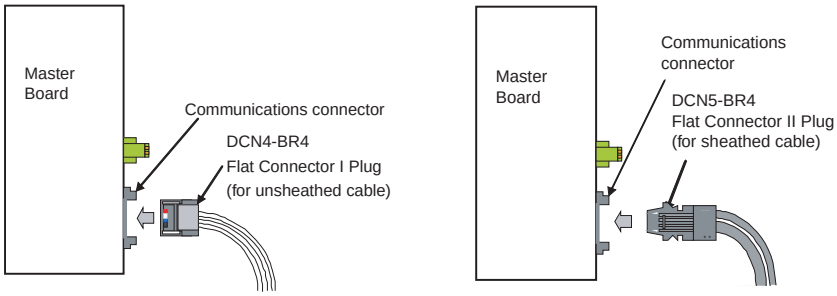
- Round cable I or II with DCN4-TB4 Open Type Connector



### When Using Flat Cable I or II with Flat Connector Plugs

Use a Flat Connector Plug to connect Flat Cable I or II to the Master Board.

- Flat Cable I with DCN4-BR4 Flat Connector I Plug
- Flat Cable II with DCN5-BR4 Flat Connector II Plug




## E-3-6 Branching Communications Cables

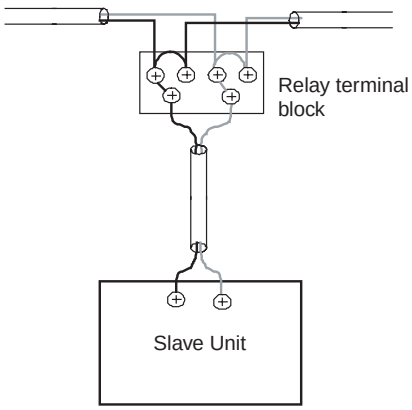
There are two methods to branch a trunk line, sub-trunk line or branch line: T-branch connection and multidrop connection.

**<T-branch connections>**

### Using Round Cable I or II with Commercially Available relay Terminal Blocks

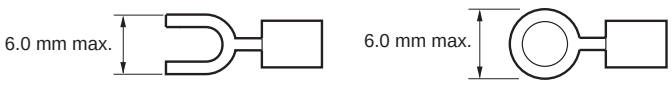
The cable wires are connected to the terminals of a relay terminal block.

Example: Round cable I




**Precautions for Correct Use**

Before connecting the cable wires to the terminal block, first attach these M3 crimp terminals to the wires.

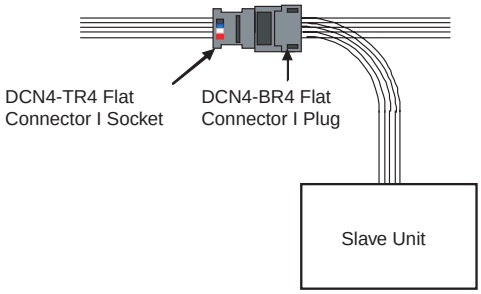


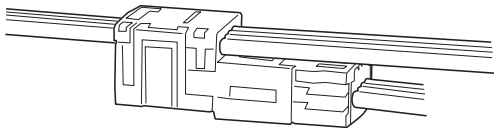
## Using Flat Cable I or II with Flat Connector Sockets and a Flat Connector Plugs

The communications cables are branched by a Flat Connector Socket and a Flat Connector Plug.

- Flat Cable I

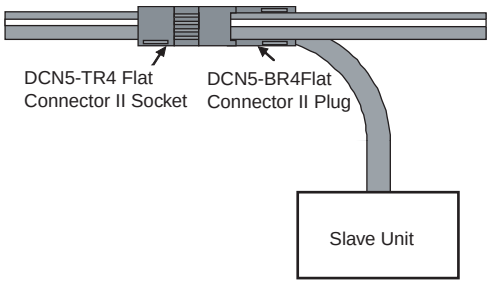
Attach a DCN4-BR4 Flat Connector I Plug which is already connected to Flat Cable to a DCN4-TR4 Flat Connector I Socket.

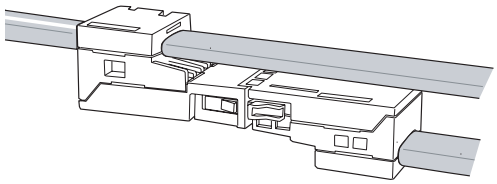


- Flat Cable II

Attach a DCN5-BR4 Flat Connector II Plug (already connected to Flat Cable) to a DCN5-TR4 Flat Connector II Socket.

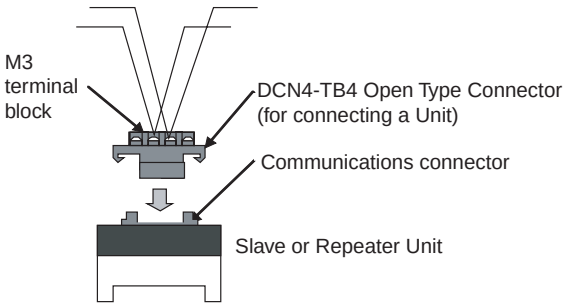


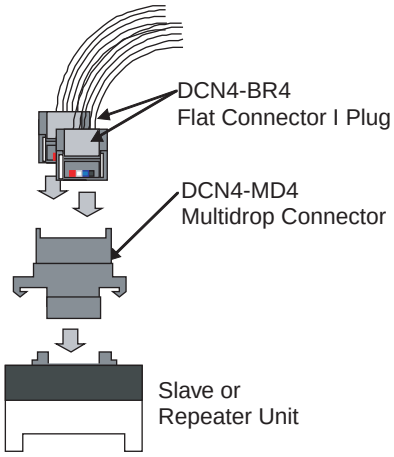
**Note** The same type of cable must be used for the trunk line and branch lines.

**<Multidrop connections>**

## Using Round Cable I or II with Open Type Connectors



### Using Flat Cable I with Multidrop Connectors

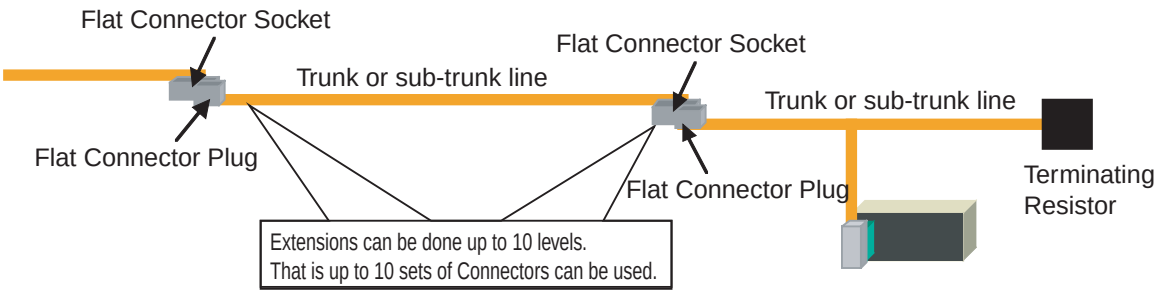



### Using Flat Cable II

Flat Cables II does not support multidrop connections.

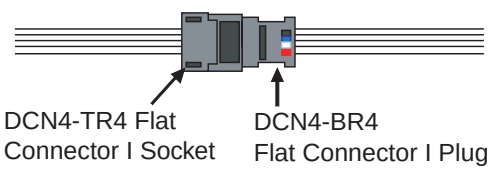
## E-3-7 Extending Communications Cables

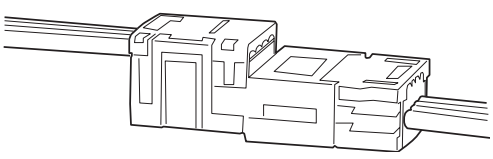
The cable length for the trunk line, sub-trunk lines, branch lines and sub-branch lines can be extended by up to 10 levels with the use of Flat Connectors. The maximum extendable length, however, is the maximum trunk line length. See Section 1-2-1.




### Flat Cable I

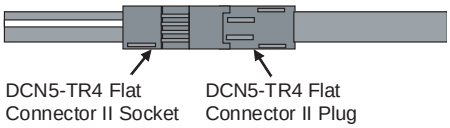
Attach a DCN4-BR4 Flat Connector I Plug to a DCN4-TR4 Flat Connector I Socket that has already been equipped with a cable stopper.

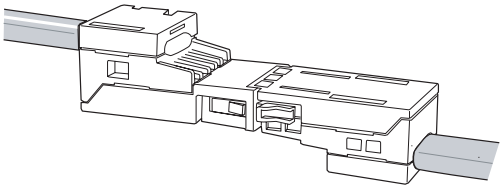


**Flat Cable II**

Attach a DCN5-BR4 Flat Connector II Plug to a DCN5-TR4 Flat Connector II Socket having an internal stopper.



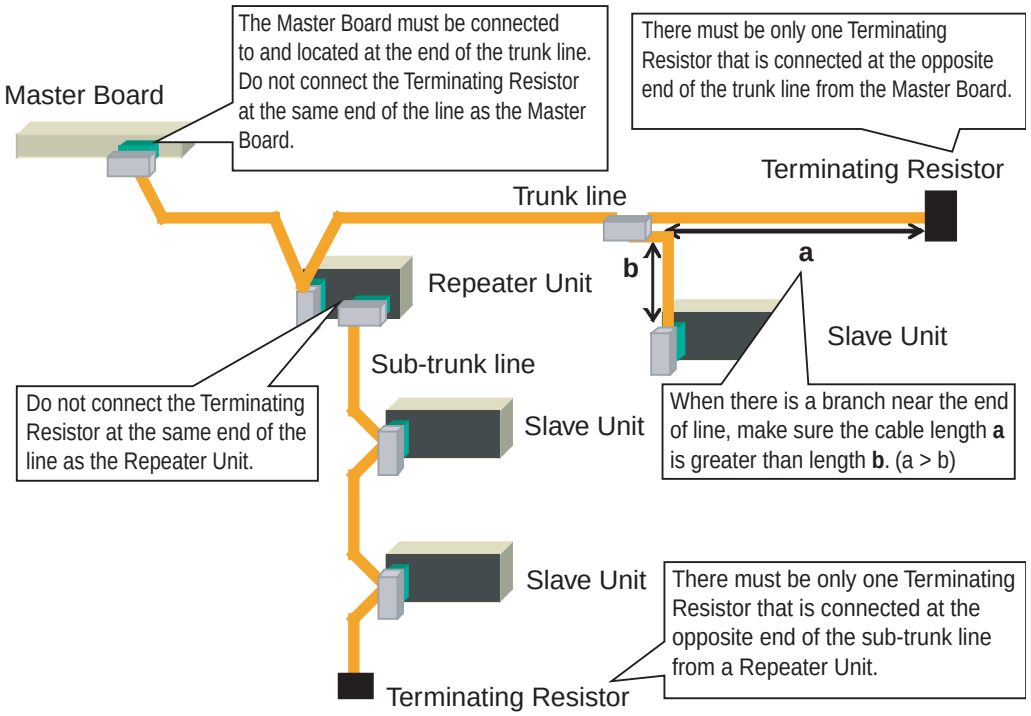



## E-3-8 Connection Locations for Terminating Resistors

A Terminating Resistor must always be connected to and located at the opposite end of the trunk line or a sub-trunk line from the Master Board or a Repeater Unit.

**Note** Do not connect the Terminating Resistor at the same end of the lines as the Master Board.

When there is a branch near the end of the trunk line or a sub-trunk line, a Terminating Resistor is connected at the farthest end of the trunk line from the Master Board.



## Types and Characteristics of Terminating Resistors

There are 2 types of Terminating Resistors: the connector type and the terminal-block type.

| Type | Connector type | | Terminal-block type |
|---|---|---|---|
| Name | Terminating Resistor | | |
| Model | DCN4-TM4 | DCN5-TM4 | DRS1-T |
| Resistance | 121Ω | 121 Ω | 121 Ω |
| Power rating | 1/4 W | 1/4 W | 1/4 W |
| Accuracy | 1% max. | 1% max. | – |
| Power-handling capacity | 0.01μF | 0.01μF | – |
| Applicable cable | Round cable II, Flat Cable I | Flat Cable II | Round cable I<br>Round Cable II |

**Precautions for Correct Use**

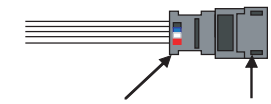
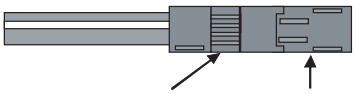
If you connect a Terminal Block-type Terminating Resistor to a Round Cable II, insulate the ends of the BS+ and BS– power lines.

## Connecting Terminating Resistors

A Terminating Resistor can be connected using one of three different methods, as shown below:

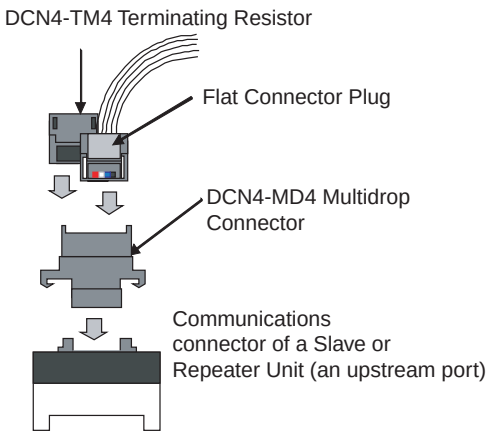
Method 1 Connect a Flat Connector Socket to the trunk line of a sub-trunk line cable.

Mount a Terminating Resistor onto the Connector Socket.

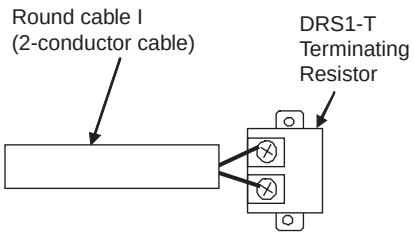
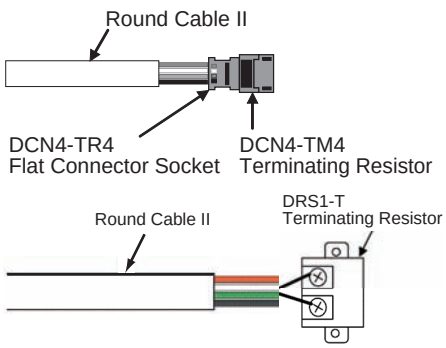
| When the line is Flat Cable I | When the line is Flat Cable II |
|---|---|
|  |  |

Method 2 Attach a Multidrop Connector on the communications connector (or an upstream port) provided on a Slave Unit or Repeater Unit. Connect a Flat Connector Plug to which the trunk lines or sub-trunk line is connected to the Multidrop Connector. Also, connect a Terminating Resistor to the Multidrop Connector.

**When the line is Flat Cable I**




Method 3 Connect a Terminating Resistor to the trunk line or a sub-trunk line cable.

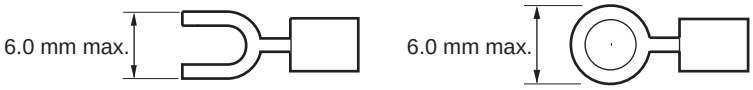
| When the line is round cable I or II | When the line is round cable II |
|---|---|
|  |  |





**Precautions for Correct Use**

When you connect the cable conductors to the terminal block, first attach the following M3 crimp terminals to the conductors.

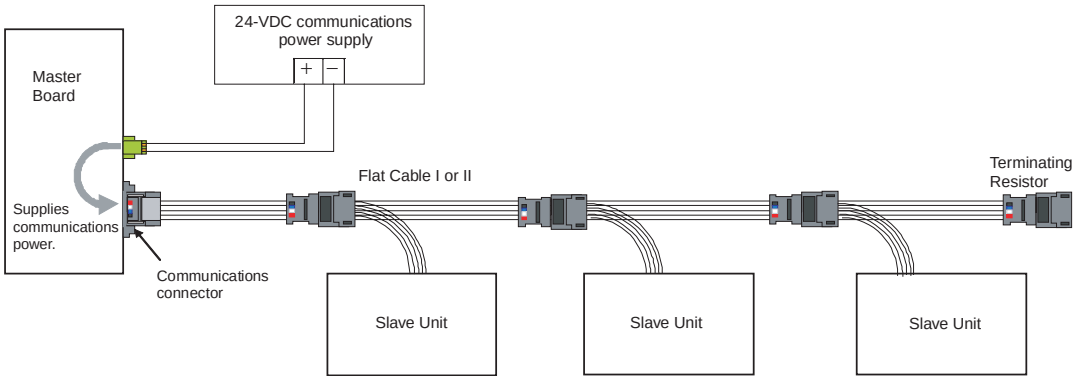


# E-3-9 Connection Locations for Communications Power Supplies

This section explains the locations to connect the communications power supplies.

## Using Round Cable II, Flat Cable I or Flat Cable II

Example: Flat Cables I or II

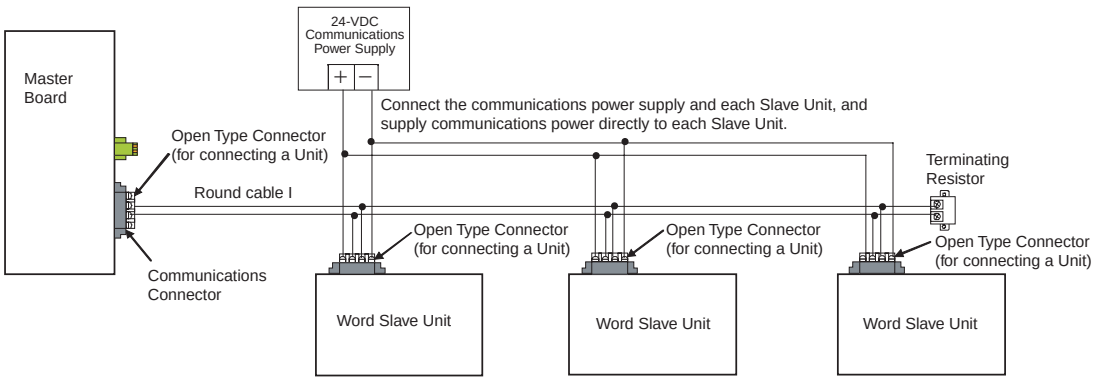



The BS+ and BS– terminals of a 24-VDC communications power supply are connected to the communications power supply connector provided on the Master Board. This connection provides all Slave Units on the trunk line, which are connected to the Master Board via round cables II, Flat Cable I or Flat Cable II, with the communications power.

**Note**

1. Only one communications power supply can be provided per trunk line or sub-trunk line.
2. Power to a sub-trunk line must be supplied through the downstream port communications power supply connector provided on a Repeater Unit.
3. For a Round Cable II, you can also use the DRS1-T Terminating Resistor. If you do, insulate the ends of the BS+ and BS– lines.

## Using Round Cable I




The BS+ and BS– terminals of a 24-VDC communications power supply are connected directly and individually to all Slave Unit and Repeater Unit*. The power supply is not connected to the Master Board.

* The communications power terminals must be connected to the BS+ and BS– terminals of the upstream port (PORT1) of the Repeater Unit.

See Appendix E.5 for detailed wiring procedures for a communications power supply.

# E-4 Preparing and Mounting Flat Connectors on the Cables

This section explains the procedures to prepare Flat Connectors and to mount them on the cables.

The procedures are required for the following purposes.

For connecting round cable II to a Terminating Resistor,

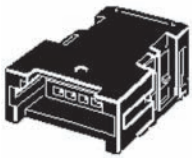
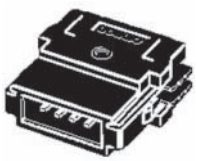
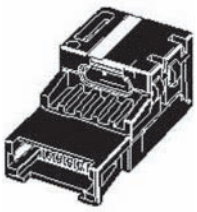
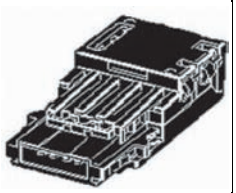
For connecting Flat Cable I or II to a Unit, and

For branching or extending the line.

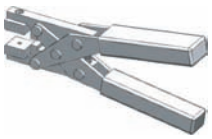
**Precautions for Correct Use**

- A Flat Connector cannot be reworked once it has been prepared.
- Hold the connector body to plug in or pull out the connector.
- After connecting the connector, pull it lightly to confirm the connection is secured.

**Required Flat Connectors**

| Name | Appearance | Model | Purpose |
|---|---|---|---|
| Flat Connector I Socket |  | DCN4-TR4 | For the following purposes, it is used in combination with a DCN4-BR4 Flat Connector I Plug:<br>• To extend the trunk line or a sub-trunk line<br>• To have a T-branch connection on the trunk line or a sub-trunk line, and to make a branch line<br>• To have a T-branch connection on a branch line, and make a sub-branch line |
| | | | It is used alone for the following purpose:<br>• To connect a DCN4-TM4 Terminating Resistor to the trunk line or a sub-trunk line |
| Flat Connector I Plug |  | DCN4-BR4 | For following purposes, it is used in combination with a DCN4-TR4 Flat Connector I Socket:<br>• To extend the trunk line or a sub-trunk line<br>• To have a T-branch connection on the trunk line or a sub-trunk line, and to make a branch line<br>• To have a T-branch connection on a branch line, and make a sub-branch line |
| | | | It is used alone for the following purposes:<br>• To connect a communications cable to the Slave Unit<br>• To connect a communications cable to a DCN4-MD4 Multidrop Connector and obtain a multidrop connection |
| Flat Connector II Socket |  | DCN5-TR4 | For the following purposes, it is used in combination with the DCN5-BR4 Flat Connector II Plug:<br>• To extend the trunk line or a sub-trunk line<br>• To have a T-branch connection on the trunk line or a sub-trunk line, and to make a branch line<br>• To have a T-branch connection on a branch line, and to make a sub-branch line |
| | | | It is used alone for the following purpose:<br>• To connect a DCN5-TM4 Terminating Resistor to the trunk line or a sub-trunk line |
| Flat Connector II Plug |  | DCN5-BR4 | For the following purposes, it is used in combination with the DCN5-TR4 Flat Connector II Socket:<br>• To extend the trunk line or a sub-trunk line<br>• To have a T-branch connection on the trunk line or a sub-trunk line, and to make a branch line<br>• To have a T-branch connection on a branch line, and to make a sub-branch line |
| | | | It is used alone for the following purpose:<br>• To connect a communications cable to the Slave Unit |

**Required Tools**

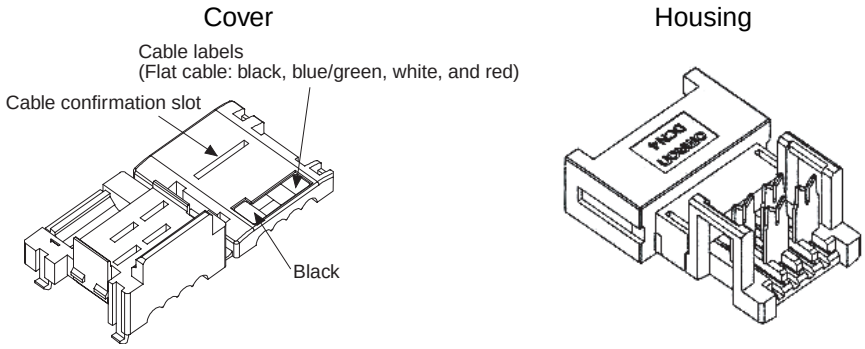
| Name | Appearance | Model | Purpose |
|---|---|---|---|
| Special Tool (Pliers) |  | DWT-A01 | A pressure welding tool for DCN4-TR4 Flat Connector I Socket and a DCN4-BR4 Flat Connector I Plug |
| Special Tool (Pliers) |  | DWT-A02 | A pressure welding tool for DCN5-TR4 Flat Connector II Socket and a DCN5-BR4 Flat Connector II Plug |

## E-4-1 Preparing Connectors for Round Cable II

This procedure is required only to connect a Round Cable II to a Connector-type Terminating Resistor.

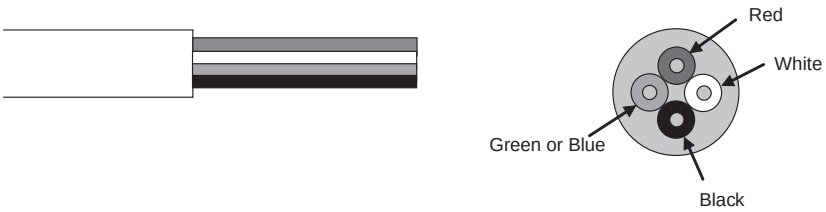
### Preparing and Mounting the DCN4-TR4 Flat Connector Sockets

Names of Flat Connecter Socket components



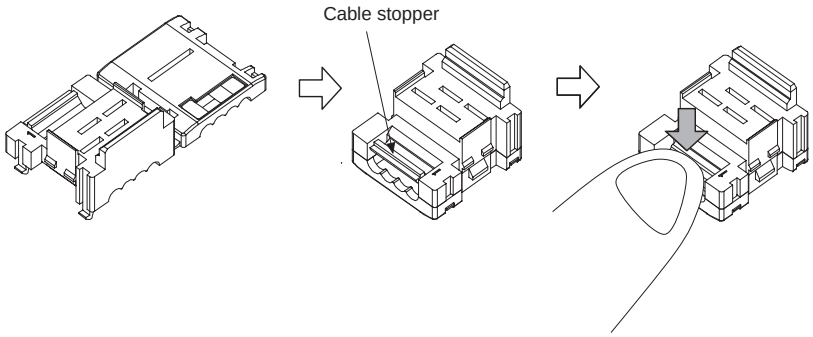

1. Preparing the Cable

At the cable end, make a cut line perpendicular to the cable length on the cable sheath; then, strip the sheath.



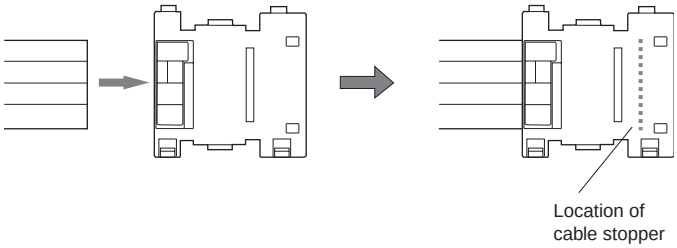
2. Setting the Cable Stopper

Close the cover of the Flat Connector I Socket. Secure the hook. Press down the cable stopper until it clicks into place and does not return.



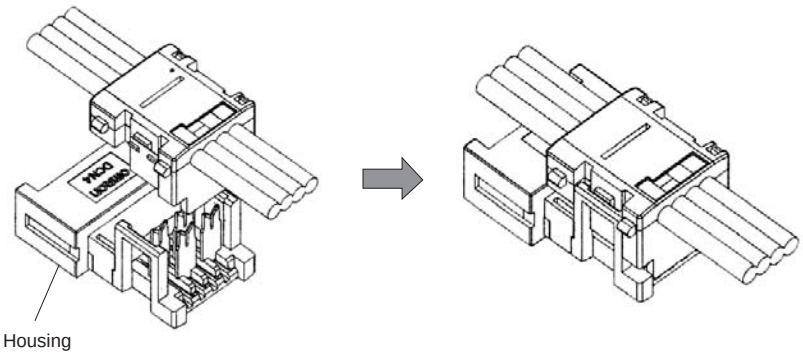

3. Attaching the Cable

Confirm that the cable wire colors match the cable label colors on the Flat Connector I Socket. Insert the tips of the cable wires all the way into the cable stopper in the cover.




4. Attaching the Housing

Reconfirm that the cable wire colors match the cable label colors. Temporarily secure the housing to the cover.

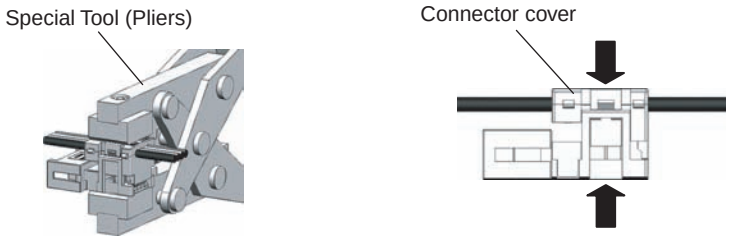



**Note** Once it is attached, the housing cannot be removed from the cover. If you attempt to remove it forcibly, you may damage the connector.

5. Pressure-Welding the Connector

Use a DWT-AT01 Special Tool (Pliers) to pressure-weld and connect the cable.

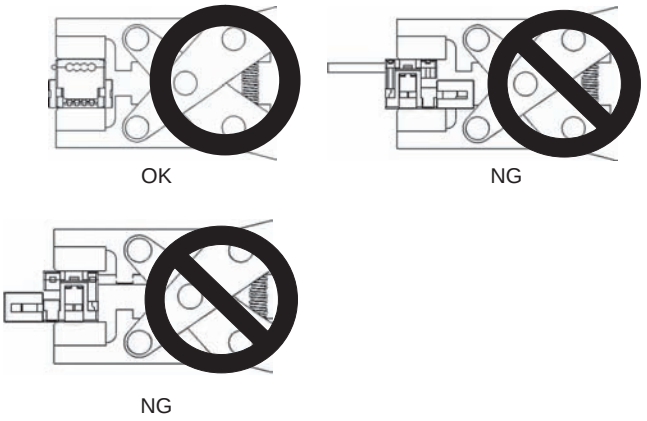
5-1 Align the center (see arrow) of the connector cover with the center of the pressure-welding block on the DWT-A01 Pliers.



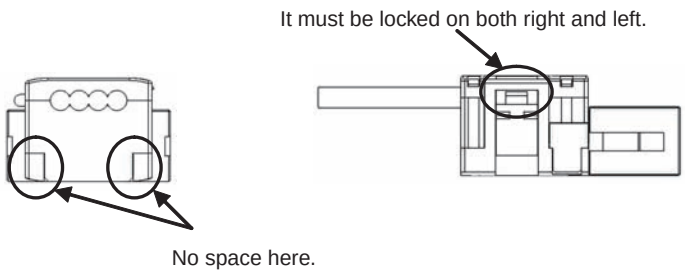

5-2 Squeeze the Pliers firmly until the lock on the connector clicks into place.

**Precautions for Correct Use**

- Do not pressure-weld the connector cover at the edge.
- Do not use the back of pressure-welding block to pressure-weld the connector cover.
- Set the Connector in the correct orientation.



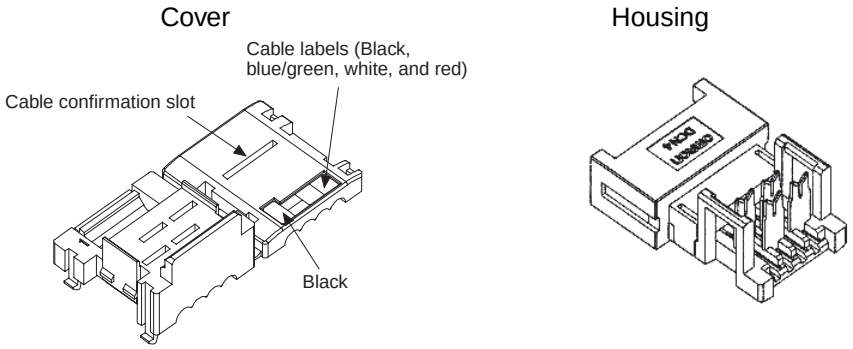

5-3 Confirm that it is properly pressure-welded as shown below:



## E-4-2 Preparing Connectors for Flat Cable I

### Preparing and Mounting the DCN4-TR4 Flat Connector Sockets

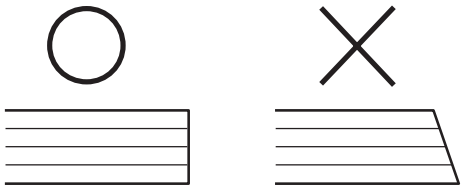
Names of Flat Connecter Socket components




1. Cutting the Cable (required only when the cable is extended or when a Terminating Resistor is connected)

At the tip of the cable, cut the cable perpendicular to the cable length.

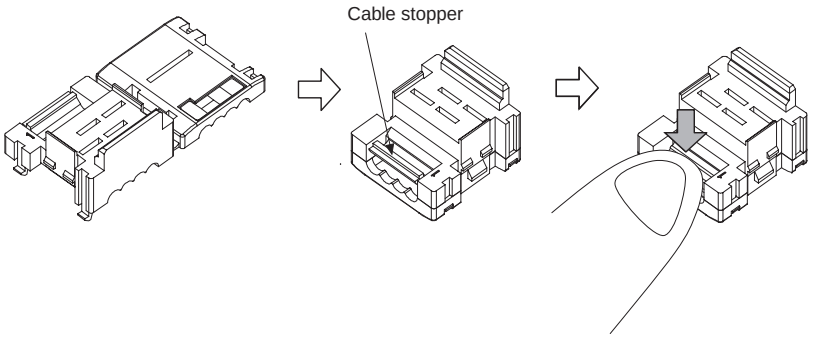
To prevent short-circuiting, use a sharp cutting tool such as a nipper. After cutting, confirm that there is no remaining wire coming out.



2. Setting the Cable Stopper (required only when the cable is extended or when a Terminating Resistor is connected)

For extending cables or connecting a Terminating Resistor, the cable can end within the Connector. Thus place a cable stopper in advance.

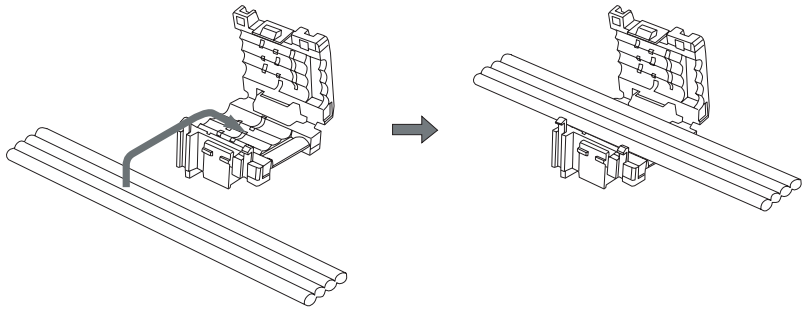
Close the cover of the Flat Connector I Socket. Secure the hook. Press down the cable stopper until it clicks into place and does not return.



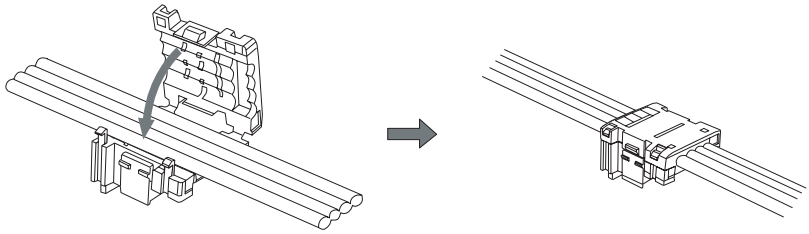
3. Mounting the Cable

For T-branch connections

3-1 Confirm that the cable colors match the cable label colors. Place the cable in the cover.

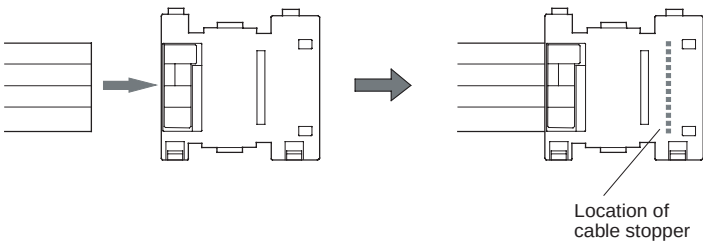


3-2 lose the cover and sandwich the cable. Secure the hook.



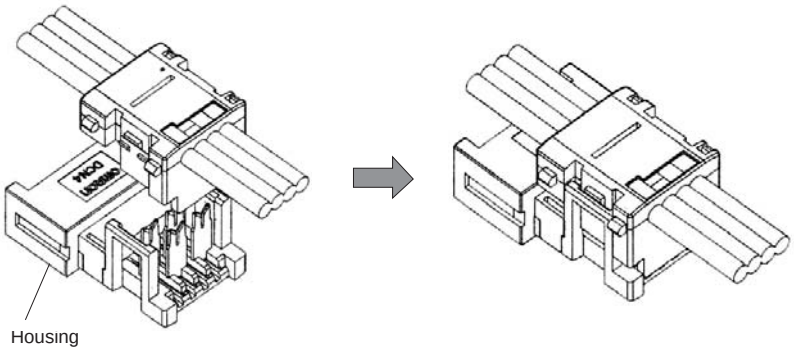
For Cable extension or connecting a Terminating Resistor

Insert the tip of the cable all the way into the cable stopper in the cover.




4. Attaching the Housing

Reconfirm that the cable wire colors match the cable label colors. Temporarily secure the housing to the cover.

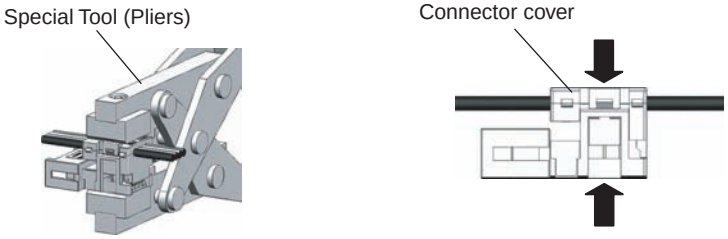


**Note** Once it is attached, the housing cannot be removed from the cover. If you attempt to remove it forcibly, you may damage the connector.

5. Pressure-Welding the Connector

Use a DWT-A01 Special Tool (Pliers) to pressure-weld and connect the cable.

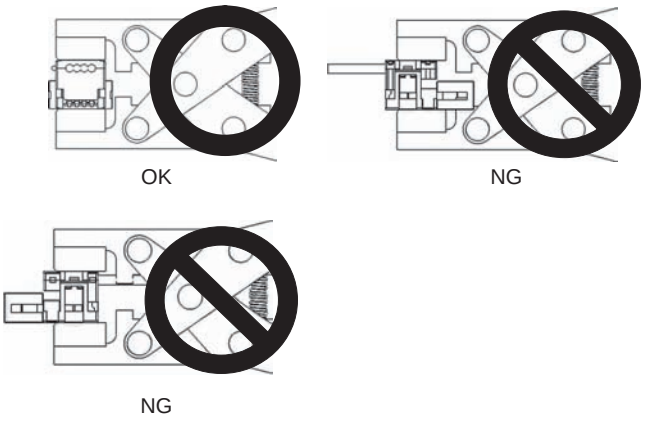
5-1 Align the center (see arrow) of the connector cover with the center of the pressure-welding block on the DWT-A01 Pliers.



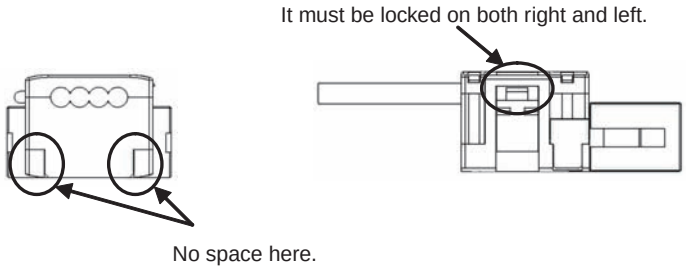

5-2 Squeeze the Pliers firmly until the lock on Connector clicks into place.

**Precautions for Correct Use**

- Do not pressure-weld the connector cover at the edge.
- Do not use the back of pressure-welding block to pressure-weld the connector cover.
- Set the Connector in the correct orientation.

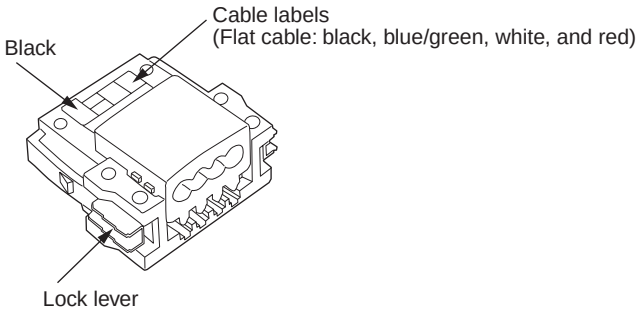



5-3 Confirm that it is properly pressure-welded as shown below:



## Preparing and Mounting the DCN4-BR4 Flat Connector Plugs

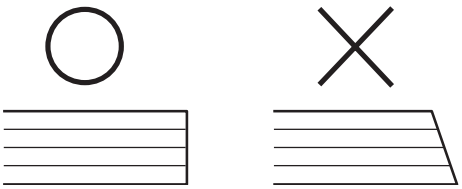
Names of Flat Connector Plug components




1. Cutting the Cable

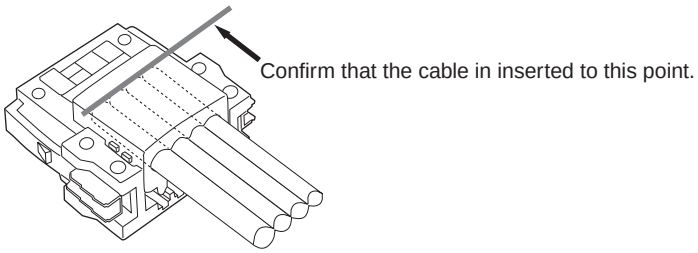
At the tip of the cable, cut the cable perpendicular to the cable length.

To prevent short-circuiting, use a sharp cutting tool such as a nipper. After cutting, confirm that there is no remaining wire coming out.



2. Mounting the Cable

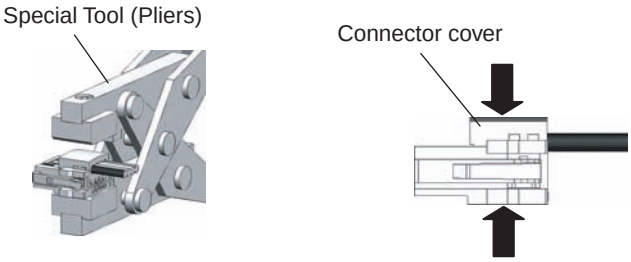
Confirm that the cable colors match the cable label colors shown on the Flat Connector Plug. Insert the cable tip all the way into cover until the line shown below. Through the transparent cover, confirm it is surely inserted all the way into the back.



3. Pressure-Welding the Connector

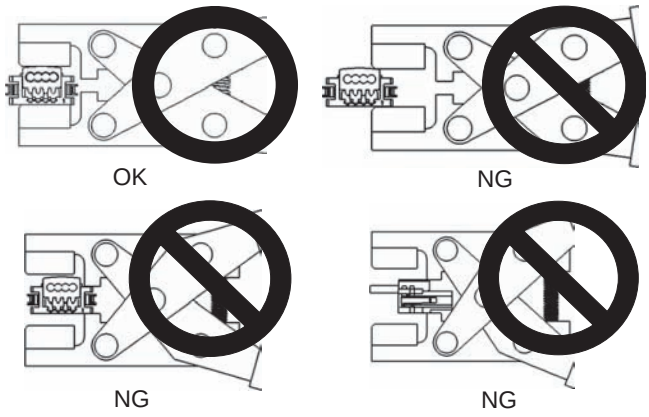
Use a DWT-A01 Special Tool (Pliers) to pressure-weld and connect the cable.

3-1 Align the center (see arrow) of the connector cover with the center of the pressure-welding block on the DWT-A01 Pliers.




3-2 Squeeze the Pliers firmly until the lock on the Connector clicks into place.

**Note**
- Do not pressure-weld the connector cover at the edge.
- Do not use the back of pressure-welding block to pressure-weld the connector cover.
- Set the Connector in the correct orientation.

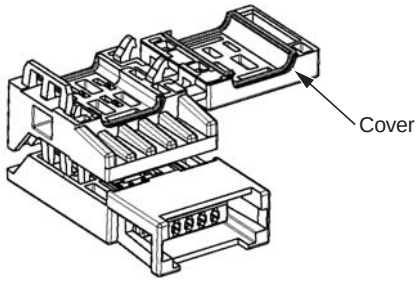



3-3 Confirm that it is properly pressure-welded as shown below:

## E-4-3 Preparing Connectors for Flat Cables II

### Preparing and Mounting the DCN5-TR4 Flat Connector Sockets

Names of Flat Connector Socket components




1. Cutting the Cable (required only when the cable is extended or when a Terminating Resistor is connected)

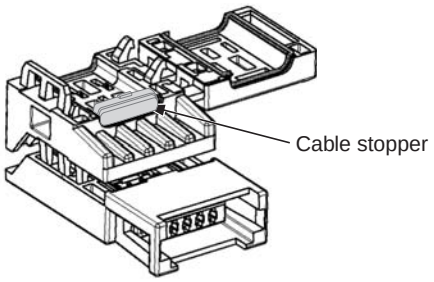
At the tip of the cable, cut the cable perpendicular to the cable length.

To prevent short-circuiting, use a sharp cutting tool such as a nipper. After cutting, confirm that there is no remaining wire coming out.

2. Setting the Cable Stopper (required only when the cable is extended or when a Terminating Resistor is connected)

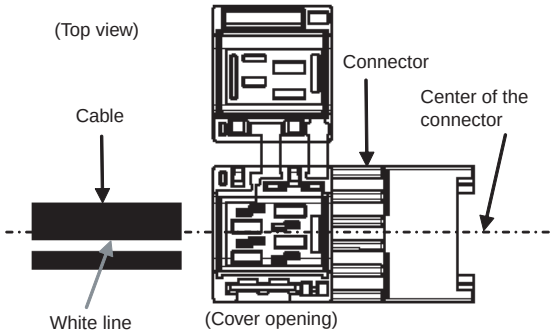
For extending cables or connecting a Terminating Resistor, the cable can end within the Connector. Thus place a cable stopper in advance.

Put the cable in the cover. Position the cable so that the cable tip touches the stopper.

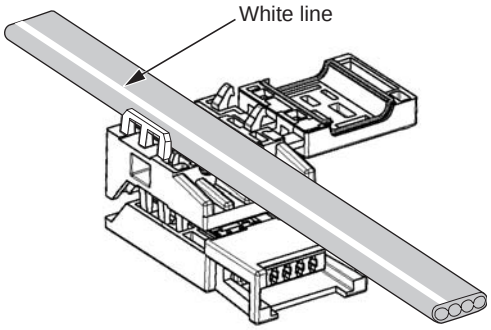


3. Mounting the Cable

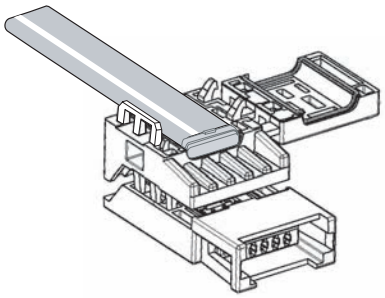
   3-1 Place the cable on the Connector with its white line facing upward, near the cover opening.



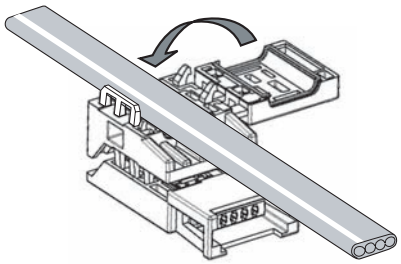

For T-branch connections




For Cable extension or connecting a Terminating Resistor



3-2 Hold the cable to prevent dislocation. Close the cover to sandwich the cable.

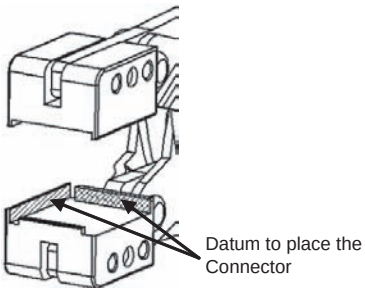


**Note** When it is for cable extension or for connecting a Terminating Resistor, be sure to insert the cable tip all the way to the cable stopper in the cover. Be sertain the cable won't come out.

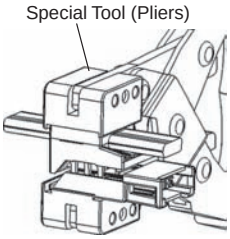
4. Pressure-Welding the Connector

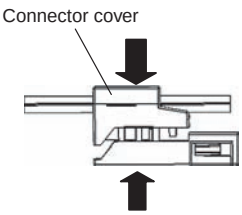
Use a DWT-A02 Special Tool (Pliers) to pressure-weld and connector the cable.

4-1 Place the Connector on the pressure-welding block of the DWT-A02 Pliers.
Align the Connector side so that it faces the datum shown in the picture below (shaded faces). Thus the center (see arrow) of the connector cover is aligned with the center of the pressure-welding block on the Pliers.

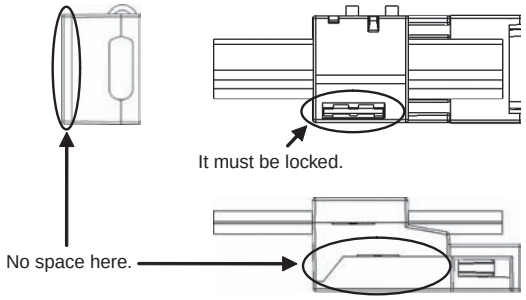



4-2 Squeeze the Pliers firmly until the lock on the Connector clicks into place.



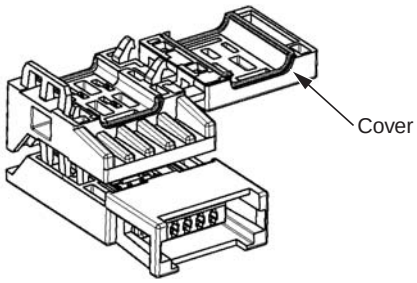



4-3 Confirm that the cable is properly pressure-welded as shown below:




## Preparing and Mounting the DCN5-BR4 Flat Connector Plugs

Names of Flat Connector Plug components



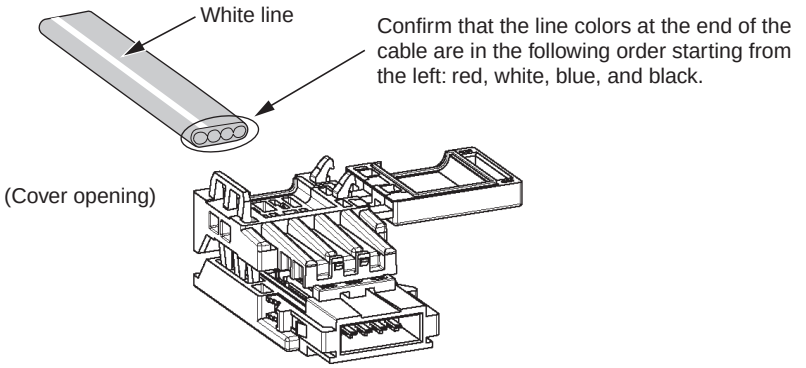

1. Cutting the Cable

At the tip of the cable, cut the cable perpendicular to the cable length.

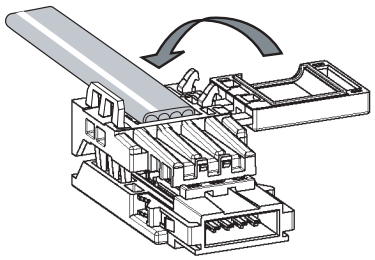
To prevent short-circuiting, use a sharp cutting tool such as a nipper. After cutting, confirm that there is no remaining wire coming out.

2. Mounting the Cable

2-1 Place the Cable on the Connector with its white line facing upward, near the cover opening.



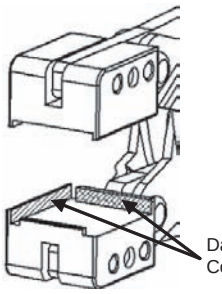
2-2 Hold the Cable to prevent dislocation. Close the cover to sandwich the Cable.



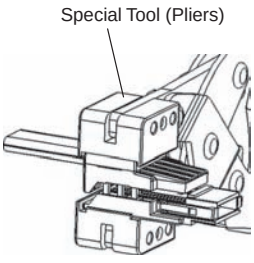
3. Pressure-welding the Connector

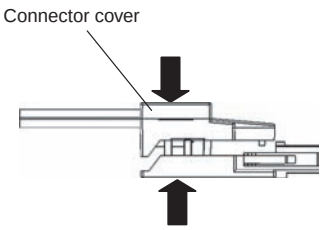
Use a DWT-A02 Special Tool (Pliers) to pressure-weld and connect the Cable.

3-1 Place the Connector on the pressure-welding block of the DWT-A02 Special Tool (Pliers). Align the Connector side faces with the datum shown in the picture below (shaded faces). Thus the center (see arrow) of the connector cover is aligned with the center of the pressure-welding block on the Pliers.

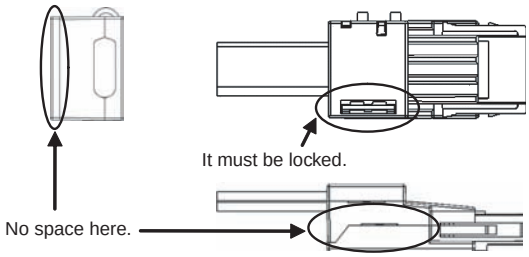



3-2 Squeeze the Pliers firmly until the lock on the Connector clicks into place.



3-3 Confirm that the cable is properly pressure-welded as shown below.




# E-5 Wiring for Power Supply

Operation of a CompoNet Network needs following power supplies.

- Communications power supply: for communications with connected Units and for operations of internal elements of these Units.
- I/O power supply: for inputting and outputting operations of externally connected I/O devices of the Units.

Power supplying method differs by cable types and Slave Unit types.

The table below summarizes it.

| Power supplying type of Slave Unit | Cable type | Communications power supplying method | I/O power supplying method |
|---|---|---|---|
| Multi-power supply | Round Cable I | Supplied to the individual Slave Units. | Supplied separately form the communications power supply to individual Slave Unit. |
| | Round Cable II, Flat Cable I and II | Supplied to the Master Board from which the power is supplied collectively to all connected Slave Unit through the communications cable. | |
| Network power supply | Round Cable I | Unable to use | |
| | Round Cable II, Flat Cable I and II | Both of communications power and I/O power are supplied collectively through the communications cable. | |

Multi-power supply type

Round Cable I

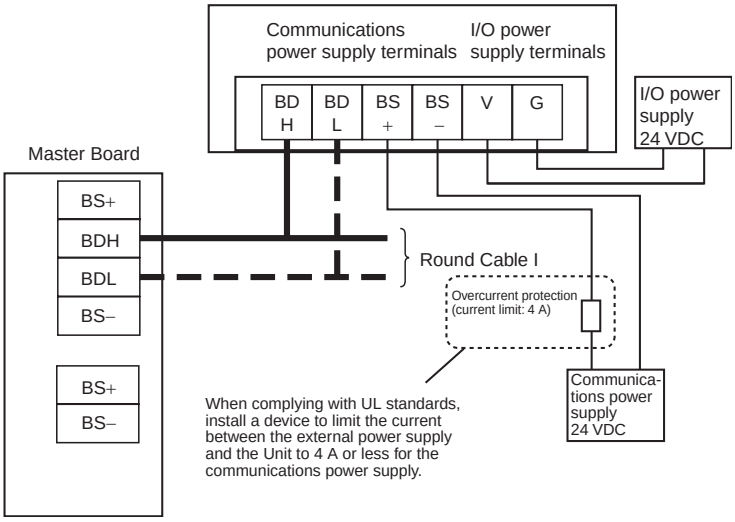
- Communications power:

Supplied individually to each power terminal on the communications connectors of the Units.

Supplied individually to each power terminal on the PORT1 connectors of the Repeater Units.

- I/O power:

Supplied separately from the communications power to each I/O power supply terminal on the Units. To prevent noise generation, the power must be supplied separately from the communications power supply.




Round Cable II, Flat Cable I and Flat Cable II

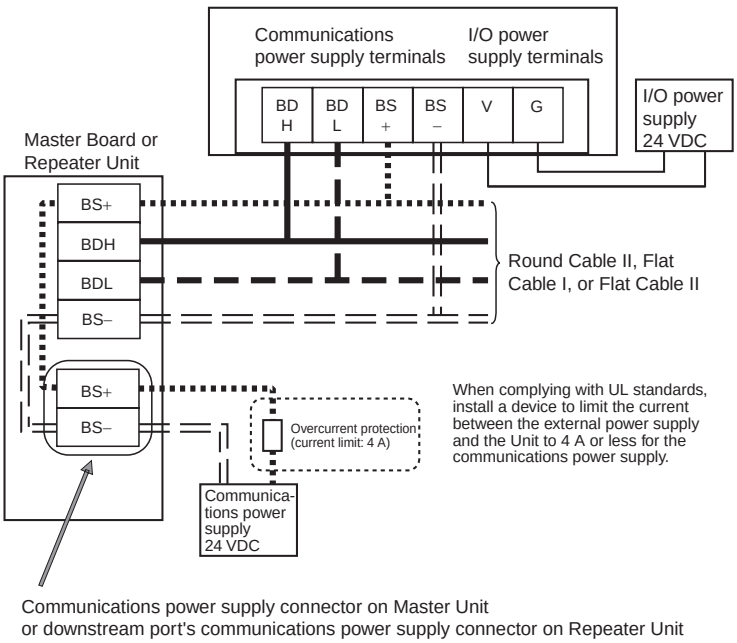
- Communications power:

Supplied through the communications power supply connector on the Master Board.

Supplied through the downstream port of communications power supply connector on the Repeater Unit.

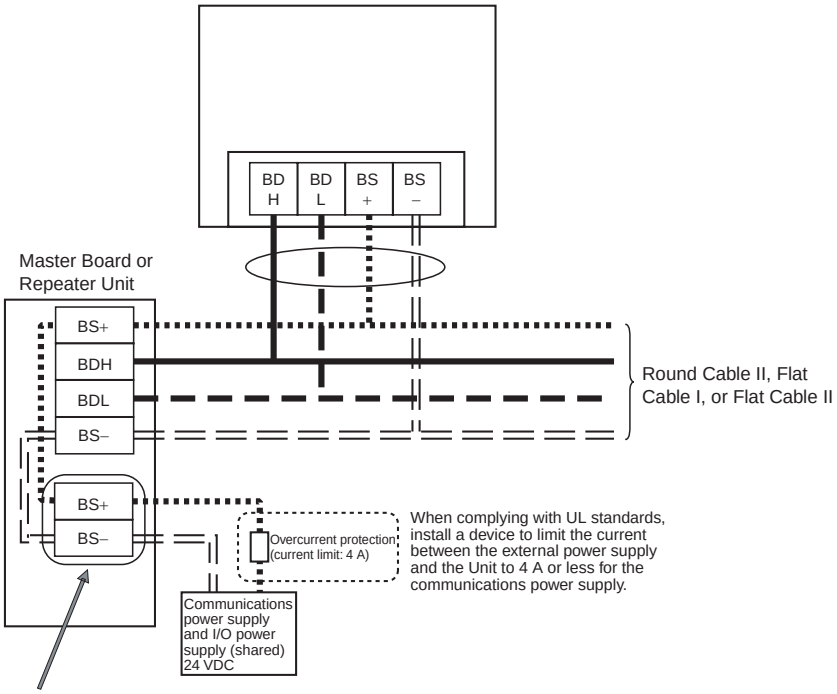
- I/O power:

Supplied separately from the communications power to each I/O power supply terminal on the Unit.



Network power supply type

The communications power supply and the I/O power supply are common. That is there is no need to provide supply units separately. The power is supplied commonly through the communications power supply connector on the Master Board or through the downstream port of communications power supply connector on the Repeater Unit. Bit Slave Units have Flat Cables attached.




## E-5-1 Communications Power Supply Specifications

The communications power supply must meet the following specifications. Commercially available power supply units can be used. An OMRON S82-series Power Supply Unit is recommended, however, as to supply communications power to CompoNet system.

| Item | Specification |
|---|---|
| Output voltage | 24 VDC ±10% |
| Output ripple | 600 mVp-p |
| Output current | Use a power supply that has a capacity equivalent or exceeding the following total current consumption:<br>• The current consumption of all of Word Slave Units and Repeater Units, and<br>• The current consumption of all of Bit Slave Units and the external I/O devices |
| Insulation | Between outputs and AC power, and between outputs and enclosure grounding |

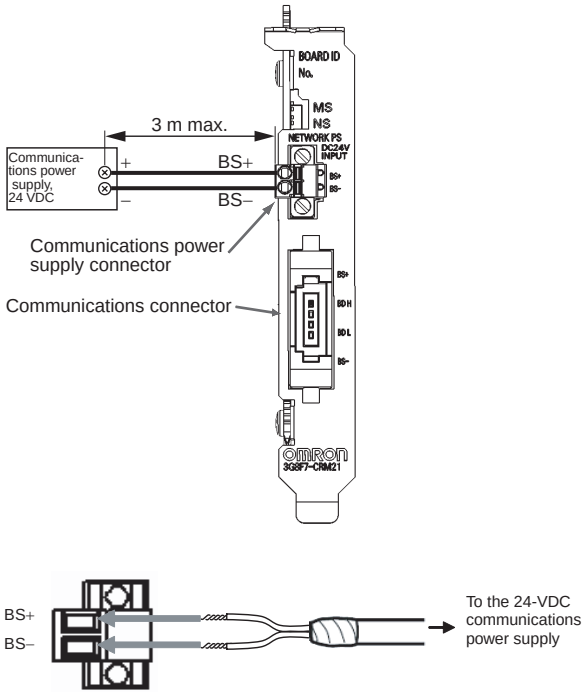
**Precautions for Correct Use**

With the Slave Units of network power supply type, the external I/O devices are also supplied power through the communications power supply connected to the Master Board or a Repeater Unit, via Flat Cables.
Therefore, the output current of communications power supply must include the consumption current and the actual load current of the external I/O devices into calculation.
Below is a calculation example of the consumption current for a Bit Slave Unit's communications power supply.

1) In case of an Input Slave unit:
   Consumption current by the communications power supply
   = Current consumed by a Bit Slave for communications
   + (Input current of a Bit Slave × the Number of used channels)
   + (Current consumed by a sensor × the Number of used sensors)
2) In case of an Output Slave unit:
   Consumption current by the communications power supply
   = Current consumed by a Bit Slave for communications
   + (Actual load current of an actuator × the Number of actuators)
3) In case of a Mixed Slave unit:
   Consumption current by the communications power supply
   = Current consumed by a Bit Slave for communications
   + (Input current of a Bit Slave × the Number of used channels)
   + (Current consumed by a sensor × the Number of used sensors)
   + (Actual load current of an actuator × the Number of actuators)

## E-5-2 Wiring the Communications Power Supply

Use a round cable II, Flat Cable I or Flat Cable II, and connect the communications power supply to the Master Board.



## E-5-3 Current Consumed by Slave Units and Repeater Units

See the CRT1 Series CompoNet Slave Units and Repeater Units Operation Manual, doc # W457.

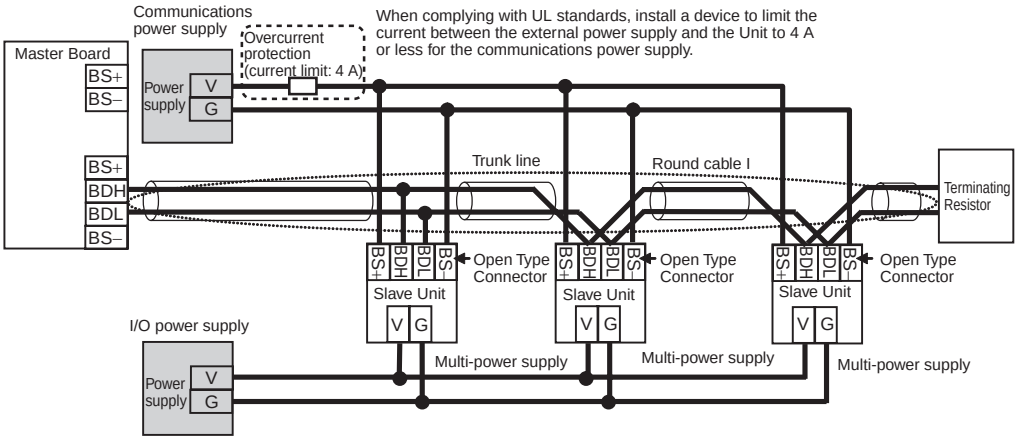
## E-5-4 Communications Power Supply Connection Example

**Using round cable I**

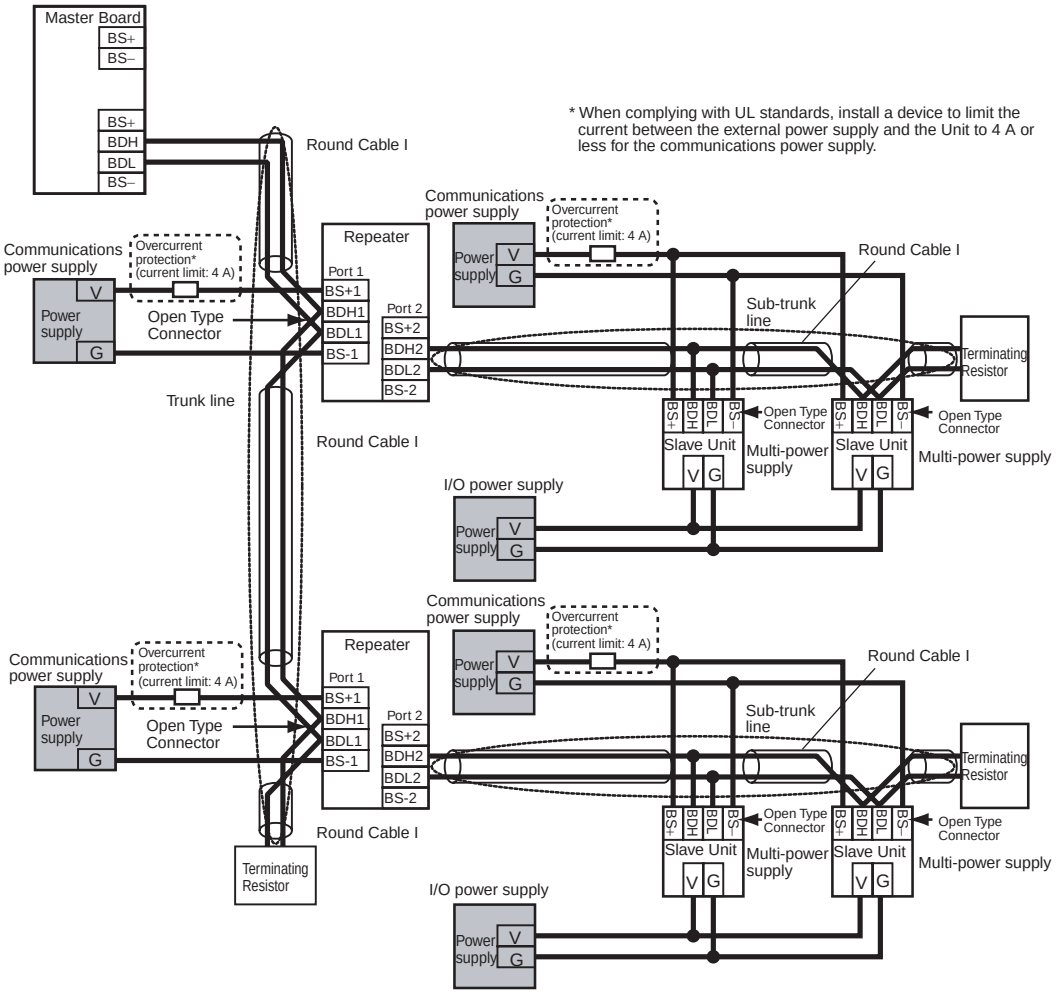
When a round cable I is used, the communications power cannot be supplied through the communications cable. The power must be supplied to each Slave Unit and Repeater Unit through separate line. For Slave Units that require I/O power supply, i.e., multi-power supply Slave Units, the I/O power must also be supplied separately.

There is no need to provide an external communications power supply for the Master Board.

**Not using a Repeater Unit**



### Using a Repeater Unit




**Precautions for Correct Use**

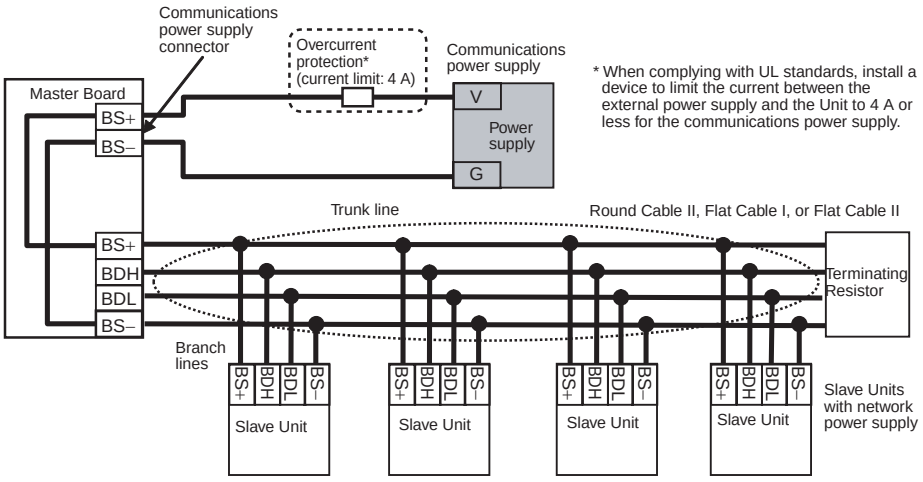
Depending on the I/O device to which the Slave Unit is connected, an I/O power supply connected to a multi-power supply Slave Unit may be a source of noise. Even when the communications power is supplied collectively to all Slave Units, a separate I/O power supply must be provided so that noise does not affect the network.

## Using round cables II, Flat Cables I or Flat Cables II

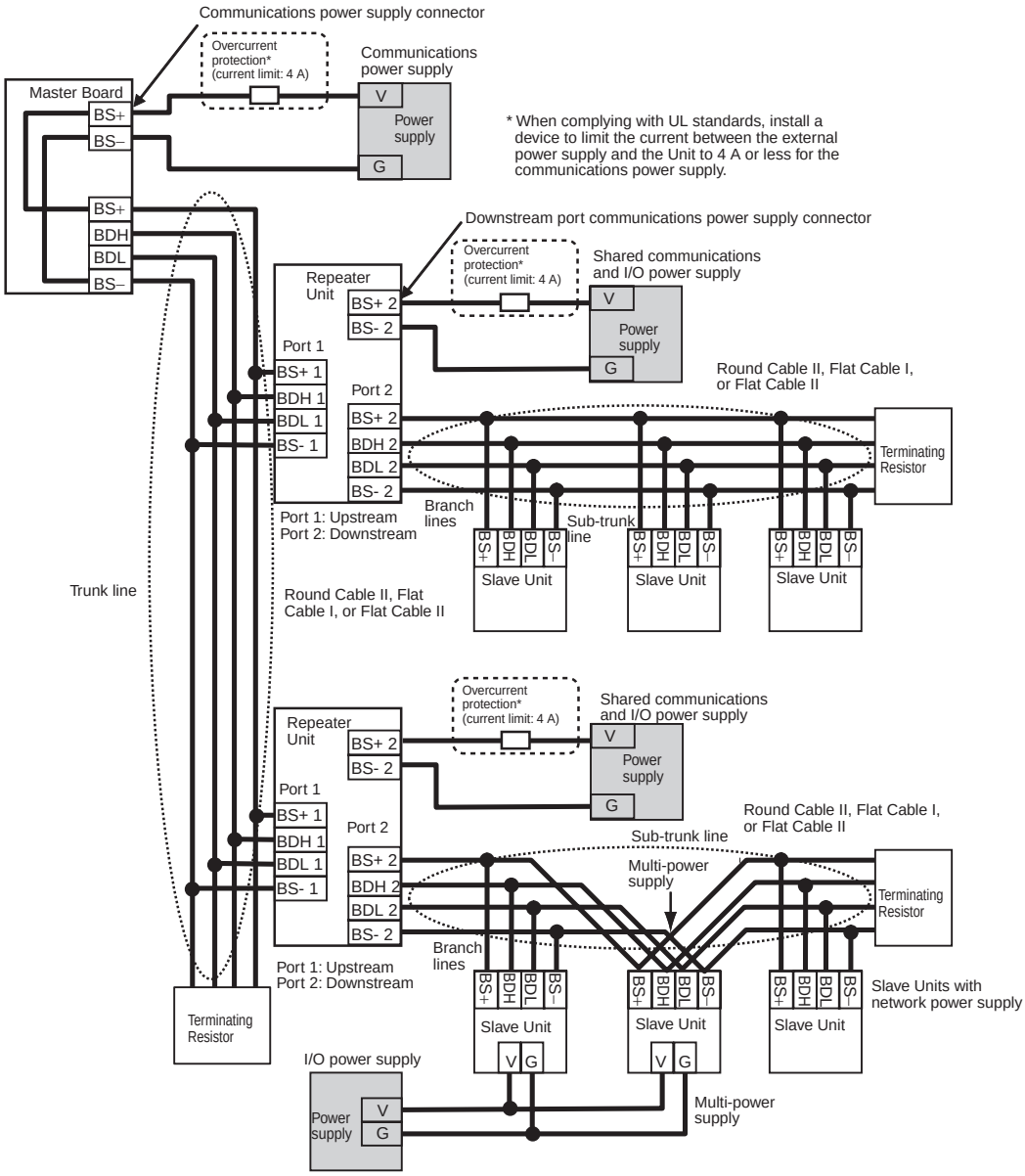
The communications power to Slave Units is supplied through a round cable II, Flat Cable I or Flat Cable II.

Therefore no separate wiring is required for a communications power supply to Slave Units. The communications power supply can be shared by all Slave Units within the same trunk line or sub-trunk line. The I/O power, however, must be supplied separately to the Slave Units which need I/O power, i.e., multi-power supply Slave Units.

### Not using a Repeater Unit



### Using a Repeater Unit



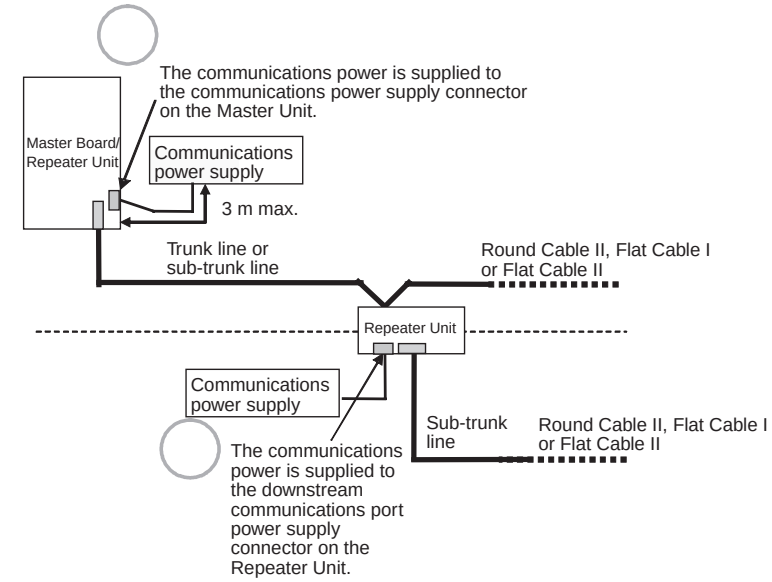

### Precautions for Correct Use

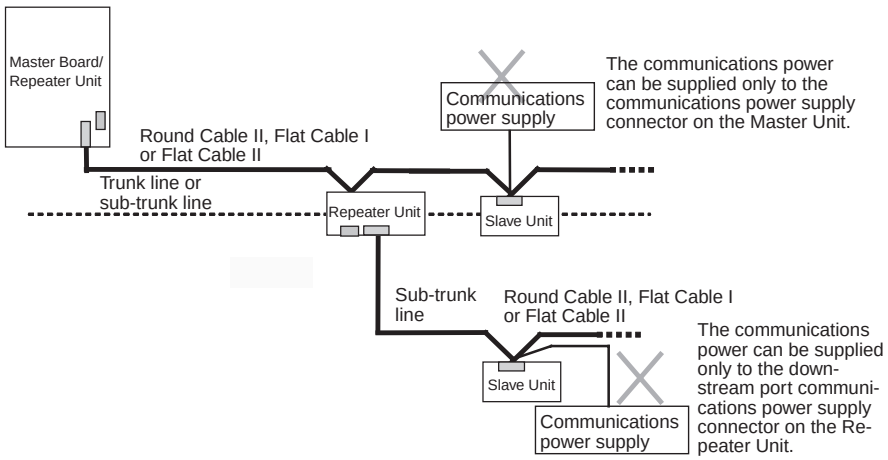
- Do not supply communications power from more than one location for the trunk line or for any one sub-trunk line. The quality of communications may decrease and normal communications may not be possible.
- Do not supply communications power from a single power supply to the trunk line and a sub-trunk line or to two sub-trunk lines. Also do not use a single communications power supply for two or more CompoNet networks. The quality of communications may decrease and normal communications may not be possible.
- The I/O power supply to multi-power supply Slave Units may be a source of noise depending on the connected devices. Even when supplying the communications power supply together to all Slave Units, use a separate I/O power supply so that noise does not affect the network.

### Restrictions

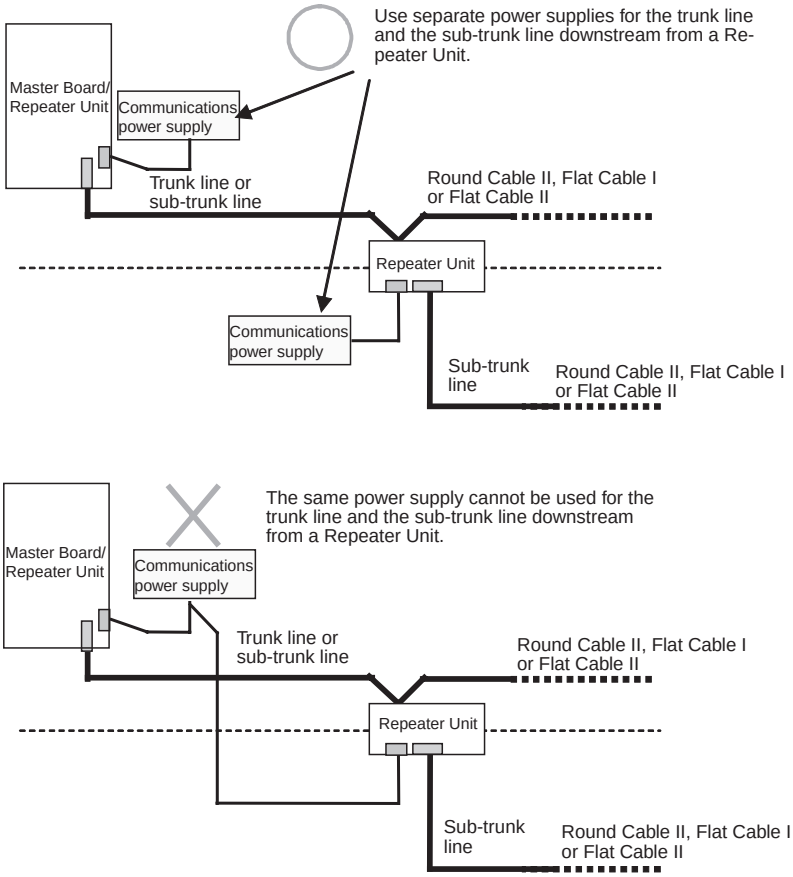
The following restrictions apply when supplying communications power through a round cable II, Flat Cable I, or Flat Cable II.

- The communications power supply can be connected at only one location for the trunk line and one location each for the sub-trunk lines.
- Communications power to the trunk line can be supplied only through the communications power supply connector on the Master Board. Communications power to a sub-trunk line can be supplied only through the downstream port of communications power supply connector on the Repeater Unit. Communications power cannot be supplied at any other locations.



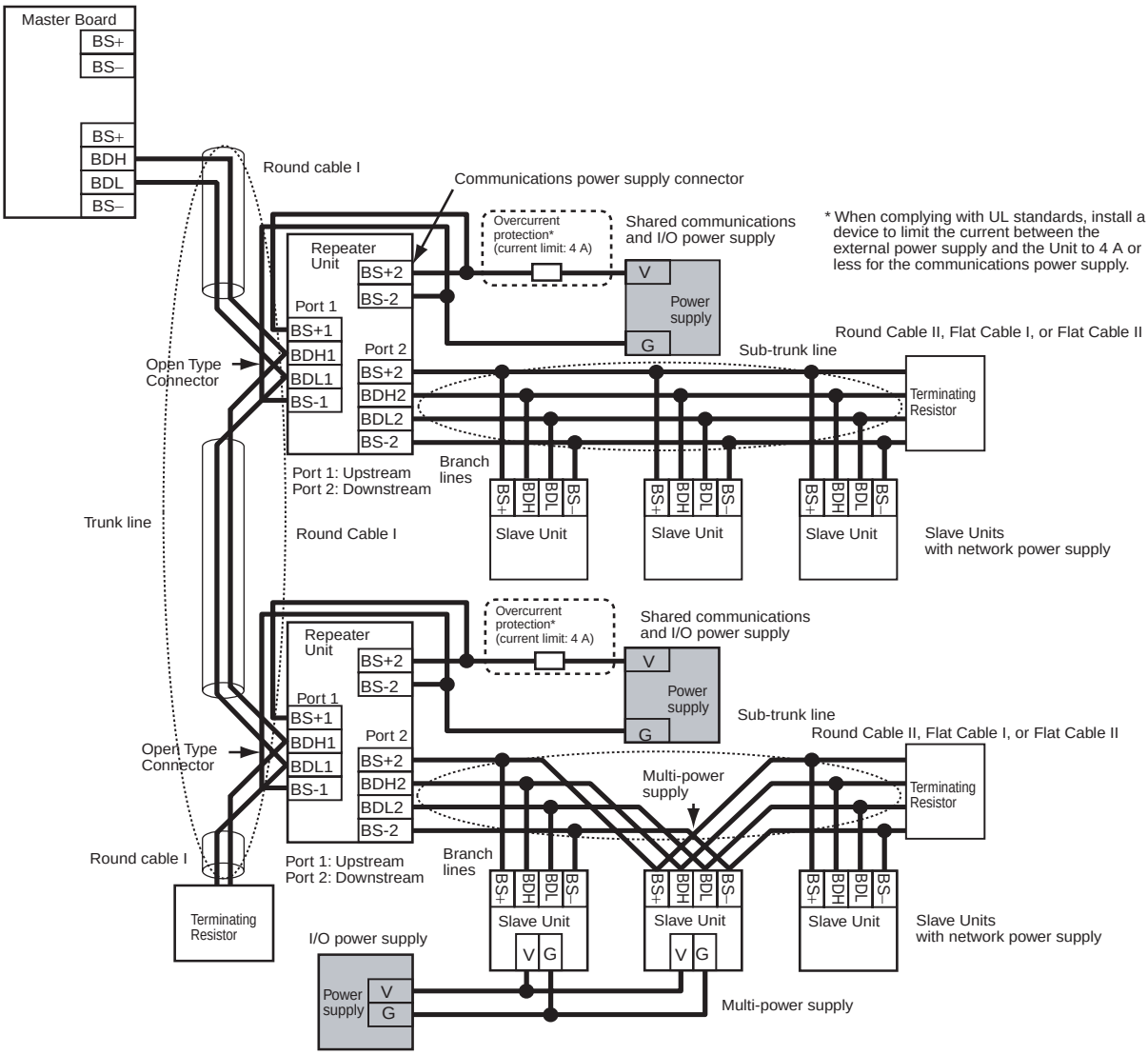
- Provide a separate power supply each for the Master Board trunk line, for the upstream, and for the downstream trunk line of a Repeater Unit.




If these precautions are not observed, transmission may deteriorate and communications error may occur.

## Using Round Cable I with Round Cable II, Flat Cable I, or Flat Cable II

In a CompoNet network, round cable I can be installed under the same Master Board Unit as round cables II, Flat Cables I or II are used, as long as they are separated by a Repeater Unit.



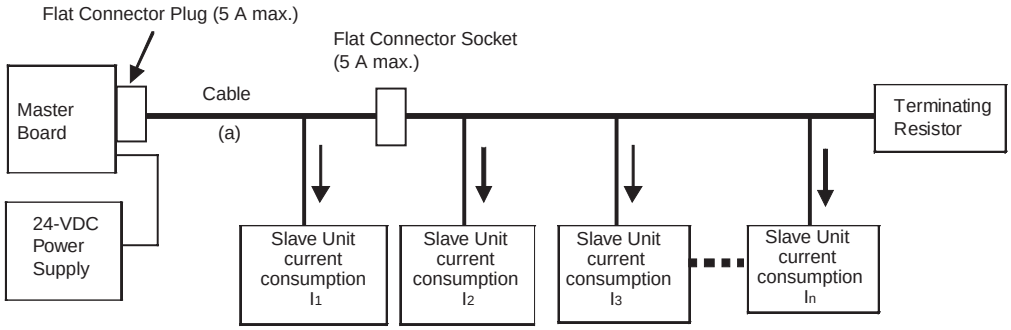

**Note** Depending on the I/O device to which the Slave Unit is connected, an I/O power supply connected to a multi-power supply Slave Unit may be a source of noise. Even when the communications power is supplied collectively to all Slave Units, a separate I/O power supply must be provided so that noise does not affect the network.

## E-5-5 Precautions in Supplying Power to Slave Units

Attentions should be paid for allowable currents of cables and Connectors as well as for voltage drop, and for capacity and location of power supplies, when the communications power or the I/O power is supplied.

## Allowable Current Restrictions

The total current consumption of all Slave Units must not exceed the allowable limit for the communications cables and connectors




### Allowable Currents for Cables

The communications cable must have a larger capacity than the total current consumed by all Slave Units.

| |
|---|
| Allowable current on the communications cable >= $I_1 + I_2 + I_3 + ....I_n$<br>(The current for the part "a" on the above diagram) |

### Allowable Currents for Connectors

The communications power supply connectors on the Master Board and Repeater Units, as well as Flat Connector Sockets, Flat Connector Plugs, and Multidrop Connectors have allowable current limits. The current flow on the points where these connectors are used must not exceed the limits.

| Connector name | Model | Allowable current limit | Remark |
|---|---|---|---|
| Communications power supply connectors on CompoNet Master Board | 3G8F7-CRM21 | 5A (UL: 4A) | Round cable I or II, Flat Cable I or II |
| | 3G8F8-CRM21 | | |
| Communications power supply connectors on Repeater Units | CRS1-RPT01 | | |
| Flat Connector Sockets | DCN4-TR4 | | |
| | DCN5-TR4 | | |
| Flat Connector Plugs | DCN4-BR4 | | |
| | DCN5-BR4 | | |
| Multidrop Connectors | DCN4-MD4 | | |

### Precautions for Correct Use

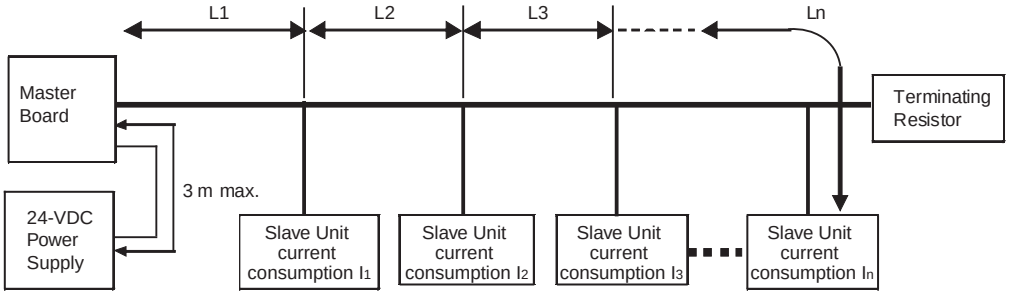
Exceeding the allowable current limit may result in heat or burnout.

**Voltage Drop**

Cable Voltage Drop

| Voltage drop (V) = Current flow (A) ×Cable conductor resistance (Ω/m) ×Cable length (m) ×2 |
|---|

If the voltage drop is too large and the power supplied to the farthest Slave Unit exceeds the allowable range, a Repeater Unit must be added and the power must be supplied from the Repeater Unit.




●Calculation Example

The allowable power supply voltage range for Slave Units is 14.0 to 26.4 VDC. If a 24-VDC power supply is used, the allowable voltage drop is 10 V.

The following formula expresses the relation between the available cables and the permissible cable extension length:

| $10\ (V) >= \{(I_1 + I_2 + I_3 + ... + I_n) \times R_1 \times L_1 \times 2\} + \{(I_2 + I_3 + ... + I_n) \times R_2 \times L_2 \times 2\} + \{(I_3 + ... + I_n) \times R_3 \times L_3 \times 2\} + ... + \{I_n \times R_n \times L_n \times 2\}$ |
|---|

Use the following approximation formula if you want to add some margin in the cable selection.

| $10\ (V) >= \{(I_1 + I_2 + I_3 + ... + I_n) \times R \times L \times 2\}$ |
|---|

Where R is the cable conductor resistance, 0.025 Ω/m, for a Flat Cable.

When a Flat Cable is used, the extendable length is:

L (m) <= 200 / (I1 + I2 + I3 + ... + In)

| $L\ (m) <= 200 \div (I_1 + I_2 + I_3 + ... + I_n)$ |
|---|

## E-5-6 Precautions when Providing the I/O Power Supply

When building a system, consideration must be given to the methods to supply the communications and the I/O power. The consideration includes not only the hardware elements, such as selecting power supplies and cables that confirm the allowable currents and the voltage drop, but also cost and software factors, such as system operation at power supply errors.

### Supplying I/O Power from One Source

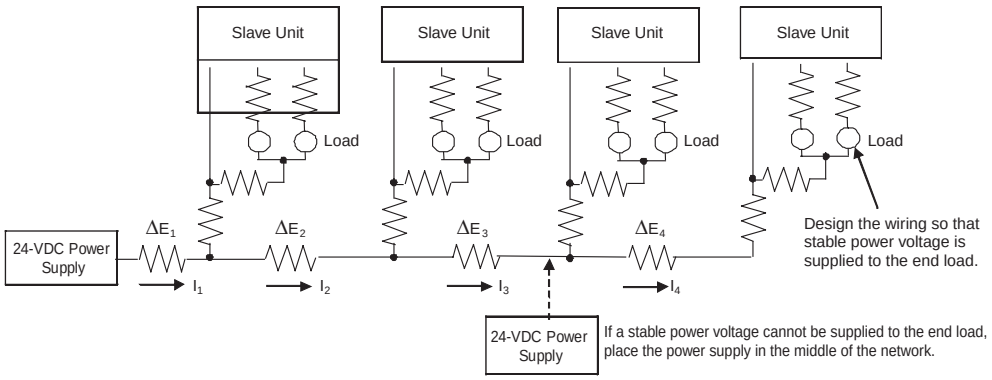
In a system where the I/O power is supplied collectively from one source,

the power consumption by individual device and load must also be considered. Cable selection must satisfy that the power supplied to the last Slave Unit or load is within the allowable voltage range.

Furthermore, attention should be paid to the power supply capacity and that the total line current is within the allowable current range of the cable.

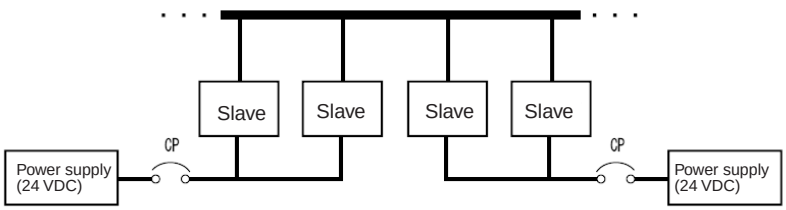
The following measures can be considered to keep the voltage drop within the allowable range in a network with a single power supply.

- Increase the thickness of the cables.
- Increase the output voltage of the power supply.
- Shorten the wiring.
- Locate the power supply in the middle of the network.




### Supplying I/O Power from Multiple Sources

Supplying the I/O power from multiple sources, instead of a single source, is effective to reduce the line current, the voltage drop, and the cable size. This method should be considered to ensure system safety at power errors.



## E-5-7 Other Precautions

### Power Supply Errors

A system can be stopped entirely if a power supply error occurs. When you want to avoid the full system stop to assure the system security, you may consider providing several power supplies in a network, and group the Slave Units with individual power supplies.

### Cost Considerations

Total cost and other elements as in below must also be included in the consideration of power supply method.

- Capacity and the number of pour supply units,
- Cable thickness (or allowable current), and length (or voltage drop),
- System safety, and
- Wiring manhours

## A



## B



## C



## D



## E

## F



## I



## L



## M



## N



## O



## P



## R



## S

## T



## U

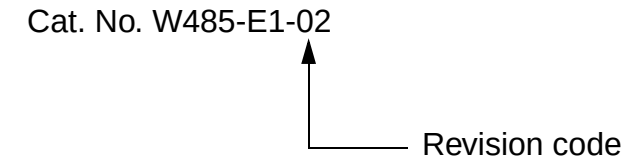


## V



## W

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.




The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

| Revision code | Date | Revised content |
|---|---|---|
| 01 | July 2009 | Original production |
| 02 | September 2013 | • Information was added for Windows 7 support.<br>• Changes were made to add models and for consistency with information in other manuals. |

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