

Open Field Network
CC-Link Compatible Product Development Reference Manual

CC-Link Ver.2 Q80BD-J61BT11N/Q81BD-J61BT11
Driver Development

-Q80BD-J61BT11N
-Q81BD-J61BT11

Safety Precautions

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

The precautions given in this manual are concerned with this product only.

In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".



WARNING

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



CAUTION

Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences. Observe the precautions of both levels because they are important for personal and system safety. Make sure that the end users read this manual and the relevant manuals and then keep the manuals in a safe place for future reference.

[Design Precautions]



WARNING

- For the operating status of each station after a communication failure, refer to the Type Q80BD-J61BT11N/Q81BD-J61BT11 CC-Link System Master/Local Interface Board User's Manual (For SW1DNC-CCBD2-B) (SH-080527ENG). If a CC-Link dedicated cable is disconnected, the network may be unstable, resulting in a communication failure of multiple stations. Configure an interlock circuit in the program to ensure that the entire system will always operate safely even if communications fail. Failure to do so may result in an accident due to an incorrect output or malfunction.
- When controlling the personal computer (changing data) during operation, configure an interlock circuit in the program to ensure that the entire system will always operate safely. For other forms of control (such as program modification or operating status change) of a running personal computer, read the this manual carefully and ensure that the operation is safe before proceeding. Especially, when a remote personal computer is controlled by an external device, immediate action cannot be taken if a problem occurs in the personal computer due to a communication failure. To prevent this, configure an interlock circuit in the user program, and determine corrective actions to be taken between the external device and the personal computer in case of a communication failure.
- Do not write any data to the "not used" area of the memory areas (PCI configuration area, 2-port memory area, and I/O port area) in the product. • Writing data to the "not used" area may cause malfunction of the product.
- The remote input and remote output may not be turned on or off due to failure of the board. Configure an external circuit for monitoring I/O signals that could cause a serious accident.

[Design Precautions]



CAUTION

- Do not install the power cables or communication cables together with the main circuit lines or power cables. Keep a distance of 100 mm or more between them. Failure to do so may result in malfunction due to noise.

[Security Precautions]



CAUTION

- To maintain the security (confidentiality, integrity, and availability) of the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

[Installation Precautions]



- Use this product in an environment that meets the general specifications in the user's manual of the board used. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- Do not directly touch any conductive parts and electronic components of the board. Doing so can cause malfunction or failure of the board.
- Securely fix the board with the fixing screws.
Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or board, resulting in drop, short circuit, or malfunction. For the tightening torque range, refer to the user's manual included with the personal computer used.
- Before handling the board, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the board to fail or malfunction.
- Shut off the external power supply (all phases) used in the system before installing or uninstalling the board. Failure to do so may result in damage to the product.
- Install the board to a personal computer which is compliant with PCI standard or PCI Express® standard. Failure to do so may cause a failure or malfunction.
- Securely attach the board to the PCI slot of the device used. Incorrect installation of the board may lead to malfunction, failure, or drop of the board.
- When installing the board, take care not to get injured by an implemented component or a surrounding member.
- When installing the board, take care not to contact with other boards.
- Handle the board in a place where static electricity will not be generated. Failure to do so may cause malfunction or failure.
- Turn off the power supply to the applicable station before installing or removing the terminal block. If not, correct data transmission cannot be guaranteed.
- Do not drop or apply strong shock to the board and the terminal block. Doing so may cause malfunction or failure.

[Wiring Precautions]



- Shut off the external power supply (all phases) used in the system before installing or uninstalling the board and wiring. Failure to do so may result in damage to the product.
- After board installation and wiring, attach the cover to the personal computer before turning it on for operation. Failure to do so may result in electric shock.
 - After wiring, attach the included terminal cover to the product before turning it on for operation. Failure to do so may result in malfunction.
 - Ground the SLD terminal of the board and the personal computer with a ground resistance of 100 ohms or less. Failure to do so may result in malfunction.
 - Tighten the terminal screws within the specified torque range. Undertightening can cause short circuit or malfunction. Overtightening can damage the screw and/or board, resulting in short circuit or malfunction.
 - Prevent foreign matter such as dust or wire chips from entering the board. Such foreign matter can cause a fire, failure, or malfunction.
 - Place the wires and cables in a duct or clamp them. If not, the dangling cables may swing or inadvertently be pulled, resulting in damage to the board or cables or malfunction due to poor contact.
 - Do not install the control lines or communication cables together or bring them close to each other. Doing so may result in malfunction due to noise.
 - When disconnecting the communication cable and power cable from the board, do not pull the cable by the cable part. Loosen the screws connected to the board before disconnecting the cable. Pulling the cable connected the board may result in damage to the board or cable or malfunction due to poor contact.
 - Solderless terminals with an insulation sleeve cannot be used for the terminal block. It is recommended that the wiring connecting sections of the solderless terminals are covered with a mark tube or an insulation tube.
 - Turn off the power supply to the applicable station before installing or removing the terminal block. If not, correct data transmission cannot be guaranteed.
 - Power off the system in advance when removing the terminating resistor to change the system. If the terminating resistor is removed and mounted while the system is energized, normal data transmission will not be guaranteed.
 - Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
 - Tighten any unused terminal screws within a tightening torque range (0.66 to 0.89N.m). Failure to do so may cause a short circuit due to contact with a solderless terminal.

[Startup and Maintenance Precautions]

 CAUTION

- Do not disassemble or modify the board. Doing so may cause failure, malfunction, injury, or a fire.
- Shut off the external power supply (all phases) used in the system before installing or uninstalling the board. Failure to do so may result in damage to the product.
- Do not touch any terminals while power is on. Doing so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning or retightening the screws. Failure to do so may result in damage to the product.
- Securely fix the board with the fixing screws. Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or board, resulting in drop, short circuit, or malfunction. For the tightening torque range, refer to the user's manual included with the personal computer used.
- Before handling the board, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the board to fail or malfunction.

[Disposal Precautions]

 CAUTION

- When disposing of the board, treat it as industrial waste.

Notice for Safety Design

(Read before using this product.)

- Mitsubishi Electric Corporation (Mitsubishi) puts the maximum effort into making its products better and more reliable, but there is always the possibility that product failure or malfunction may occur. Failure or malfunction of Mitsubishi products may lead to personal injury, fire, and/or property damage. Remember to give due consideration to safety when making your designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of non-flammable material, or (iii) prevention against any malfunction or mishap.

Notes Regarding This Manual

(Read before using this product.)

- This manual is intended as a reference to assist our customers in the development of CC-Link family products best suited to the customer's application; it does not convey any license under any intellectual property rights, or any other rights, belonging to Mitsubishi in relation to the technical information described herein.
- When using any or all of the information contained in this manual, including product data, technical information in diagrams and charts, programs, and algorithms, please be sure to evaluate all information not only in terms of the technical details, programs, or algorithms, but as a total system before making a final decision on the applicability of the information and products. Mitsubishi assumes no responsibility for inapplicability.
- Mitsubishi assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in this manual.
- The precautions given in this manual are concerned with this product only. For the safety precautions of the system, refer to the user's manuals for the products used.
- The model names of each components described in this manual are subject to change at the discretion of each manufacturer.
- All information contained in this manual, including product data, diagrams, charts, programs, and algorithms, represents information on products at the time of publication of this manual; the items and specifications described herein are subject to change by Mitsubishi without notice. Please consult your local Mitsubishi Electric representative for the latest product information before purchasing a Mitsubishi product.
- When disposing of a product that uses this product, treat it as industrial waste.
- The prior written approval of Mitsubishi is necessary to reprint or reproduce this manual in whole or in part.
- If you have any questions or concerns regarding the details described in this manual, consult your local Mitsubishi Electric representative.

Conditions of Use for the Product

- (1) Mitsubishi personal computer board ("the PRODUCT") shall be used in conditions;
 - i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
 - ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.
- (2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries. MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
 - Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
 - Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
 - Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.Notwithstanding the above restrictions, Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTS are required. For details, please contact the Mitsubishi representative in your region.
- (3) Mitsubishi shall have no responsibility or liability for any problems involving system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

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Relevant Manuals

This manual does not describe the details on terms and functions of the CC-Link system. For the details, please refer to the following manuals.

Manual name [manual number]	Description
MELSEC-Q CC-Link System Master/Local Module User's Manual [SH(NA)-080394ENG]	System configuration, performance specifications, functions, handling, wiring, and troubleshooting of the MELSEC Q series master/local module
Type Q80BD-J61BT11N/Q81BD-J61BT11 CC-Link System Master/Local Interface Board User's Manual (For SW1DNC-CCBD2-B) [SH(NA)-080527ENG]	System configuration, specifications, functions, settings and procedures before operation, parameter settings, programming and troubleshooting of the CC-Link system master/local interface board

Terms

Unless otherwise specified, this manual uses the following terms.

Term	Description
Board	A generic term for the Q80BD-J61BT11N CC-Link system master/local interface board and the Q81BD-J61BT11 CC-Link system master/local interface board
Driver	Software created based on this manual. The driver accesses the board from the host and performs cyclic transmission and transient transmission.
F/W	Firmware
Host	Device where the Q80BD-J61BT11N or the Q81BD-J61BT11 is installed
I/O	Input and output

Usage Precautions

- (1) The sample code described in this manual is for the Q80BD-J61BT11N/Q81BD-J71GF11-T2 CC-Link system master/local interface boards developed by Mitsubishi Electric. The sample code indicates an example of use of the materials herein; its operation is not guaranteed by Mitsubishi Electric.
- (2) Before using the sample code, check the "END-USER SOFTWARE LICENSE AGREEMENT" (BCN-P5999-1690). The document can be viewed on the Mitsubishi Electric FA website.
- (3) The intellectual property rights of the information provided on the CD-ROM belong to Mitsubishi Electric. Reprinting the information without the consent of Mitsubishi Electric and reproduction of the information for any purpose other than the development of an OS-compatible driver is prohibited. Distribution of a product (object code or the like) after sample code compilation, however, is unrestricted.

Address Notation

This manual uses byte addresses, unless otherwise specified.

Radix Notation

This manual uses the following radix notation, unless otherwise specified.

Radix	Description	Example
Binary	"b" is added at the end of the number to indicate bit.	0b
Decimal	Nothing is added at the end of the number.	0
Hexadecimal	"h" is added at the end of the number to indicate hexadecimal.	10BAh

CC-Link Partner Association

(1) Specifications

The materials related to this manual include the specifications published by the CC-Link Partner Association below.
For CC-Link details, refer to the following specifications published by the CC-Link Partner Association.

Document title	Document No.
CC-Link Specification (Overview/Protocol)	BAP-C2001ENG-001
CC-Link Specification (Implementation)	BAP-C2001ENG-002
CC-Link Specification (Profile)	BAP-C2001ENG-003
CC-Link IE TSN Installation Manual	BAP-C3007ENG-001

(2) Inquiries

To request materials published by the CC-Link Partner Association, please contact the following:

Web: <http://www.cc-link.org/>

E-mail: info@cc-link.org

TEL: +81-52-919-1588

FAX: +81-52-916-8655

1 Overview

1.1 Overview

This manual describes how to develop an OS-compatible driver for the Q80BD-J61BT11N/Q81BD-J61BT11 CC-Link system master/local interface boards.

The manual includes the memory information of the Q80BD-J61BT11N/Q81BD-J61BT11, driver processing procedure, sample code specifications, and operation check methods required for the driver development.

Cyclic transmission and transient transmission can be performed by installing an OS-compatible driver together with the board to the host.

The CD-ROM with sample code is included with the manual.

1.2 Sample Code

The following are the precautions for the sample code.

- (1) Use the sample code as a reference to check the logic.
- (2) Add processing required for the target OS to use the sample code.
- (3) The sample code is created so that the host can operate as a master station or local station.

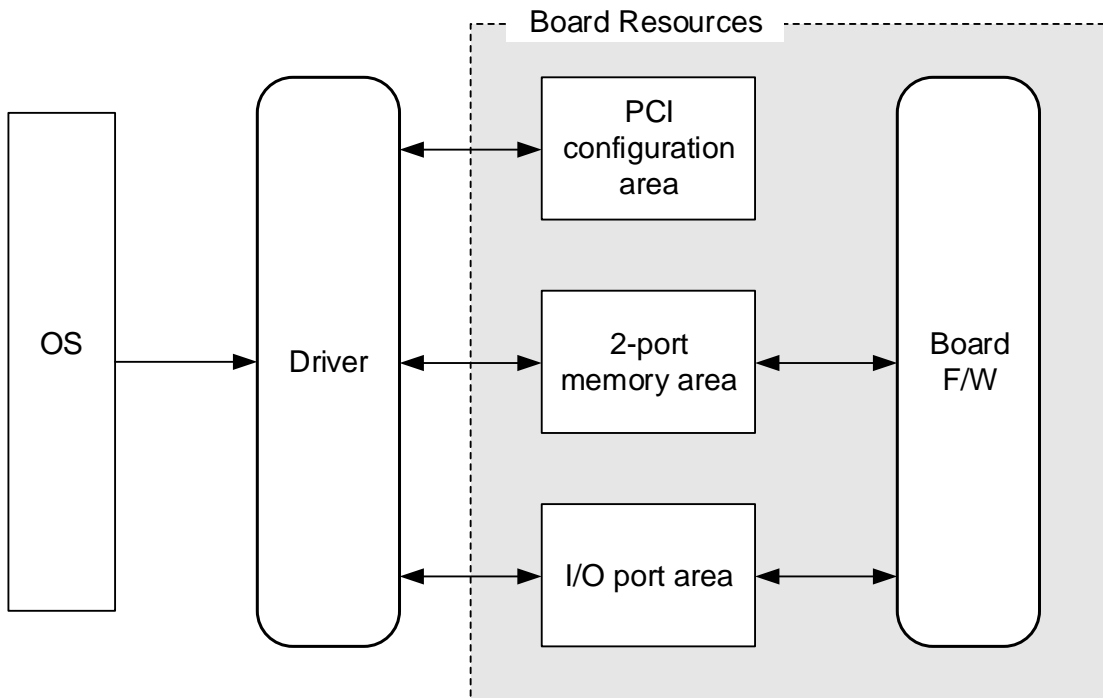
For details on the folder structure and files of sample code, refer to Chapter 5.

2 Board Hardware Information

The driver realizes CC-Link master station and local station setting and operation by accessing board resources. The board resources include a PCI configuration area, 2-port memory area and an I/O port area.

The addresses of the 2-port memory area and I/O port area are set in the PCI configuration area. The 2-port memory area contains a system area and user area for parameter setting and transient communication processing. The I/O port area sets the board firmware information.

The following shows the driver and board resource relationship.



2.1 PCI Configuration Area

The PCI configuration area is used to set the addresses for the driver to access the 2-port memory area and I/O port area.

2.1.1 PCI Configuration Area Image

The following shows an image of the PCI configuration area.

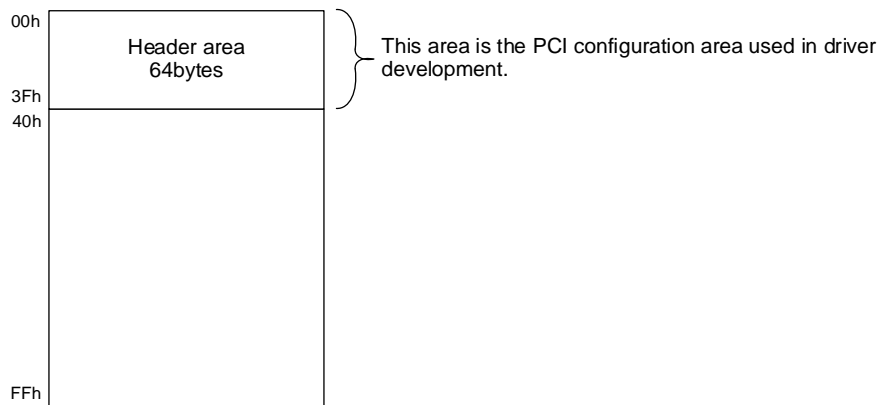


Figure 2.1.1-1 PCI Configuration Area

2.1.2 PCI Configuration Area List

The following shows the memory content of the header section of the PCI configuration area. For memory content details, refer to Section 2.1.3.

Byte Address	Bit 31	Bit 16	Bit 15	Bit 0
00h to 03h	Device ID		Vendor ID	
04h to 0Fh	Not used			
10h to 13h	2-port memory basic address register			
14h to 17h	Not used			
18h to 1Bh	I/O port basic address register			
1Ch to 2Bh	Not used			
2Ch to 2Fh	Sub-system ID		Sub-system vendor ID	
30h to 3Fh	Not used			

2.1.3 PCI Configuration Area Details

The following describes the PCI configuration area memory content that is required for driver development. The 2-port memory area and I/O port area addresses are set in the register of this memory.

The following are the meanings of the symbols (R/W, R, W, -) in the "R/W" column of the tables in this section.

R/W	Values can be read and written.
R	Values can be read only. Written values are ignored.
W	Values can be written only. Read values will be undefined.
-	Use prohibited. Read values will be undefined. A value to be written must be "0".

Address 00h: Vendor ID

Bit	R/W	Description	Initial Value
15-0	R	Allows reading of the ID code for identifying the device vendor. 10BAh: Mitsubishi Electric	10BAh (fixed)

Address 02h: Device ID

Bit	R/W	Description	Initial Value
15-0	R	Allows reading of the ID code for identifying the device. 0616h: CC-Link Ver. 2	0616h (fixed)

Address 10h: 2-Port Memory Basic Address Register

Bit	R/W	Description	Initial Value
31-19	R/W	Sets the head address of the 2-port memory area.	0000h
18-0	R	00h (fixed)	00000h (fixed)

Address 18h: I/O Port Basic Address Register

Bit	R/W	Description	Initial Value
31-8	R/W	Sets the head address of the I/O port area.	000000h
7-0	R	00h (fixed)	00h (fixed)

Address 2Ch: Sub-System Vendor ID

Bit	R/W	Description	Initial Value
15-0	R	Allows reading of the ID for identifying the sub-system vendor. 10BAh: Mitsubishi Electric	10BAh

Address 2Eh: Sub-System ID

Bit	R/W	Description	Initial Value
15-0	R	Allows reading of the ID for identifying the sub-system. 0601h: Q80BD-J61BT11N	0601h

2.2 2-Port Memory Area

The 2-port memory area contains a system area and user area.

The system area stores the parameter replacement information head address, transient communication processing area head address, host operation information, and host-board interrupt cause.

The user area stores parameters, link device areas (RX, RY, RWw, RWr), status information, the transient communication processing area, and CC-Link Ver. 2. compatible link device areas (RX, RY, RWw, RWr).

2.2.1 2-Port Memory Area Image

The following shows an image of the 2-port memory area.

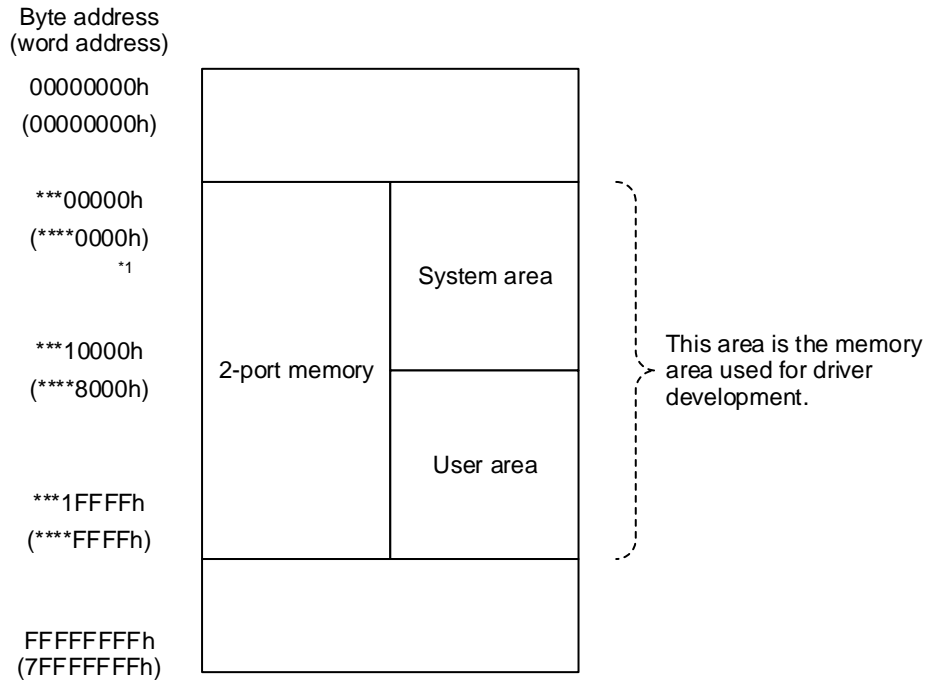


Figure 2.2.1-1 2-Port Memory Area

*1: The 2-port memory area is accessible using the PCI configuration area (address 10h: 2-port memory system address register) content as the head address.

2.2.2 2-Port Memory List

The following describes the 2-port memory area memory content required for driver development.

(1) System Area List

The content of the system area is described below. For content details, refer to the applicable section.

Byte Address	Word Address	Item	Reference
00h-21h	00h-10h	Not used	-
22h-23h	11h	Parameter replacement area head address* ¹	Section 2.2.3(1)
24h-25h	12h	Transient communication processing buffer area head address* ¹	Section 2.2.3(2)
26h-3Fh	13h-1Fh	Not used	-
40h-41h	20h	Host operation information 1	Section 2.2.3(3)
42h-45h	21h-22h	Not used	
46h-47h	23h	Host operation information 2	
48h-49h	24h	Host operation information 3	
4Ah-4Bh	25h	Host operation information 4	
4Ch-5Fh	26h-2Fh	Not used	-
60h-61h	30h	Host ← Board interrupt cause (board request)	Section 2.2.3(4)
62h-7Fh	31h-3Fh	Not used	-
80h-81h	40h	Host ← Board interrupt cause (host processing completed)	Section 2.2.3(5)
82h-9Fh	41h-4Fh	Not used	-
A0h-A1h	50h	Host → Board interrupt cause (host request)	Section 2.2.3(6)
A2h-BFh	51h-5Fh	Not used	-
C0h-C1h	60h	Host → Board interrupt cause (board processing completed)	Section 2.2.3(7)
C2h-DFh	61h-6Fh	Not used	-

*1: The head address of each information area is stored. Access each information area, referring to the head address read.

(2) User Area List

The following describes the content of the user area. For details, refer to Section 2.2.4 "Details of areas in the 2-port memory area (User area)".

Byte Address	Word Address	Item	Description	Read/Write Capability	Availability		
					Master Station	Local Station	
10000h to 101BFh	8000h to 80DFh	Parameter information area	An area that stores parameter settings information	Read only	○	-	
101C0h to 102BFh	80E0h to 815Fh	Remote input (RX)	RX area	Read only	○	○	
102C0h to 103BFh	8160h to 81DFh	Remote output (RY)	RY area	Master station	Write only	○	○
				Local station	Read/Write possible		
103C0h to 105BFh	81E0h to 82DFh	Remote register (RWw)	RWw area	Master station	Write only	○	○
				Local station	Read/Write possible		
105C0h to 107BFh	82E0h to 83DFh	Remote register (RWr)	RWr area	Read only	○	○	
107C0h to 10BBFh	83E0h to 85DFh	Device station offset, size information	Stores the RX/RX/RWw/RWr offset and size information for each remote station, local station, intelligent device station and standby master station.	Read only	○	○	
10BC0h to 10BFFh	85E0h to 85FFh	Link special relay (SB)	An area where the data link status is stored (bit)	Read/Write possible	○	○	
10C00h to 10FFFh	8600h to 87FFh	Link special register (SW)	An area where the data link status is stored (word)	Read/Write possible	○	○	
11000h to 11FFFh	8800h to 8FFFh	Not used	-	-	-	-	
12000h to 13FFFh	9000h to 9FFFh	Transient communication processing area	An area that stores transient data	Read/Write possible	○	○	
14000h to 17FFFh	A000h to BFFFh	Not used	-	-	-	-	
18000h to 183FFh	C000h to C1FFh	Ver. 2 compatible remote input (RX)	RX area	Read only	○	○	
18400h to 187FFh	C200h to C3FFh	Ver. 2 compatible remote output (RY)	RY area	Master station	Write only	○	○
				Local station	Read/Write possible		
18800h to 197FFh	C400h to CBFFh	Ver. 2 compatible remote register (RWw)	RWw area	Master station	Write only	○	○
				Local station	Read/Write possible		
19800h to 1A7FFh	CC00h to D3FFh	Ver. 2 compatible remote register (RWr)	RWr area	Read only	○	○	
1A800h to 1FFFFh	D400h to FFFFh	Not used	-	-	-	-	

2.2.3 Details of areas in the 2-port memory area (System area)

The following are the meanings of the symbols (R/W, R, W, -) in the "R/W" column of the tables in this section.

R/W	Values can be read and written.
R	Values can be read only. Written values are ignored.
W	Values can be written only. Read values will be undefined.
-	Use prohibited. Read values will be undefined. A value to be written must be "0".

(1) Parameter Replacement Area

The address of the parameter replacement area is stored in "2-port memory area 11h: Parameter replacement area head address". Offset values from the start of the system area are stored using word addresses.

11h	Parameter replacement area head address			
	Byte Offset Address	Word Offset Address	Item	Description
	+00h-0Fh	+00h-07h	Not used	-
	+10h-11h	+08h	Parameter information area head address* ¹	Stores the head address of the parameter information area using word addresses.
	+12h-1Bh	+09h-0Dh	Not used	-
	+1Ch-1Dh	+0Eh	Parameter replacement flag 1	Flag 1 for handshake during parameter setting
	+1Eh-1Fh	+0Fh	Not used	-
	+20h-21h	+10h	Parameter replacement flag 2	Flag 2 for handshake during parameter setting
	+22h-23h	+11h	Parameter replacement information 1	1 (fixed)
	+24h-25h	+12h	Parameter replacement information 2	1 (fixed)
	+26h-27h	+13h	Parameter replacement information 3	Size at the time of parameter replacement* ²
	+28h-29h	+14h	Parameter replacement flag 3	Flag 3 for handshake during parameter setting
	+2Ah-33h	+15h-19h	Not used	-
	+34h-35h	+1Ah	Parameter replacement flag 4	Flag 4 for handshake during parameter setting
	+36h-4Dh	+1Bh-26h	Not used	-

*1: For details on the parameter information area, refer to Section 4.3.2 "Parameter Information".

*2: When replacing parameters, the parameter information size, "Parameter name" to "End block", needs to be stored. (Refer to Section 4.3.2 "Parameter Information" (1) (a).)

(2) Transient Communication Processing Buffer Area

The address of the transient communication processing buffer area is stored in "2-port memory area 12h: Transient communication processing buffer area head address".

Offset values from the start of the system area are stored using word addresses.

12h	Transient communication processing buffer area head address		
	Byte Offset Address	Word Offset Address	Item
	+00h-01h	+00h	Area size
	+02h-03h	+01h	Number of transient communication processing buffer areas n (n = 0 to 4, maximum)
	+04h-05h	+02h	Host → Board information buffer area 1 head address
	+06h-07h	+03h	Host → Board information buffer area 1 size
	+08h-09h	+04h	Host → Board data buffer area 1 head address
	+0Ah-0Bh	+05h	Host → Board data buffer area 1 size
	+0Ch-0Dh	+06h	Not used
	+0Eh-0Fh	+07h	Host → Board information buffer area 2 head address
	+10h-11h	+08h	Host → Board information buffer area 2 size
	+12h-13h	+09h	Host → Board data buffer area 2 head address
	+14h-15h	+0Ah	Host → Board data buffer area 2 size
	+16h-17h	+0Bh	Not used
	+18h-19h	+0Ch	Host → Board information buffer area 3 head address
	+1Ah-1Bh	+0Dh	Host → Board information buffer area 3 size
	+1Ch-1Dh	+0Eh	Host → Board data buffer area 3 head address
	+1Eh-1Fh	+0Fh	Host → Board data buffer area 3 size
	+20h-21h	+10h	Not used
	+22h-23h	+11h	Host → Board information buffer area 4 head address
	+24h-25h	+12h	Host → Board information buffer area 4 size
	+26h-27h	+13h	Host → Board data buffer area 4 head address
	+28h-29h	+14h	Host → Board data buffer area 4 size
	+2Ah-2Bh	+15h	Not used

*: For details on how the transient communication processing buffer is used, refer to Section 4.5.2 "Transmission and Reception Data Areas".

(3) Host Operation Information

The host operation information area contains the parameters that determine host operation. Set the parameters to the fixed values indicated below during F/W initial processing.

Byte Address	Word Address	Item	Description
40h-41h	20h	Host operation information 1	Set to "2032h (fixed)".
42h-45h	21h-22h	Not used	-
46h-47h	23h	Host operation information 2	Set to "0001h (fixed)".
48h-49h	24h	Host operation information 3	Set to "2031h (fixed)".
4Ah-4Bh	25h	Host operation information 4	Set to "0000h (fixed)".
4Ch-5Fh	26h-2Fh	Not used	-

(4) Host ← Board Interrupt Cause (Board Request)

When the board has notified the host of an interrupt, this area stores the interrupt cause.

Word Address: 30h (Byte Address: 60h)

Bit	R/W	Description
15	R	Parameter replacement board request flag
14-8	-	Not used
7	R	Area 4
6		Area 3
5		Area 2
4		Area 1
Transient data receive request flag (Areas 1 to 4)		
3	R	Area 4
2		Area 3
1		Area 2
0		Area 1
Transient data send completed flag (Areas 1 to 4)		

(5) Host ← Board Interrupt Cause (Host Processing Completed)

When the board has notified the host of an interrupt, this area indicates acknowledgement of the request regarding the interrupt cause.

Word Address: 40h (Byte Address: 80h)

Bit	R/W	Description
15	R/W	Parameter replacement host processing completed flag
14-8	-	Not used
7	R/W	Area 4
6		Area 3
5		Area 2
4		Area 1
Transient data receive request flag (Areas 1 to 4)		
3	R/W	Area 4
2		Area 3
1		Area 2
0		Area 1
Transient data send completed flag (Areas 1 to 4)		

(6) Host → Board Interrupt Cause (Host Request)

When the host has notified the board of an interrupt, this area stores the interrupt cause.

Word Address: 50h (Byte Address: A0h)

Bit	R/W	Description
15	R/W	Parameter replacement host request flag
14-8	-	Not used
7	R/W	Area 4
6		Area 3
5		Area 2
4		Area 1
Transient data receive completed flag (Areas 1 to 4)		
3	R/W	Area 4
2		Area 3
1		Area 2
0		Area 1
Transient data send request flag (Areas 1 to 4)		

(7) Host → Board Interrupt Cause (Board Processing Completed)

When the host has notified the board of an interrupt, this area indicates acknowledgement of the request regarding to the interrupt cause.

Word Address: 60h (Byte Address: C0h)

Bit	R/W	Description
15	R	Parameter replacement board processing completed flag
14-8	-	Not used
7	R	Area 4
6		Area 3
5		Area 2
4		Area 1
Transient data receive completed flag (Areas 1 to 4)		
3	R	Area 4
2		Area 3
1		Area 2
0		Area 1
Transient data send request flag (Areas 1 to 4)		

2.2.4 Details of areas in the 2-port memory area (User area)

(1) Parameter Information Area

The parameter information area stores parameter setting information. For parameter setting details, refer to Section 4.3.2 "Parameter Information".

(2) Device Station Offset, Size Information

This area stores the RX, RY, RWw and RWr head buffer memory address and size assigned to each station, in units of words.

With two or more occupied stations, the area stores the offset and size information for the head station number. The offset and size information stored for all stations other than the head station number is "0000h".

When the size of a device station is less than one word, the size is rounded up and "1" is stored.

(For example, when the set number of points of a remote I/O station is 8, "1" is stored.)

Byte Address	Word Address	Description		
107C0h-107C1h	83E0h	RX area	Station No. 1	Offset
107C2h-107C3h	83E1h			Size
107C4h-107C5h	83E2h		Station No. 2	Offset
107C6h-107C7h	83E3h			Size
..
108BCh-107BDh	845Eh		Station No. 64	Offset
108BEh-108EFh	845Fh	Size		
108C0h-108C1h	8460h	RY area	Station No. 1	Offset
108C2h-108C3h	8461h			Size
108C4h-108C5h	8462h		Station No. 2	Offset
108C6h-108C7h	8463h			Size
..
109BCh-109BDh	84DEh		Station No. 64	Offset
109BEh-109BFh	84DFh	Size		
109C0h-109C1h	84E0h	RWw area	Station No. 1	Offset
109C2h-109C3h	84E1h			Size
109C4h-109C5h	84E2h		Station No. 2	Offset
109C6h-109C7h	84E3h			Size
..
10ABCh-10ABDh	855Eh		Station No. 64	Offset
10ABEh-10ABFh	855Fh	Size		
10AC0h-10AC1h	8560h	RWr area	Station No. 1	Offset
10AC2h-10AC3h	8561h			Size
10AC4h-10AC5h	8562h		Station No. 2	Offset
10AC6h-10AC7h	8563h			Size
..
10BBCh-10BBDh	85DEh		Station No. 64	Offset
10BBEh-10BBFh	85DFh	Size		

(3) Link Special Relay (SB), Link Special Register (SW)

The link special relay area stores the data link status based on bit ON/OFF information. The word addresses 85E0h to 85FFh of the 2-port memory correspond to SB0000 to SB01FF.

The link special register area stores the data link status based on word information.

The word addresses 8600h to 87FFh of the 2-port memory correspond to SW0000 to SW01FF.

(4) Transient Communication Processing Area

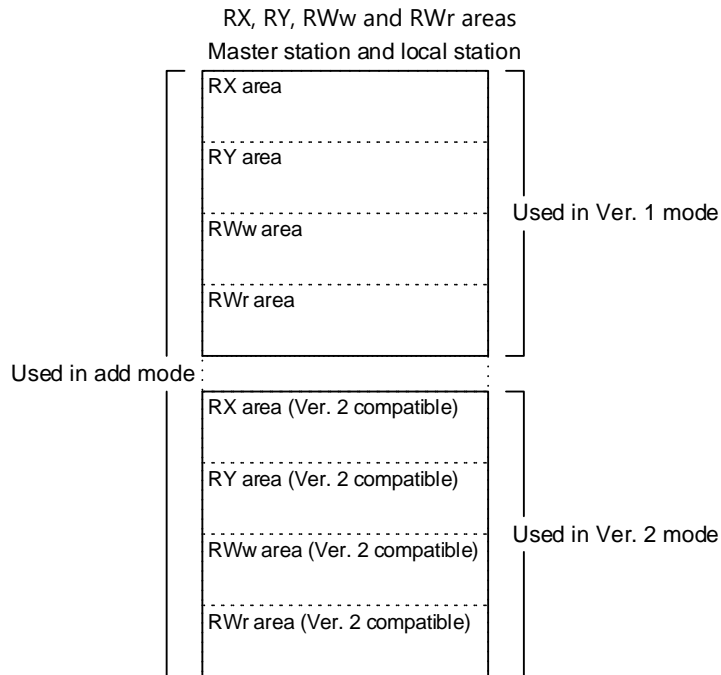
This area stores request transmission data and response reception data when transient communication is performed.

For details, refer to Section 4.5.3 "Transient Communication Data".

(5) Remote I/O and Remote Register (RX, RY, RWw and RWr areas)

This area stores the data transmitted and received by cyclic transfers.

The RX, RY, RWw and RWr areas which store data differ in Ver. 1 mode and Ver. 2 mode. In add mode, both of the areas shown below are used. For details, refer to Section 4.4 "Cyclic Communication Processing Procedure".



2.3 I/O Port Area

2.3.1 I/O Port Area Image

The following shows an image of the I/O port area.

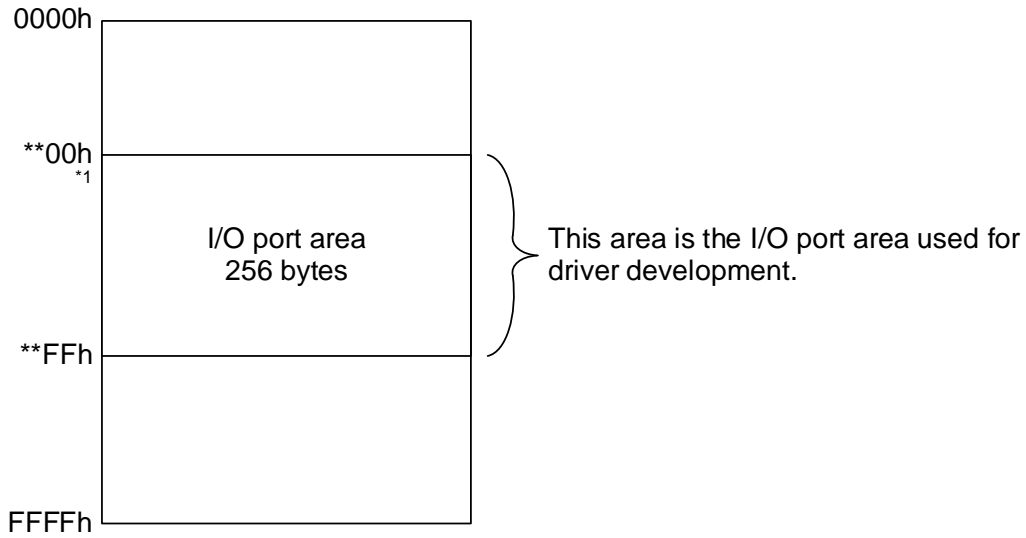


Figure 2.3.1-1 I/O Port Area

*1: The I/O port area is accessible using the PCI configuration area (address 18h: I/O port basic address register) content as the head address.

2.3.2 I/O Port Area List

The following describes the I/O port area memory content required for driver development.
For memory content details, refer to Section 2.3.3.

Byte Address	R/W	Item
00h-01h	R	Common information 0 (SPI/O0)
02h-03h	R/W	Common information 1 (SPI/O1)
04h-05h	R/W	Common information 2 (SPI/O2)
06h-07h	R/W	Common information 3 (SPI/O3)
08h-09h	R/W	Board → Host interrupt area (SPI/O4)
0Ah-0Bh	R/W	Host → Board interrupt area (SPI/O5)
0Ch-0Dh	R/W	Interrupt information 1 (SPI/O6)
0Eh-13h	-	Not used
14h-15h	R/W	Operation mode, parameter mode setting area (SPI/OA)
16h-17h	R/W	Hardware information setting area (SPI/OB)
18h-2Fh	-	Not used
30h-31h	R/W	Host-side initial processing completed flag
32h-35h	-	Not used
36h-37h	R/W	Clock set flag
38h-39h	R/W	Clock information (month), clock information (year lower level)
3Ah-3Bh	R/W	Clock information (hour), clock information (date)
3Ch-3Dh	R/W	Clock information (second), clock information (minute)
3Eh-3Fh	R/W	Clock information (year upper level), clock information (day)
40h-4Fh	-	Not used
50h-51h	R/W	Host operation information
52h-53h	R/W	Host error code
54h-63h	-	Not used
64h-65h	R/W	Switch setting register
68h-6Dh	-	Not used
6Eh-6Fh	R	Board number setting switch port
70h-AFh	-	Not used
B0h-B1h	R	Board status
B2h-B3h	-	Not used
B4h-B5h	R	WDT interrupt information
B6h-B7h	-	Not used
B8h-B9h	R/W	Interrupt information 2
BAh-BBh	-	Not used
BCh-BDh	W	Interrupt information 3
BEh-BFh	-	Not used
C0h-C1h	W	Host error reset register
C2h-CFh	-	Not used
D0h-D1h	W	OS timer stop register
D2h-D3h	-	Not used
D4h-D7h	R/W	OS WDT setting register
D8h-D9h	W	OS WDT setting register lock register
DAh-ABh	-	Not used
DCh-DDh	R	OS WDT reset register
DEh-DFh	-	Not used
E0h-E1h	W	OS WDT reset lock register
E2h-F3h	-	Not used
F4h-F5h	R/W	Host → Board communication register
F6h-F7h	-	Not used
F8h-F9h	R	Board → Host communication register
FAh-FFh	-	Not used

2.3.3 I/O Port Area Details

The following are the meanings of the symbols (R/W, R, W, -) in the "R/W" column of the tables in this section.

R/W	Values can be read and written.
R	Values can be read only. Written values are ignored.
W	Values can be written only. Read values will be undefined.
-	Use prohibited. Read values will be undefined. A value to be written must be "0".

Byte Address 00h: Common Information 0 (SPI/O0)

Bit	R/W	Description	Initial Value
15-14	-	Not used	10b (fixed)
13	R	Assessment of board-side I/O information setting status 0: Not set 1: Set	0b
12-0	-	Not used	-

Byte Address 02h: Common Information 1 (SPI/O1)

Bit	R/W	Description	Initial Value
15	W	Assessment of host-side I/O information setting status 0: Not completed 1: Completed	0b
14-0	-	Not used	-

Byte Address 04h: Common Information 2 (SPI/O2)

Bit	R/W	Description	Initial Value
15	R/W	Assessment of host-side initial information setting status 0: Not completed 1: Completed	0b
14-2	-	Not used	-
1	R	Assessment of board information READY status 0: Not ready 1: Ready	0b
0	R	Assessment of board-side initial information setting status 0: Not completed 1: Completed	0b

Byte Address 06h: Common Information 3 (SPI/O3)

Bit	R/W	Description	Initial Value
15-4	-	Not used	-
3	R/W	Operation setting area setting status flag 0: No setting 1: Setting (This enables the content of "Byte address 16h: Hardware information setting area" as board information.)	0b
2	R/W	Operation mode, parameter mode setting area setting status flag 0: No setting 1: Setting (This enables the content of "Byte address 14h: Operation mode and parameter mode setting area" as board information.)	0b
1-0	-	Not used	-

Byte Address 08h: Board → Host Interrupt Area (SPI/O4)

Bit	R/W	Description	Initial Value
15-4	-	Not used	-
3	R	Board → Host interrupt cause 2 ^{*1, *4} 0: No cause 1: Cause	0b
	W	Board → Host interrupt cause 2 reset 0: No processing 1: Cause reset	-
2	R	Board → Host interrupt cause 1 ^{*1, *4} 0: No cause 1: Cause	0b
	W	Board → Host interrupt cause 1 reset 0: No processing 1: Cause reset	-
1	W	Board → Host interrupt mask release bit ^{*2, *3} 0: No processing 1: Mask release	-
0	W	Board → Host interrupt mask specification bit ^{*2, *3} 0: No processing 1: Mask set	-

*1: The interrupt cause is readable when the interrupt mask is set.

*2: The mask is applied after reset.

*3: When the mask specification and mask release bits are set simultaneously, the mask is applied.

*4: When a driver response error and a host-side OS startup error occur, the system assesses the status as host-side OS runaway and clears the interrupt using hardware based on the setting of the interrupt reset condition bit.

Byte Address 0Ah: Host → Board Interrupt Area (SPI/O5)

Bit	R/W	Description	Initial Value
15-4	-	Not used	-
3	R	Host → Board interrupt cause 2 0: No cause 1: Cause	0b
	W	Host → Board interrupt cause 2 0: No processing 1: Cause set	-
2	R	Host → Board interrupt cause 1 0: No cause 1: Cause	0b
	W	Host → Board interrupt cause 1 0: No processing 1: Cause set	-
1-0	-	Not used	-

Byte Address 0Ch: Interrupt Information 1 (SPI/O6)

Bit	R/W	Description	Initial Value
15-4	-	Not used	-
3-0	W	Initial information 02 setting 0001b: Mask set 1100b: Reset	-

Byte Address 14h: Operation Mode, Parameter Mode Setting Area (SPI/OA)

Bit	R/W	Description	Initial Value
15-8	R/W	Operation mode setting 00h: Ver. 1 mode 01h: Add mode 02h: Ver. 2 mode	00h
7-0	R/W	Parameter mode setting 00h: Online (remote network mode) 01h: Online (remote I/O network mode) 02h: Offline mode	00h

Byte Address 16h: Hardware Information Setting Area (SPI/OB)

Bit	R/W	Description	Initial Value
15-12	-	Not used	-
11-10	R/W	Extended cyclic setting*1 00b: Single setting 01b: Double setting 10b: Quadruple setting 11b: Octuple setting	00b
9	R/W	Refresh/Forced clear specification during CPU STOP 0: Refresh during STOP 1: Forced clear during STOP	0b
8	R/W	0b (fixed)	0b (fixed)
7-6	-	Not used	-
5-4	R/W	Number of occupied stations setting*1 00b: 1 occupied station 10b: 2 occupied stations 11b: 3 occupied stations 01b: 4 occupied stations	00b
3	R/W	0: Clear input of data link faulty station 1: Hold input of data link faulty station	0b
2	-	Not used	-
1	R/W	0: No master station return to system (single master function) 1: Master station return to system (redundant master function)	0b
0	R/W	0b (fixed)	0b (fixed)

*1: When the station operates as a master station, set 00b.

Byte Address 36h: Clock Set Flag

Bit	R/W	Description	Initial Value
15-8	-	Not used	00h
7-0	R/W	Clock set flag Sets any 8-bit flag.	00h

Byte Address 38h: Clock Information (Month), Clock Information (Year Lower Level)

Bit	R/W	Description	Initial Value
15-8	R/W	Clock information (month) An 8-bit BCD code is set by the host.	00h
7-0	R/W	Clock information (year lower level) Sets an 8-bit BCD code.	00h

Byte Address 3Ah: Clock Information (Hour), Clock Information (Date)

Bit	R/W	Description	Initial Value
15-8	R/W	Clock information (hour) Sets an 8-bit BCD code.	00h
7-0	R/W	Clock information (date) Sets an 8-bit BCD code.	00h

Byte Address 3Ch: Clock Information (Second), Clock Information (Minute)

Bit	R/W	Description	Initial Value
15-8	R/W	Clock information (second) Sets an 8-bit BCD code.	00h
7-0	R/W	Clock information (minute) Sets an 8-bit BCD code.	00h

Byte Address 3Eh: Clock Information (Year Upper Level), Clock Information (Day)

Bit	R/W	Description	Initial Value
15-8	R/W	Clock information (year upper level) Sets an 8-bit BCD code.	00h
7-0	R/W	Clock information (day) 00h: Sunday 03h: Wednesday 06h: Saturday 01h: Monday 04h: Thursday 02h: Tuesday 05h: Friday	00h

Byte Address 50h: Host Interrupt Type, Host Operation Information

Bit	R/W	Description	Initial Value
15-8	-	Not used	-
7	R/W	I/O reset 1: Reset 0: Reset release	1b
6	R/W	Board reset 1: Reset 0: Reset release	1b
5-0	R/W	Host operation information 000001b: STOP 000100b: RUN 001111b: Hosting initial processing in progress	000000b

Byte Address 52h: Host Error Code

Bit	R/W	Description	Initial Value
15-0	R/W	Host error code	0000h

Byte Address 64h: Switch Setting Information

Bit	R/W	Description	Initial Value
15-12	R/W	Transmission speed/mode (Refer to "Table 2.3.3-1".)	0h
11-8	R	Not used	0h
7-0	R/W	Station number setting (Refer to "Table 2.3.2-2".)	00h

Set this register prior to releasing board reset. The content of this register is reflected in the system by reset release. When the register is set after reset release, the content of the register is not reflected in the system.

Table 2.3.3-1 Transmission Speed/Mode

Value	Transmission Speed	Mode
0h	156kbps	Online
1h	625kbps	
2h	2.5Mbps	
3h	5Mbps	
4h	10Mbps	
5h to Fh	Not used	-

Table 2.3.3-2 Station Number Setting

Value	Setting Details
0h	Master station
1h to 40h (1 to 64)	Local station
41h to FFh (65 to 255)	Not used

Byte Address 6Eh: Board Number Setting Switch Port

Bit	R/W	Description	Initial Value				
15-2	-	Not used	-				
1-0	R	Board number setting switch Reads the board number of Q80BD-J61BT11N/Q81BD-J61BT11 mounted on the host.	-				
				Register Value	Switch 2	Switch 1	Board No.
				11b	OFF	OFF	1
				10b	OFF	ON	2
				01b	ON	OFF	3
00b	ON	ON	4				

Byte Address B0h: Board Status

Bit	R/W	Description	Initial Value
15-7	-	Not used	-
6	R	Host-side OS WDT error 0: No error 1: Error	0b
5	-	Not used	-
4	R	Board-side WDT error 0: No error 1: Error	0b
3-0	-	Not used	-

Byte Address B4h: WDT Interrupt Information

Bit	R/W	Description	Initial Value
15-4	-	Not used	-
3	R	Host-side OS WDT error interrupt 0: No cause 1: Cause	0b
2	R	Board-side WDT error interrupt 0: No cause 1: Cause	0b
1-0	-	Not used	-

Byte Address B8h: Interrupt Information 2

Bit	R/W	Description	Initial Value
15-7	-	Not used	-
6	R/W	Reserved interrupt mask 1	1b ^{*1}
5	R/W	Reserved interrupt mask 2	1b ^{*1}
4	R/W	Reserved interrupt mask 3	1b ^{*1}
3	R/W	Host-side OS WDT error interrupt mask 0: Mask release 1: Mask	1b
2	R/W	Board-side WDT error interrupt mask 0: Mask release 1: Mask	1b
1	R/W	Reserved interrupt mask 4	1b ^{*1}
0	R/W	Reserved interrupt mask 5	1b ^{*1}

*1. Do not write "0" in reserved interrupt masks 1 to 5.

Byte Address BCh: Interrupt Information 3

Bit	R/W	Description	Initial Value
15-7	-	Not used	-
6	W	Reserved interrupt reset 1	0b
5	W	Reserved interrupt reset 2	0b
4	W	Reserved interrupt reset 3	0b
3	W	Reserved interrupt reset 4	0b
2	W	Host-side OS WDT error interrupt reset 0: No processing 1: Reset	0b
1	W	Board-side WDT error interrupt reset 0: No processing 1: Reset	0b
0	W	Reserved interrupt reset 5	0b

Byte Address C0h: Host Error Reset Register

Bit	R/W	Description	Initial Value
15-4	-	Not used	-
3-0	W	Resets the host error status. 0h: No processing Fh: Reset	Fh

Byte Address D0h: OS Timer Stop Register

Bit	R/W	Description	Initial Value
15-1	-	Not used	-
0	W	OS timer stop 0: No processing 1: Stop timer	-

Byte Address D4h: OS WDT Setting Register

Bit	R/W	Description	Initial Value
31-18	-	Not used	-
17-16	R/W	Time until driver response error after interrupt notice 00b: 0.5s 01b: 2s 10b: 4s 11b: 8s	11b
15	R/W	OS WDT startup 0: Stop WDT 1: Start WDT	0b
14-0	R/W	OS WDT interval time setting Setting in binary format (0000h to 7FFFh) Interval time = 8ms × (Set value)	0000h

Note 1: Do not set Bit 15 and Bit 14-0 simultaneously. Set Bit 14-0 and subsequently Bit 15.

Note 2: Set Bit 14-0 to any value other than "0". If WDT is started with Bit 14-0 set to "0", an error will occur immediately.

Note 3: Do not change the set values during WDT startup. Always change the values with WDT in the stop state.

Byte Address D8h: OS WDT Setting Register Lock Register

Bit	R/W	Description	Initial Value
15-8	-	Not used	-
7-0	W	OS WDT setting register lock register 55h: Lock release AAh: Lock	-

Byte Address DCh: OS WDT Reset Register

Bit	R/W	Description	Initial Value
15-8	-	Not used	-
7-0	R	OS WDT reset WDT is reset by reading.	00h

Byte Address E0h: OS WDT Reset Lock Register

Bit	R/W	Description	Initial Value
15-8	-	Not used	-
7-0	W	OS WDT reset lock register 55h: Lock release AAh: Lock	-

Byte Address F4h: Host → Board Communication Register

Bit	R/W	Description	Initial Value
15-1	-	Not used	-
0	R/W	For switch information, hardware information reset processing From board to 2-port memory access stop request 0: Request cleared 1: Request	0b

Byte Address F8h: Board → Host Communication Register

Bit	R/W	Description	Initial Value
15-1	-	Not used	-
0	R	For switch information, hardware information reset processing From board to 2-port memory access stop response 0: No response 1: Response	0b

3 Error Codes

3.1 Error Codes

The error codes are described in detail in the table below.

Error Code List

Error Code	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station
B004h	Transmission line error	Transmission line disconnection has been detected.	Check the terminal block connection.	N	Y
B006h	Refresh frame reception interval error	Transmission line switching has been detected. (Disconnection of other transmission channel)	Check the terminal block connection.	N	Y
B007h	Host station frame reception interval error	Master station failure has been detected. (Disconnection of both transmission channels)	Check the terminal block connection.	N	Y
B008h	Carrier detection continuous "H" error	The carrier remains as "H".	Check the line.	Y	Y
B009h	Station number switch setting error	The switch was changed with the system online.	Return the switch back to its original setting.	Y	Y
B083h	All stations faulty	There are no connected modules.	Connect the device stations.	Y	Y
B084h	Transmission block switching error	The transmission block is not switched using the block switch command. (Hardware error)	Replace the board.	Y	Y
B088h	Monitoring timeout	A line error has occurred.	Check the line.	Y	Y
B102h	Link error	A line error has occurred.	Check the line.	Y	Y
B110h	Unable to receive transient data	A line error has occurred.	Check the line.	Y	Y
B111h	Transient data receiving order error	A line error has occurred.	Check the line.	Y	Y
B112h	Transient data length error	A line error has occurred.	Check the line.	Y	Y
B113h	Transient data ID error	A line error has occurred.	Check the line.	Y	Y
B114h	Link error	A line error has occurred.	Check the line.	Y	Y
B115h	Link error	A line error has occurred.	Check the line.	Y	Y
B116h	Packet error	A line error has occurred.	Check the line.	Y	Y
B201h	Relevant station error when sending	A data link error has occurred at the relevant station at the time of transient transmission.	Check the status of communication with other stations, whether or not a temporary error invalid station is specified, or if the host station is stopped.	Y	Y
B202h	Data length error	A line error may have occurred if improper packet data length is identified at the time of transient transmission.	Check the line. Set a data length that fulfills required conditions.	Y	Y
B203h	CT value error	The CT value in the CC-Link transient frame is wrong.	Check the value in the CC-Link transient frame.	Y	Y
B204h	Error response send buffer acquisition failed	When an error response is sent, buffer data cannot be acquired.	Wait a while and then send the request (transient transmission overload status).	Y	Y
B205h	Target station is not intelligent device station	The target station was not an intelligent device station.	Check the target station.	Y	Y
B302h	Specified station number exceeds the highest allowable station number	The station number specified for a temporary error invalid request or temporary error invalid cancel request exceeded the highest allowable station number.	Specify a station number that is not greater than the highest allowable station number.	Y	N
B303h	No station number specified	No station number is specified for a temporary error invalid request or cancel request.	Specify any station numbers. (SW0003, SW0004 to SW0007)	Y	N
B306h	Specified station is not head station	A station other than the head station was specified for the temporary error invalid request.	Specify a head station for the temporary error invalid request.	Y	N

Error Code	Error	Error Cause (Details)	Corrective Action	Detectability			
				Master Station	Local Station		
B307h	All stations faulty	All stations were in a data link error state when either of the following requests was issued: • SB0000 (data link restart) • SB0002 (data link stop)	Request again after the data link becomes normal.	Y	Y		
B308h	Total number of device stations (station number error)	The station number is outside the range 1 to 64.	Check the station numbers of the mounted modules for any duplication (including occupied station numbers).	Y	N		
B309h	Station number duplication	The station number of the connected module was duplicated (including occupied station numbers). Note that this excludes duplication of the head station number.	Check the modules' station numbers.	Y	N		
B30Ah	Inconsistency between connected module and parameter (connected module > parameter)	The station types of the module are different from those set as parameters, or the number of occupied stations of the module is greater than the parameter. Example:	Set correct parameters.	Y	N		
		<table border="1"> <thead> <tr> <th>Connected Module</th> <th>Parameter Setting</th> </tr> </thead> <tbody> <tr> <td>Remote device</td> <td>Remote I/O</td> </tr> <tr> <td rowspan="2">Intelligent device</td> <td>Remote I/O</td> </tr> <tr> <td>Remote device</td> </tr> </tbody> </table>				Connected Module	Parameter Setting
Connected Module	Parameter Setting						
Remote device	Remote I/O						
Intelligent device	Remote I/O						
	Remote device						
B30Bh	Inconsistency between connected module and parameter	The mounting state does not match the corresponding parameters. (A station, whose station number is set as a parameter, is not mounted.)	Match the mounting status with corresponding parameters.	Y	N		
B30Ch	Switching station specification error	SB0001 was turned ON in other than the master station or a system that does not have a standby master station.	Check if the standby master station exists in the system.	Y	Y		
B30Dh	Initial status	Temporary error invalid station specification and SB requests were issued before starting the data link.	Issue the requests after the data link is started.	Y	N		
B30Eh	Local station not supported	The execution of the function, which is started by SB/SW and executable at the master station only, was attempted at the local station.	Execute the function from the master station.	N	Y		
B310h	Data link restart error	A data link restart request (SB0000) was executed for the station that was performing a data link.	Execute the data link restart request (SB0000) for the station that has stopped a data link with a data link stop request (SB0002).	Y	Y		
B311h	Data link stop error	A data link stop request (SB0002) was executed for the station that had stopped a data link.	Execute the data link stop request (SB0002) for the station that is performing a data link.	Y	Y		
B312h	Standby master station absence error	A forced master to standby master switching request (SB000C) was issued in a system where no standby master station exists or where the standby master station had become faulty.	Execute the request after starting the data link of the standby master station.	Y	N		
B313h	All stations faulty	A forced master to standby master switching request (SB000C) was issued in a system where all stations had become faulty.	Execute the request after starting the data link of the standby master station.	Y	N		
B314h	Switching target error	A forced master to standby master switching request (SB000C) was issued to a station other than the master station.	Execute the request to the master station.	N	Y		
B315h	Forced switching error during master switching	A forced master to standby master switching request (SB000C) was issued again while the master station was being switched to the standby master station.	Check the ON/OFF operation of SB000C.	Y	N		
B381h	Station number switch setting error	The station number switch setting was outside the setting range.	Set the station number switch to a value within the setting range.	Y	Y		
B383h	Baud rate switch setting error	The baud rate switch setting is outside the setting range.	Set the baud rate switch to a value within the setting range.	Y	Y		
B384h	Station number setting error (parameter)	The station number (including the occupied station numbers) of the station information parameter was set to a value outside the range 1h to 40h.	Set a value within the range 1h to 40h.	Y	N		

Error Code	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station
B385h	Total number of device stations error (total number of occupied stations > 64)	The total number of occupied stations set in the station information parameter exceeded 64.	Set a parameter value of 64 or less.	Y	N
B386h	Total number of device stations (all stations reserved specification)	All the numbers of occupied stations were set to 0 in the station information parameter.	Set each of the occupied station numbers to a value within the range 1 to 4.	Y	N
B387h	Delay timer setting error	The delay timer was set to a value outside the range 0 to 100.	Set the delay timer to a value within the range 0 to 100.	Y	Y
B388h	Station information specification (other than 0 to 3)	The station type in the station information parameter was set to a value other than 0 to 3. (Ver. 1 mode only)	Set the station type to a value within the range 0 to 3.	Y	N
B389h	Writing to use prohibited area error	Writing was performed to a use prohibited area (unused) in the 2-port memory.	Do not write any data to use prohibited areas (unused) in the 2-port memory.	Y	Y
B38Ah	Station information specification (number of remote I/O stations > 64)	The number of remote I/O stations was set to a value of 65 or more with the station information parameter.	Set the number of remote I/O stations to a value of 64 or less.	Y	N
B38Bh	Station information specification (number of remote device stations > 42)	The number of remote device stations was set to a value of 43 or more with the station information parameter (addresses 220h to 25Fh).	Set the number of remote device stations to a value of 42 or less.	Y	N
B38Ch	Station information specification (number of intelligent device stations > 26)	The number of intelligent device stations (including local stations) was set to a value of 27 or more with the station information parameter.	Set the number of intelligent device stations to a value of 26 or less.	Y	N
B38Dh	Invalid station specification (other than head station)	The station number set with the invalid station specification parameter was "other than the module's head station number" or "a station number not specified in the parameter". <Example of other than head station number> A bit other than that for station number 5 was ON for a module occupying four stations (station numbers 5 to 8).	Set the head station number of the module. Do not specify any station not specified with the parameter.	Y	N
B38Eh	Buffer assignment specification (transfer data size > 4k words)	The total size of the transfer buffers in the station information parameter exceeded 4k words.	Set the total size of the transfer buffers to less than 4k words.	Y	Y
B38Fh	Buffer assignment specification (unused area)	Writing was performed to a use prohibited (unused) area of the 2-port memory.	Do not write to the use prohibited (unused) area of the 2-port memory.	Y	Y
B390h	Standby master station specification (station number error)	The standby master station specification parameter was set to a value outside the range of 0 to 64.	Specify the standby master station number to a value within the range of 0 to 64.	Y	Y
B391h	Retry count (other than 1 to 7)	The retry count parameter was set to a value outside the range of 1 to 7.	Set a value within the range of 1 to 7.	Y	N
B392h	Specification in the event of a driver error (other than 0 and 1)	The parameter specifying the operation in the event of a driver error was set to a value other than 0 and 1.	Set 0 or 1.	Y	N
B394h	Invalid number of automatic return stations (parameter)	The "number of automatic return stations" parameter was set to a value outside the range of 1 to 10.	Set a value within the range of 1 to 10.	Y	N
B396h	Duplicate station number error (parameter)	A duplicate station number was specified with the station information parameter.	Set parameters correctly so that no station numbers are duplicated.	Y	N
B397h	Station information setting error (parameter)	The station information parameter setting does not meet the following condition: $(16 \times A) + (54 \times B) + (88 \times C) \leq 2304$ A: Number of remote I/O stations B: Number of remote device stations C: Number of intelligent device stations (including local stations)	Set the parameter so that it meets the condition shown on the left.	Y	N

3. Error Codes

Error Code	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station
B398h	Invalid number of occupied stations (parameter)	The number of occupied stations in the station information parameter (addresses 0220h to 025Fh) was set to a value outside the range of 1 to 4.	Set a value within the range from 1 to 4.	Y	N
B399h	Invalid number of connected modules (parameter)	The "number of connected modules" parameter was set to a value outside the range of 1 to 64.	Set a value within the range of 1 to 64.	Y	N
B39Ah	Standby master station specification (different from host station number)	The "standby master station number" set to the master station is different from the actual station number of the standby master station, or it is a local station number.	Change the parameter setting of the master station, or change the station number setting of the local/standby master station, and then reset the system.	N	Y
B39Bh	All stations reserved setting	All stations were set as reserved stations.	Check the reserved station settings.	Y	N
B39Ch	Station type when standby master station is specified Ver. 1 mode: Other than 2 and 3 Ver. 2 mode: Other than 6, 9, C and F	Any other than "intelligent device station" is set in the station type in the device station setting of the station set as the standby master station. Or, the mode of the master station is different from the one set in the standby master station specification.	Specify the standby master station as an intelligent device station.	Y	N
B39Dh	0-point reserved station setting illegal	0-point reserved station setting has been made for a station not specified as a reserved station, or the setting has been made in Ver. 1 mode.	Set the 0-point station as a reserved station.	Y	N
B39Eh	8-/16-point setting illegal	A setting of 8-point I/O station or 16-point I/O station has been made for a station other than the remote I/O station.	Configure an 8-point/16-point setting for the remote I/O station.	Y	N
B3A0h	Mode illegal (master/local stations)	A model illegal error has occurred between the master and the local or standby master station. • The mode differs between the master and standby master stations. • The local station is in the Ver. 2/additional mode while the master station is in the Ver. 1 mode.	After setting the master station parameter or local or standby master station parameter again, reset the system.	N	Y
B3A3h	Assignment error	The assignment of RX, RY, RWw or RWr exceeds the maximum number of points, or the total number of RX/RY points in the station information parameter exceeds 8192 in Ver. 2 mode.	Change the station information, decreasing the numbers of RX, RY, RWw and RWr points.	Y	N
B3A4h	Parameter mismatch	A mismatch occurred between the master station parameter and standby master station parameter when using the master station duplex function.	Return the master station parameter to the original value.	Y	N
B3A5h	Mode illegal (parameter)	The mode (Ver. 2 or Ver. 1) set with the hardware switch differs from the mode (Ver. 2 or Ver. 1) set in the parameter.	Check the hardware switch and parameter setting.	Y	N
B601h	Command type setting error	A nonexistent command type was set.	Set a correct command type.	Y	Y
B602h	Send buffer acquisition failed	The send buffer could not be obtained.	Wait a while and then transmit. (Transient operation overload status)	Y	Y
B603h	Send buffer acquisition failed	The send buffer could not be obtained.	Wait a while and then transmit. (Transient operation overload status)	Y	Y
B605h	Unable to access transient buffer	The transient buffer could not be obtained.	Wait a while and then retransmit.	Y	Y
B701h	Transient request overload error	There are too many transient requests to the station.	Wait a while and then retransmit.	Y	Y
B771h	Transient request overload error	There are too many transient requests to the station.	Wait a while and then retransmit. (Transient operation overload status)	Y	Y
B772h	Send buffer awaiting data exceeded maximum	The number of data awaiting transient send buffer acquisition exceeded the maximum.	Wait a while and then retransmit. (Transient operation overload status)	Y	Y
B773h	Receive buffer awaiting data exceeded maximum	The number of data awaiting transient receive buffer acquisition exceeded the maximum.	Wait a while and then retransmit. (Transient operation overload status)	Y	Y

Error Code	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station
B774h	Target station not intelligent device	The target station is not an intelligent device station.	Check if the target station is an intelligent device station.	Y	Y
B778h	Response timeout	No response was received from the requested station.	Check the requested module and cables.	Y	Y
B802h	Access code error	A nonexistent access code was used.	Use a correct access code.	Y	Y
B803h	Data points error	The number of data points is out of range.	Set the number of data points to a value within the range of 1 to 960 bytes.	Y	Y
B804h	Attribute definition error Transient transmission unsupported station specification error	The attribute definition is invalid. Or, transient transmission was performed even though the target station does not support transient transmission.	Review the attribute definition. Check the specification of the target station number.	Y	Y
B805h	Data amount error	The data amount is out of range.	Set it to a value within the range of 1 to 100 for writing, and within the range of 1 to 160 for reading.	Y	Y
B807h	Address definition error	The address number is not a multiple of 16 when accessing a bit device.	Set a multiple of 16 to the address number when accessing the bit device.	Y	Y
B80Ah	Data length error	The data length is abnormal.	Check the data length.	Y	Y
B80Dh	(Addresses and points) range error	The specified combination (addresses and points) exceeded the valid processing range.	Make the setting so that the number of processing points does not exceed the device range.	Y	Y
B812h	Total number of points exceeded 960 bytes at time of transient transmission	The total number of points exceeded 960 bytes at the time of transient transmission.	Set 960 bytes or less to the number of points.	Y	Y
B823h	Remote control mode error	The mode specification for the remote control is incorrect.	Check the mode specification.	Y	Y
B903h	No parameter	A transient request was issued to a station for which no transfer buffer area is ensured.	Ensure a transfer buffer area with a parameter.	Y	Y
B904h	Buffer size error	When the dedicated instruction is executed, the transfer buffer size setting of the station is outside the setting range.	Set the transfer buffer size of the station within the setting range.	Y	Y
B9FEh	Parameter sumcheck error	The sumcheck value of the parameter setting area is abnormal.	Check the sumcheck value.	Y	N
B9FFh	Software handshake error	An alive check error is detected in handshake processing with the driver.	Replace the board.	Y	Y
BA01h	Sumcheck code error	The ROM sumcheck value is wrong (hardware error).	Replace the device.	Y	Y
BA02h	Network parameter error	Parameter error	Set the correct parameter.	Y	Y
BA03h	2-port memory error code	2-port memory reading and writing cannot be carried out successfully (hardware error).	Replace the board.	Y	Y
BA04h	Work RAM error code	Work RAM reading and writing cannot be carried out successfully (hardware error).	Replace the board.	Y	Y
BA07h	Self loopback reception data comparison error	Self loopback communication was not successfully performed (hardware error).	Replace the board.	Y	Y
BA08h	Transmission line error	Transmission line error	Check the line.	Y	Y
BA0Ah	Refresh frame reception interval error 1	Refresh frame reception interval error 1	Check the line.	Y	Y
BA0Bh	Refresh frame reception interval error 2	Refresh frame reception interval error 2	Check the line.	Y	Y
BA0Ch	Carrier detection continuous "H" error	Carrier detection continuous "H" error	Replace the board.	Y	Y
BA0Dh	Transmission table access error	Transmission table access error	Replace the board.	Y	Y
BA0Eh	Switch change with power on alarm	Alarm notifying of switch change with the power on	Do not change the switches while the power is on.	Y	Y
BA0Fh	Continuous transmission time error	Continuous transmission time error	Check the line.	Y	Y
BA10h	Send buffer access error	Send buffer access error	Replace the board.	Y	Y
BA11h	Polling status bit	Polling status bit	Check the line.	Y	Y
BA12h	CRC error status flag error	CRC error status flag error	Check the line.	Y	Y

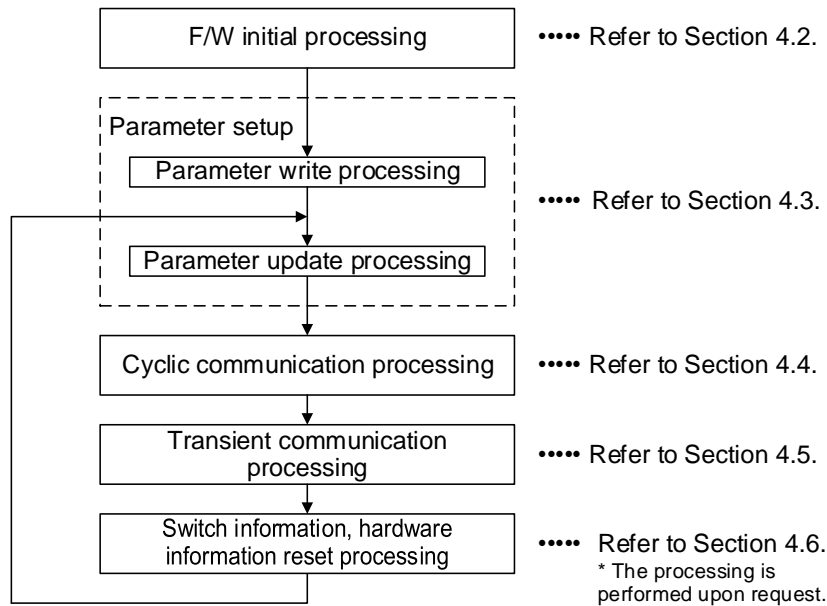
3. Error Codes

Error Code	Error	Error Cause (Details)	Corrective Action	Detectability	
				Master Station	Local Station
BA13h	Abort error status flag error	Abort error status flag error	Check the line.	Y	Y
BA14h	Timeout error status flag error	Timeout error status flag error	Check the line.	Y	Y
BA15h	Buffer exceeded status flag error	Buffer exceeded status flag error	Replace the board.	Y	Y
BA16h	Receive frame address error status flag error	Receive frame address error status flag error	Replace the board.	Y	Y
BA17h	Retry status flag error	Retry status flag error	Line faulty	Y	Y
BA1Ch	Station number duplication	The station number included in occupied stations already exists.	Check the occupied stations and station number.	Y	N
BA1Dh	Maximum number of stations exceeded	The value of the station number + occupied stations exceeds 64.	Check the occupied stations and station number.	Y	N
BBC1h	Mode number switch error	The mode switch setting is outside the setting range.	Check the mode.	Y	Y
BBC2h	Station number setting error	The station number setting switch setting of the module is outside the range of 0 to 64. Or, the last station number is greater than 64.	Check the station number and the number of occupied stations of the module.	Y	Y
BBC3h	Baud rate switch error	The baud rate is set to other than 0 to 4.	Set the baud rate within the range of 0 to 4.	Y	Y
BBC5h	Master station duplication error	The master station already exists. Alternatively, line noise was detected at power on.	Reduce the number of master stations on the same line to one. Or, check the line status.	Y	N
BBC9h	Sumcheck error	The sumcheck value is illegal.	Set the sumcheck value to the correct value.	Y	Y
BD85h	Hardware error detected	A hardware error was detected.	The hardware may be faulty.	Y	Y
BD86h	CPU error detected	A CPU error detection interrupt was detected, but the operation information is normal.	Replace the module.	Y	Y
BD87h	CPU error detected	A WDT error occurred for NMI.	Replace the board.	Y	Y
BF01h	Send buffer storage location error	Data was set in a send buffer not assigned by the value set for DA.	Check the transfer buffer assignments and DA value.	Y	N
BF02h	Transfer buffer size error	The transfer buffer size was not enough to store the header information.	Check the transfer buffer size.	Y	Y
BF03h	Data size exceeded	The amount of transferred data exceeded the communication buffer size.	Check the transfer buffer size.	Y	Y
BF04h	Transient transmission target station error	Transient transmission was conducted with a station for which no setting was made or a station that is not an intelligent device station.	Check the parameter setting.	Y	N
BF10h	Response transmission failed	There is no reception data, or no response waiting.	Transmit the response after receiving a request. Check the value of SW000A.	Y	Y

4 Driver Processing Procedure Processing Procedure

4.1 Processing Procedure

To run the host as a master station or local station, the following processing must be implemented on the driver. The processing procedure is described below.



4.1.1 Board and Driver Information Exchange

The board and driver notify one another that it is necessary to exchange information using (1) interrupt processing and (2) a handshake. This type of processing is used in "parameter setup" and "transient communication processing".

4.1.2 Interrupt Processing Procedure

In parameter setup and transient communication processing, the board notifies the driver of an interrupt when there is an interrupt request.

The driver receives the interrupt notice and assesses the interrupt cause using the I/O port and 2-port memory.

(1) I/O port interrupt cause assessment

When there is an interrupt from the board, the host assesses the cause of the interrupt at the I/O port.

Refer to the 08h host ← board interrupt area of the I/O port (SPI/04).

When the host reads the 08h host ← board interrupt area of the I/O port (SPI/04), "1" will be entered in bit 2 if a cause exists.

(2) 2-port memory interrupt cause assessment

If an interrupt cause exists at the I/O port, the interrupt cause is assessed at 2-port memory.

Refer to the host ← board interrupt cause (board request) (word address: 30h) and the host ← board interrupt cause (host processing completed) (word address: 40h) of 2-port memory.

If the word addresses (30h and 40h) of 2-port memory are read and the bits are found to be different upon comparison, a host ← board interrupt cause exists.

If bit 15 is different, a parameter setup interrupt exists.

If one of the bits 4 to 7 is different, a transient communication request transmission processing interrupt exists.

If one of the bits 0 to 3 is different, a transient communication response reception processing interrupt exists.

4.1.3 Driver and Board Handshake Procedure

The driver and board handshake processing performed when an interrupt cause exists uses the word addresses (30h to 60h) of 2-port memory.

The following describes the content of the word addresses (30h to 60h) of 2-port memory.

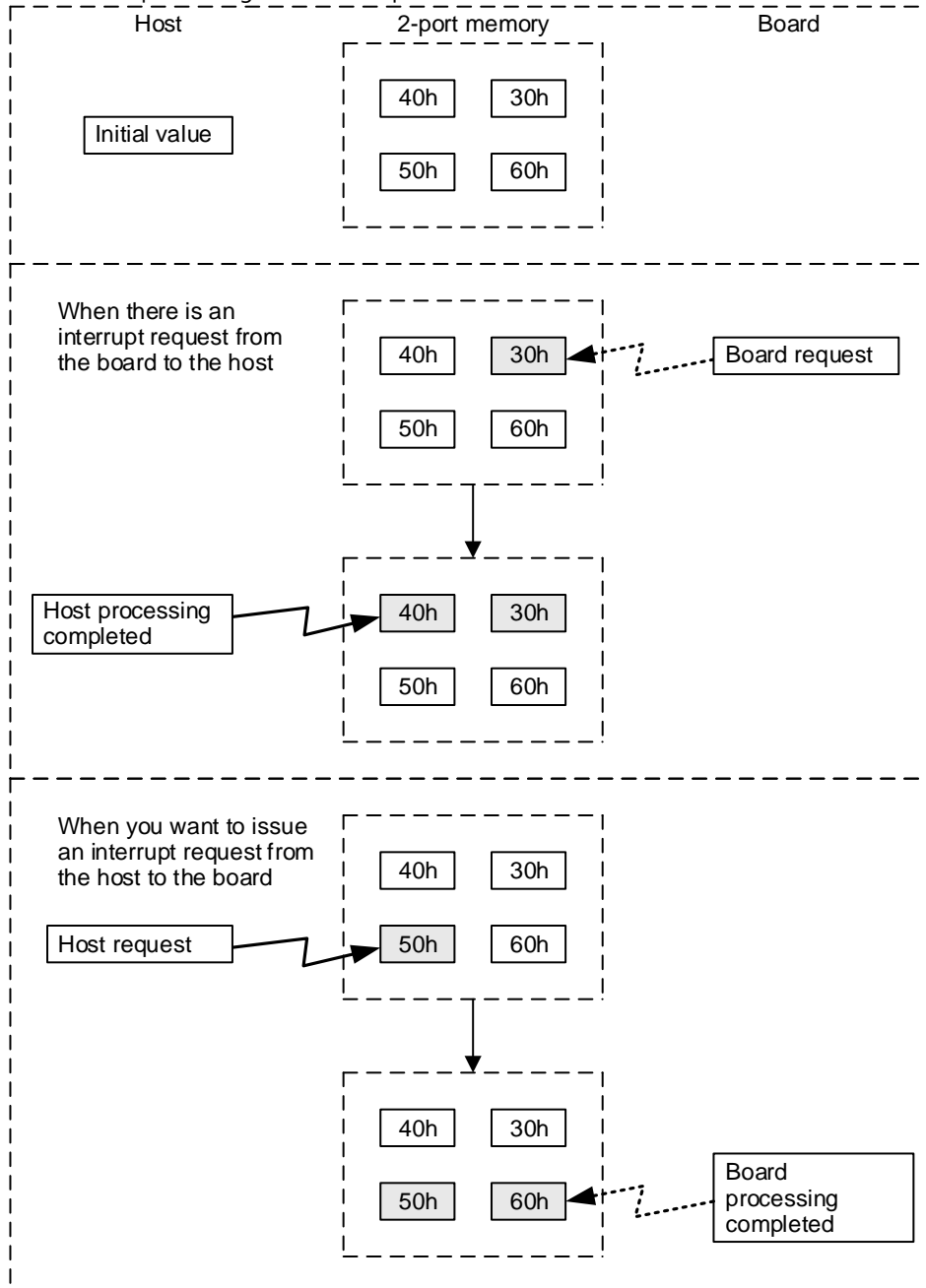
30h: Host ← Board interrupt cause (board request)

40h: Host ← Board interrupt cause (host processing completed)

50h: Host → Board interrupt cause (host request)

60h: Host → Board interrupt cause (board processing completed)

Driver and board handshake processing when interrupt cause exists



When a host ← board interrupt cause exists

When a host ← board interrupt cause exists, the host ← board interrupt cause (word address: 30h and 40h) are used.

When an interrupt cause exists, the bits of word addresses (30h and 40h) will be different. In this case, invert the different bit to indicate that processing is completed.

When you want to set the host → board interrupt cause status to "exists"

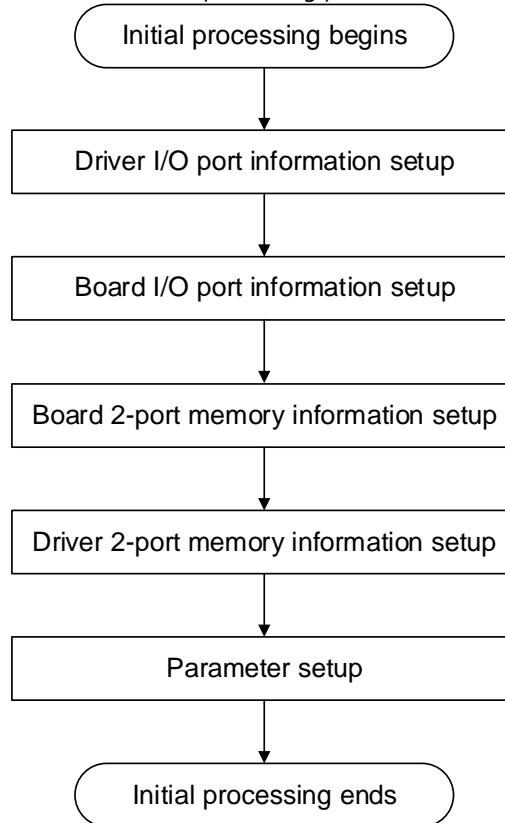
Use the host → board interrupt cause (word address: 50h and 60h). To set the interrupt cause status to "exists", invert the bit of 50h (word address) and issue a processing request.

4.2 F/W Initial Processing

The firmware of the board begins initial processing when the host power is turned on. During initial processing, write the settings that are required for operation as a CC-Link master or local station.

4.2.1 F/W Initial Processing Overview

F/W initial processing sets the I/O port information, 2-port memory information and parameter settings, in that order. The following shows the general flow of the F/W initial processing procedure.



For details, refer to Section 4.2.2 "F/W Initial Processing Details".

4.2.2 F/W Initial Processing Details

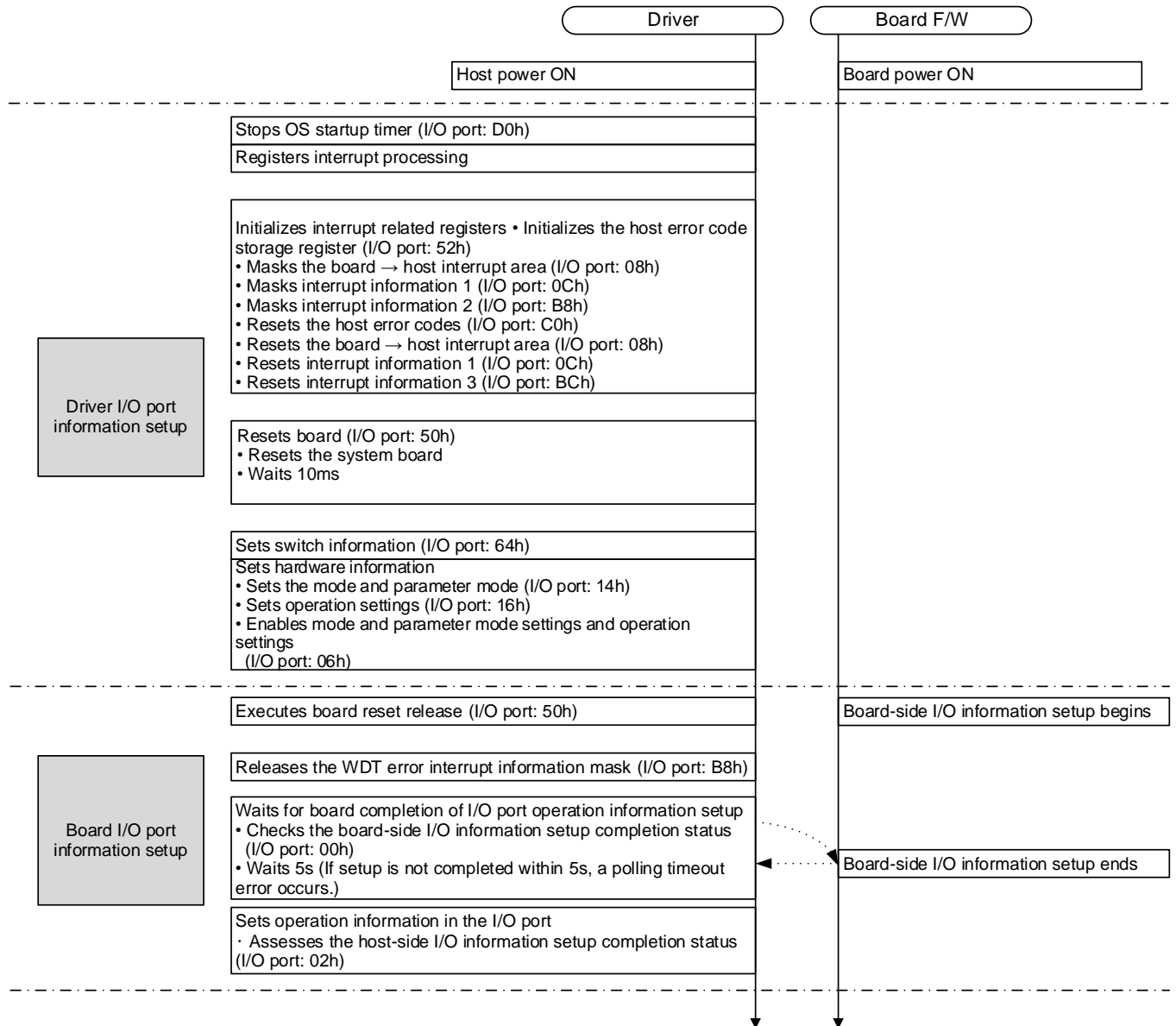
The following describes the details of the F/W initial procedure.

For details on the 2-port memory, refer to Section 2.2.3 "Details of areas in the 2-port memory area (System area)".

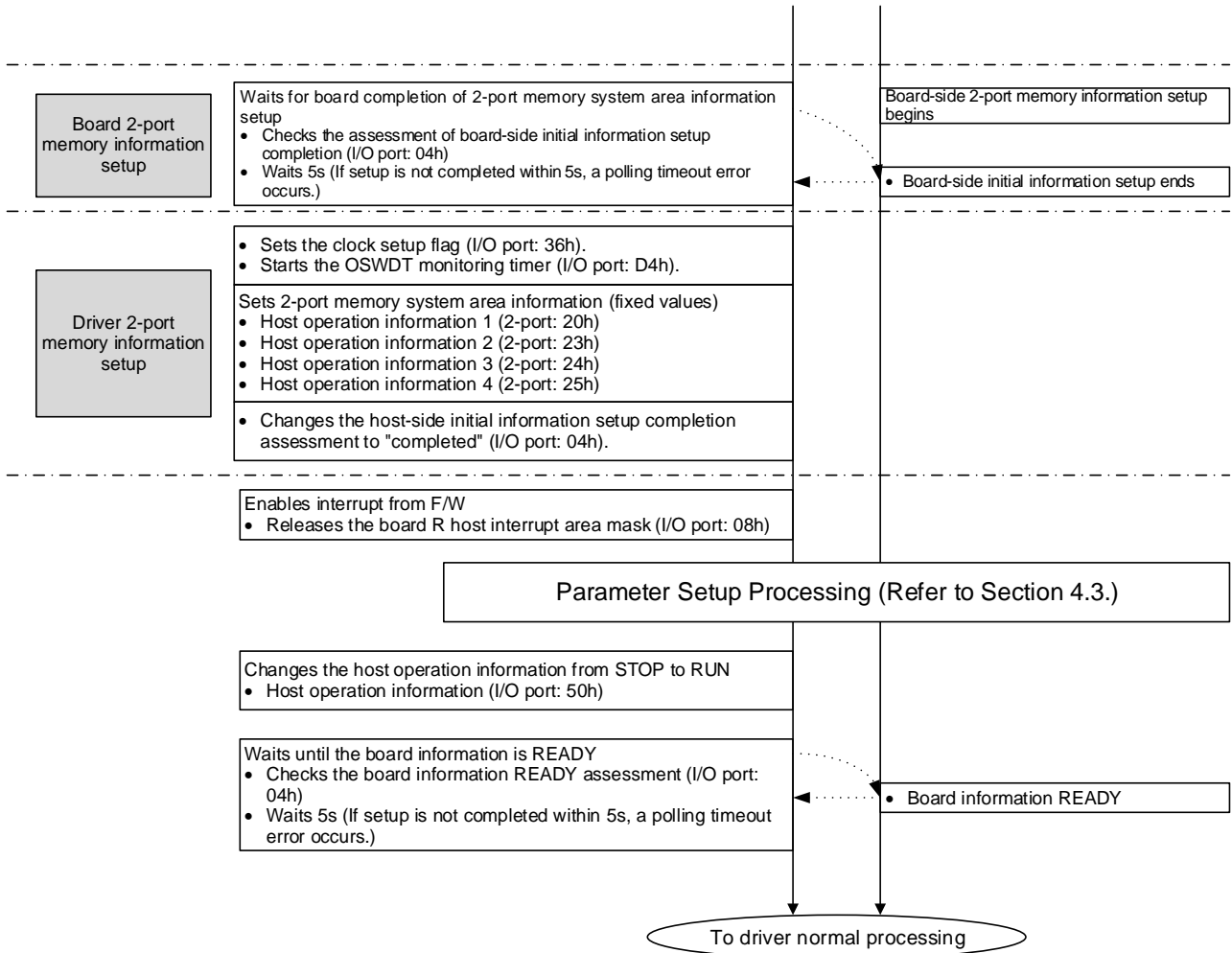
For details on the I/O port, refer to Section 2.3.3 "I/O Port Area Details".

Once the I/O port and 2-port memory information is set, interrupts from board F/W are enabled. This enables parameter setup.

For details on the parameter setup, refer to Section 4.3 "Parameter Setup".



Continued on next page

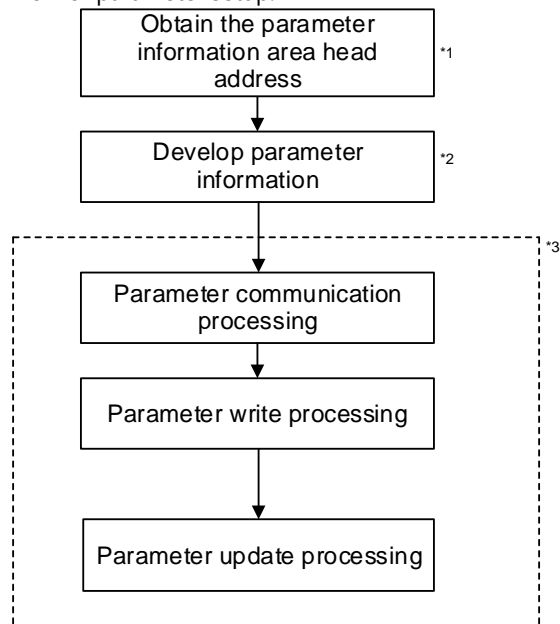


4.3 Parameter Setup

Parameter setup sets CC-Link network settings.

4.3.1 Parameter Setup Overview

The following shows the general flow of parameter setup.



*1: Obtain the offset address +08h described in Section 2.2.3(1)Parameter Replacement Area.

*2: Refer to Section 4.3.2 "Parameter Information".

*3: Refer to Section 4.3.3 "Parameter Setup Procedure".

4.3.2 Parameter Information

In order to set parameters, parameters must first be developed. The content of the parameters developed differ depending on whether network parameters exist in the master station and local station. The following shows the parameter content to be developed for the master station and local station.

- (1) Parameter List
 - (a) Master Station

The following shows the parameter information for the master station.

Item	Item
Parameter name	Reserved
Total number of bytes	Total No. of connected module
Reserved	Mode
Fixed value	No. of retries
System setup time	No. of automatic return modules
Start block	Standby master station specification
Fixed value 1	Reserved
Fixed value 2	CPU down specification
Fixed value 3	Fixed value
Fixed value 4	Delay time setting
Network parameters	Fixed value
End block	Reserved
	Reserved station specification
	Invalid station specification
	Reserved
	Station 1 information
	Station 2 information
	Station 64 information
	Module 1 send buffer size
	Module 1 receive buffer size
	Reserved
	Module 2 send buffer size
	Module 2 receive buffer size
	Reserved
	Module 26 send buffer size
	Module 26 receive buffer size
	Reserved
	Reserved
	8-point I/O station specification (CC-Link Ver.2 only)
	16-point I/O station specification (CC-Link Ver.2 only)
	Reserved station 0-point specification (CC-Link Ver.2 only)

(b) Local Station

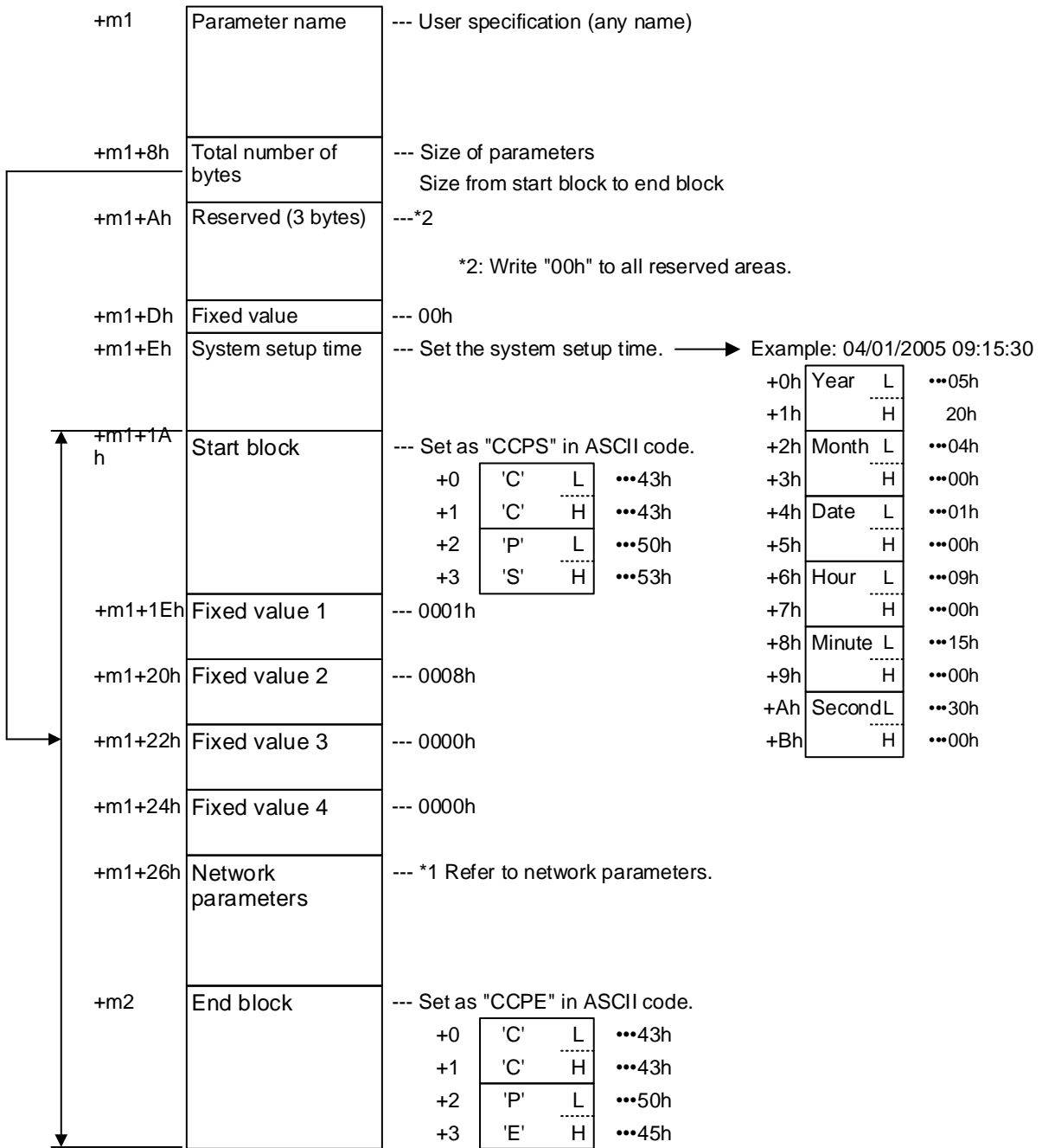
The following shows the parameter information for the local station.

Item
Parameter name
Total number of bytes
Reserved
Fixed value
System setup time
Start block
Fixed value 1
Fixed value 2
Fixed value 3
Fixed value 4
End block

(2) Parameter Details
 (a) Master Station

The following shows the parameter information details for the master station.

The "+m1" address is the parameter information head address of the offset address +08h. (Refer to Section 2.2.3(1)Parameter Replacement Area.)



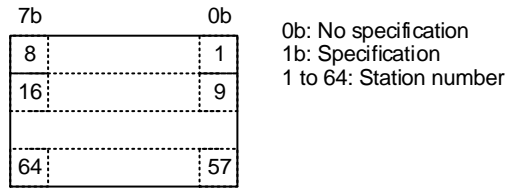
*1. Network Parameters

+m	Reserved	
+m+2h	Total No. of connected module	--01h to 40h ^{*1}
+m+3h	Mode	-- ^{*2}
+m+4h	No. of retries	--0001h to 0007h
+m+6h	No. of automatic return modules	--0001h to 000Ah
+m+8h	Standby master station specification	--0000h: No specification 0001h to 0040h: Standby station number
+m+Ah	Reserved	
+m+Ch	CPU down specification	--0000h: Stop 0001h: Continue
+m+Eh	Fixed value	--0000h
+m+10h	Delay time setting	--Fixed to 0000h
+m+12h	Fixed value	--0001h
+m+14h	Reserved (12 bytes)	-- ^{*5}
+m+20h	Reserved station specification	-- ^{*3}
+m+28h	Invalid station specification	-- ^{*3}
+m+30h	Reserved (16 bytes)	-- ^{*5}
+m+40h	Station 1 information	-- ^{*4}
+m+42h	Station 2 information	-- ^{*4}
+m+BEh	Station 64 information	-- ^{*4}
+m+C0h	Reserved (64 bytes)	-- ^{*5}
+m+100h		

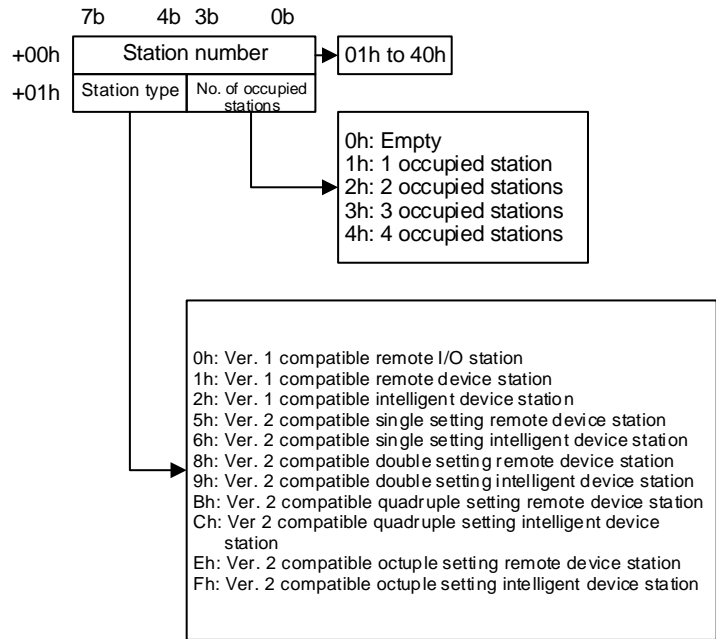
*1: The number set in the station information specification. Standby stations are included. (1 to 64 modules) (Empty areas are also included in the set number.)

*2: 00h: CC-Link Ver. 1 mode
01h: Additional mode
02h: CC-Link Ver. 2 mode

*3: Station specification
Set the bit of the corresponding station number to 1b.



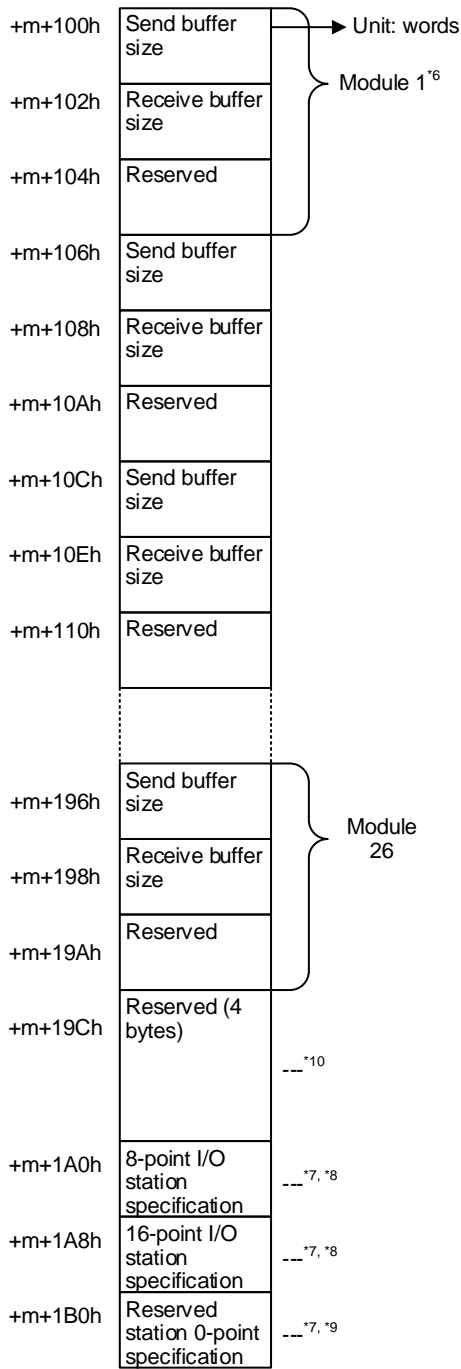
*4: Station information



*5: Set all reserved areas to 0.

(Continued on next page)

(Continued from previous page)



*6: Send/receive buffer size

The total of [(Send buffer size + Receive buffer size) × No. of modules] should not exceed 4K words.

*7: Station specification

Set the bit of the corresponding station number to 1b.

7b	0b
8	1
16	9
64	57

0b: No specification
1b: Specification
1 to 64: Station number

*8: I/O station specification (CC-Link Ver. 2 only)

With an 8-point + 8-point empty setting, set the bits of the corresponding station number of the 8-point I/O specification and 16-point I/O specification to 1b.

When CC-Link Ver.1 is used, do not set the value other than 0b.

*9: Reserved station specification (CC-Link Ver. 2 only)

If the reserved station 0-point specification is set to "Specification" and yet there is no reserved station specification, a parameter error will occur.

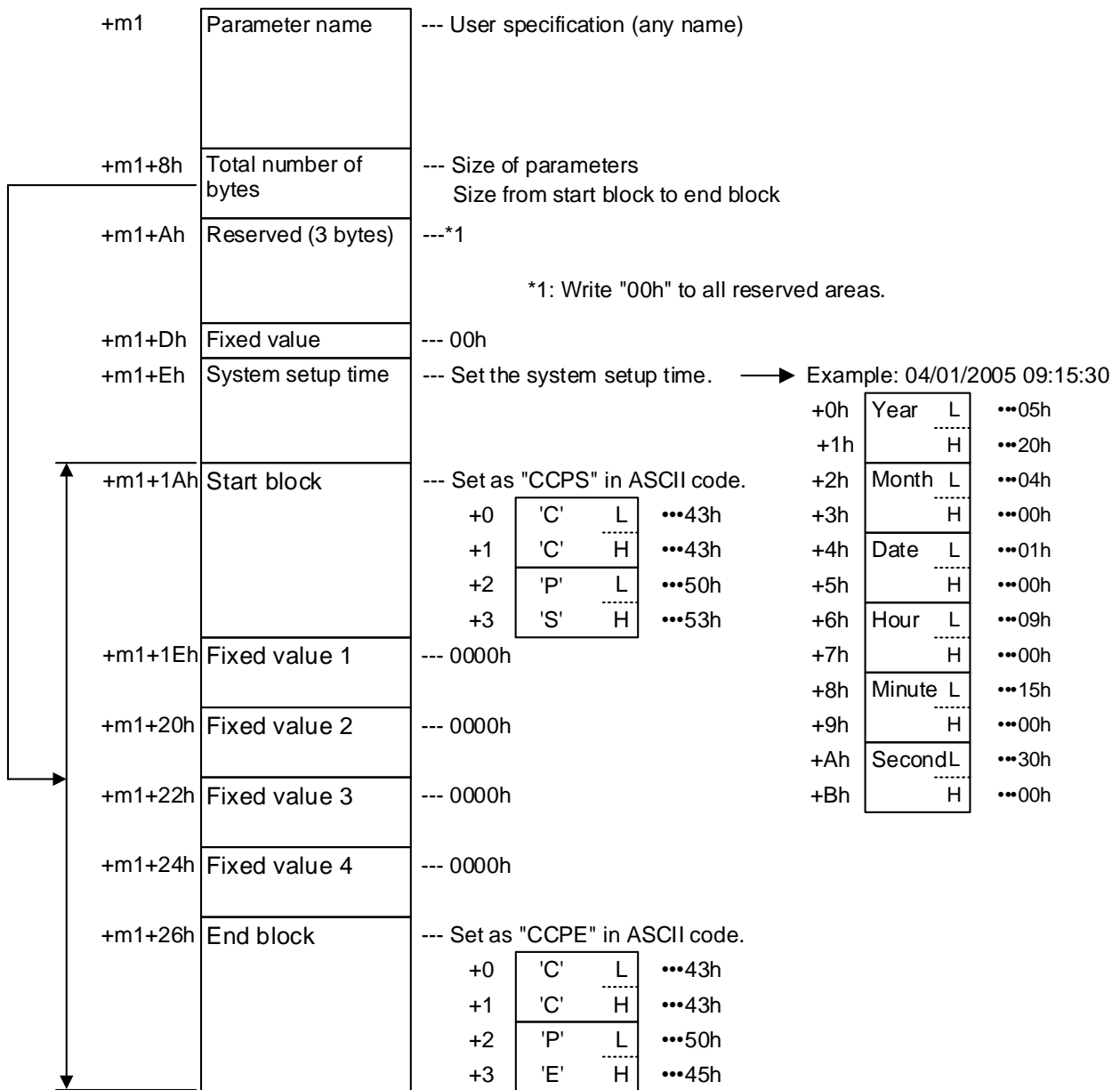
When CC-Link Ver.1 is used, do not set the value other than 0b.

*10: Set all reserved areas to 0.

(b) Local Station

The following shows the parameter information details for the local station.

The "+m1" address is the parameter information head address of the offset address +08h. (Refer to Section 2.2.3(1)Parameter Replacement Area.)



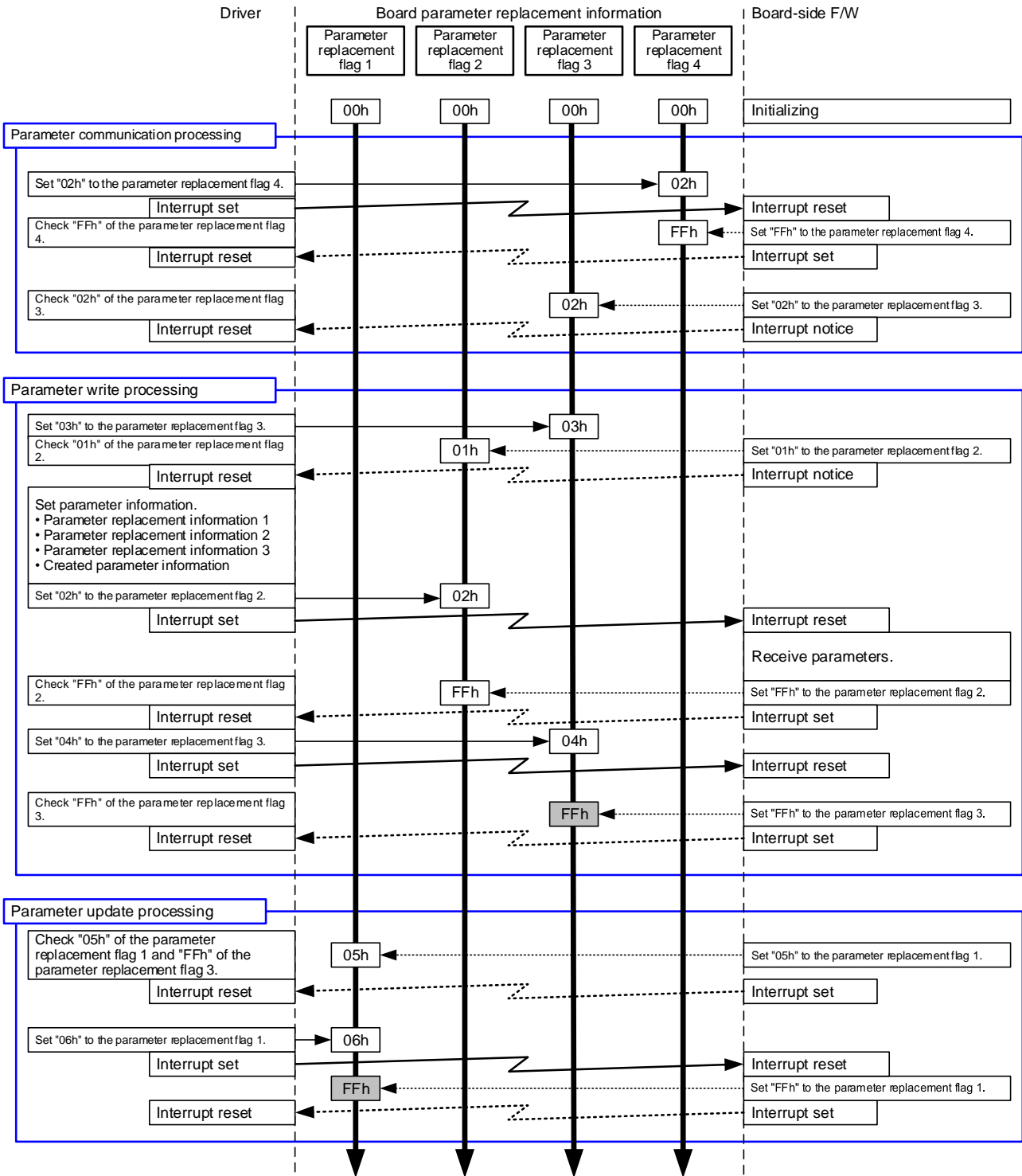
4.3.3 Parameter Setup Procedure

Parameters are set by handshake processing performed between the driver and board using parameter replacement flags 1 to 4. Parameter replacement flags 1 to 4 contain the parameter replacement setting information of the 2-port memory area. Refer to Section 2.2.3(1)Parameter Replacement Area.

When the driver changes the parameter replacement flag, the driver sets an interrupt cause in order to notify the board of the change.

When the board changes the parameter replacement flag, the interrupt cause is set. The driver must therefore acknowledge that the parameter replacement flag has been changed and reset the interrupt cause.

The following shows the parameter setup handshake procedure.



*: When an error occurs as a result of board processing in a shaded parameter replacement flag area (■), "FEh" is set.

*: For details on interrupt set and interrupt reset, refer to the following.

(1) Interrupt Set

When the host changes the parameter replacement flag, the host must notify the board of the interrupt.

To do so, the parameter replacement host request flag (bit 15) of the 50h (word address) host → board interrupt cause (host request) in the 2-port memory is set to "Request" and the host → board interrupt cause 1 (bit 2) of the I/O port 0Ah host → board interrupt area (SPI/05) is set to "Cause set".

Procedure for host to set "Interrupt set"

[1] Compare bits 15 of 50h and 60h (word address) in 2-port memory and verify that there is no interrupt processing request.

If bits 15 of 50h and 60h are equivalent, there is no processing request.

[2] Invert bit 15 of 50h (word address) of 2-port memory.

Set the parameter communication host request flag to "Request" and set that a parameter interrupt exists.

[3] Set "1" in the bit 2 of I/O port 0Ah.

The host sets interrupt cause 1.

[4] The host notifies the board of the interrupt.

(2) Interrupt Reset

When the board changes the parameter replacement flag, an interrupt is set. The host must therefore reset the interrupt.

To do so, the parameter communication host processing complete flag (bit 15) of the 40h (word address) host ← board interrupt cause (host processing complete) of 2-port memory is set to "Processing completed" and the board → host interrupt cause 1 (bit 2) of the I/O port 08h board → host interrupt area (SPI/04) is set to "Cause reset".

Procedure for the host to set "Interrupt reset"

[1] Verify that "1" is set in bit 2 of I/O port 08h.

Verify that board → host interrupt cause 1 is set to "Cause".

[2] Compare bits 15 of 30h and 40h (word address) in 2-port memory and verify that an interrupt cause exists.

If bits 15 of 30h and 40h are not equivalent, a parameter processing request exists.

[3] Invert bit 15 of 40h (word address) of 2-port memory.

Set the parameter communication host processing completed flag to "Processing completed".

[4] Set "1" in bit 2 of I/O port 08h.

The host resets interrupt cause 1.

4.4 Cyclic Communication Processing Procedure

Cyclic communication processing is executed only by writing data in the RX, RY, RWw and RWr areas of the user area of 2-port memory. Cyclically send data to device stations by updating the RX, RY, RWw and RWr areas each refresh cycle using the host application.

4.4.1 Ver. 2 Mode Extended Cyclic Transmission

In Ver. 2 mode, the cyclic data capacity per station can be increased using extended cyclic transmission. The following table compares the Ver. 1 and Ver. 2 cyclic data amounts.

		Ver. 2	Ver. 1
Maximum number of link points (data amount)		RX/RY: 8192 points (bit) RWw/RWr: 2048 words each	RX/RY: 2048 points (bit) RWw/RWr: 256 words each
No. of link points per station	With 1 occupied station	RX/RY: 32 to 128 points (bit) RWw/RWr: 8 to 32 words each	RX/RY: 32 points (bit) RWw/RWr: 4 words each
	With 2 occupied stations	RX/RY: 96 to 384 points (bit) RWw/RWr: 16 to 64 words each	RX/RY: 64 points (bit) RWw/RWr: 8 words each
	With 3 occupied stations	RX/RY: 160 to 640 points (bit) RWw/RWr: 24 to 96 words each	RX/RY: 96 points (bit) RWw/RWr: 12 words each
	With 4 occupied stations	RX/RY: 224 to 896 points (bit) RWw/RWr: 32 to 128 words each	RX/RY: 128 points (bit) RWw/RWr: 16 words each
No. of occupied stations per module		1 to 4	1 to 4
Extended cyclic setting		Double, quadruple, octuple (single*1)	None

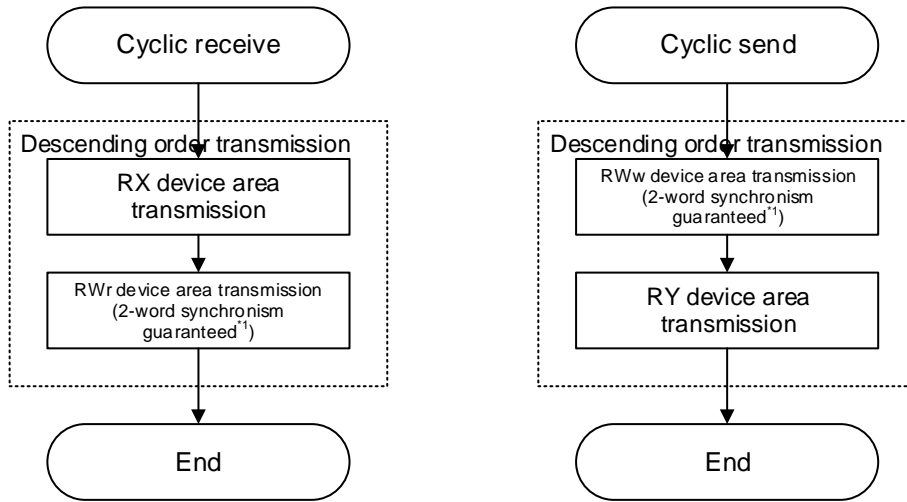
*1: The cyclic data capacity for a Ver. 2 single setting is the same as that for Ver. 1.

CC-Link Ver. 2 No. of Occupied Stations and Extended Cyclic Setting Relationship

No. of Occupied Stations	Extended Cyclic Setting		
	Double Setting	Quadruple Setting	Octuple Setting
1 occupied station	RX/RY: 32 points (bit) RWw/RWr: 8 words	RX/RY: 64 points (bit) RWw/RWr: 16 words	RX/RY: 128 points (bit) RWw/RWr: 32 words
2 occupied stations	RX/RY: 96 points (bit) RWw/RWr: 16 words	RX/RY: 192 points (bit) RWw/RWr: 32 words	RX/RY: 384 points (bit) RWw/RWr: 64 words
3 occupied stations	RX/RY: 160 points (bit) RWw/RWr: 24 words	RX/RY: 320 points (bit) RWw/RWr: 48 words	RX/RY: 640 points (bit) RWw/RWr: 96 words
4 occupied stations	RX/RY: 224 points (bit) RWw/RWr: 32 words	RX/RY: 448 points (bit) RWw/RWr: 64 words	RX/RY: 896 points (bit) RWw/RWr: 128 words

4.4.2 Cyclic Communication Procedure

Cyclic communication is performed on the driver side and board side asynchronously.



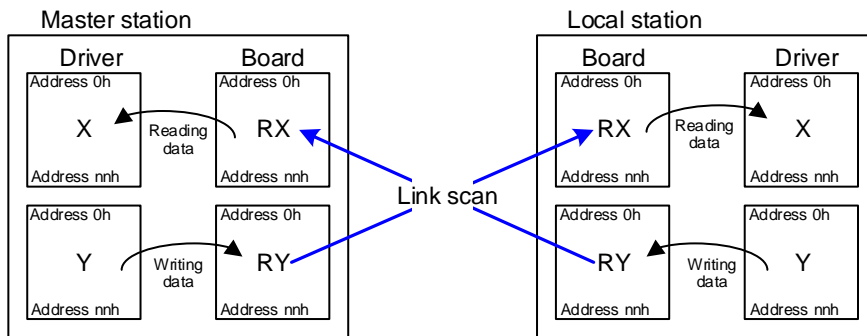
*1: "2-word synchronism guaranteed" means that the data of an even numbered address (n) and the data of the next address (n+1) are transmitted based on the same refresh timing.

If you want to guarantee synchronism of the data of 3 words or more, configure an interlock using RX/RX.

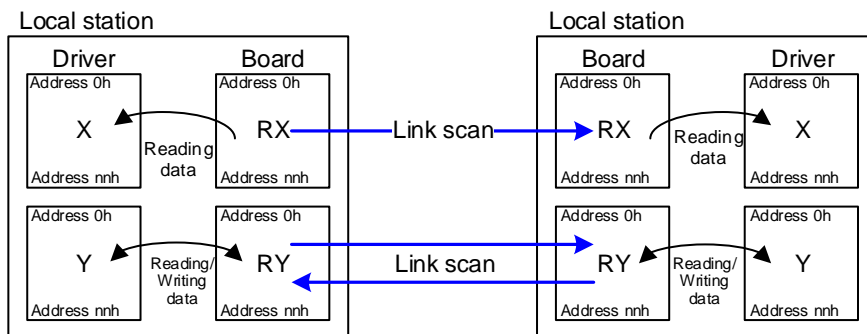
With cyclic communication, data is updated every link scan, as shown below.

When the data is updated, the data of the RX, RY, RWw and RWr areas is updated starting from the end of the address.

The following shows when the cyclic communication is performed from the master station to the local station.



The following shows when the cyclic communication is performed from the local station to another local station.



The driver reads/writes data from/to the RX, RY, RWw, and RWr areas of 2-port memory of the board at any timing.

4.5 Transient Communication Processing Procedure

4.5.1 Transient Communication Processing Overview

During transient communication, the host station and another station exchange data based on 1:1 communication. To perform transient communication, the driver writes the transient communication data to the send buffer, sends a request to the other station, and then reads the transient communication data received as a response in the receive buffer.

There are two types of transient communication:

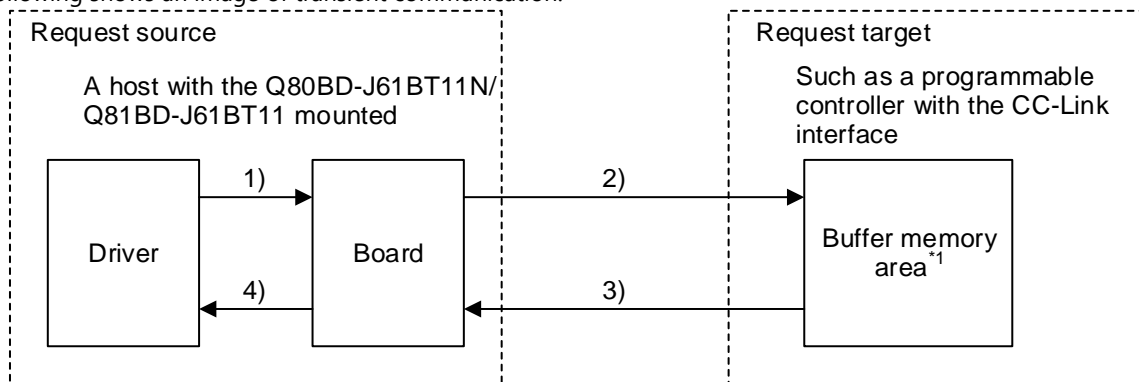
- (1) Communication in which all data is written to the buffer memory of the other station at once
- (2) Communication in which all data is read from the buffer memory of the other station at once

For each of the above two types of communication, the driver sends a request and receives a response.

When writing data to the buffer memory of the other station, set the data to be written at the time of request transmission. The results will be returned in a response.

When reading data from the buffer memory of the other station, set the type of data to be read at the time of request transmission. The data to be read will be stored in the response.

The following shows an image of transient communication.



*1: The content of the buffer memory area is the same as that of the user area of 2-port memory.

Procedure for writing to and reading from the buffer memory of the other station

[1] Check if an unused area exists in transient communication processing buffer areas 1 to 4.

If an unused area exists, set the transmission request in that area.

Set the host → board interrupt cause to "Cause". (An interrupt is set in the board.)

The driver sets the transmission data in the board.

[2] The board sends the data to the request destination.

[3] The board receives the reception data from the other station.

[4] The driver reads the reception data.

Set "Reception completed" in the used transient communication processing buffer area.

Set the host → board interrupt cause to "Cause". (An interrupt is set in the board.)

Point	
	When the host station receives the transient communication request from another station, the board F/W creates response data and communicates with another station. In this case, the driver does not require the response data create processing. However, the driver needs to update the interrupt cause and the transient control flag and notify the board F/W of the transient data receive completion according to Section 4.5.5 "Response Reception Procedure (Board → Driver Processing Procedure)".

4.5.2 Transmission and Reception Data Areas

The transmission and reception data are stored in the transient communication processing buffer area of the 2-port memory.

The buffer area contains four transmission and reception areas each. The area used is an empty area.

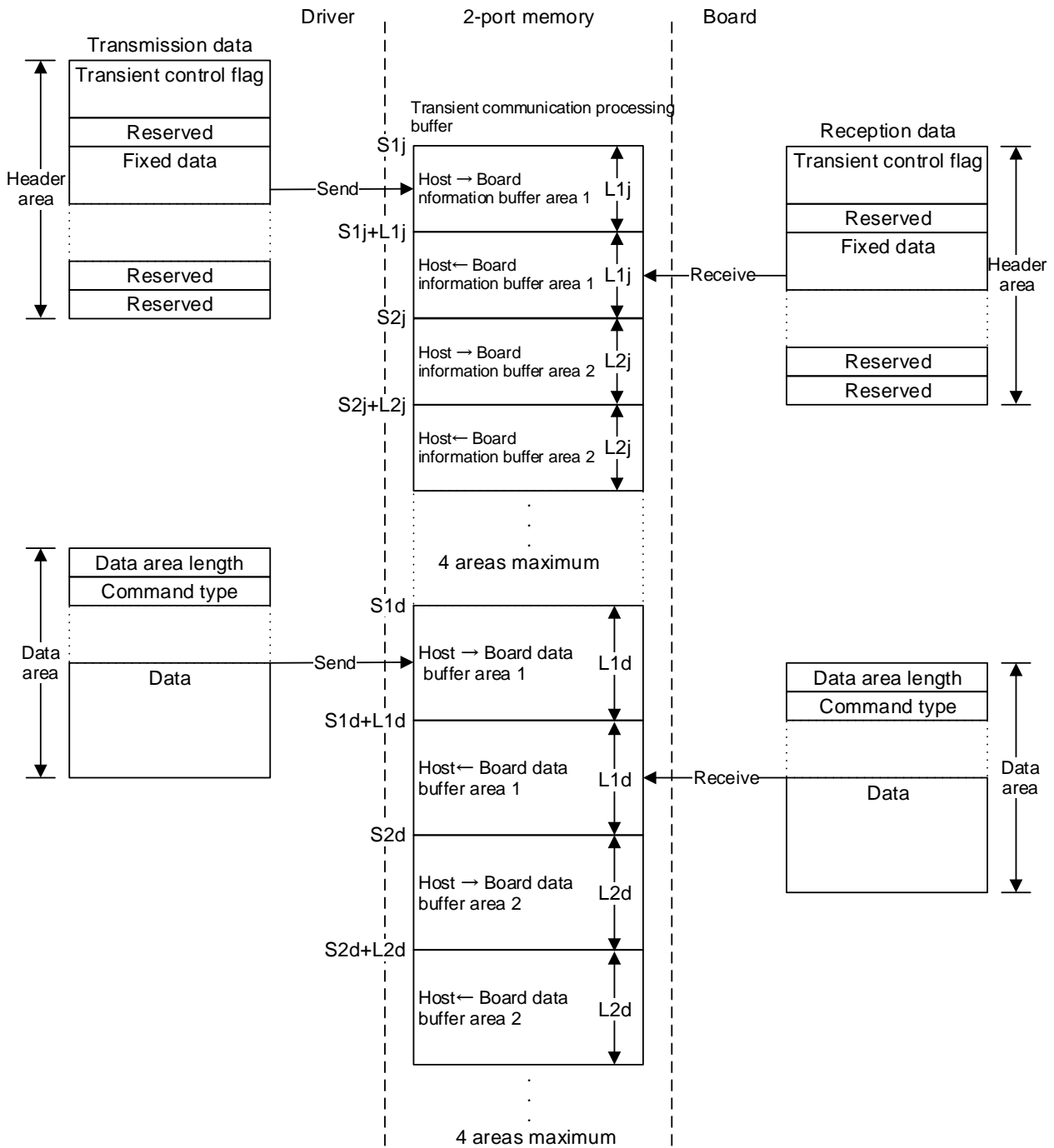


Figure 4.5.2-1 Request and Response Frames & Transient Communication Processing Buffer Areas

The following describes the content of the transient communication processing buffer areas of 2-port memory.

S1j: Host → Board information buffer area 1 head address

L1j: Host → Board information buffer area 1 size

S1j+L1j: Host ← Board information buffer area 1 head address

S1d: Host → Board data buffer area 1 head address

L1d: Host → Board data buffer area 1 size

S1d+L1d: Host ← Board data buffer area 1 head address

For address details, refer to Section 2.2.3(2) Transient Communication Processing Buffer Area.

4.5.3 Transient Communication Data

(1) Request Transmission Data

To write all data to the buffer memory of another station at once, set the command type to "12h: Other station buffer memory batch write".

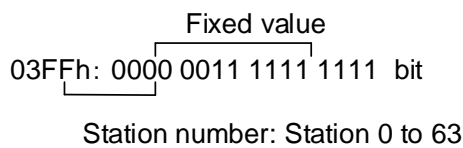
To read all data from the buffer memory of another station at once, set the command type to "10h: Other station buffer memory batch read".

Set the command type to "12h" to write the write data to "Data".

(a) Header area

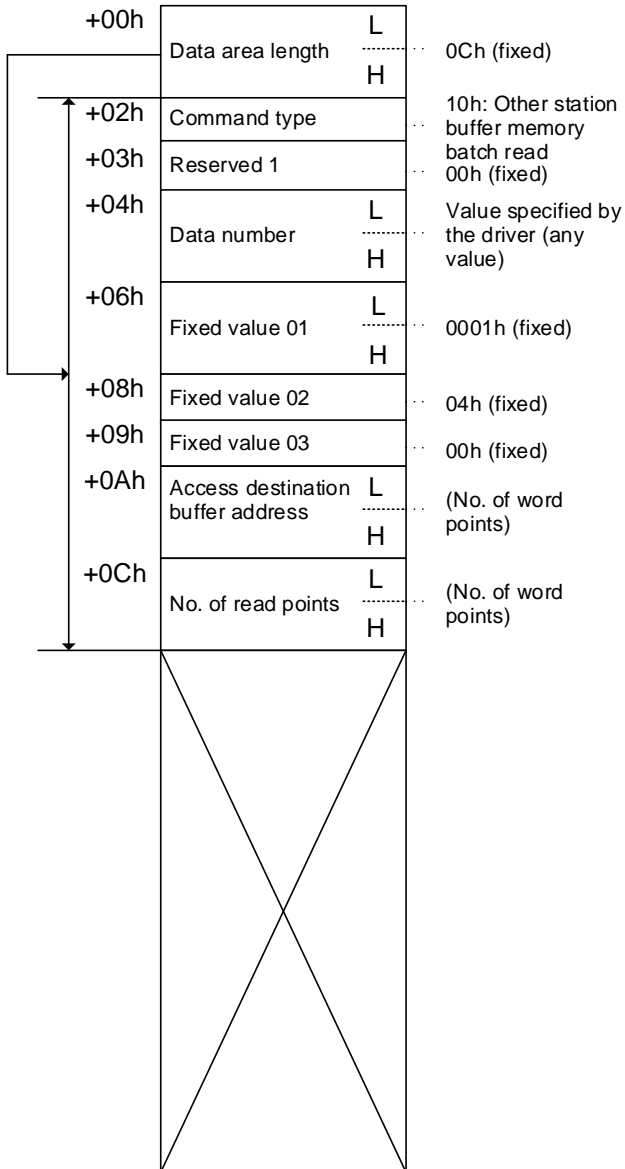
+00h	Transient control flag	00h to FFh ^{*1}	*1: 00h: No processing request 01h: Processing request 02h: Processing FEh: Abnormal completion FFh: Normal completion
+01h	Reserved 1	00h (fixed)	
+02h	Fixed value 01	0000h (fixed)	
		L	
		H	
+04h	Fixed value 02	F8h (fixed)	
+05h	Reserved 2	00h (fixed)	
+06h	Reserved 3	00h (fixed)	
+07h	Fixed value 03	00h (fixed)	
+08h	Fixed value 04	00h (fixed)	
+09h	Fixed value 05	00h (fixed)	
+0Ah	Fixed value 06	21h (fixed)	
+0Bh	Fixed value 07	21h (fixed)	
+0Ch	Fixed value 08	00h (fixed)	
+0Dh	Fixed value 09	02h (fixed)	
+0Eh	Fixed value 10	00h (fixed)	
+0Fh	Fixed value 11	FFh (Fixed)	
+10h	Station number	03FFh to FFFFh: Station 0 to 63 ^{*2}	
		L	
		H	
+12h	Fixed value 12	00h (fixed)	
+13h	Fixed value 13	00h (fixed)	
+14h	Fixed value 14	03FFh (fixed)	
		L	
		H	
+16h	Reserved 4	00h (fixed)	
+17h	Reserved 5	00h (fixed)	

*2: Setting method for the station number of request transmission data

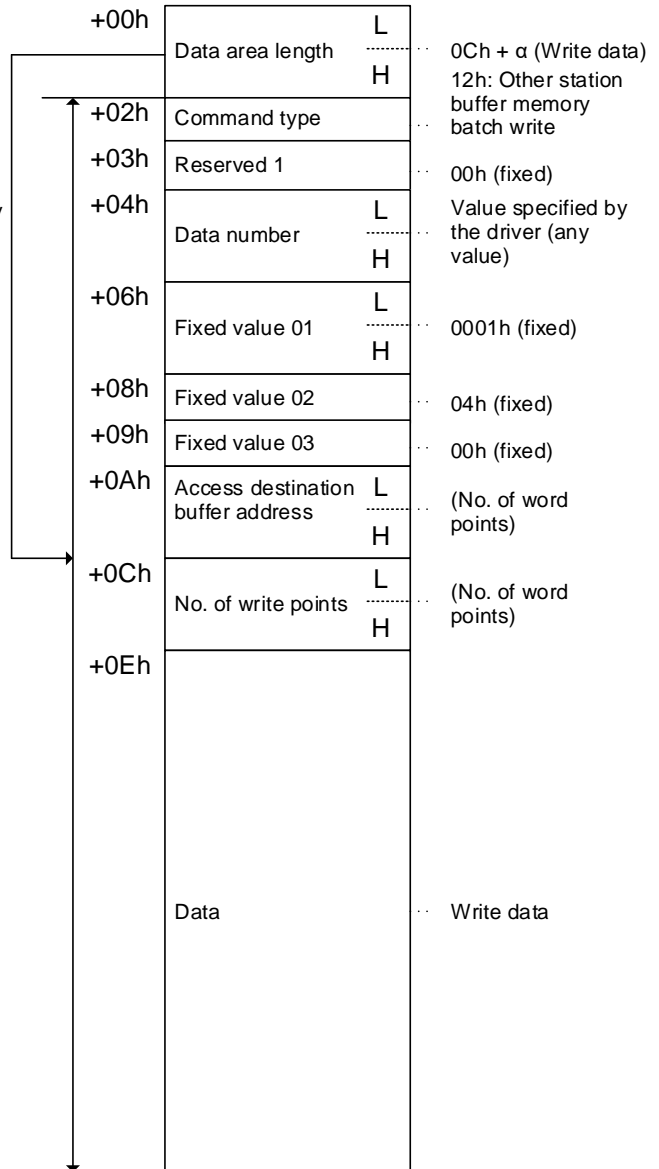


(b) Data Area

When the command type is set to "Other station buffer memory batch read"



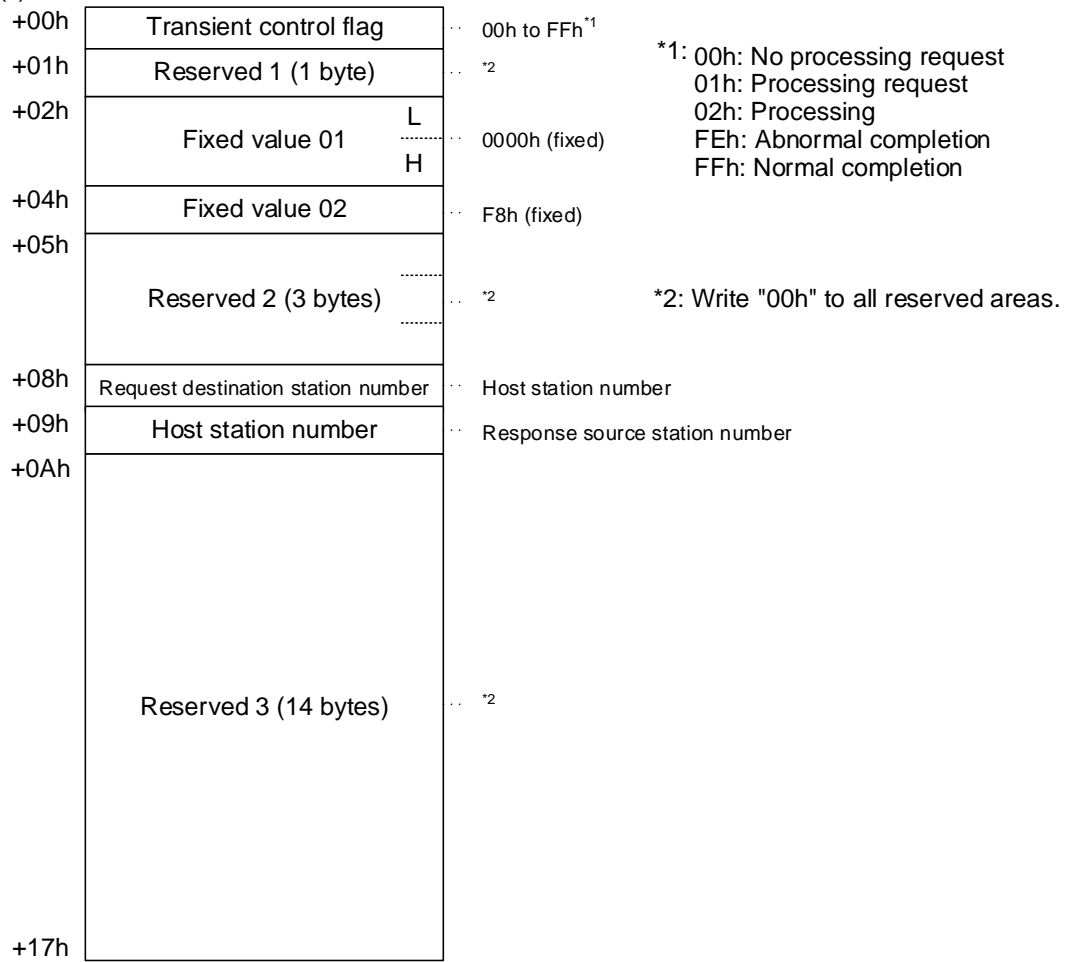
When the command type is set to "Other station buffer memory batch write"



(2) Response Reception Data

Set the command type of the request transmission data to "10h" when the other station buffer memory batch read processing is performed so that the command type of the response receive data is set to "90h" and the read data can be read from the "Data" area.

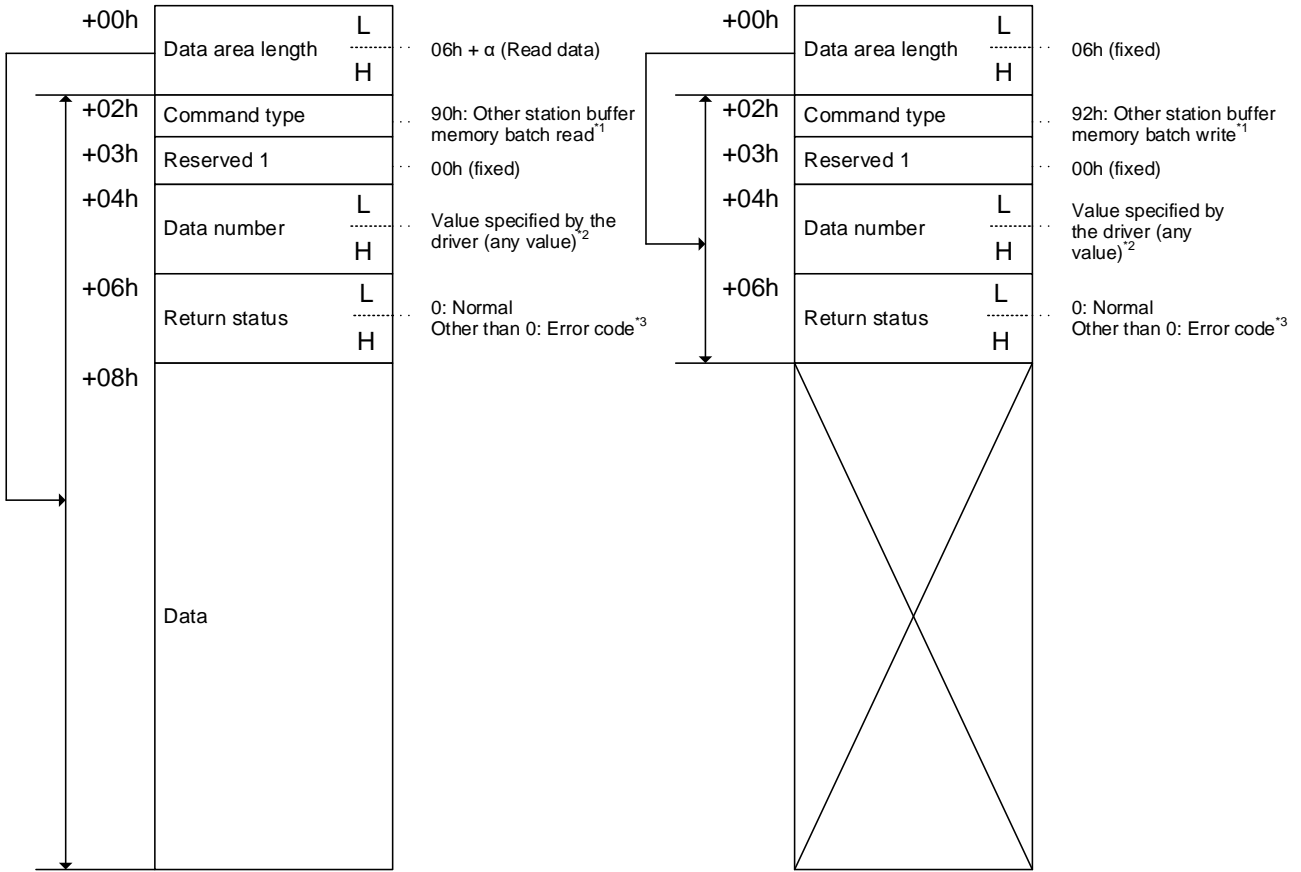
(a) Header area



(b) Data Area

When the command type is set to "Other station buffer memory batch read"

When the command type is set to "Other station buffer memory batch write"



*1: 1 is entered in the uppermost bit of the command type set in request transmission data.

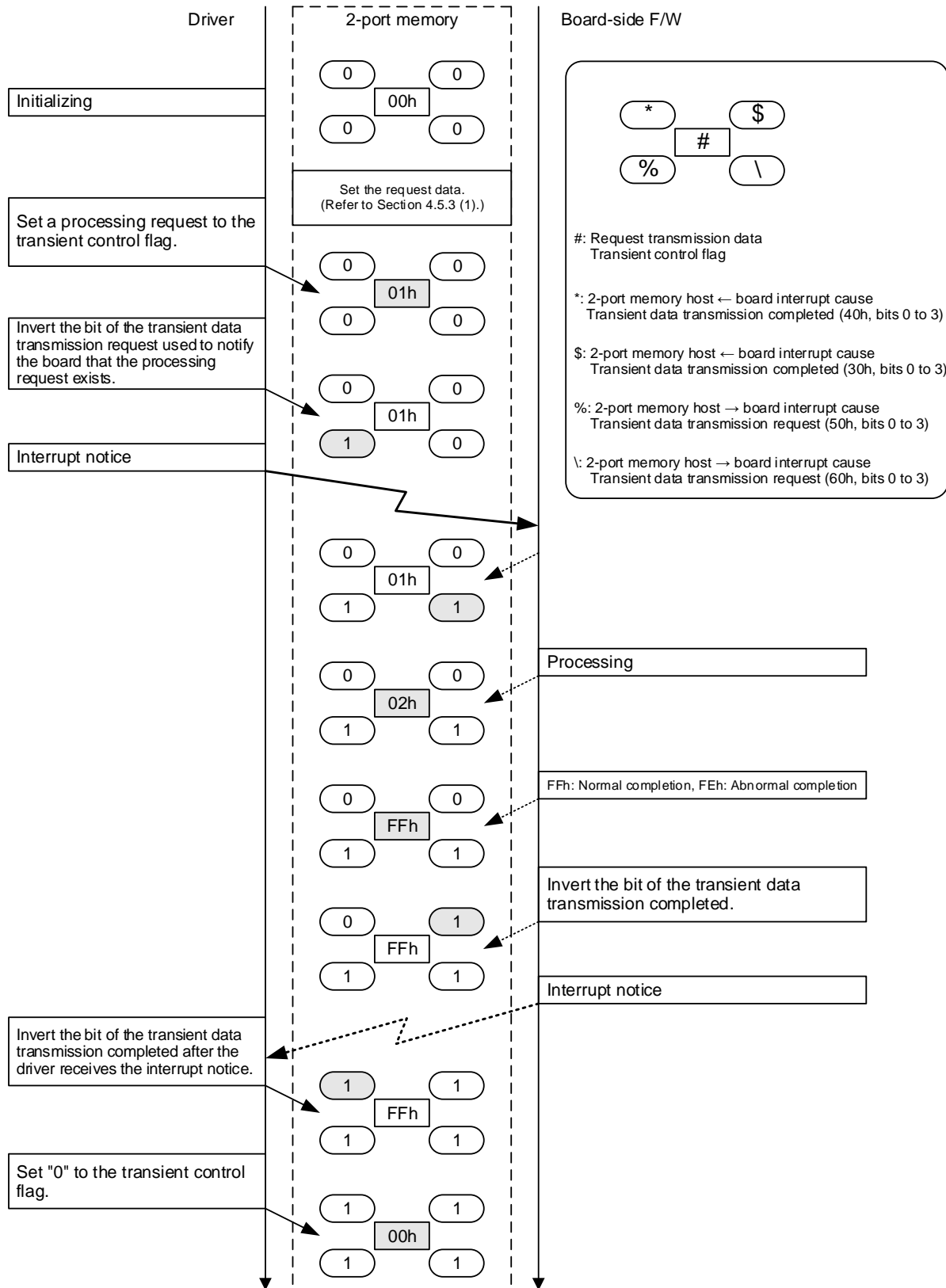
*2: The data number specified in request transmission data is stored.

*3: For details on error codes, refer to Chapter 3 "Error Codes".

4.5.4 Request Transmission Procedure (Driver → Board Processing Procedure)

A request transmission is set by executing a handshake between the driver and board using the transient control flag and host – board interrupt cause.

Parameter replacement flags 1 to 4 contain the parameter replacement setting information of the 2-port memory area. Refer to Section 2.2.3(1)Parameter Replacement Area.



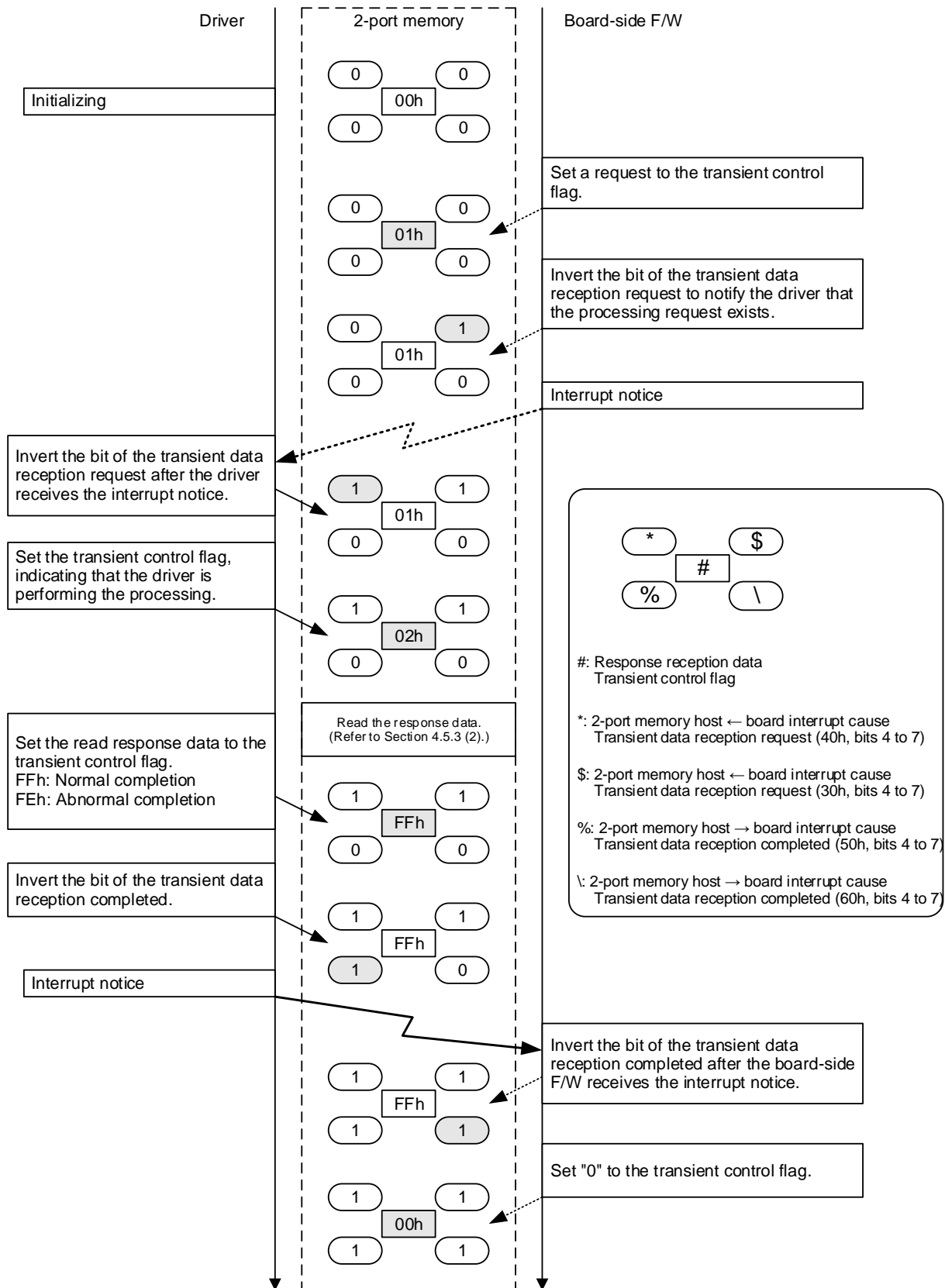
* The shaded areas (■) indicate that a value was set.

* The non-shaded areas (□) indicate that the bit was inverted. When the value is 0, 1 is set. When the value is 1, 0 is set.

4.5.5 Response Reception Procedure (Board → Driver Processing Procedure)

Response reception is set by executing a handshake between the driver and board using the transient control flag and host – board interrupt cause.

Parameter replacement flags 1 to 4 contain the parameter replacement setting information of the 2-port memory area. Refer to Section 2.2.3(1)Parameter Replacement Area.



* The shaded areas () indicate that a value was set.

* The non-shaded areas () indicate that the bit was inverted. When the value is 0, 1 is set. When the value is 1, 0 is set.

4.5.6 Reading Response Data During Transient Communication Processing

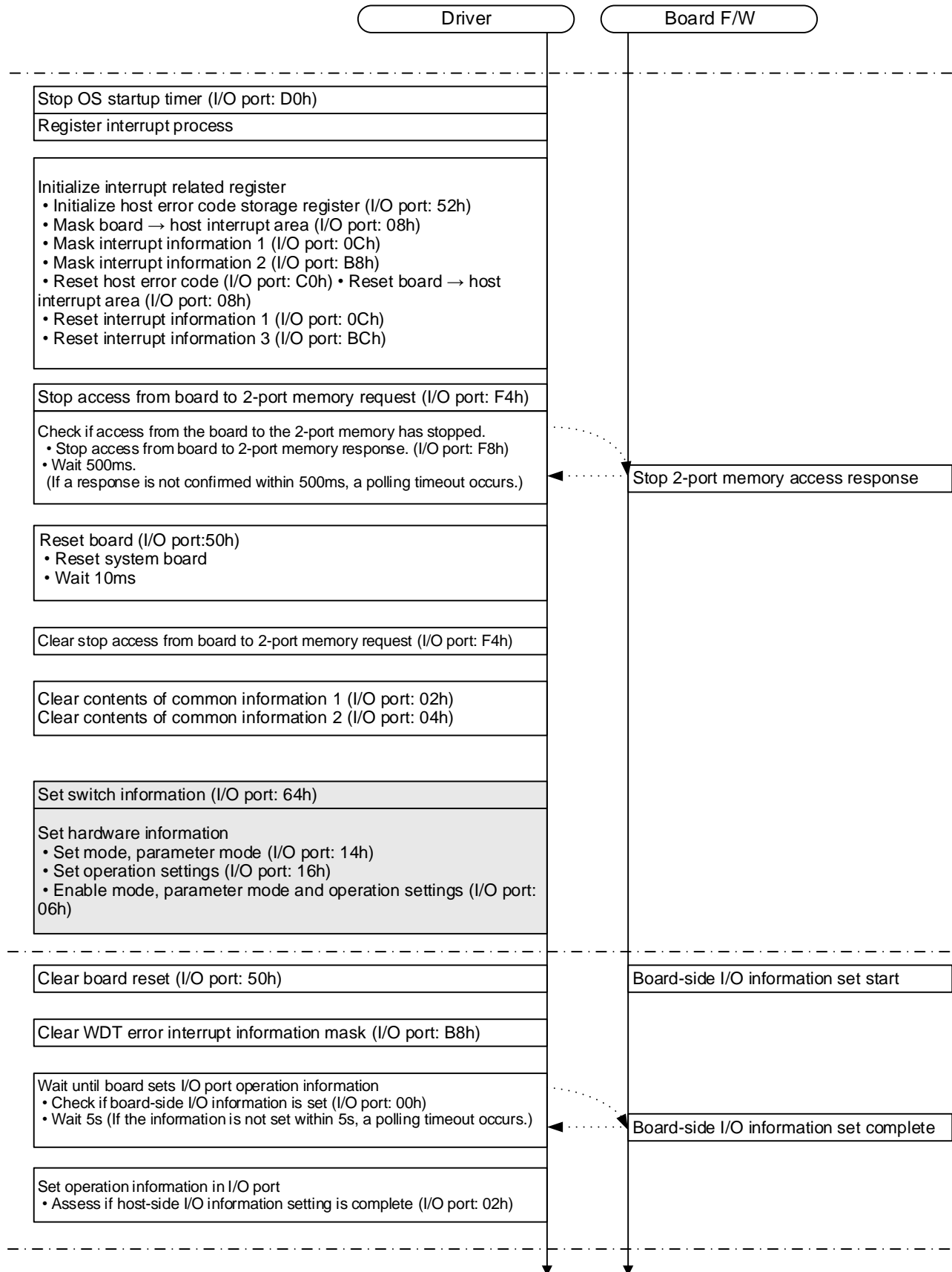
When response data is to be read, check whether the data is the requested response data.

Check the following:

- Is the fixed value 02 of the header area "F8h"?
 - Are the request destination station number and host station number of the header area correct?
 - Has 1 been entered in the uppermost bit of the command type set in request data?
 - Is the value of the data number in the data area set in the request frame?
 - Is the return status "0"?
- * If the value of return status is other than "0", an error code is entered. For details on error codes, refer to Chapter 3 "Error Codes".

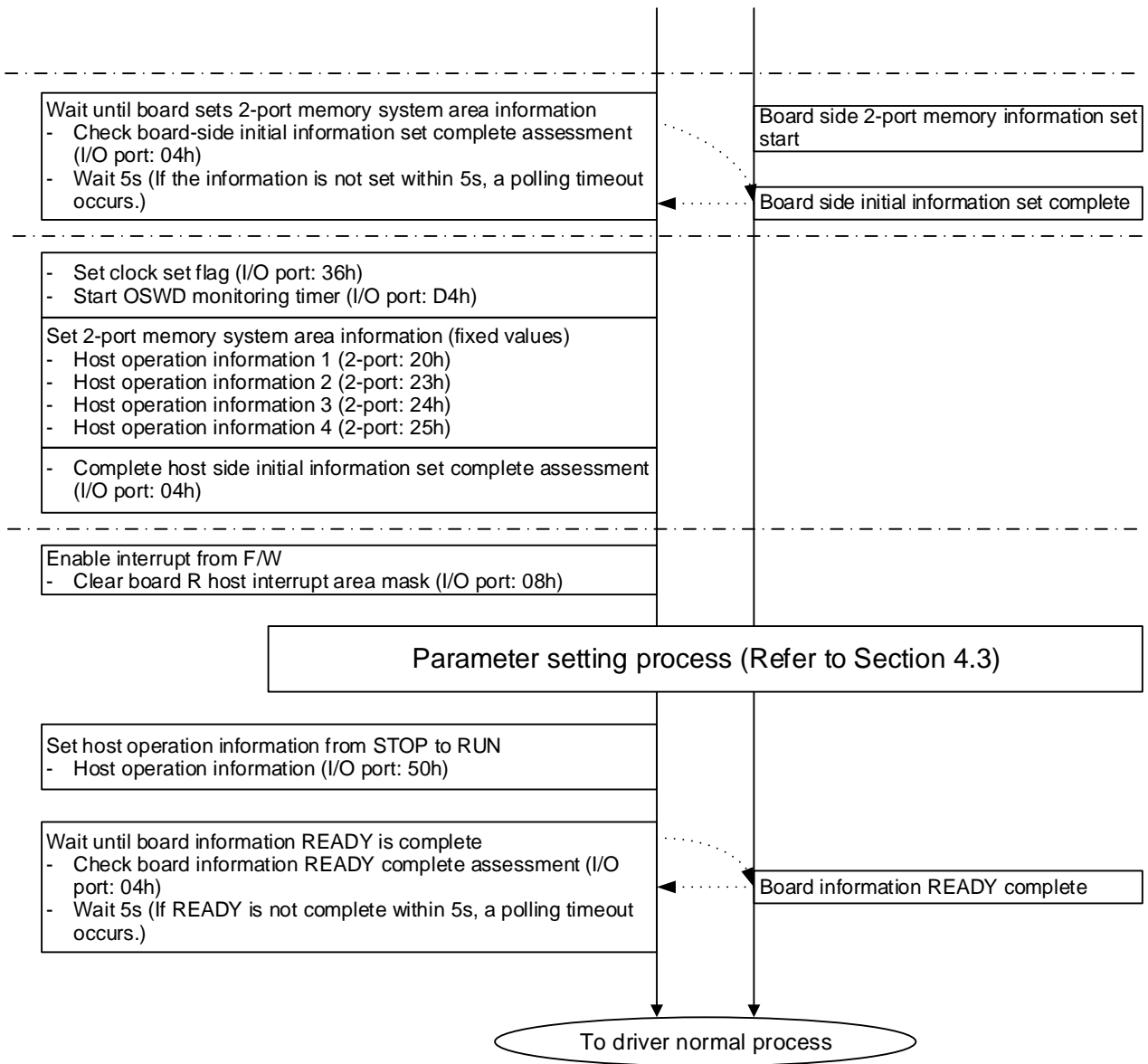
4.6 Resetting Switch Information and Hardware Information

To reset the switch information and hardware information in the following shaded areas, either perform the following process or restart the host. This process is not implemented in sample code. The following describes the switch information and hardware information reset process.



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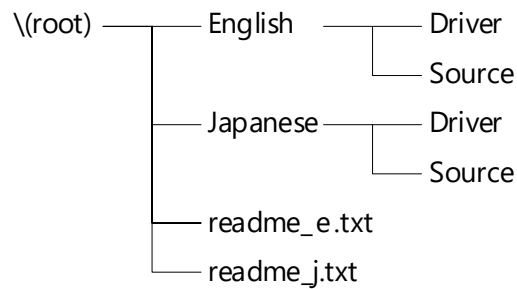


5 Sample Code

The following describes the specifications of the sample code provided on the CD-ROM that came with this manual. The sample code consists of applications and drivers.

(1) Folder structure in the CD-ROM

The following describes the folder structure of sample code.



(2) File overview in the CD-ROM

The following describes the file structure of sample code.

Folder	File	Description
English	Driver *1	Driver Format: C language source file
	Source *1	Sample code (application) Format: C language source file, C language header file
Japanese	Driver *1	(Japanese comment version)
	Source *1	(Japanese comment version)
-	readme_e.txt	Sample code modification procedure (overview) (English)
-	readme_j.txt	Sample code modification procedure (overview) (Japanese)

For details on the folder structure and files, refer to Section 5.1 "File List".

(3) The application does not use the hardware interrupt and performs the interrupt processing by checking the interrupt cause in the software.

The application contains the following functions:

Modify the sample code as required.

- F/W initial processing
- Parameter setting
- Cyclic communication
- Transient communication

(4) The application is operated by using the driver.

The driver does not have the following processing. Design and implement functions depending on the OS environment.

- I/O port access
- 2-port memory access

5.1 File List

The following table lists the sample code source files and header files.

Folder name	File name	Description	
\English	\Driver	bdchk_drv.c	Driver
	\Source	SD_main.c	Main processing at application startup
		SD_INIT.c	Board initialization and interrupt processing
		SD_PRM.c	Parameter development and setting
		SD_DRV.c	2-port and I/O port access, read and write processing
		SD_LIB.c	Device read and write processing
		BDCHK.h	Driver header
		CCPRM.h	CC-Link parameter header
	Driver.h	Driver header	
\Parameter	Parameter.ini	Parameter information storage location	
Japanese	(Same as English folders)	(Japanese comment version of English folders/files)	

5.2 Function List

The following table lists the application functions.

File Name	Function Name	Type	Description
SD_main.c	main	void	Main processing
	proc_seq_read	void	Batch read processing
	proc_seq_write	void	Batch write processing
	proc_bit_set	void	Bit set processing
	proc_bit_reset	void	Bit reset processing
	tr_seq_write	void	Other station buffer batch write processing
	tr_seq_read	void	Other station buffer batch read processing
	dev_name_select	char	Device selection processing
	dev_no_select	short	Device number setting processing
	num_select	short	No. of device points setting processing
	disp	void	Console window display processing
	seq_disp	void	Device batch display processing
	data_init	void	Device value initialization processing
	htob	void	Hexadecimal to binary conversion display processing
	rnd_disp	void	Device random display processing
	word_disp	void	Device value word unit display processing
	calc_data_size	short	Data size setting processing
	ask_to_disp	short	Display confirmation
	st_no_select	unsigned char	Other station number setting processing
Tr_Ad_input	unsigned short	Write and read destination buffer address input processing	
SD_INIT.c	drv_init	void	Board initialization processing
	drv_end	void	Board end processing
	IsrThead	void	Board initialization processing
SD_PRM.c	prm_set	short	Parameter setting
	master_prm_make	short	Parameter development (master station)
	local_prm_make	short	Parameter development (local station)

File Name	Function Name	Type	Description
SD_LIB.c	lib_seq_read	short	Device batch read library
	lib_seq_write	short	Device batch write library
	lib_rnd_read	short	Device random read library
	lib_rnd_write	short	Device random write library
	lib_bit_set	void	Bit device set library
	lib_bit_reset	void	Bit device reset library
	calc_adr	unsigned long	Specified device address calculation
	calc_count	short	Read/Write word count calculation
SD_DRV.c	getmem	void	2-port memory read processing
	setmem	void	2-port memory write processing
	getbyte	unsigned char	Byte data read processing
	setbyte	void	Byte data write processing
	getword	unsigned short	Word data read processing
	setword	void	Word data write processing
	getdword	unsigned long	Double-word data read processing
	setdword	void	Double-word data write processing
	IO_Read_Word	unsigned short	I/O port word data read processing
	IO_Read_DWord	unsigned long	I/O port double-word data read processing
	IO_Write_Word	void	I/O port word data write processing
	IO_Write_DWord	void	I/O port double-word data write processing
	Fw_PrInt	void	F/W interrupt (parameter communication processing)
	Fw_PrIntRst	void	F/W interrupt reset (parameter communication processing)
	FwInt	void	Transient data communication processing (Sending data from the host to the board)
	prm_read	short	Receiving the category and key and reading the values from the parameter file

(2) The following table lists the driver functions.

File Name	Function Name	Type	Description
bdchk_drv.c	bdckOpen	short	Driver open
	bdckClose	short	Driver close
	bdckMemRead	short	Reading data from a 2-port memory address
	bdchkMemWrite	short	Writing data to a 2-port memory address
	bdckIORead	short	Reading data from an I/O port address
	bdckIOWrite	short	Writing data to an I/O port address

5.3 Modifying the Sample Code

The sample code provides the board initialization processing and device access methods.

The following describes the required modifications to perform the board initialization processing and access devices.

(1) The 2-port memory and I/O port address destinations on driver.h must be edited.

```
Driver.h
#define RAM_BASE      0xDA00000 /* 2-port memory base address */
#define IO_BASE       0x1000 /* I/O port base address */
```

(2) The parameter setting file must be edited

(Specify the directory in which Parameter.ini is located.)

```
Driver.h
#define PRM_FILE_PATH "C:/CCV2DRV_Sample/sourse/Parameter/PRM_Sample.ini"
```

(3) The following parameters in Parameter.ini must be set.

<Parameter.ini>

Station type (Decimal) (0: Master station, 1: Local station)

Mode switch (Hexadecimal) (I/O port: Refer to 14h and set the value.)

Switch setting (Hexadecimal) (I/O port: Refer to 64h and set the value.)

Network: If the set station type is "master station", set the following settings as well.

Mode (Decimal) (0: Ver. 1 mode, 1: Additional mode, 2: Ver. 2 mode)

No. of connected modules (Decimal) (No. of device stations connected to the master station)

Station number of n-th station (Decimal) (1 to 63)

Station information of n-th station (Hexadecimal) (Refer to "*4 Network parameter station information" in "(a) Master station" under (2) Parameter details" in Section 4.3.2.)

5.4 Application Function Specifications

The following tables lists the application functions.

5.4.1 SD_main.c

main

Item	Main processing
Call format	void main()
Argument	-
Return value	-
Function description	Main processing of program

proc_seq_read

Item	Batch read processing
Call format	void proc_seq_read()
Argument	-
Return value	-
Function description	This function reads all data to the host station link device.

proc_seq_write

Item	Batch write processing
Call format	void proc_seq_write()
Argument	-
Return value	-
Function description	This function writes all data to the host station link device.

proc_bit_set

Item	Bit set processing
Call format	void proc_bit_set()
Argument	-
Return value	-
Function description	This function turns ON the bit device.

proc_bit_reset

Item	Bit reset processing
Call format	void proc_bit_reset()
Argument	-
Return value	-
Function description	This function resets the bit device.

tr_seq_read

Item	Other station buffer batch read processing
Call format	void tr_seq_read()
Argument	-
Return value	-
Function description	This function reads all data in the buffer of the other station by transient communication processing.

tr_seq_write

Item	Other station buffer batch write processing
Call format	void tr_seq_write()
Argument	-
Return value	-
Function description	This function writes all data to the buffer in other station by transient communication processing.

dev_name_select

Item	Device selection processing
Call format	char dev_name_select ()
Argument	-
Return value	char
Function description	This function selects the devices to be read (written).

dev_no_select

Item	Device number setting processing
Call format	short dev_no_select ()
Argument	-
Return value	short
Function description	This function sets the number of the device to be read (written).

num_select

Item	No. of device points setting processing
Call format	short num_select ()
Argument	-
Return value	short
Function description	This function sets the range of the number of points of the device to be read or (written).

disp

Item	Console window display processing		
Call format	void disp(char* data[])		
Argument	Type Name	Variable Name	Content
	char*	data[]	Data buffer
Return value	-		
Function description	This function displays messages in the console window.		

seq_disp

Item	Device batch display processing		
Call format	void seq_disp(char dev_name, short dev_no, short data[], short num)		
Argument	Type Name	Variable Name	Content
	char	dev_name	Device name
	short	dev_no	Device number
	short	data[]	Data buffer
	short	num	Number of device points
Return value	-		
Function description	This function displays all device values in the console window.		

data_init

Item	Device value initialization processing		
Call format	void data_init()		
Argument	Type Name	Variable Name	Content
	unsigned short	data[]	Data buffer
	short	data_size	Data size
Return value	-		
Function description	This function sets the value of the write data.		

htob

Item	Hexadecimal to binary conversion display processing		
Call format	void htob(short data)		
Argument	Type Name	Variable Name	Content
	short	data	Data
Return value	-		
Function description	This function displays hexadecimal data in units of bits.		

word_disp

Item	Device value word unit display processing		
Call format	void word_disp()		
Argument	Type Name	Variable Name	Content
	char	dev_name	Device name
	short	dev_no	Device number
	short	data	Data
Return value	-		
Function description	This function displays the device value in units of words.		

calc_data_size

Item	Data size setting processing		
Call format	short calc_data_size(char dev_name, short num)		
Argument	Type Name	Variable Name	Content
	char	dev_name	Device name
	short	num	Number of device points
Return value	short		
Function description	This function calculates the data size from the device and the number of device points.		

ask_to_disp

Item	Display confirmation		
Call format	short ask_to_disp()		
Argument	-		
Return value	short		
Function description	This function checks whether to display the write result or not.		

st_no_select

Item	Transient other station number specification		
Call format	unsigned char st_no_select()		
Argument	-		
Return value	unsigned char		
Function description	This function specifies the station number of the transient access destination.		

Tr_Ad_input

Item	Write and read destination buffer address specification		
Call format	unsigned short Tr_Ad_input()		
Argument	-		
Return value	unsigned short		
Function description	This function specifies the transient access destination buffer address.		

5.4.2 SD_INIT.c

drv_init

Item	Board initialization processing
Call format	short drv_init()
Argument	-
Return value	short 0: Initialization abnormal completion 1: Initialization normal completion
Function description	This function performs initialization processing of the CC-Link Ver. 2 interface board.

drv_end

Item	Board end processing
Call format	void drv_end()
Argument	-
Return value	-
Function description	This function closes the board check driver and interrupt processing thread and exiting the program.

IsrThead

Item	Interrupt processing thread		
Call format	void IsrThead(void *NotUsed)		
Argument	Type Name	Variable Name	Content
	void	*NotUsed	Undefined type
Return value	-		
Function description	This function monitors interrupt causes at all times and performing the interrupt processing.		

5.4.3 SD_PRM.c

prm_set

Item	Parameter setting
Call format	short prm_set()
Argument	-
Return value	short 1: Parameter setting normal completion 0: Parameter setting abnormal completion
Function description	This function creates and setting CC-Link Ver. 2 board parameters.

master_prm_make

Item	Parameter development (master station)		
Call format	short master_prm_make(MASTER_PRM* master_prm)		
Argument	Type Name	Variable Name	Content
	MASTER_PRM*	master_prm	Master station parameters
Return value	short		
Function description	This function reads master station parameters from a text file and creating the parameters.		

local_prm_make

Item	Parameter development (local station)		
Call format	short local_prm_make(LOCAL_PRM* local_prm)		
Argument	Type Name	Variable Name	Content
	LOCAL_PRM*	local_prm	Local station parameters
Return value	short		
Function description	This function reads local station parameters from a text file and creating the parameters.		

prm_read

Item	Parameter read		
Call format	short prm_read(FILE* pFD, char* pcCategory, char* pcKey, void* pvValue, short sPRMType)		
Argument	Type Name	Variable Name	Content
	FILE*	pFD	File data
	char*	pcCategory	Category
	char*	pcKey	Key
	void*	pvValue	Pointer destination for parameter entry
	short	sPRMType	Parameter type
Return value	short		
Function description	Receiving the category and key and reading the value from the parameter file		

5.4.4 SD_DRV.c

getmem

Item	2-port memory read processing		
Call format	void getmem(unsigned long offset_adr, short count, unsigned short data[])		
Argument	Type Name	Variable Name	Content
	unsigned long	offset_adr	Read head address
	short	count	Read word count
	unsigned short	data[]	Data buffer
Return value	-		
Function description	This function reads the data corresponding to the read word count from the specified address of 2-port memory.		

setmem

Item	2-port memory write processing		
Call format	void setmem(unsigned long offset_adr, short count, unsigned short data[])		
Argument	Type Name	Variable Name	Content
	unsigned long	offset_adr	Write head address
	short	count	Write word count
	unsigned short	data[]	Data buffer
Return value	-		
Function description	This function writes the data corresponding to the write word count from the specified address of 2-port memory.		

getbyte

Item	Byte data read processing		
Call format	unsigned char getbyte(unsigned long offset_adr)		
Argument	Type Name	Variable Name	Content
	unsigned long	offset_adr	Read head address
Return value	unsigned char		
Function description	This function reads the byte data from the specified address of 2-port memory.		

setbyte

Item	Byte data write processing		
Call format	void setbyte(unsigned long offset_adr, unsigned char data)		
Argument	Type Name	Variable Name	Content
	unsigned long	offset_adr	Read head address
	unsigned char	data	Data
Return value	-		
Function description	This function writes the byte data from the specified address of 2-port memory.		

getword

Item	Word data read processing		
Call format	unsigned short getword(unsigned long offset_adr)		
Argument	Type Name	Variable Name	Content
	unsigned long	offset_adr	Read head address
Return value	unsigned short		
Function description	This function reads the word data from the specified address of 2-port memory.		

setword

Item	Word data write processing		
Call format	void setword(unsigned long offset_adr, unsigned short data)		
Argument	Type Name	Variable Name	Content
	unsigned long	offset_adr	Write head address
	unsigned short	data	Write data
Return value	-		
Function description	This function reads the word data from the specified address of 2-port memory.		

getdword

Item	Double-word data read processing		
Call format	unsigned long getdword(unsigned long offset_adr)		
Argument	Type Name	Variable Name	Content
	unsigned long	offset_adr	Read head address
Return value	unsigned long		
Function description	This function reads the double-word data from the specified address of 2-port memory.		

setdword

Item	Double-word data write processing		
Call format	void setdword(unsigned long offset_adr, unsigned long data)		
Argument	Type Name	Variable Name	Content
	unsigned long	offset_adr	Write head address
	unsigned long	data	Write data
Return value	-		
Function description	This function writes the double-word data from the specified address of 2-port memory.		

IO_Read_Word

Item	I/O port word data read processing		
Call format	unsigned short IO_Read_Word(unsigned short lo_adr)		
Argument	Type Name	Variable Name	Content
	unsigned short	lo_adr	I/O address
Return value	unsigned short		
Function description	This function reads the word data from the specified address of the I/O port.		

IO_Read_Dword

Item	I/O port double-word data read processing		
Call format	unsigned long IO_Read_DWord(unsigned short lo_adr)		
Argument	Type Name	Variable Name	Content
	unsigned short	lo_adr	I/O address
Return value	unsigned long		
Function description	This function reads the double-word data from the specified address of the I/O port.		

IO_Write_Word

Item	I/O port word data write processing		
Call format	void IO_Write_Word(unsigned short lo_adr, unsigned short dat)		
Argument	Type Name	Variable Name	Content
	unsigned short	lo_adr	I/O address
	unsigned short	dat	Write data
Return value	-		
Function description	This function writes the word data from the specified address of the I/O port.		

IO_Write_Dword

Item	I/O port double-word data write processing		
Call format	void IO_Write_DWord(unsigned short lo_adr, unsigned long dat)		
Argument	Type Name	Variable Name	Content
	unsigned short	lo_adr	I/O address
	unsigned long	dat	Write data
Return value	-		
Function description	This function writes the double-word data from the specified address of the I/O port.		

Fw_PrInt

Item	F/W interrupt (parameter communication processing)		
Call format	void Fw_PrInt()		
Argument			
Return value	-		
Function description	This function sets the interrupt cause to the board F/W when the parameter communication processing is performed.		

Fw_PrIntRst

Item	F/W interrupt reset (parameter communication processing)		
Call format	void Fw_PrIntRst()		
Argument			
Return value	-		
Function description	This function resets the interrupt cause from the board F/W when the parameter communication processing is performed.		

Fw_TrInt

Item	F/W interrupt (transient communication processing)		
Call format	void FwTrInt()		
Argument			
Return value	-		
Function description	This function sets the interrupt cause to the board F/W when the transient communication processing is performed.		

prm_read

Item	I/O port double-word data write processing		
Call format	short prm_read (FILE* pFD, char* pcCategory, char* pcKey, void* pvValue, short sPRMType, short sCdnI)		
Argument	Type Name	Variable Name	Content
	FILE*	pFD	File data
	char*	pcCategory	Category
	char*	pcKey	Key
	void*	pvValue	Pointer destination for parameter entry
	short	sPRMType	Parameter type
	short	sCdnI	DEX: Decimal HEX: Hexadecimal
Return value	short		
Function description	This function receives the category and key and reading the value from the parameter file.		

5.4.5 SD_LIB.c

lib_seq_read

Item	Device batch read library		
Call format	short lib_seq_read(char dev_name, short dev_no, short num, short data[])		
Argument	Type Name	Variable Name	Content
	char	dev_name	Device name
	short	dev_no	Device number
	short	num	No. of points
	short	data[]	Data buffer
Return value	short		
Function description	This function calculates the word count of the device to be read.		

lib_seq_write

Item	Device batch write library		
Call format	short lib_seq_write(char dev_name, short dev_no, short num, short data[])		
Argument	Type Name	Variable Name	Content
	Char	dev_name	Device name
	short	dev_no	Device number
	short	num	No. of points
	short	data[]	Data buffer
Return value	short		
Function description	This function calculates the word count of the device to be written.		

lib_bit_set

Item	Bit device set library		
Call format	void lib_bit_set(char dev_name, short dev_no)		
Argument	Type Name	Variable Name	Content
	char	dev_name	Device name
	short	dev_no	Device number
Return value	-		
Function description	This function sets the bit device.		

lib_bit_reset

Item	Bit device reset library		
Call format	void lib_bit_reset(char dev_name, short dev_no)		
Argument	Type Name	Variable Name	Content
	char	dev_name	Device name
	short	dev_no	Device number
Return value	-		
Function description	This function resets the bit device.		

calc_adr

Item	Specified device address calculation		
Call format	unsigned long calc_adr(char dev_name, short dev_no)		
Argument	Type Name	Variable Name	Content
	char	dev_name	Device name
	short	dev_no	Device number
Return value	unsigned long		
Function description	This function calculates the specified device address.		

calc_count

Item	Read/Write word count calculation		
Call format	short calc_count(char dev_name, short num)		
Argument	Type Name	Variable Name	Content
	char	dev_name	Device name
	short	num	No. of points
Return value	short		
Function description	This function calculates the word count to be read or written.		

5.5 Driver Function Specifications

The following describes example of the driver function specifications in the sample code. Define the driver function specifications according to the required functions, and implement the processing.

bdckOpen

Function	Driver open		
Call format	short bdckOpen (long * path)		
Argument	Type Name	Variable Name	Content
	long *	path	Driver path
Return value	short		

bdckClose

Function	Driver close		
Call format	short bdckClose (long path)		
Argument	Type Name	Variable Name	Content
	long	path	Driver path
Return value	short		

bdckMemRead

Function	Reading data from a 2-port memory address		
Call format	short bdckMemRead (unsigned long PhysicalAddress, unsigned short AccessType, unsigned long count, void * Buffer, unsigned short BufferSize)		
Argument	Type Name	Variable Name	Content
	unsigned long	PhysicalAddress	2-port memory address
	unsigned short	AccessType	Access type 0: Byte 1: Word
	unsigned long	count	No. of read points
	void *	Buffer	Pointer of storage location of read data
	unsigned short	BufferSize	Size of storage location
Return value	short		

bdchkMemWrite

Function	Writing data to a 2-port memory address		
Call format	short bdchkMemWrite (unsigned long PhysicalAddress, unsigned short AccessType, unsigned long count, void * Buffer)		
Argument	Type Name	Variable Name	Content
	unsigned long	PhysicalAddress	2-port memory address
	unsigned short	AccessType	Access type 0: Byte 1: Word
	unsigned long	count	No. of write points
	void *	Buffer	Pointer of storage location of written data
Return value	short		

bdckIOWrite

Function	Reading data from an I/O port address		
Call format	short bdckIOWrite (unsigned long PortAddress, unsigned short AccessType, unsigned long count, void * Buffer, unsigned short BufferSize)		
Argument	Type Name	Variable Name	Content
	unsigned long	PortAddress	I/O port address
	unsigned short	AccessType	Access type 0: Byte 1: Word 2: Double-word
	unsigned long	count	No. of read points
	void *	Buffer	Pointer of storage location of read data
	unsigned short	BufferSize	Size of storage location
Return value	short		

bdckIOWrite

Function	Writing data to an I/O port address		
Call format	short bdckIOWrite (unsigned long PortAddress, unsigned short AccessType, unsigned long count, void * Buffer)		
Argument	Type Name	Variable Name	Content
	unsigned long	PortAddress	I/O port address
	unsigned short	AccessType	Access type 0: Byte 1: Word 2: Double-word
	unsigned long	count	Write size
	void *	Buffer	Pointer of storage location of written data
Return value	short		

5.6 Sample Code Operating Procedure

Verification of cyclic communication

Cyclic communication can be verified by selecting the following items 1 to 6 after the "Select a menu number" message appears.

The following shows an example of when FFFFh is written to a 10-point area from 20h of the device (RWw) using Batch Write.

Select a menu number.

- | | |
|---------------------|-------------------------------------|
| 1: Batch Read | 4: Bit Device Set |
| 2: Batch Write | 5: Other Station Buffer Batch Read |
| 3: Bit Device Reset | 6: Other Station Buffer Batch Write |

Select 2.

Select the device name.

- | | |
|--------|-----------------------|
| 1: RX | 6: SW |
| 2: RY | 7: RX (Ver. 2 area) |
| 3: RWr | 8: RY (Ver. 2 area) |
| 4: RWw | 9: RWr (Ver. 2 area) |
| 5: SB | 10: RWw (Ver. 2 area) |

Select 4.

Enter the device number.

Enter 20.

Enter the number of points (decimal).

Enter 10.

Write data

- 1: 0000h (all)
- 2: FFFFh (all)
- 3: Ascending order
- 4: Descending order

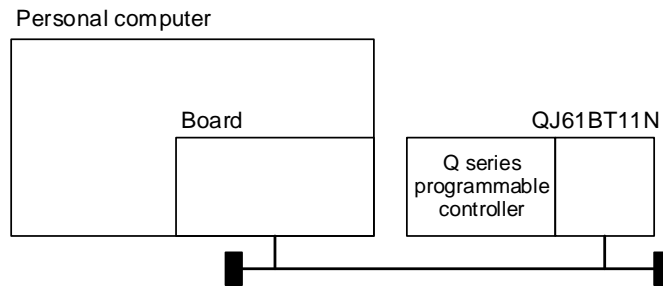
Select 2.

Execute Batch Read and check the write data which is written using Batch Write.

Verification of transient communication

Another module which can perform the transient communication is required other than the personal computer with the Q80BDJ-61BT11N mounted.

The following shows an example of when FFFFh is written to a 10-point area from 1E0h using Other Station Buffer Batch Write.



Board :	Station number : 0 (master station)	QJ61BT11N :	Station number : 1 (local station)
	Baud rate : 4 (10M)		Baud rate : 4 (10M)
	Parameter mode : 0 (Online)		Parameter mode : 0 (Online)
	Clear specification : 0 (clear)		Clear specification : 0 (clear)
	No. of occupied stations : 0 (1 station)		No. of occupied stations : 0 (1 station)

Select a menu number.

- | | |
|---------------------|-------------------------------------|
| 1: Batch Read | 4: Bit Device Set |
| 2: Batch Write | 5: Other Station Buffer Batch Read |
| 3: Bit Device Reset | 6: Other Station Buffer Batch Write |

Select 5.

Specify the other station number (0 to 63).

Enter 1.

Enter the address (hexadecimal).

Enter 1E0.

Enter the number of points (decimal).

Enter 10.

Write data

- 1: 0000h (all)
- 2: FFFF (all)
- 3: Ascending order
- 4: Descending order

Select 2.

Execute Other Station Buffer Batch Read and check the write data which is written using Other Station Buffer Batch Write.

Appendix 1 Link Special Relay (SB)

The link special relay stores the data link status by bit status (on/off).
 The two-port memory addresses 85E0h to 85FFh correspond to SB0000 to SB01FF.

List of Link Special Relay Areas

Number	Name	Description	User Availability (Y: Available N: Not available)		
			Online		Offline
			Master Station	Local Station	
SB0000 (85E0h, b0)	Data link restart	Restarts the data link that had been stopped by SB0002. OFF: Restart not instructed ON: Restart instructed	Y	Y	N
SB0001 (85E0h, b1)	Refresh instructions at switching to standby master	Provides instructions for cyclic data refresh after the data link control authority switches to the standby master station. OFF: Not instructed ON: Instructed	Y	N	N
SB0002 (85E0h, b2)	Data link stop	Stops the data link of the host station. (SB0000 is used for restart.) However, when the master station executes this, the entire system will stop. OFF: No stop instruction ON: Stop instructed	Y	Y	N
SB0003 (85E0h, b3)	Refresh instructions at parameter change by dedicated instruction	Provides instructions for cyclic data refresh after a parameter changes by the RLPASET instruction. OFF: No instruction (stop refresh) ON: Instruction (start/continue refresh)	Y	Y	N
SB0004 (85E0h, b4)	Temporary error invalid request	Sets the stations specified in SW0003 to SW0007 as temporary error invalid stations. The request execution result is stored in SW0049. OFF: Not requested ON: Requested	Y	N	N
SB0005 (85E0h, b5)	Temporary error invalid cancellation request	Cancel the temporarily error invalid status of stations specified in SW0003 to SW0007. The request execution result is stored in SW004B. OFF: Not requested ON: Requested	Y	N	N
SB0008 (85E0h, b8)	Line test request	Conducts line tests for the station specified in SW0008. The request execution result is stored in SW004D. OFF: Not requested ON: Requested	Y	N	N
SB0009 (85E0h, b9)	Parameter setting test request	Loads the parameter setting information of the actual system configuration. The request execution result is stored in SW004F. OFF: Normal ON: Error	Y	N	N
SB000C (85E0h, b12)	Forced master switching	Forcibly transfers the data link control authority from the standby master station controlling the data link to the master station standing by in case the standby master station goes down. OFF: Not requested ON: Requested	Y ²	N	N
SB000D (85E0h, b13)	Remote device station initialization procedure registration instruction	Starts initial processing of information registered by initialization procedure registration. When SB000D is ON, remote input/output and remote register refresh stops. OFF: No instruction ON: Instruction	Y ¹	N	N
SB0020 (85E2h, b0)	Board status	Indicates the buffer access state. OFF: Normal ON: Error	Y	Y	Y
SB0040 (85E4h, b0)	Data link restart acceptance	Indicates the data link restart instruction acceptance status. OFF: Not accepted ON: Startup instruction accepted	Y	Y	N

Number	Name	Description	User Availability (Y: Available N: Not available)		
			Online		Offline
			Master Station	Local Station	
SB0041 (85E4h, b1)	Data link restart complete	Indicates the data link restart instruction completion status. OFF: Not complete ON: Startup complete	Y	Y	N
SB0042 (85E4h, b2)	Refresh instruction acceptance status at switching to standby master	Indicates whether or not the refresh instruction at switching to the standby master status has been accepted. OFF: Not accepted ON: Instruction accepted	Y	N	N
SB0043 (85E4h, b3)	Refresh instruction completion status at standby master switching	Indicates the refresh instruction acceptance completion status at standby master switching. OFF: Not executed ON: Execution complete	Y	N	N
SB0044 (85E4h, b4)	Data link stop acceptance	Indicates the data link stop instruction acceptance status. OFF: Not accepted ON: Stop instruction accepted	Y	Y	N
SB0045 (85E4h, b5)	Data link stop complete	Indicates the acceptance completion status of the data link stop instruction. OFF: Not complete ON: Complete	Y	Y	N
SB0046 (85E4h, b6)	Forced master switching executable status	Indicates whether the forced master switching (SB000C) signal is executable or not. OFF: Not executable ON: Executable	Y ²	N	N
SB0048 (85E4h, b8)	Temporary error invalid acceptance status	Indicates the acceptance status of the temporary error invalid station instruction. OFF: Not accepted ON: Instruction accepted	Y	N	N
SB0049 (85E4h, b9)	Temporary error invalid complete status	Indicates the acceptance status of the temporary error invalid station instruction. OFF: Not complete ON: Temporary error invalid station established/Specified station number error	Y	N	N
SB004A (85E4h, b10)	Temporary error invalid cancellation acceptance status	Indicates the acceptance status of the temporary error invalid station instruction. OFF: Not accepted ON: Instruction accepted	Y	N	N
SB004B (85E4h, b11)	Temporary error invalid cancellation complete status	Indicates the acceptance status of the temporary error invalid station instruction. OFF: Not complete ON: Temporary error invalid station cancellation complete	Y	N	N
SB004C (85E4h, b12)	Line test acceptance status	Indicates the line test request acceptance status. OFF: Not accepted ON: Instruction accepted	Y	N	N
SB004D (85E4h, b13)	Line test complete status	Indicates the line test completion status. OFF: Not complete ON: Test complete	Y	N	N
SB004E (85E4h, b14)	Parameter information read acceptance status	Indicates the acceptance status of the parameter information read request. OFF: Not accepted ON: Instruction accepted	Y	N	N
SB004F (85E4h, b15)	Parameter information read completion status	Indicates the completion status of parameter information read. OFF: Not complete ON: Test complete	Y	N	N
SB0050 (85E5h, b0)	Offline test status	Indicates the offline test execution status. OFF: Not executed ON: Being executed	N	N	Y
SB005A (85E5h, b10)	Master switching request acceptance	Indicates whether or not the standby master station has accepted a switching-to-master request from the network. OFF: Not accepted ON: Request accepted	Y	N	N
SB005B (85E5h, b11)	Master switching request complete	Indicates whether or not the switching from the standby master station to master station is complete. OFF: Not complete ON: Complete	Y	N	N

Number	Name	Description	User Availability (Y: Available N: Not available)				
			Online		Offline		
			Master Station	Local Station			
SB005C (85E5h, b12)	Forced master switching request acceptance	Indicates whether or not a forced switching-to-master request has been accepted. OFF: Not accepted ON: Request accepted	Y ²	N	N		
SB005D (85E5h, b13)	Forced master switching request complete	Indicates the acceptance completion status of a forced switching-to-master request. OFF: Not complete ON: Complete	Y ²	N	N		
SB005E (85E5h, b14)	Remote device station initialization procedure execution status	Indicates the execution status of the initialization procedure. OFF: Not executed ON: Execution in progress	Y ¹	N	N		
SB005F (85E5h, b15)	Remote device station initialization procedure execution completion status	Indicates the execution completion status of the initialization procedure. OFF: Not complete ON: Complete	Y ¹	N	N		
SB0060 (85E6h, b0)	Host station mode	Indicates the mode setting status of the host station. OFF: Online (0) ON: Other than online (0)	Y	Y	Y		
SB0061 (85E6h, b1)	Host station type	Indicates the station type of the host station. OFF: Master station (station number 0) ON: Local station (station numbers 1-64)	Y	Y	N		
SB0062 (85E6h, b2)	Host standby master station setting status	Indicates whether or not the standby master station setting has been made for the host station. OFF: Not set ON: Set	Y	Y	Y		
SB0065 (85E6h, b5)	Host station's input data status for data link error station	Indicates the input status setting from a data link error station of the host station. OFF: Clear ON: Retain	Y	Y	N		
SB0066 (85E6h, b6)	Number of stations occupied by the host station	Indicates the setting status of the number of stations occupied by the host station.			N	Y	N
		No. of Occupied Stations	SB0066	SB0067			
SB0067 (85E6h, b7)		1 station	OFF	OFF			
		2 stations	OFF	ON			
		3 stations	ON	ON			
	4 stations	ON	OFF				
SB006A (85E6h, b10)	Switch setting status	Indicates the switch setting status. OFF: Normal ON: Setting error exists (The error code is stored in SW006A.)	Y	Y	Y		
SB006D (85E6h, b13)	Parameter setting status	Indicates the parameter setting status. OFF: Normal ON: Setting error exists (The error code is stored in SW0068.)	Y	Y	N		
SB006E (85E6h, b14)	Host station operation status	Indicates the host station operation status. OFF: Normal ON: Error	Y	Y	N		
SB0070 (85E7h, b0)	Master station information	Indicates the data link status. OFF: Master station based data link control ON: Standby master station based data link control	Y	Y	N		
SB0071 (85E7h, b1)	Standby master station information	Indicates whether or not a standby master station is present. OFF: Not present ON: Present	Y	Y	N		
SB0072 (85E7h, b2)	Scan mode setting information	Indicates the setting information of the scan mode. OFF: Asynchronous mode ON: Synchronous mode	Y	N	N		
SB0073 (85E7h, b3)	Specified operation status in the event of CPU down	Indicates the operation status specified by a parameter in the event the CPU goes down. OFF: Stop ON: Continue	Y	N	N		
SB0074 (85E7h, b4)	Reserved station specification status	Indicates the reserved station status specified by a parameter. (SW0074 to SW0077) OFF: No specification ON: Specification exists (Information stored in SW0074 to SW0077)	Y	Y	N		

Number	Name	Description	User Availability (Y: Available N: Not available)		
			Online		Offline
			Master Station	Local Station	
SB0075 (85E7h, b5)	Error invalid station specification status	Indicates the error invalid station status specified by a parameter. (SW0078-SW007B) OFF: No specification ON: Specification exists (Information stored in SW0078 to SW007B)	Y	Y	N
SB0076 (85E7h, b6)	Temporary error invalid station setting information	Indicates whether there is a temporary error invalid station setting. (SW007C-SW007F) OFF: No setting ON: Setting exists (Information stored in SW007C to SW007F)	Y	Y	N
SB0077 (85E7h, b7)	Parameter reception status	Indicates the reception status of the parameter sent from the master station. OFF: Reception complete ON: Reception not complete	N	Y	N
SB0079 (85E7h, b9)	Master station return specification information	Indicates whether the "station type" setting of the host station is set for "Master station" or "Master station (dual function compatible)". OFF: Master station ON: Master station (dual function compatible)	Y	N	N
SB007B (85E7h, b11)	Host master/standby master operation status	Indicates whether the host operates as the master or standby master station. OFF: Operates as the master station (Data link control in progress) ON: Operates as the standby master station (Standby in progress)	Y	Y	N
SB007C (85E7h, b12)	Device station refresh/forced clear specification status at PLC CPU STOP	Indicates the device station refresh/forced clear specification status at PLC CPU STOP based on parameters. OFF: Refresh ON: Forcibly clear	Y	N	N
SB0080 (85E8h, b0)	Other station data link status	Indicates the communication status with other local stations, standby master stations or intelligent device stations. OFF: All stations normal ON: Faulty station exists (Information stored in SW0080 to SW0083)	Y	Y	N
SB0081 (85E8h, b1)	Other station watchdog timer error status	Indicates a watchdog timer error status in other stations. (SW0084 to SW0087) OFF: No error ON: Error exists	Y	Y	N
SB0082 (85E8h, b2)	Other station fuse blown status	Indicates the fuse blown status at other stations. (SW0088 to SW008B) OFF: No error ON: Error exists	Y	Y	N
SB0083 (85E8h, b3)	Other station switch change status	Detects changes in setting switches of other stations during data link. (SW008C to SW008F) OFF: No change ON: Changed	Y	Y	N
SB0090 (85E9h, b0)	Host line status	Indicates the line status of the host. OFF: Normal ON: Error (line disconnection)	N	Y	N
SB0094 (85E9h, b4)	Transient transmission status	Indicates whether there is a transient transmission error. (SW0094 to SW0097) OFF: No error ON: Error exists	Y	Y	N
SB0095 (85E9h, b5)	Master station transient transmission status	Indicates the transient transmission status of the master station. OFF: Normal ON: Error	N	Y	N
SB00B4 (85Ebh, b4)	Standby master station test result	Stores the test result of Line Test 1 or Line Test 2. OFF: Normal ON: Error	Y	N	Y

*1: Applicable to master station only.

*2: Applicable to standby master station only.

Appendix 2 Link Special Register (SW)

The data link status of link special register is stored based on word information.
The two-port memory addresses 8600h to 87FFh correspond to SW0000 to SW01FF.

List of Link Special Register Areas

Number	Name	Description	User Availability (Y: Available N: Not available)		
			Online		Offline
			Master Station	Local Station	
SW0003 (8603h)	Multiple temporary error invalid stations specification	Specifies whether or not multiple temporary error invalid stations will be specified. 00: Specify the multiple stations indicated in SW0004 to SW0007 01 to 64: Specify a single station of 1 to 64 (The number specifies the station number that will be set as the temporary error invalid station.)	Y	N	N
SW0004 (8604h)	Temporary error invalid station specification ^{*1}	Specifies temporary error invalid station(s). 0: Not specified as a temporary error invalid station 1: Specified as a temporary error invalid station	Y	N	N
SW0005 (8605h)		b15 b14 b13 b12 to b3 b2 b1 b0			
SW0006 (8606h)		SW0004 16 15 14 13 to 4 3 2 1			
SW0007 (8607h)		SW0005 32 31 30 29 to 20 19 18 17			
		SW0006 48 47 46 45 to 36 35 34 33			
		SW0007 64 63 62 61 to 52 51 50 49			
		1 to 64: Station number			
SW0008 (8608h)	Line test station setting	Sets the station for which line tests are executed. 0: Entire system (executed for all stations) 01 to 64: Specified station Default value: 0	Y	N	N
SW0009 (8609h)	Monitoring time setting	Sets the monitoring time when dedicated instructions are used. Default value: 10 (seconds) Setting range: 0 to 360 (seconds) Set to 360 seconds when set out of range.	Y	Y	N
SW000A (860Ah)	CPU monitoring time setting	Sets the CPU response monitoring time when the CPU is accessed based on dedicated instructions. Default value: 90 (seconds) Setting range: 0 to 3600 (seconds) Set to 3600 seconds when set out of range.	Y	Y	N
SW0020 (8620h)	Module status	Indicates the module status. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	Y	Y
SW0041 (8641h)	Data link restart result	Stores the execution result of the data link restart instruction with SB0000. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	Y	N
SW0043 (8643h)	Result of refresh instruction at standby master switching	Indicates the execution result of the refresh instruction at standby master switching. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	N	N
SW0045 (8645h)	Data link stop result	Stores the execution result of the data-link stop instruction by SB0002. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	Y	N
SW0049 (8649h)	Temporary error invalid station specification result	Indicates the execution result of temporary error invalid station specification by SB0004. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	N	N
SW004B (864Bh)	Temporary error invalid station specification cancellation result	Indicates the execution result of temporary error invalid station specification cancellation by SB0005. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	N	N
SW004D (864Dh)	Line test result	Indicates the execution result of the line test by SB0008. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	N	N
SW004F (864Fh)	Parameter setting test result	Indicates the execution result of the parameter setting test by SB0009. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	N	N

Number	Name	Description	User Availability (Y: Available N: Not available)																																									
			Online		Offline																																							
			Master Station	Local Station																																								
SW0052 (8652h)	Automatic CC-Link startup execution result	Stores the system configuration check result when a new station is added to the system at automatic CC-Link startup. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	N	N																																							
SW0058 (8658h)	Detailed LED display status	Stores the LED display status details. 0: OFF 1: ON <table border="1"> <thead> <tr> <th>Bit</th> <th>Name</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>RUN</td> <td>The board operates normally.</td> </tr> <tr> <td>13</td> <td>ERR.</td> <td>An error exists.</td> </tr> <tr> <td>13</td> <td>MST</td> <td>The station is operating as a master station.</td> </tr> <tr> <td>12</td> <td>S MST</td> <td>The station is operating as a standby master station.</td> </tr> <tr> <td>11</td> <td>LOCAL</td> <td>The station is operating as a local station.</td> </tr> <tr> <td>10, 9</td> <td>-</td> <td>Not used</td> </tr> <tr> <td>8</td> <td>SW (ERROR)</td> <td>The setting is faulty.</td> </tr> <tr> <td>7</td> <td>M/S (ERROR)</td> <td>Multiple master stations exist on the same line.</td> </tr> <tr> <td>6</td> <td>PRM (ERROR)</td> <td>There is an error in the parameter settings.</td> </tr> <tr> <td>5</td> <td>TIME (ERROR)</td> <td>The cable is disconnected or the transmission path is affected by noise. Therefore, all stations do not return any response.</td> </tr> <tr> <td>4</td> <td>LINE (ERROR)</td> <td>The cable is disconnected or the transmission path is affected by noise.</td> </tr> <tr> <td>3 to 0</td> <td>-</td> <td>Not used</td> </tr> </tbody> </table>	Bit	Name	Description	15	RUN	The board operates normally.	13	ERR.	An error exists.	13	MST	The station is operating as a master station.	12	S MST	The station is operating as a standby master station.	11	LOCAL	The station is operating as a local station.	10, 9	-	Not used	8	SW (ERROR)	The setting is faulty.	7	M/S (ERROR)	Multiple master stations exist on the same line.	6	PRM (ERROR)	There is an error in the parameter settings.	5	TIME (ERROR)	The cable is disconnected or the transmission path is affected by noise. Therefore, all stations do not return any response.	4	LINE (ERROR)	The cable is disconnected or the transmission path is affected by noise.	3 to 0	-	Not used	Y	Y	Y
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SW0059 (8659h)	Transmission speed setting	Stores the content of the transmission speed setting. 0: Clear 1: Set <table border="1"> <thead> <tr> <th>Bit</th> <th>Name</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>156bps</td> </tr> <tr> <td>6</td> <td>625bps</td> </tr> <tr> <td>5</td> <td>2.5Mbps</td> </tr> <tr> <td>4</td> <td>5Mbps</td> </tr> <tr> <td>3</td> <td>10Mbps</td> </tr> </tbody> </table> Other than bits 7 to 3: Not used	Bit	Name	7	156bps	6	625bps	5	2.5Mbps	4	5Mbps	3	10Mbps	Y	Y	Y																											
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SW005D (865Dh)	Forced master switching instruction result	Stores the execution result of the forced master switching instruction by SB000C. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y ³	N	N																																							
SW005F (865Fh)	Remote device station initialization procedure registration instruction result	Stores the execution result of the SB000B based initialization procedure registration instruction. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y ²	N	N																																							
SW0060 (8660h)	Mode setting status	Stores the mode setting status. 0h: Online (Automatic return to system) 2h: Offline 3h: Line Test 1 4h: Line Test 2 6h: Hardware test	Y	Y	Y																																							
SW0061 (8661h)	Host station number	Stores the station number of the host that is currently in operation. 0: Master station 1 to 64: Local station	Y	Y	Y																																							

Number	Name	Description	User Availability (Y: Available N: Not available)																																
			Online		Offline																														
			Master Station	Local Station																															
SW0062 (8662h)	Module operation status	Stores the operation setting status of the CC-Link Ver. 2 board.	Y	Y	Y																														
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SW0064 (8664h)	Number of retries	Indicates the retry count setting information for error response. 1 to 7 (times)	Y	N	N																														
SW0065 (8665h)	Number of automatic return stations	Indicates the setting information for the number of automatic return stations during one link scan. 1 to 10 (stations)	Y	N	N																														
SW0066 (8666h)	Delay timer information	Indicates the setting information for the scan interval delay time. 0 to 100 (50µs)	Y	N	N																														
SW0067 (8667h)	Parameter information	Stores the parameter information area to be used. 0h: CPU built-in parameters 3h: Dedicated instruction (RLPASET instruction based parameter setting and data link startup) Dh: Default parameters (automatic CC-Link startup)	Y	N	Y																														
SW0068 (8668h)	Host station parameter status	Stores the parameter setting status. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	Y	N																														
SW0069 (8669h)	Mounting status ^{*4}	Stores the duplicate station number status and parameter matching status of each station. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.) Details are stored in SW0098 to SW009B and SW009C to SW009F.	Y	N	N																														
SW006A (866Ah)	Switch setting status	Stores the switch setting status. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	Y	Y	Y																														
SW006D (866Dh)	Maximum link scan time	Stores the maximum value of the link scan time (in 1ms units).	Y	Y	N																														
SW006E (866Eh)	Current link scan time	Stores the current value of the link scan time (in 1ms units).	Y	Y	N																														
SW006F (866Fh)	Minimum link scan time	Stores the minimum value of the link scan time (in 1ms units).	Y	Y	N																														
SW0070 (8670h)	Total number of stations	Stores the last station number set in the parameter. 1 to 64 (stations)	Y	N	N																														
SW0071 (8671h)	Largest station number of communicating stations	Stores the largest station number of the station that is performing data link. 1 to 64 (stations)	Y	N	N																														

Number	Name	Description	User Availability (Y: Available N: Not available)		
			Online		Offline
			Master Station	Local Station	
SW0072 (8672h)	Number of connected modules	Stores the number of connected modules that are performing data link.	Y	N	N
SW0073 (8673h)	Standby master station number	Stores the station number of the standby master station. 1 to 64 (stations)	Y	Y	N
SW0074 (8674h)	Reserved station specification status*1	Stores the reserved station setting status. 0: Other than reserved station 1: Reserved station	Y	Y	N
SW0075 (8675h)		b15 b14 b13 b12 to b3 b2 b1 b0			
SW0076 (8676h)		SW0074 16 15 14 13 to 4 3 2 1			
SW0077 (8677h)		SW0075 32 31 30 29 to 20 19 18 17			
		SW0076 48 47 46 45 to 36 35 34 33			
	SW0077 64 63 62 61 to 52 51 50 49	1 to 64: Station number			
SW0078 (8678h)	Error invalid station specification status*1	Stores the error invalid station setting status. 0: Other than error invalid station 1: Error invalid station	Y	Y	N
SW0079 (8679h)		b15 b14 b13 b12 to b3 b2 b1 b0			
SW007A (867Ah)		SW0078 16 15 14 13 to 4 3 2 1			
SW007B (867Bh)		SW0079 32 31 30 29 to 20 19 18 17			
		SW007A 48 47 46 45 to 36 35 34 33			
	SW007B 64 63 62 61 to 52 51 50 49	1 to 64: Station number			
SW007C (867Ch)	Temporary error invalid status*5	Indicates the temporary error invalid status. 0: Normal status 1: Temporary error invalid status	Y	Y	N
SW007D (867Dh)		b15 b14 b13 b12 to b3 b2 b1 b0			
SW007E (867Eh)		SW007C 16 15 14 13 to 4 3 2 1			
SW007F (867Fh)		SW007D 32 31 30 29 to 20 19 18 17			
		SW007E 48 47 46 45 to 36 35 34 33			
	SW007F 64 63 62 61 to 52 51 50 49	1 to 64: Station number			
SW0080 (8680h)	Other station data link status*5	Stores the data link status of each station. 0: Normal 1: Data link error occurred	Y	Y	N
SW0081 (8681h)		b15 b14 b13 b12 to b3 b2 b1 b0			
SW0082 (8682h)		SW0080 16 15 14 13 to 4 3 2 1			
SW0083 (8683h)		SW0081 32 31 30 29 to 20 19 18 17			
		SW0082 48 47 46 45 to 36 35 34 33			
	SW0083 64 63 62 61 to 52 51 50 49	1 to 64: Station number			
SW0084 (8684h)	Other station watchdog timer error status*1	Indicates the watchdog timer error status of each station. 0: No watchdog timer error 1: Watchdog timer error occurred	Y	Y	N
SW0085 (8685h)		b15 b14 b13 b12 to b3 b2 b1 b0			
SW0086 (8686h)		SW0084 16 15 14 13 to 4 3 2 1			
SW0087 (8687h)		SW0085 32 31 30 29 to 20 19 18 17			
		SW0086 48 47 46 45 to 36 35 34 33			
	SW0087 64 63 62 61 to 52 51 50 49	1 to 64: Station number			
SW0088 (8688h)	Other station fuse blown status*5	Stores the fuse blown status of each station. 0: Normal 1: Fuse blown	Y	Y	N
SW0089 (8689h)		b15 b14 b13 b12 to b3 b2 b1 b0			
SW008A (868Ah)		SW0088 16 15 14 13 to 4 3 2 1			
SW008B (868Bh)		SW0089 32 31 30 29 to 20 19 18 17			
		SW008A 48 47 46 45 to 36 35 34 33			
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Number	Name	Description	User Availability (Y: Available N: Not available)																																																							
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SW008C (868Ch) SW008D (868Dh) SW008E (868Eh) SW008F (868Fh)	Other station switch change status ^{*1}	<p>Indicates the switch change status of other stations in data link status.</p> <p>0: No change 1: Changed</p> <table border="1"> <thead> <tr> <th>b15</th> <th>b14</th> <th>b13</th> <th>b12</th> <th>to</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>b0</th> </tr> </thead> <tbody> <tr> <td>16</td> <td>15</td> <td>14</td> <td>13</td> <td>to</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> </tr> <tr> <td>32</td> <td>31</td> <td>30</td> <td>29</td> <td>to</td> <td>20</td> <td>19</td> <td>18</td> <td>17</td> </tr> <tr> <td>48</td> <td>47</td> <td>46</td> <td>45</td> <td>to</td> <td>36</td> <td>35</td> <td>34</td> <td>33</td> </tr> <tr> <td>64</td> <td>63</td> <td>62</td> <td>61</td> <td>to</td> <td>52</td> <td>51</td> <td>50</td> <td>49</td> </tr> </tbody> </table> <p>1 to 64: Station number</p>	b15	b14	b13	b12	to	b3	b2	b1	b0	16	15	14	13	to	4	3	2	1	32	31	30	29	to	20	19	18	17	48	47	46	45	to	36	35	34	33	64	63	62	61	to	52	51	50	49	Y	Y	N								
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SW0090 (8690h)	Line status	<p>Stores the line status.</p> <p>0: Normal 1: Data link disabled (line disconnection)</p>	N	Y	N																																																					
SW0094 (8694h) SW0095 (8695h) SW0096 (8696h) SW0097 (8697h)	Transient transmission status ^{*1}	<p>Indicates the transient transmission error status.</p> <p>0: No transient transmission error 1: Transient transmission error occurred</p> <table border="1"> <thead> <tr> <th>b15</th> <th>b14</th> <th>b13</th> <th>b12</th> <th>to</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>b0</th> </tr> </thead> <tbody> <tr> <td>16</td> <td>15</td> <td>14</td> <td>13</td> <td>to</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> </tr> <tr> <td>32</td> <td>31</td> <td>30</td> <td>29</td> <td>to</td> <td>20</td> <td>19</td> <td>18</td> <td>17</td> </tr> <tr> <td>48</td> <td>47</td> <td>46</td> <td>45</td> <td>to</td> <td>36</td> <td>35</td> <td>34</td> <td>33</td> </tr> <tr> <td>64</td> <td>63</td> <td>62</td> <td>61</td> <td>to</td> <td>52</td> <td>51</td> <td>50</td> <td>49</td> </tr> </tbody> </table> <p>1 to 64: Station number</p>	b15	b14	b13	b12	to	b3	b2	b1	b0	16	15	14	13	to	4	3	2	1	32	31	30	29	to	20	19	18	17	48	47	46	45	to	36	35	34	33	64	63	62	61	to	52	51	50	49	Y	Y	N								
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SW0098 (8698h) SW0099 (8699h) SW009A (869Ah) SW009B (869Bh)	Station number duplication status ^{*6}	<p>Stores the duplication status when the first station number of each module is not duplicated.</p> <p>0: Normal 1: Station number duplicated (first station number only)</p> <table border="1"> <thead> <tr> <th>b15</th> <th>b14</th> <th>b13</th> <th>b12</th> <th>to</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>b0</th> </tr> </thead> <tbody> <tr> <td>16</td> <td>15</td> <td>14</td> <td>13</td> <td>to</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> </tr> <tr> <td>32</td> <td>31</td> <td>30</td> <td>29</td> <td>to</td> <td>20</td> <td>19</td> <td>18</td> <td>17</td> </tr> <tr> <td>48</td> <td>47</td> <td>46</td> <td>45</td> <td>to</td> <td>36</td> <td>35</td> <td>34</td> <td>33</td> </tr> <tr> <td>64</td> <td>63</td> <td>62</td> <td>61</td> <td>to</td> <td>52</td> <td>51</td> <td>50</td> <td>49</td> </tr> </tbody> </table> <p>1 to 64: Station number</p>	b15	b14	b13	b12	to	b3	b2	b1	b0	16	15	14	13	to	4	3	2	1	32	31	30	29	to	20	19	18	17	48	47	46	45	to	36	35	34	33	64	63	62	61	to	52	51	50	49	Y	N	N								
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SW009C (869Ch) SW009D (869Dh) SW009E (869Eh) SW009F (869Fh)	Mounting/Parameter consistency status ^{*6}	<p>Stores the parameter consistency status.</p> <p>A consistency error occurs in the following cases: [1] Inconsistency in station type* [2] Inconsistency in number of occupied stations [3] Inconsistency in extended cyclic setting* [4] Inconsistency in CC-Link compatible version.</p> <p>* When mounting \leq parameter, a consistency error does not occur. (For example, when the mounted station is a remote device station and the parameter indicates an intelligent device station, a consistency error does not occur.)</p> <p>Example of consistency error</p> <table border="1"> <thead> <tr> <th>Mounting</th> <th>Parameter</th> </tr> </thead> <tbody> <tr> <td>Remote device station</td> <td>Remote I/O station</td> </tr> <tr> <td>Intelligent device station</td> <td>Remote I/O station</td> </tr> <tr> <td></td> <td>Remote device station</td> </tr> </tbody> </table> <p>0: Normal 1: Consistency error</p> <table border="1"> <thead> <tr> <th>b15</th> <th>b14</th> <th>b13</th> <th>b12</th> <th>to</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>b0</th> </tr> </thead> <tbody> <tr> <td>16</td> <td>15</td> <td>14</td> <td>13</td> <td>to</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> </tr> <tr> <td>32</td> <td>31</td> <td>30</td> <td>29</td> <td>to</td> <td>20</td> <td>19</td> <td>18</td> <td>17</td> </tr> <tr> <td>48</td> <td>47</td> <td>46</td> <td>45</td> <td>to</td> <td>36</td> <td>35</td> <td>34</td> <td>33</td> </tr> <tr> <td>64</td> <td>63</td> <td>62</td> <td>61</td> <td>to</td> <td>52</td> <td>51</td> <td>50</td> <td>49</td> </tr> </tbody> </table> <p>1 to 64: Station number</p>	Mounting	Parameter	Remote device station	Remote I/O station	Intelligent device station	Remote I/O station		Remote device station	b15	b14	b13	b12	to	b3	b2	b1	b0	16	15	14	13	to	4	3	2	1	32	31	30	29	to	20	19	18	17	48	47	46	45	to	36	35	34	33	64	63	62	61	to	52	51	50	49	Y	N	N
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Number	Name	Description	User Availability (Y: Available N: Not available)																																																													
			Online		Offline																																																											
			Master Station	Local Station																																																												
SW00B4 (86B4h) SW00B5 (86B5h) SW00B6 (86B6h) SW00B7 (86B7h)	Line test 1 result*5	Stores the result of line test 1. 0: Normal 1: Error <table border="1"> <thead> <tr> <th></th> <th>b15</th> <th>b14</th> <th>b13</th> <th>b12</th> <th>to</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>b0</th> </tr> </thead> <tbody> <tr> <td>SW00B4</td> <td>16</td> <td>15</td> <td>14</td> <td>13</td> <td>to</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> </tr> <tr> <td>SW00B5</td> <td>32</td> <td>31</td> <td>30</td> <td>29</td> <td>to</td> <td>20</td> <td>19</td> <td>18</td> <td>17</td> </tr> <tr> <td>SW00B6</td> <td>48</td> <td>47</td> <td>46</td> <td>45</td> <td>to</td> <td>36</td> <td>35</td> <td>34</td> <td>33</td> </tr> <tr> <td>SW00B7</td> <td>64</td> <td>63</td> <td>62</td> <td>61</td> <td>to</td> <td>52</td> <td>51</td> <td>50</td> <td>49</td> </tr> </tbody> </table> 1 to 64: Station number		b15	b14	b13	b12	to	b3	b2	b1	b0	SW00B4	16	15	14	13	to	4	3	2	1	SW00B5	32	31	30	29	to	20	19	18	17	SW00B6	48	47	46	45	to	36	35	34	33	SW00B7	64	63	62	61	to	52	51	50	49	Y	N	Y									
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SW00B8 (86B8h)	Line test result	Stores the result of line test 1 / line test 2. 0: Normal Other than 0: Stores an error code. (Refer to Section 3.1.)	N	N	Y																																																											
SW0140 (8740h) SW0141 (8741h) SW0142 (8742h) SW0143 (8743h)	Compatible CC-Link Ver. Information*6	Indicates CC-Link Ver. 2 compatible device stations. 0: Ver. 1 compatible device station 1: Ver. 2 compatible device station <table border="1"> <thead> <tr> <th></th> <th>b15</th> <th>b14</th> <th>b13</th> <th>b12</th> <th>to</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>b0</th> </tr> </thead> <tbody> <tr> <td>SW0140</td> <td>16</td> <td>15</td> <td>14</td> <td>13</td> <td>to</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> </tr> <tr> <td>SW0141</td> <td>32</td> <td>31</td> <td>30</td> <td>29</td> <td>to</td> <td>20</td> <td>19</td> <td>18</td> <td>17</td> </tr> <tr> <td>SW0142</td> <td>48</td> <td>47</td> <td>46</td> <td>45</td> <td>to</td> <td>36</td> <td>35</td> <td>34</td> <td>33</td> </tr> <tr> <td>SW0143</td> <td>64</td> <td>63</td> <td>62</td> <td>61</td> <td>to</td> <td>52</td> <td>51</td> <td>50</td> <td>49</td> </tr> </tbody> </table> 1 to 64: Station number		b15	b14	b13	b12	to	b3	b2	b1	b0	SW0140	16	15	14	13	to	4	3	2	1	SW0141	32	31	30	29	to	20	19	18	17	SW0142	48	47	46	45	to	36	35	34	33	SW0143	64	63	62	61	to	52	51	50	49	Y	N	N									
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SW0144 (8744h) SW0145 (8745h) SW0146 (8746h) SW0147 (8747h)	CC-Link Ver. mounting/parameter consistency status*6	Stores the consistency status of the CC-Link Version of the device station with parameters. Example of consistency error <table border="1"> <thead> <tr> <th colspan="2">Mounting</th> <th>Parameter</th> </tr> </thead> <tbody> <tr> <td colspan="2">Ver. 2 compatible remote device station</td> <td>Ver. 1 compatible remote device station</td> </tr> <tr> <td colspan="2">Ver. 1 compatible remote device station</td> <td>Ver. 2 compatible remote device station</td> </tr> </tbody> </table> 0: Normal 1: Consistency error <table border="1"> <thead> <tr> <th></th> <th>b15</th> <th>b14</th> <th>b13</th> <th>b12</th> <th>to</th> <th>b3</th> <th>b2</th> <th>b1</th> <th>b0</th> </tr> </thead> <tbody> <tr> <td>SW0144</td> <td>16</td> <td>15</td> <td>14</td> <td>13</td> <td>to</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> </tr> <tr> <td>SW0145</td> <td>32</td> <td>31</td> <td>30</td> <td>29</td> <td>to</td> <td>20</td> <td>19</td> <td>18</td> <td>17</td> </tr> <tr> <td>SW0146</td> <td>48</td> <td>47</td> <td>46</td> <td>45</td> <td>to</td> <td>36</td> <td>35</td> <td>34</td> <td>33</td> </tr> <tr> <td>SW0147</td> <td>64</td> <td>63</td> <td>62</td> <td>61</td> <td>to</td> <td>52</td> <td>51</td> <td>50</td> <td>49</td> </tr> </tbody> </table> 1 to 64: Station number	Mounting		Parameter	Ver. 2 compatible remote device station		Ver. 1 compatible remote device station	Ver. 1 compatible remote device station		Ver. 2 compatible remote device station		b15	b14	b13	b12	to	b3	b2	b1	b0	SW0144	16	15	14	13	to	4	3	2	1	SW0145	32	31	30	29	to	20	19	18	17	SW0146	48	47	46	45	to	36	35	34	33	SW0147	64	63	62	61	to	52	51	50	49	Y	N	N
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SW0147	64	63	62	61	to	52	51	50	49																																																							
SW0148 (8748h)	Parameter mode	Indicates the mode in which the system is operating. 0: Remote net Ver. 1 mode 1: Remote net addition mode 2: Remote net Ver. 2 mode	Y	Y	N																																																											
SW0149 (8749h)	Host station parameter mode	Indicates the mode in which the host station is operating. 0: Remote net Ver. 1 mode 1: Remote net addition mode 2: Remote net Ver. 2 mode	Y	Y	Y																																																											

*1: Only the head station number bit turns ON.

*2: Applicable to standby master station only.

*3: Applicable to master station only.

*4: Checked and stored at link startup only.

*5: The bit for the number of occupied stations turns ON.

*6: Only the head station number bit turns ON. Checked and stored at link startup only.

The timing in which the data of the link special register (SW) is updated differs according to number. The following table indicates the different update timings.

Link special register update timings

Link Special Register	Data Update Timing	Link Special Register	Data Update Timing	
SW0041	Independently updated regardless of SB.	SW0071	Independently updated regardless of SB. (Updated after each station becomes stable.)	
SW0045		SW0072		
SW0060	When SB0060 changes	SW0074 to SW0077	When SB0074 changes	
SW0061	When SB0061 changes	SW0078 to SW007B	When SB0075 changes	
SW0062	Independently updated regardless of SB.	SW0080 to SW0083	When SB0080 changes	
SW0067		SW0088 to SW008B	Independently updated regardless of SB.	
SW0068		SW0090	When SB0090 changes	
SW0069		SW0098 to SW009B	Independently updated regardless of SB.	
SW006A		SW009C to SW009F		
SW006D		SW00B4 to SW00B7		
SW006E		SW00B8		
SW006F		SW00B9		
SW0070		-	-	-

REVISIONS

* The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
April 2005	SH(NA)-080702ENG-A	First Edition
September 2006	SH(NA)-080702ENG-B	Modified Section 4.2, Section 4.3.2, Section 6.2, Sample Code Added Appendix (SB/SW Area)
August 2008	SH(NA)-080702ENG-C	Modified Section 1.1, Section 4.5.2, Section 4.5.3, Section 5.2, Section 5.3, Section 5.4.4, Section 5.4.5, Section 6.2, Section 6.3
March 2021	SH(NA)-080702ENG-D	Added model Q81BD-J61BT11 Overall modification
January 2022	SH(NA)-080702ENG-E	Modified Section 2.2.3, Section 2.3.3
September 2023	SH(NA)-080702ENG-F	Modified Safety Precautions, Conditions of Use for the Product, Usage Precautions
July 2024	SH(NA)-080702ENG-G	Modified Terms

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents in this manual.

Warranty

Please confirm the following product warranty details before using the personal computer board.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be replaced at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion.

Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for thirty-six (36) months after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be forty-two (42) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

- (1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
- (2) Even within the gratis warranty term, a replacement fee shall be applied in the following cases.
 - [1] Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
 - [2] Failure caused by unapproved modifications, etc., to the product by the user.
 - [3] When the Mitsubishi product is assembled into a user's device, failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
 - [4] Failure caused by external irresistible forces such as fires or abnormal voltages, and failure caused by force majeure such as earthquakes, lightning, wind and water damage.
 - [5] Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
 - [6] Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

- (1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
- (2) Product supply (including repair parts) is not available after production is discontinued.

3. Customer service

- (1) When the cause of failure requires an investigation, Mitsubishi shall conduct the investigation using the personal computer board unit only. Please bring the personal computer board removed from the product to which it was incorporated to Mitsubishi. Mitsubishi will not conduct business travel in connection with the investigation.
- (2) Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

- (1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
- (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
- (3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
- (4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals, and technical documents are subject to change without prior notice.

Trademarks

PCI Express is either a registered trademark or a trademark of PCI-SIG.

The company names, system names and product names mentioned in this manual are either registered trademarks or trademarks of their respective companies.

In some cases, trademark symbols such as '™' or '®' are not specified in this manual.

SH(NA)-080702ENG-G(2407)MEE

MODEL: CC-LINK-DRIVER-R-E

MODEL CODE: 13JV19

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA 461-8670, JAPAN

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Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.