

V600 RFID System

V600-CA1A-V

V600-CA2A-V

Serial Interface ID Controller

OPERATION MANUAL

OMRON

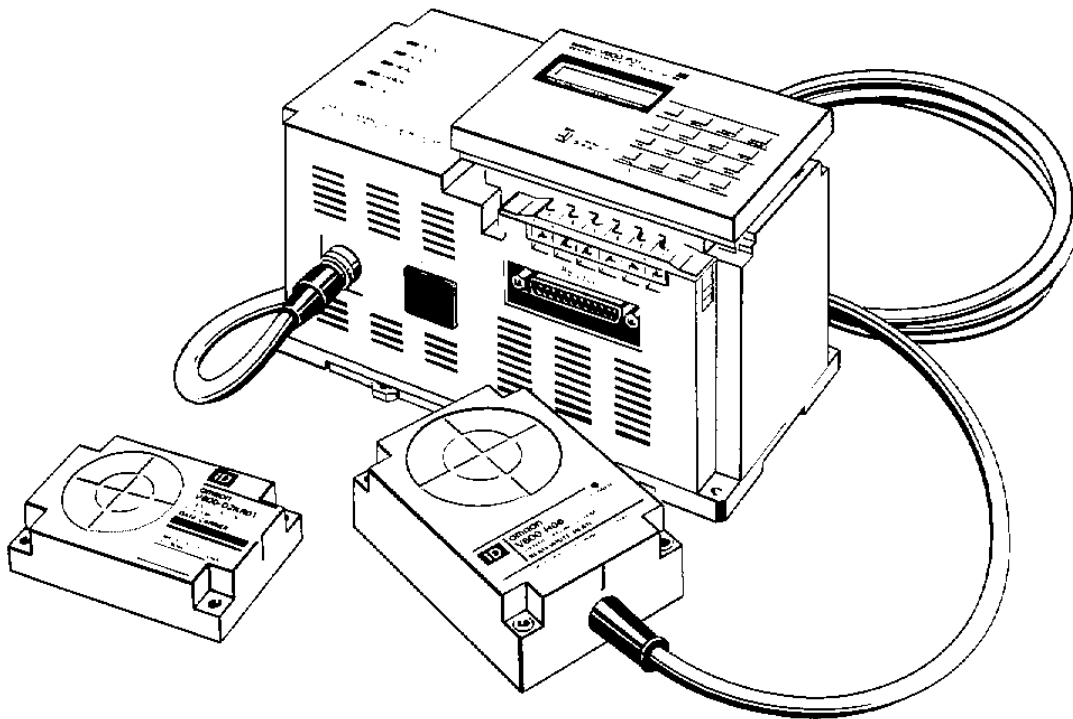
V600 RFID System

V600-CA1A-V□/V600-CA2A-V□

Serial Interface ID Controller

Operation Manual

Revised April 2004



Read and Understand this Manual

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

Warranty, Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this instruction manual.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

Meanings of Signal Words

The following signal words are used in this operation manual.



Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

Meanings of Alert Symbols

The following alert symbols are used in this manual.



Indicates the possibility of explosion under specific conditions.

Alert Statements in this Manual

The following alert statements apply to the products in this manual. Each alert statement also appears at the locations needed in this manual to attract your attention.



Do not attempt to take a SRAM Data Carrier apart or expose the SRAM Data Carrier to pressures that would distort it, temperatures above 100°C, or fire. The Data Carrier has a built-in lithium battery which may catch fire or explode if not handled properly.



Precautions for Safe Use

To ensure safety, be sure to follow the following precautions:

1. Do not operate this device in any flammable, explosive, or corrosive gas environment.
2. Do not disassemble, repair, or remodel this device.
3. Tighten the base lock screws and terminal block screws completely.
4. Be sure to use wiring crimp terminals of the specified size.
5. If any cable has a locking mechanism, be sure to check that it has been locked before using it.
6. The power supply must be within the specified rating.
7. Be sure to follow any other warnings, cautions, and notices given in this manual.
8. In the event that the system gives out a foul smell, is heated abnormally in the main body portion, emits smoke, or exhibits any other abnormal condition, immediately stop using the system and turn off the power.
9. Dispose of this product as industrial waste.

Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunctions, or undesirable effects on product performance.

Installation Site

Install the product at a location where:

- It is not exposed to corrosive gases, dust, metal chips, or salt.
- The working temperature is within the range stipulated in the specifications.
- There are no sudden variations in temperature (no condensation).
- The relative humidity is within the range stipulated in the specifications.
- No vibration or shock exceeding the values stipulated in the specifications is transmitted directly to the body of the product.
- It is not subject to splashing water, oil, or chemical substances.

Installation

- 530 kHz frequency band to communicate with ID Tags. Some devices, such as some transceivers, motors, inverters, switching power supplies, and monitoring devices, generate electromagnetic waves (i.e., noise) that can affect communications with ID Tags. If any of these devices are nearby, communications with Data Carriers may be affected or Data Carriers may be destroyed. If the product is to be used near such devices, check the effects on communications before using the product.
- To minimize the general influence of noise, follow the following precautions:
 - (1) Ground any metallic material located around this device to 100 Ω or less.
 - (2) Wire this device keeping the wiring away from high voltage and heavy current.
- Connectors are not waterproof. Do not use the product in a humid environment.
- Do not use any chemical that may affect the materials of the product.

Cleaning

- Do not use any thinner. Resin material and case paint are dissolved by thinner.

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No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

TABLE OF CONTENTS

SECTION 1	
Features and System Configuration	1
1-1 Features	2
1-2 System Configuration	2
1-3 Operation	5
SECTION 2	
Nomenclature and Specifications	7
2-1 V600-CA□A-V□ ID Controller	8
2-2 Monitor Unit	12
SECTION 3	
Communications with Host Computer	13
3-1 Data Carrier Motion and Command Conditions	14
3-2 Data Carrier Memory Map	21
3-3 Command Format	29
3-4 Command Types and Responses	34
3-5 Communication Time	47
3-6 Communications Program Example	49
SECTION 4	
Monitor Unit Operation	51
4-1 Using Monitor Unit (V600-P01)	52
4-2 Monitor Unit Operation List	55
4-3 Basic Operations	57
4-4 Data Read and Write Operations	61
4-5 Operation Test (TEST)	65
4-6 Reading Error Information (ERR)	70
SECTION 5	
Installation and Wiring	75
5-1 Installation Environment	76
5-2 ID Controller Installation	76
5-3 Wiring Procedures	78
5-4 DIP Switch Settings	81
5-5 RS-232C Interface	84
5-6 RS-422 Interface	86
SECTION 6	
Diagnosis and Maintenance	91
6-1 Test Operation	92
6-2 Diagnostic Functions	93
6-3 Error Lists	95
6-4 Dealing with Abnormalities	97
6-5 Maintenance and Inspections	97
6-6 Troubleshooting	99
Appendices	
A Standard Models	105
B Codes	107
C Auto Read/Auto Write	109
D Conformity to Standards	111
Revision History	115

About this Manual:

This manual describes the installation and operation of the V600 RFID System with serial interface and the ID Controller and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the V600 RFID System with serial interface and the ID Controller.

Section 1 provides a general introduction to the V600 RFID System with serial interface and the ID Controller.

Section 2 provides the V600-CA1A-V□/CA2A-V□ nomenclature and specifications as well as the dimensions of both Units.

Section 3 provides procedures and formats required for communications with the host computer. A program example is also provided.

Section 4 provides the commands and procedures required for Monitor Unit operations.

Section 5 provides installation and pre-operation setting procedures.

Section 6 provides diagnosis and maintenance procedures as well as solutions to possible problems and abnormalities.

The **Appendices** contain information relating to standard models, ASCII codes, and Auto Read/Auto Write operations.



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

SECTION 1

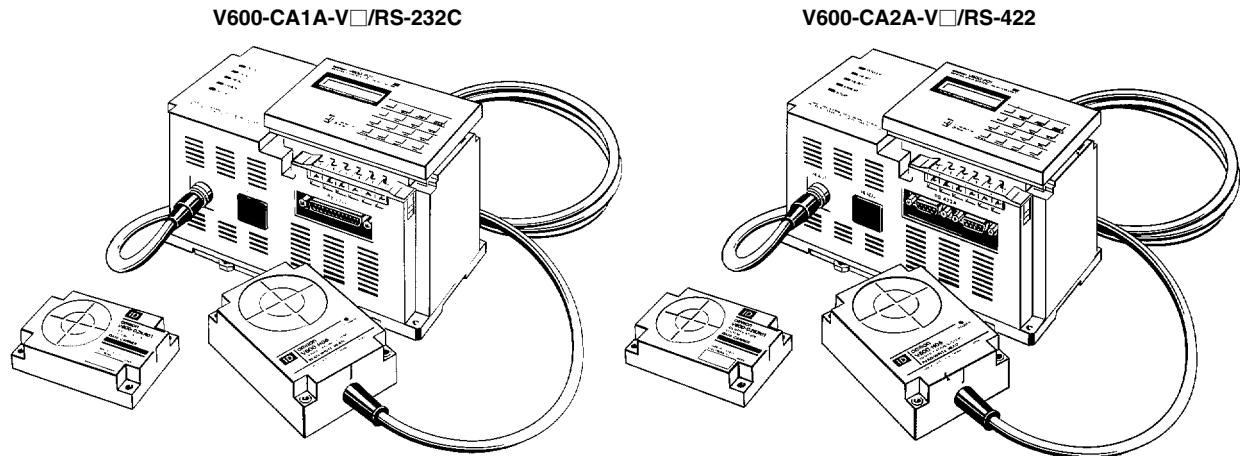
Features and System Configuration

This section provides a general introduction to the V600 RFID System with serial interface and the ID Controller.

1-1	Features	2
1-2	System Configuration	2
1-2-1	System Configuration for 1 to N Connection	4
1-3	Operation	5

1-1 Features

The V600 RFID System adopts electromagnetic coupling enabling contactless data communications. It can significantly enhance factory automation (FA) systems incorporating large-scale decentralized control systems and small lot production systems.



V600-CA1A-V□/RS-232C

The V600-CA1A-V□ includes an RS-232C interface enabling connection to a general-purpose factory computer, or IBM PC/AT or compatible. This makes it possible to process and manipulate large volumes of data with ease using simple commands.

V600-CA2A-V□/RS-422

The V600-CA2A-V□ includes an RS-422 interface enabling connection to a general-purpose factory computer, or IBM PC/AT or compatible. This connection allows high-speed transmissions of 19.2k bps over long distances of up to 500 m. The V600-CA2A-V□ is highly resistant to noise because the RS-422 interface and the power supply circuit are insulated from each other.

1 to 1 and 1 to N Connections 1 to 1 and 1 to N (maximum 16 Units) are possible. It is possible to add horizontal parity as a FCS (frame check sequence), in addition to vertical parity in the 1 to N mode, which improves the reliability of the host communications path.

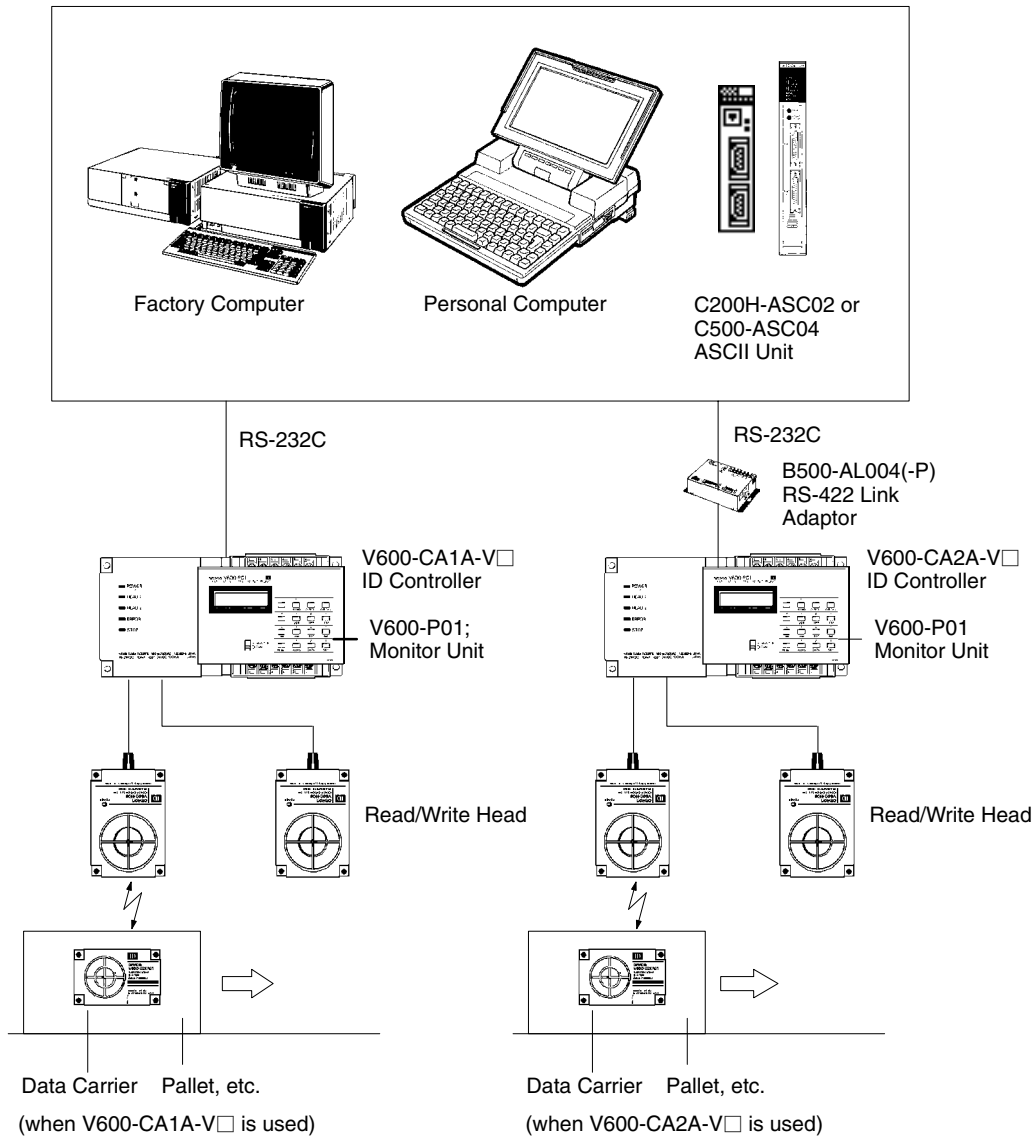
Easy to Use

- Safety is ensured with powerful check functions such as an innovative error logging function which records the 30 most current operational errors.
- An optional Monitor Unit can be mounted on the ID Controller for the off-line monitoring of system operations and reading of error log data and error messages, thus improving system start-up and on-site maintenance.
- Two Read/Write Heads can be connected to one ID Controller providing flexibility for sophisticated production systems.

1-2 System Configuration

The V600-CA1A-V□ ID Controller has a built-in serial interface conforming to RS-232C, while the V600-CA2A-V□ ID Controller has a built-in serial interface conforming to RS-422. These interfaces enable communications with general-purpose factory computers, IBM PC/AT or compatible, and C200H-ASC02 or C500H-ASC04 ASCII Unit installed in an OMRON PC.

All communications processing is controlled in the operational mode of the host computer's command language (IBM PC/AT or compatible).



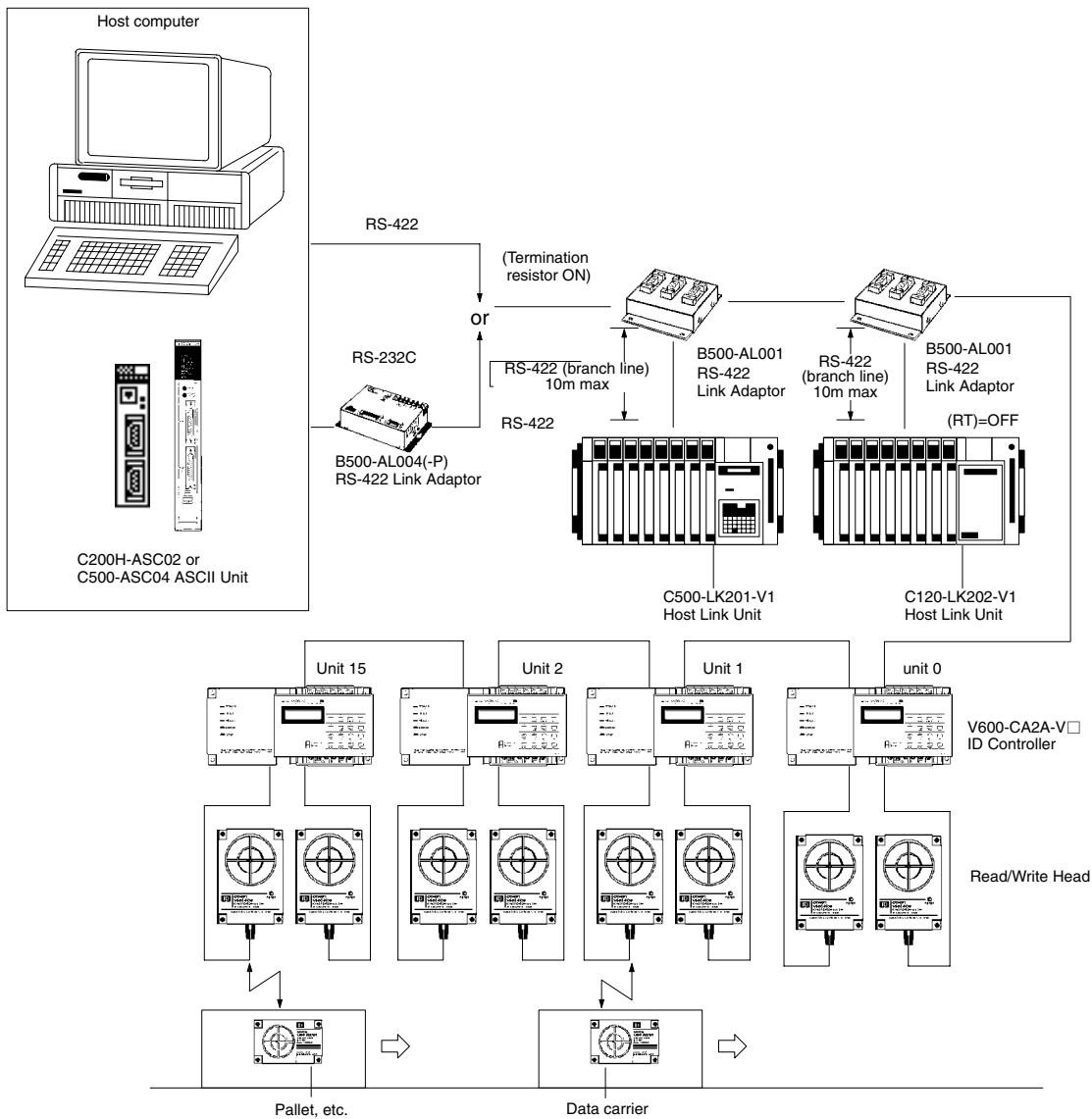
Read/Write Head (R/W Head) The R/W Head enables contactless communications with a Data Carrier (DC) mounted on a stationary or moving pallet or other means of conveyance. The epoxy resin mold makes it highly durable, maintenance free, and ensures stable operation.

Data Carrier (DC) The Data Carrier can record data such as production indicators, and data can be read or written at any time using the Read/Write Head. The DC is molded with epoxy resin to withstand severe operating conditions and is sufficiently compact to be attached anywhere.

Monitor Unit This convenient monitoring tool enables the user to communicate with DCs without connecting to a host computer, as well as allowing readout of error conditions. Refer to *Section 4 Monitor Unit Operation*.

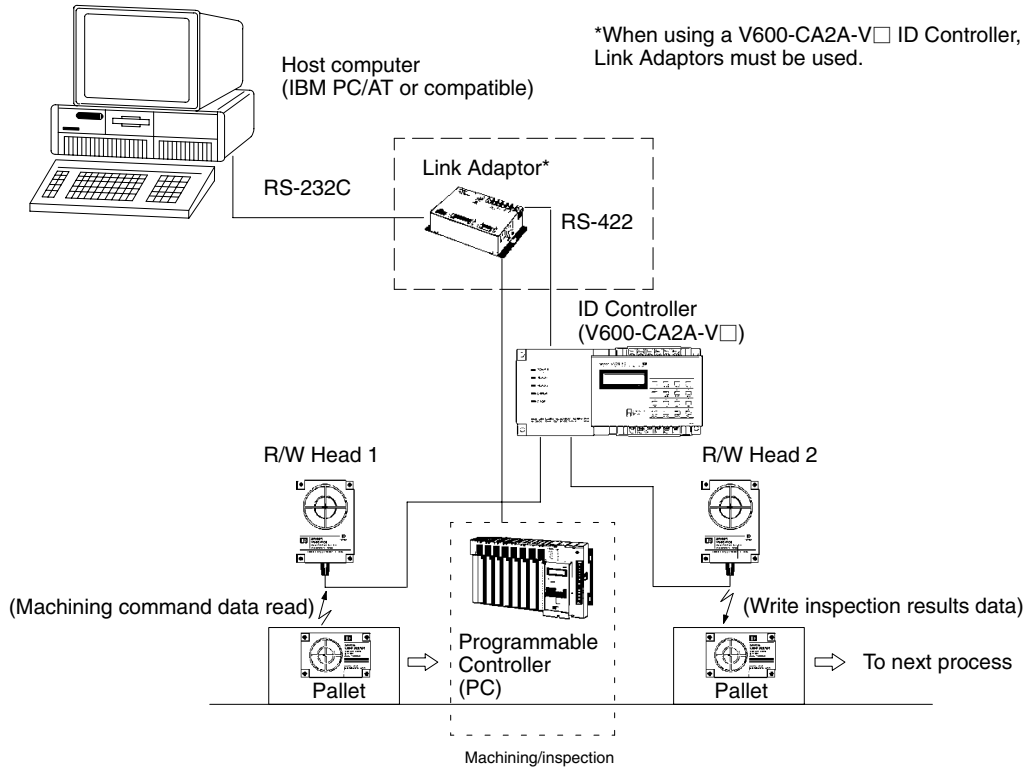
1-2-1 System Configuration for 1 to N Connection

This system configuration is available only with the V600-CA2A-V□. Up to 16 ID Controllers can be connected using the 1 to N configuration.



- Note**
1. Use communications cables with a maximum total length of 500 m.
 2. Attach B500-AL004(-P) Link Adaptors to both ends of the communications cable and turn on the ID Controller termination resistor. Turn off the intermediate ID Controller and the Host Link Unit.
 3. When using a host computer with a built-in RS-422 interface, turn on only the termination resistor of the terminal ID Controller.

1-3 Operation



- 1, 2, 3...**
1. When a command is sent from the host computer to the ID Controller, R/W Head 1 enters the waiting condition and waits for the arrival of the DC. The command data at this time specifies the memory area from which data is to be read by R/W Head 1.
 2. When the DC arrives within communications range of R/W Head 1, the data (format and machining/inspection command data) in the memory area indicated by the read command is sent to the host computer as the response.
 3. Based on the response data, the host computer transmits the workpiece machining/inspection command to the PC.
 4. Once operations in the machining/inspection process have been completed, machining/inspection results data is sent from the PC to the IBM PC/AT or compatible.
 5. The host computer sends a write command to the ID Controller, and this time R/W Head 2 waits for arrival of the DC. This command sets the memory area to which R/W Head 2 is to write data and set the machining/inspection results data.
 6. When the DC arrives in the R/W Head 2 communications range, the machining/inspection results data is written to the memory area specified by the DC.

SECTION 2

Nomenclature and Specifications

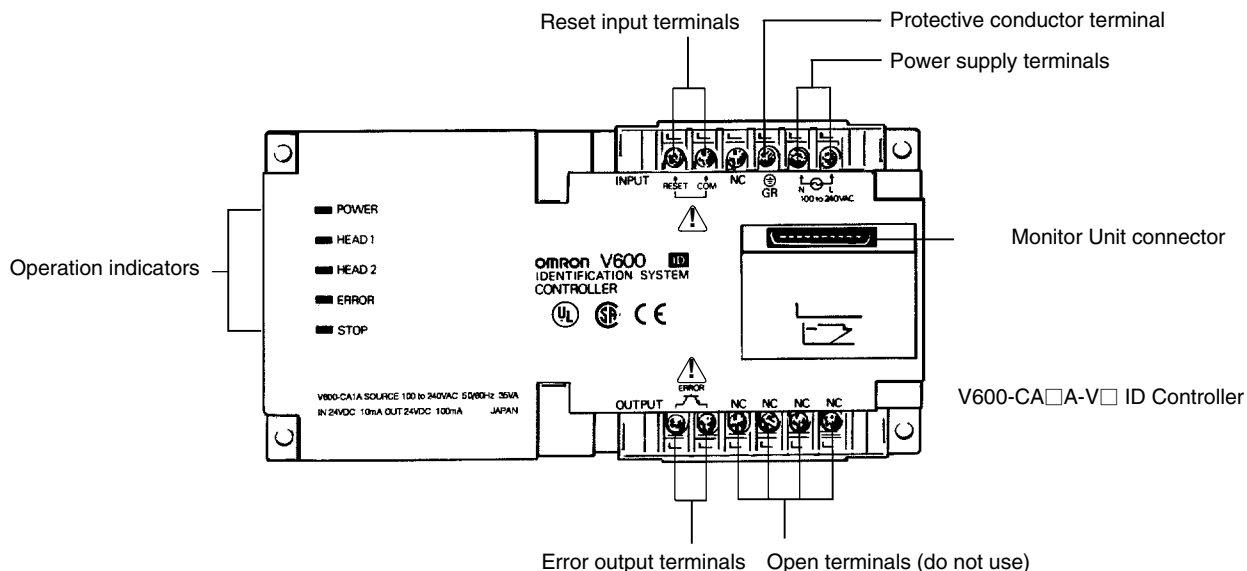
This section provides the V600-CA1A-V□/CA2A-V□ nomenclature and specifications as well as the dimensions of both Units.

2-1	V600-CA□A-V□ ID Controller	8
2-1-1	Nomenclature	8
2-1-2	Specifications	10
2-1-3	External Input/Output Specifications	11
2-1-4	Dimensions	11
2-1-5	Host Computer Communications Specifications	12
2-2	Monitor Unit	12
2-2-1	General Specifications	12
2-2-2	Dimensions	12

2-1 V600-CA□A-V□ ID Controller

2-1-1 Nomenclature

Front Panel




Note Where there is no reference to the “V600-CA1A-V□ only” or the “V600-CA2A-V□ only” is given, all information in this section is common to both.

Operation Indicators

Name	Description
POWER (green)	Lit when power is applied.
HEAD 1 (green)	Lit when R/W Head 1 is communicating.
HEAD 2 (green)	Lit when R/W Head 2 is communicating.
ERROR (red)	Lit when an ID Controller operation stop error (CPU error, memory error) is detected, or when an error in communications with an IBM PC/AT or compatible or with R/W Heads is detected. Error messages can be read from the host computer or Monitor Unit.
STOP (red)	Lit when an operation stop error (CPU error, memory error) occurs, or when an external reset input is received.

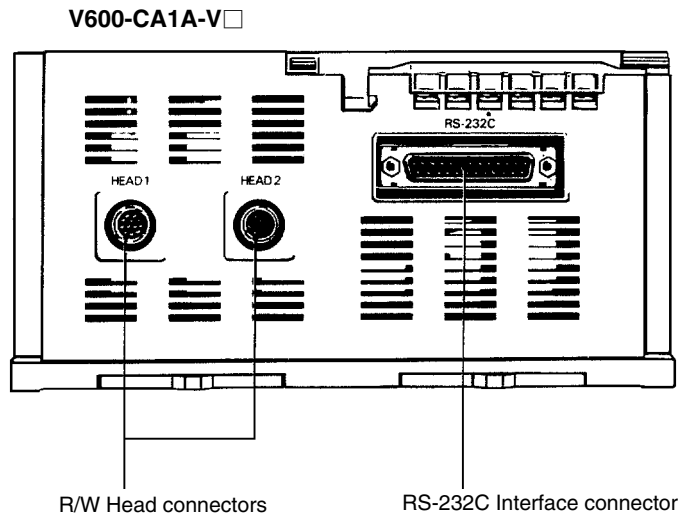
Terminal Connections

Name	Description
100 to 240 VAC	Connection for the 100 to 240 VAC (50/60 Hz) power supply.
GR 	Protective conductor terminal. Connect a dedicated ground cable here and ground at a resistance of less than 100 Ω.
RESET/COM	Emergency stop external reset input. Use a 24-VDC power supply.
ERROR	External output terminal for error signals when an operation stop error is detected. Connect via a 24-VDC relay or similar device.

V600-CA1A-V□ Side Panel

R/W Head Connector Up to two R/W Heads can be connected.

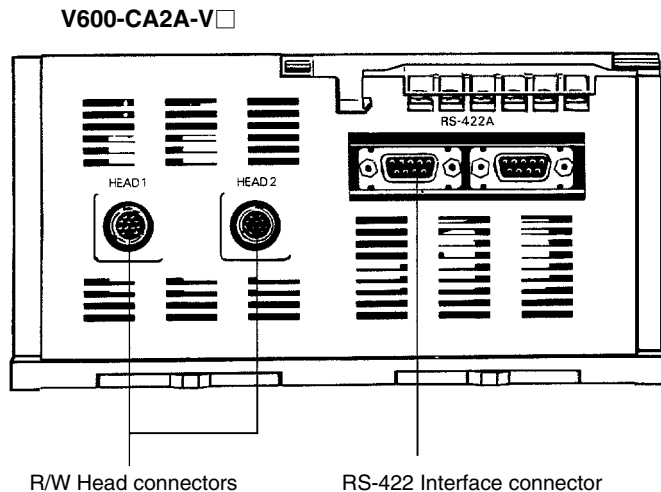
RS-232C Interface Connector Used for communications with the host computer. It can be used for connection with a general-purpose factory computer, or IBM PC/AT or compatible that conforms to RS-232C. Use the connector provided as an accessory with the Unit when making the connection (refer to page 84 for details on interface connection).



V600-CA2A-V□ Side Panel

R/W Head Connector Up to two R/W Heads can be connected.

RS-422 Interface Connector Used for communications with the host computer. The RS-422 Interface can be used for connection to general-purpose computers, or IBM PC/AT or compatible. Use the connector plug provided as an accessory with the Unit when making the connection (see page 86 for the connector assembly method).



2-1-2 Specifications

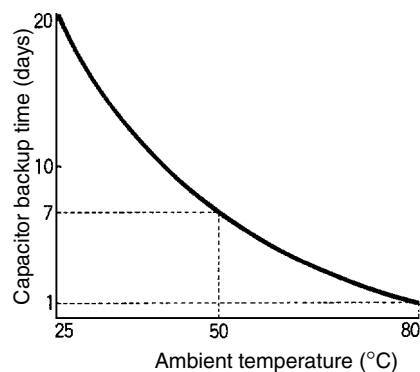
Ratings

Parameter	Specifications	
Supply voltage	100 to 240 VAC, 50/60 Hz	
Permissible variation range of supply voltage	85 to 264 VAC	
Current consumption	35 VA max.	
Insulation resistance	50 M Ω min. at 500 VDC between power supply terminals and case; between input/output terminals and case; between power supply terminals and input/output terminals	
Dielectric strength	For all combinations given above: 1,500 VAC 50/60 Hz for 1 minute, leakage current: 10 mA max.	
Noise resistance	1,500 Vp-p, pulse width: 100 ns to 1 μ s, rise time: 1 ns	
Vibration resistance	Mechanical	10 to 150 Hz with 0.3-mm double amplitude for 32 minutes in X, Y, and Z directions
	Malfunction	10 to 150 Hz with 0.2-mm double amplitude for 32 minutes in X, Y, and Z directions
Shock resistance	19.6 m/s ² , three times in X, Y, and Z directions	
Ambient operating temperature	-10°C to 55°C	
Ambient operating humidity	35% to 85% (with no condensation)	
Ambient environment	With no corrosive gases	
Storage temperature	-25 to 65°C	
Protection class	Class I (with protective conductor terminal)	
Degree of protection	IEC60529: IP20 (in-panel)	
Applicable standards	IEC1010-1, EN61010-1, UL3101, CSA1010.1, FCC Part 15 Subpart B	
Weight	V600-CA1A-V□: 890 g V600-CA2A-V□: 930 g	
Altitude	2,000 m max.	
Installation category	II	
Pollution degree	2	

Characteristics

Parameter	Specifications
Memory backup	Capacitors used for backup, and storage of statistical errors and latest errors are effective for 20 days after Unit power is turned off (at ambient temperature of 25°C). Refer to the plot given below for the relationship between ambient temperature and memory backup time.
Self-diagnosis function	Checks CPU errors, memory errors, power cutoff, and communication errors.

Ambient Temperature vs. Memory Backup Characteristics

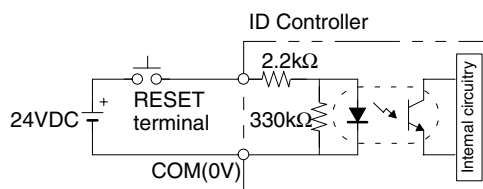


2-1-3 External Input/Output Specifications

Input Specifications (RESET)

Input voltage	24 VDC: +10% (including ripple component), -15%
Input impedance	2.2 kΩ
Input current	10 mA typ. (24 VDC)
On voltage	19 V min.
Off voltage	5 V max.
Input response time	70 ms max.

Circuit Diagram

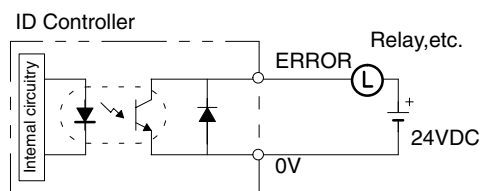


Output Specifications (Error)

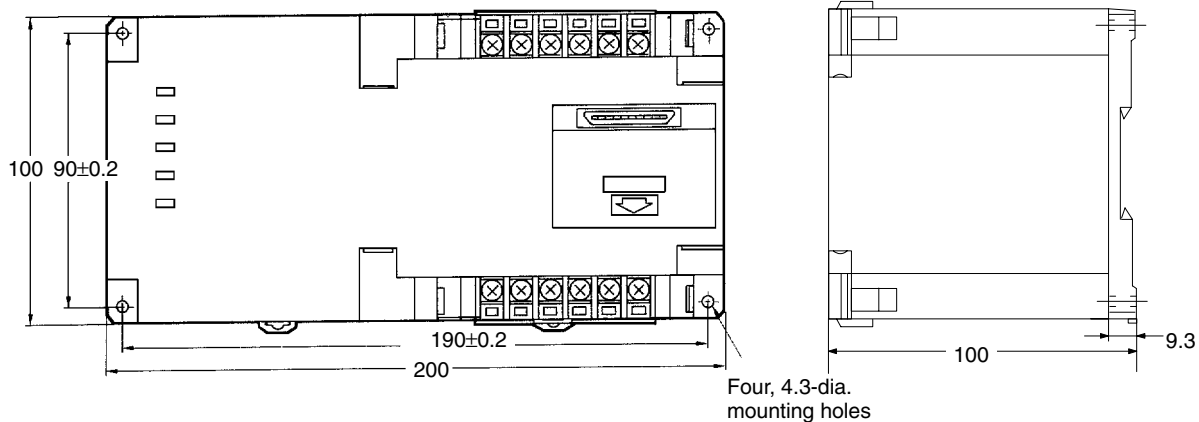
Maximum switching capacity	24 VDC: +10% (including ripple component) 100 mA, -15%
Leak current	100 μA max.
Residual voltage	1.5 V Max.

- Note**
1. When RESET input is ON, the CPU stops operation, and the STOP indicator lights. At this time the ERROR output is reset.
 2. If short-circuited without load, the internal transistor may be damaged.

Circuit Diagram



2-1-4 Dimensions



2-1-5 Host Computer Communications Specifications

Any general-purpose factory computer or personal computer conforming to the RS-232C Interface or RS-422 Interface can be connected. The communications protocol conforms to SYSMAC WAY Host Link System.

Model	V600-CA1A-V□	V600-CA2A-V□
Standard	RS-232C	RS-422
Transmission path connection	1 to 1	1 to N (16 Units max.)
Communications format	2 lines, half duplex	4 lines, half duplex
Sync format	Start-stop sync, stop bit: 1 or 2 (see note)	
Transmission specification	1,200, 2,400, 4,800, 9,600 bps or 19.2k bps (see note)	
Transmission code	ASCII (7 bits) or JIS (8 bits) (see note)	
Communications control procedure	1 to 1 procedure	1 to 1 procedure or 1 to N procedure
Error detection	Vertical parity: odd/even/none (see note)	Vertical parity: odd/even/none (see note) Horizontal parity: 1 to N procedure
Path length	15 m max.	Total length: 500 m

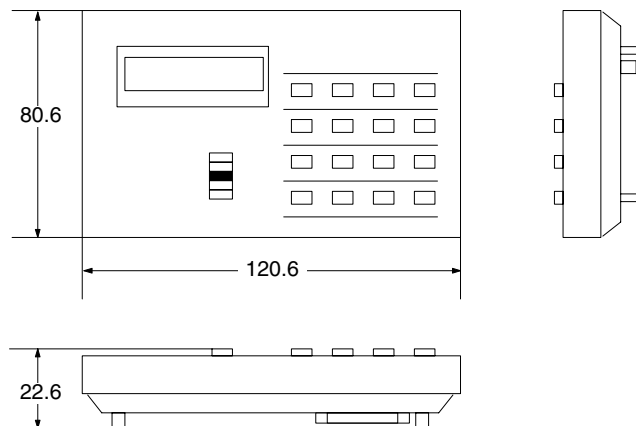
Note These items are set with internal DIP switches. Refer to page 81.

2-2 Monitor Unit

2-2-1 General Specifications

General specifications are the same as those for the ID Controller. Note that the operating ambient temperature must be in the range 0°C to 40°C.

2-2-2 Dimensions



Refer to *Section 4 Monitor Unit Operation* for information on the functions and operating procedures of the Monitor Unit.

Note Remove the Monitor Unit before starting system operation.

SECTION 3

Communications with Host Computer

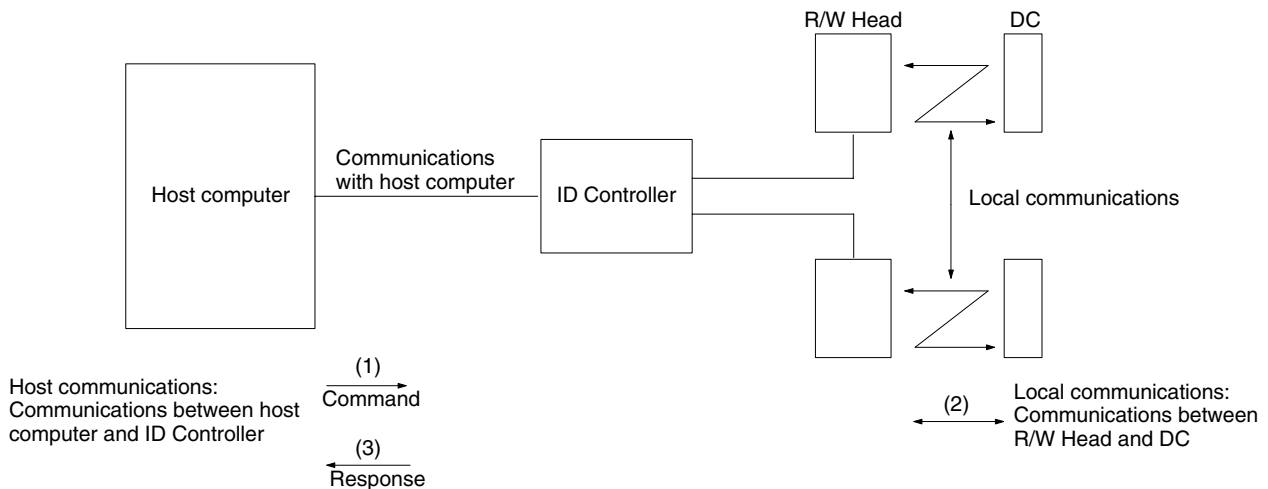
This section provides procedures and formats required for communications with the host computer. A program example is also provided.

3-1	Data Carrier Motion and Command Conditions	14
3-1-1	Communications Control Procedure	14
3-1-2	Command Reception Status	15
3-1-3	Read and Write Functions	15
3-1-4	Automatic Read/Write Function	16
3-1-5	Polling Function	17
3-1-6	Polling Auto Function with 1 to N Connection (V600-CA2A-V□ Only)	19
3-2	Data Carrier Memory Map	21
3-2-1	Memory Map	21
3-2-2	Production Date Format	22
3-2-3	Write Protect Function	22
3-2-4	Data Carrier Usage Level Check Function	24
3-2-5	DC Memory Check Function	27
3-3	Command Format	29
3-3-1	Command Response Table	29
3-3-2	Command Format	29
3-3-3	FCS Computation Procedure (V600-CA2A-V□ Only)	30
3-3-4	FCS Computation Program Example (V600-CA2A-V□ Only)	31
3-3-5	Data Code Specification	31
3-3-6	Address and Number of Bytes Specifiable Ranges	33
3-4	Command Types and Responses	34
3-4-1	Read (RD)	34
3-4-2	Write (WT)	35
3-4-3	Auto Read (AR)	36
3-4-4	Auto Write (AW)	37
3-4-5	Polling Auto Read (PR)	38
3-4-6	Polling Auto Write (PW)	40
3-4-7	Auto Command Processing Cancel (AA)	42
3-4-8	Management Data Check (MD C/K)	43
3-4-9	Management Data Limit (MDL)	44
3-4-10	Test Command (TS)	45
3-4-11	Abort Command (XZ)	45
3-4-12	Undefined Command Response (IC)	46
3-4-13	Error Response	46
3-4-14	End Code List	47
3-5	Communication Time	47
3-5-1	DC SRAM (Reference)	48
3-5-2	DC EEPROM (Reference)	48
3-6	Communications Program Example	49
3-6-1	Serial System Link to Host Computer	49
3-6-2	Example of Basic Program with Host Computer's Time-up Functions	49

3-1 Data Carrier Motion and Command Conditions

3-1-1 Communications Control Procedure

The procedure for communications with the host computer is based on OMRON's SYSMAC WAY Host Link System procedure.



Explanation

- 1, 2, 3...**
1. The host computer sends a command to the ID Controller.
 2. The ID Controller interprets the host computer command and executes local communications, and writes/reads data to/from the DC memory.
 3. If it is a read command, the data read out is sent to the host computer as the response. If it is a write command, a message indicating the completion of processing is sent to the host computer as the response.

When the V600-CA2A-V□ is used, the following procedure is used to control communications with the host computer.

- 1, 2, 3...**
1. The host computer has the initial transmission right, which is transferred to the ID Controller after command transmission is completed.
 2. Once the response is returned from the ID Controller, the transmission right goes back to the host computer.

The transmission right is transferred by pressing the carriage return key.

Different control procedures are available for the 1 to 1 procedure and the 1 to N procedure.

- The 1 to N procedure is used for connection of multiple (up to four) ID Controllers to one host computer. A control number is inserted at the head of all commands and responses to identify the ID Controller. A horizontal parity check is included to ensure effective error detection.
- The 1 to 1 procedure is used when only one ID Controller is connected to the host computer. The horizontal parity check is not included to simplify the procedure.

3-1-2 Command Reception Status

Command Wait Status This is the condition in which no command processing is being performed, and the ID Controller is ready to accept any command. Once a command is received, it enters the command processing status.

Command Processing Status Commands received during the interval from when a command has been accepted until a response indicating the command processing has been completed has been returned, are ignored. However, one exception during processing of auto read and auto write commands (see page 36 to 37) is that the auto command processing's abort command can be accepted.

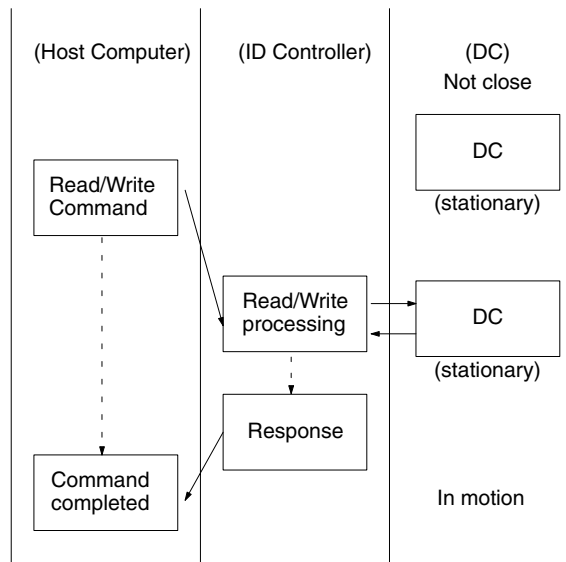
Note This command processing status does not include the polling auto command.

Polling Auto Subcommand Wait Status This refers to the situation when a polling auto command is sent and the DC has not arrived in front of the specified R/W Head. In this status, the specified R/W Head can only accept subcommands. Subcommands are commands that query the wait status for approach of the DC at the R/W Head (see page 38 to 40). In the polling auto subcommand wait status, commands can be sent to the other R/W Head.

3-1-3 Read and Write Functions

Command Processing During Read/Write Operations

The read/write functions are used for communications when the DC is stationary. Thus, before using these commands, it is necessary to check that the DC is at a specific position. If the DC is not in a specified position, an error response is returned.

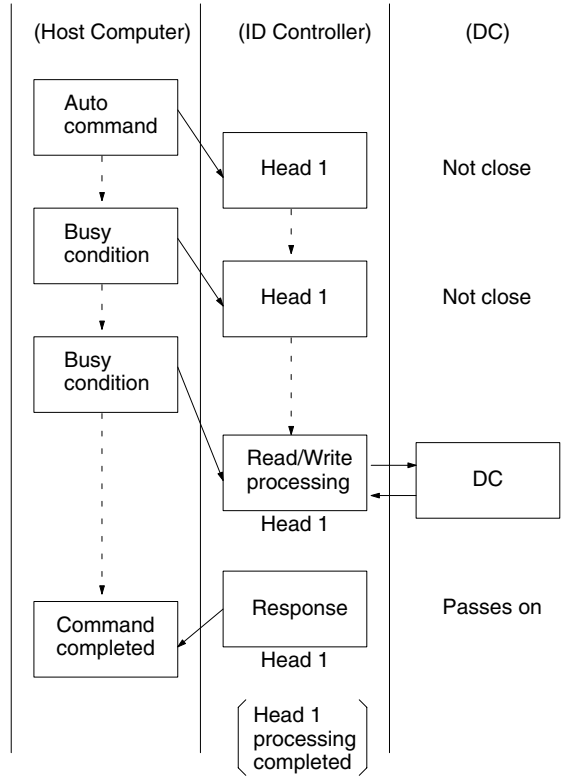


- 1, 2, 3...**
1. Once it is confirmed that the DC has stopped in the specified position, the host computer sends the command.
 2. The ID Controller follows the command and performs read/write operations.
 3. After processing has been completed, the ID Controller returns a processing completed response to the host computer. The host computer accepts the response and once again starts the line workpiece, with the DC attached, in motion.

3-1-4 Automatic Read/Write Function

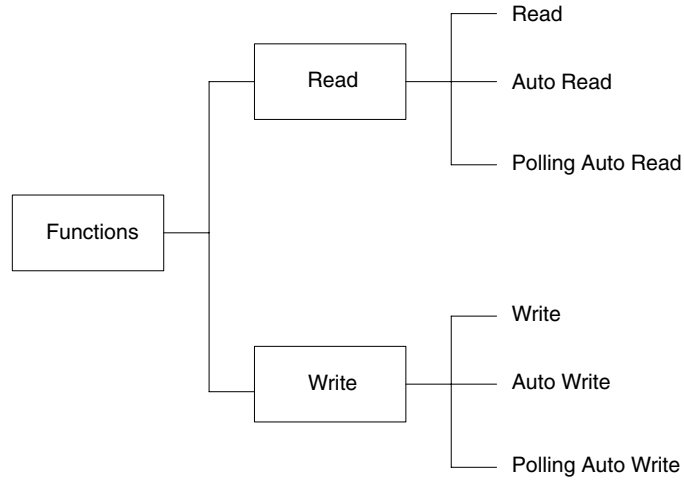
Automatic Command Processing

Under the automatic commands, the ID Controller does not return a response until the DC comes close to the specified R/W Head. This means that the communications path to the host computer remains in the busy condition until the response is returned, and the host computer cannot send commands specifying another R/W Head of the same ID Controller.



- 1, 2, 3...**
1. The host computer sends the auto command to Head 1.
 2. The ID Controller does not return the response until the DC comes close to the specified R/W Head, and consequently the host computer stays in the busy condition. If two R/W Heads are connected to the same ID Controller, communications to Head 2 are not possible.
 3. When the DC passes in front of a R/W Head, write or read processing is performed.

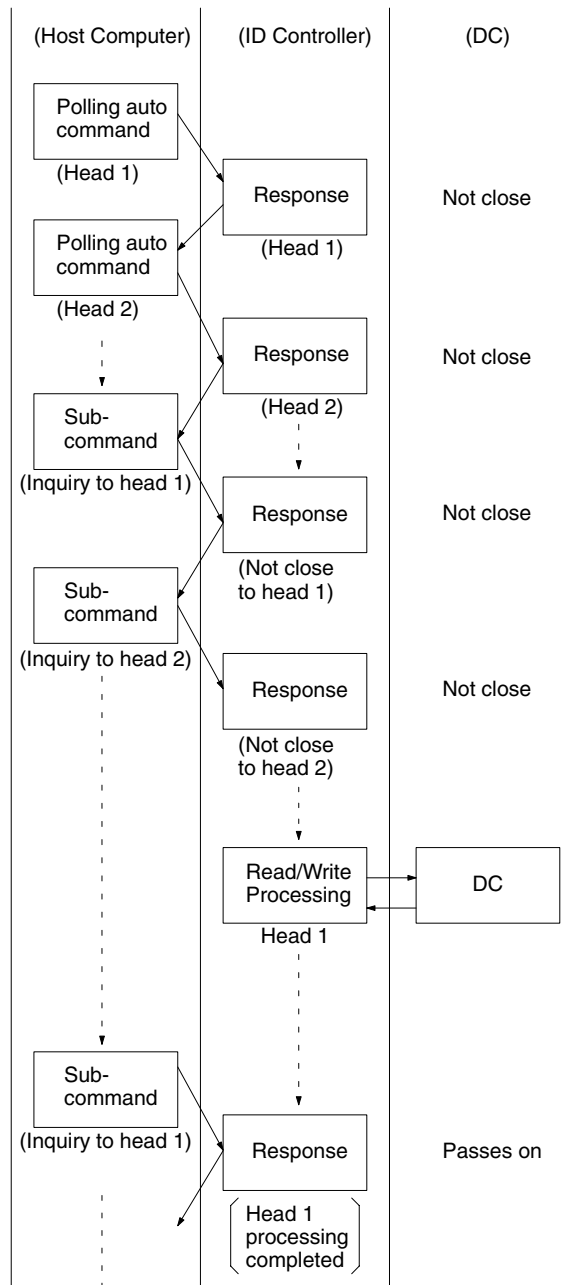
- 4. Once processing is completed, the ID Controller sends a response to the host computer indicating that processing indicated by the auto command has been completed.



3-1-5 Polling Function

The following describes command processing when two R/W Heads are connected to one ID Controller. In the case of normal auto commands, the ID Controller does not return a response until the DC comes close to the specified R/W Head. This means that until the response is sent, the communications path with the host computer remains in the busy status, and the host computer cannot send commands specifying the ID Controller’s other R/W Head. However, the polling auto command enables the ID Controller to return the response when requested by the host computer. Thus, the busy condition on the communication

path to the host computer is cleared and the host computer can then send commands to the ID Controller's other R/W Head.

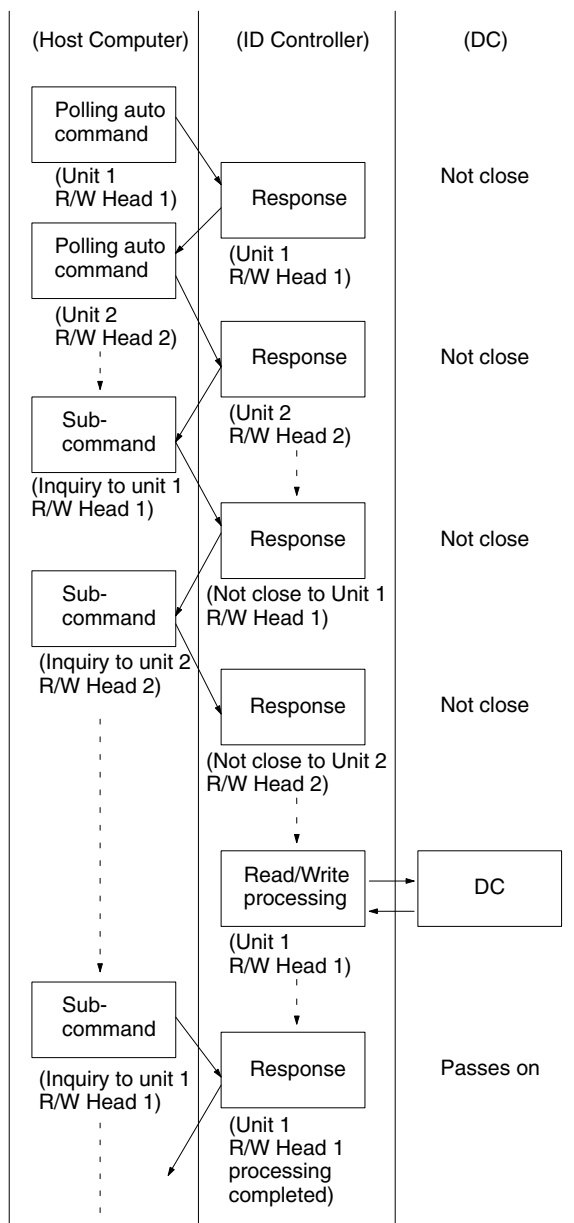


- 1, 2, 3...**
1. A polling auto command is sent to Head 1.
 2. The ID Controller receives the command and returns a response indicating that it has received the command.
 3. A polling auto command is sent to Head 2.
 4. The ID Controller receives the command and returns a response indicating that it has received the command.
 5. The host computer can query the status of processing using subcommands or suspend polling auto processing.
 6. When the DC is not close to the specified R/W Head, a “not close” response is returned in response to a query subcommand.
 7. When the DC passes in front of a R/W Head, write or read processing is performed.

8. Once processing is completed, the ID Controller sends a response to the host computer indicating that the processing indicated by the query sub-command has been completed.

3-1-6 Polling Auto Function with 1 to N Connection (V600-CA2A-V□ Only)

This section describes command processing when one R/W Head is connected to each of two ID Controllers (Unit 1 and 2). In the case of normal auto commands, the ID Controller does not return a response until the DC comes close to the specified R/W Head. This means that until the response is sent, the communication path with the host computer remains in the busy condition, and the host computer cannot send commands to the other R/W Head. However, the polling auto command enables the ID Controller to return the response when requested by the host computer. Thus, the busy condition on the communication path to the host computer is cleared, and the host computer can then send commands to the other R/W Head.



- 1, 2, 3...**
1. Send a polling auto command to Unit 1 R/W Head 1.
 2. The ID Controller Immediately receives the command and returns a response indicating that it has received the command.
 3. Send a polling auto command to Unit 2 R/W Head 2.
 4. The ID Controller immediately receives the command and returns a response indicating that it has received the command.
 5. The host computer can query the status of processing using subcommands or suspend polling auto processing.
 6. When the DC is not close to the specified R/W Head, a “not close” response is returned in response to a query subcommand.
 7. When a data carrier passes in front of Unit 1 R/W Head 1, write or read processing is performed.
 8. Once processing is completed, the ID Controller sends a response to the host computer indicating that the processing indicated by the query subcommand has been completed.

3-2 Data Carrier Memory Map

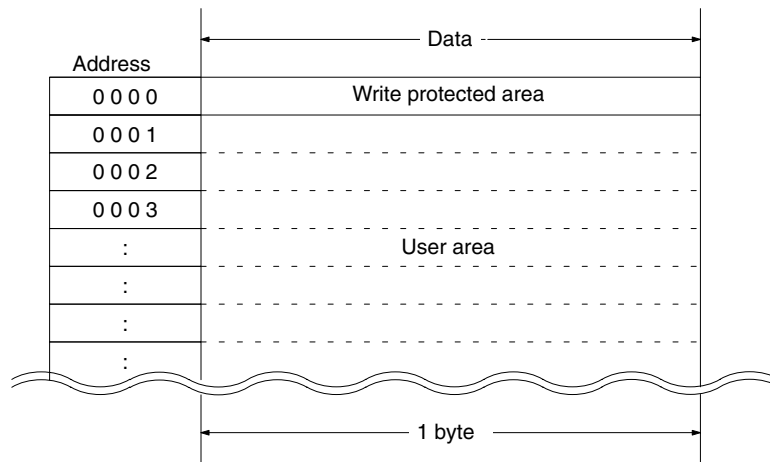
Access to a maximum of 64k bytes of (0000 to FFFF) ID Controller memory area is possible. The actual accessible memory area of the ID Controller varies with the memory capacity of the DC.

A DC with a memory capacity of more than 256 bytes has a production date (month and year) area and write protected area. On the other hand, a DC with a memory capacity of 256 bytes or less does not have a production date (month and year) area. The processing methods of these areas vary between a DC with a memory capacity of 256 bytes or less and a DC with a memory capacity of more than 256 bytes.

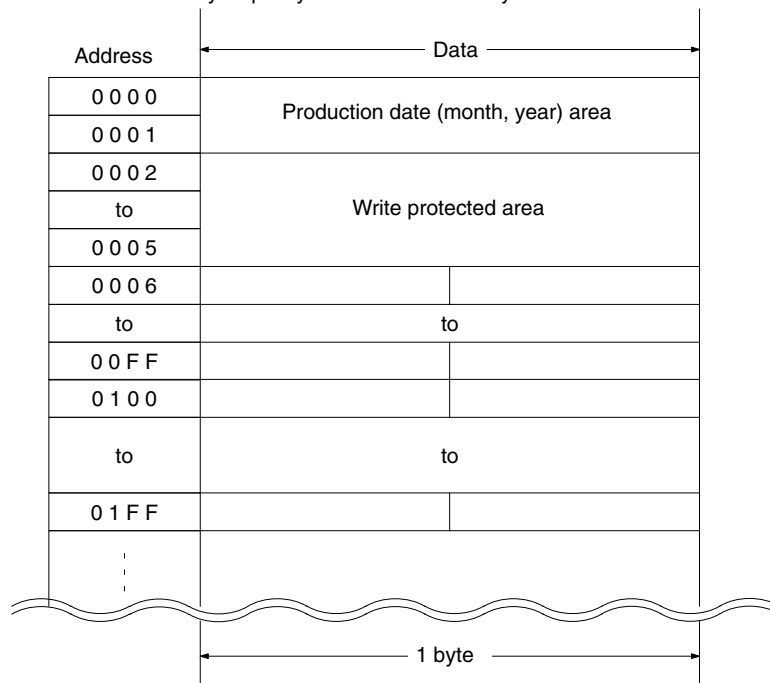
The system areas of DCs vary with the kind of memory (SRAM or EEPROM). For details refer to the manuals for the R/W Head and DC.

3-2-1 Memory Map

DC with a Memory Capacity of 256 Bytes or Less



DC with a Memory Capacity of More Than 256 Bytes



Note Refer to *Appendix A* for the DC's memory capacity and memory types in detail.

3-2-2 Production Date Format

The production date format is valid for a DC with a memory capacity of more than 256 bytes.

For checking the life of the DC battery, the manufacturer registers the production date in the first two bytes of the memory area immediately prior to shipping the DC from the factory. Data can be read from this area, but cannot be written to it. If a write operation to this area is attempted by mistake, an error message, "7D," will be issued.

Production Date Control Area

Address	Bit							
	7	6	5	4	3	2	1	0
0000	Month, first digit				Month, second digit			
0001	Year, first digit				Year, second digit			

- Note**
1. The last two digits of the year is used. For example, 92 for 1992.
 2. The month is represented by two digits. For example, 03 for March and 10 for October.

Example

In the case of September 1992, the bits are as follows:

Address	Bit							
	7	6	5	4	3	2	1	0
0000	0	0	0	0	1	0	0	1
	0				9			
0001	1	0	0	0	1	0	0	1
	9				2			

- Note** A DC with a memory capacity of 256 bytes or less does not have a production date (month and year) area. The first address of such a DC is a write protect area.

3-2-3 Write Protect Function

The write protect function protects important data stored in the memory of the Data Carrier, such as product number and model, from inadvertent write access. With this function, the data up to a specified memory address can be protected. It is recommended that important data be write-protected as follows:

Memory of 256 Bytes or Less

Setting Write Protect Function The write protect function is set in address 0000 of the Data Carrier's memory. The most significant bit (MSB) of address 0000 determines whether or not the write protect function is in effect.

Address	Bit							
	7	6	5	4	3	2	1	0
0000	YES/ NO	Last 2 digits of end address						

Write protect execution bit (most significant bit of address 0000)

1: Write-protected

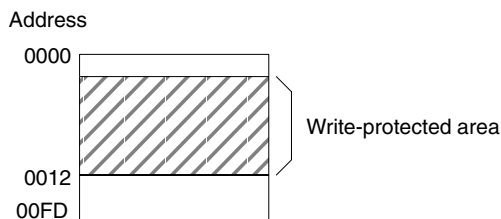
0: Not write-protected

The end address can be set between 00 and 7F. Setting the address to 00 protects all bytes from 0001 through 00FF. Setting the address to a value from 01 to 7F protects all bytes from 0001 through the specified address. It is not possible to specify an end address between 0080 and 00FF.

- Note**
1. Address 0000 cannot be write-protected.
 2. Address 0001 is always the starting address of the write-protect area. Important data that needs to be protected should be input from 0001 on.

Example 1

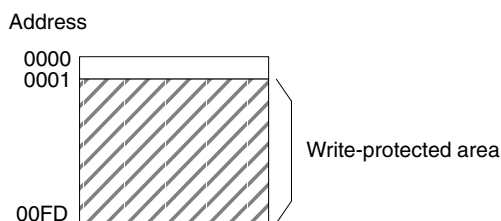
To protect addresses 0001 through 0012:



Address	Higher digits				Lower digits			
0000	1	0	0	1	0	0	1	0
	9				2			

Example 2

All bytes from 0001 through 00FD will be write-protected when bit 7 is ON and the end address is set to 00.



Address	Higher digits				Lower digits			
0000	1	0	0	0	0	0	0	0
	8				0			

Canceling Write Protection To cancel write protection, clear the most significant bit of address 0000 to 0. The write protection will be cancelled and the end address specified in 0000 will be invalid.

Memory Exceeding 256 Bytes

Specify the four bytes in DC addresses 0002 to 0005. The most significant bit (MSB) of address 0002 is used to specify whether a write protect specification is to be made or not.

Bit	7	6	5	4	3	2	1	0
Address								
0002	Y/N	Start address lower two bits						
0003	Start address upper two bits							
0004	End address lower two bits							
0005	End address upper two bits							

- Note**
1. When the write protect control bit (address 0002 most significant bit) is 1 (Y), write protect is ON and when it is 0 (N), write protect is OFF.
 2. The start address of the available setting area is 0006 to FFFF and the end address is 0006 to FFFF.

The following is an example of the conditions of addresses 0006 to 07FF to be write protected.

Address	Upper bits				Lower bits			
0002	1	0	0	0	0	0	0	0
	8				0			
0003	0	0	0	0	0	1	1	0
	0				6			
0004	0	0	0	0	0	1	1	1
	0				7			
0005	1	1	1	1	1	1	1	1
	F				F			

When the addresses are not write protected, the conditions of the addresses are as follows:

Address	Upper bits				Lower bits			
0002	0	0	0	0	0	0	0	0
	0				0			
0003	0	0	0	0	0	0	0	0
	0				0			
0004	0	0	0	0	0	0	0	0
	0				0			
0005	0	0	0	0	0	0	0	0
	0				0			

3-2-4 Data Carrier Usage Level Check Function

The Data Carrier’s usage level check function varies with the Data Carrier’s memory (SRAM or EEPROM). With the SRAM DC, usage level is obtained from the battery check function. With the EEPROM DC, the usage level is obtained from the number of rewriting operations (100,000 max.).

SRAM DC with Battery

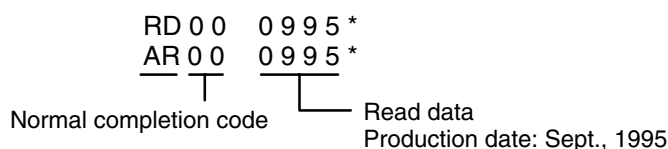
Battery Check

Data Carrier battery checks are not performed automatically, only when the contents of the production date area (addresses 0000 and 0001) are read. When a battery check is performed, a small current is passed through the DC’s internal circuitry. Too much power would be consumed if a battery check was performed automatically every time DC memory was accessed.

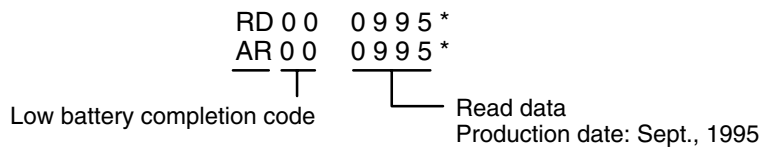
Use one of the following commands to read the contents of the production date area and check the battery’s production date and current status. (The \rceil at the end of each command means carriage return.)

- 1, 2, 3... 1. Read command: RD H/A 1/2 0000 02* \rceil
 2. Auto Read command: AR H/A 1/2 0000 02* \rceil
 3. Polling Auto Read command: PR H/A 1/2 0000 02* \rceil

If the end code of the response is 00, the battery is operating normally. If the end code is 7B, the battery is low. The following are responses to Read and Auto Read commands sent to a DC with a good battery:



The following are responses to Read and Auto Read commands sent to a DC with a low battery:



Under ordinary operating conditions the DC can be used for about 1 month after a low battery completion code is received. However, it is recommended that the data carrier battery be replaced with a new one as soon as possible.

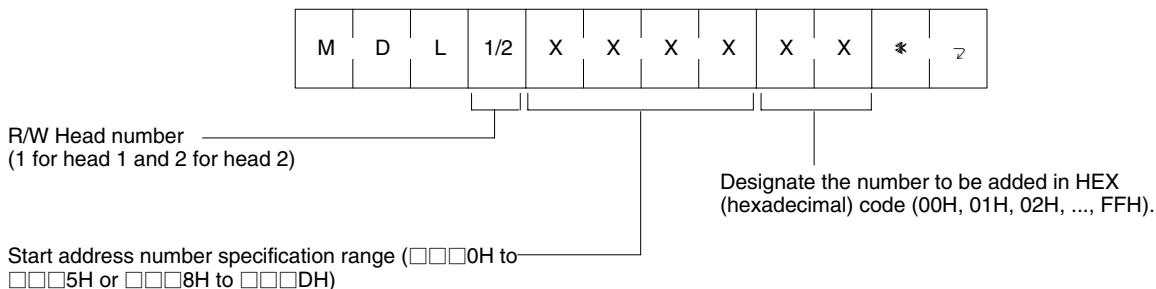
Note The DC contains a thionyl chloride-type lithium battery. One characteristic of this type of battery is its tendency to develop a higher internal resistance when it is not used. If the battery isn't used for several months, the internal resistance can increase enough to cause a low battery response, even if the battery is good.

Consequently, after several months of disuse it is recommended to transmit data to/from the DC for about 10 minutes to "warm up" the battery and decrease its internal resistance. This operation will have almost no effect on the useful life of the battery.

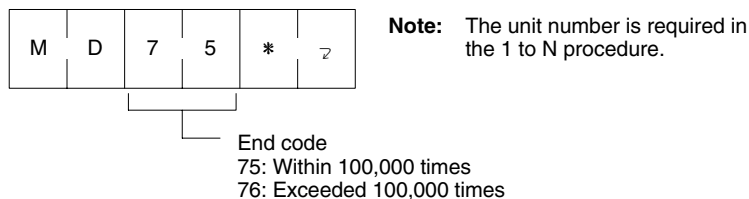
EEPROM DC without Battery

The MDL command makes it possible to check whether or not the EEPROM of a DC has been overwritten 100,000 times or more by adding the data on overwriting operations to the management area designated by the user.

Command Format

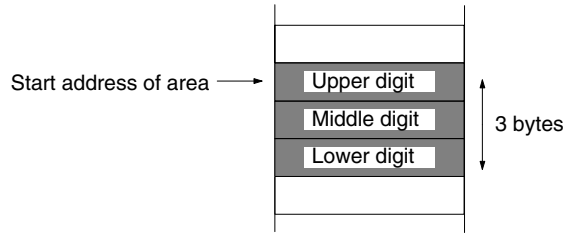


Response Format



The management area consists of the first three bytes. If the EEPROM is overwritten 100,000 (0186A0) times or more, an end code warning of 76 will be returned. The number of overwriting operations is written in hexadecimal code in the management area. It is possible to read the data from the management area using the read command.

If the EEPROM is overwritten 100,000 times or more, the data in the management area will not be revised and only a warning will be returned as a response. If the number of overwriting operations is set as 00, the number will not be revised and only the number of overwriting operations can be checked.



Note The first address must be □□□0 to □□□5 or □□□8 to □□□D. If the first address is □□□6 to □□□7 or □□□E to □□□F, the address error code, 7A (HEX) will be returned as an end code.

MDL Command Examples

The following are MDL command usage examples with the condition that three bytes beginning with 0010H are used as the management area.

- 1, 2, 3... 1. The management area is cleared.

"WTH1001000000"

0010	0 0 H
0011	0 0 H
0012	0 0 H

2. Input 4 as the number of overwriting operations.

"MDL1001004"

0010	0 0 H
0011	0 0 H
0012	0 4 H

3. Input 5 as the number of overwriting operations.

"MDL1001005"
is added to be 9 times.

0010	0 0 H
0011	0 0 H
0012	0 9 H

4. The EEPROM has been overwritten 100,000 times.

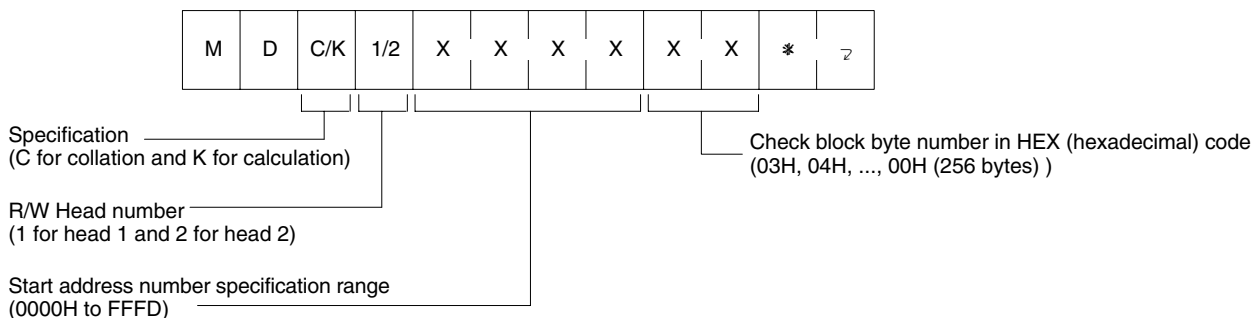
When MDL1001000 is executed, MD76 (excessive overwriting operations) results.

0010	0 1 H
0011	8 6 H
0012	A 0 H

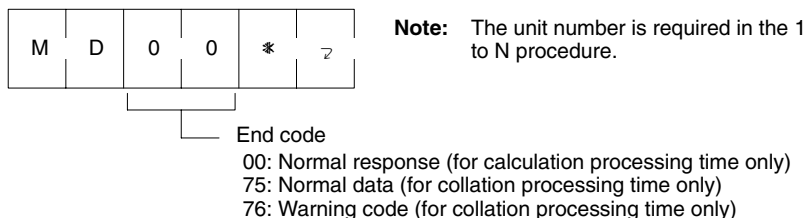
3-2-5 DC Memory Check Function

The MD command enables memory check. By designating the check block, it is possible to calculate, write, and collate the CRC (Cyclic Redundancy Check) code. The CRC code is calculated using the formula $X^{16} + X^{12} + X^5 + 1$.

Command Format

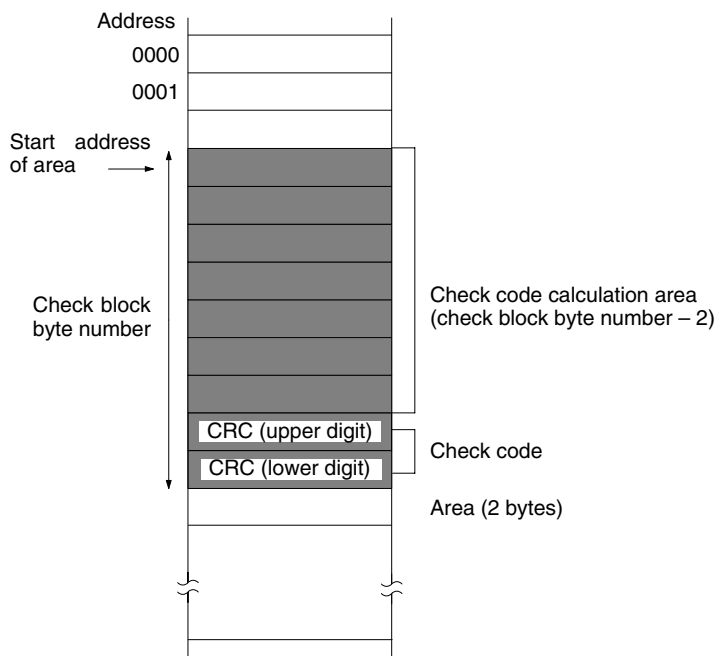


Response Format



In a check block, which is designated by the first address and the number of bytes, the area excluding the last two bytes can be calculated. The check code area is the last two bytes.

If the user designates to write a check code (using processing code K), the CRC of the data in the area to be calculated will be processed and the result will be written to the check code area. If the user designates to data collation (using processing code C), the CRC of the data in the area to be calculated will be processed and compare the result with the data in the check code area. If they coincide, an end code of 75 will be returned. If they do not coincide, an end code warning of 76 will be returned.



DC Memory Check Command Example

The following is a DC memory check command usage example for checking the data in 0010 to 0012.

- 1, 2, 3... 1. This example is on condition that the following data exists from the start.

0010	1 2 H
0011	3 4 H
0012	5 6 H
0013	
0014	

2. MDK1001005 (calculation processing) is executed.

CRC code (5CD6) calculated from 123456 is written at addresses 0013 and 0014.

0010	1 2 H
0011	3 4 H
0012	5 6 H
0013	5 C H
0014	D 6 H

3. MDC1001005 (collation processing) is executed.

If the data values coincide, MD75 (normal response code) will be returned.

1 2 H
3 4 H
5 6 H
5 C H
D 6 H

If the data values do not coincide, MD76 (abnormal response code) will be returned.

0010	0 0 H	← Abnormal data
0011	3 4 H	
0012	5 6 H	
0013	5 C H	
0014	D 6 H	

3-3 Command Format

3-3-1 Command Response Table

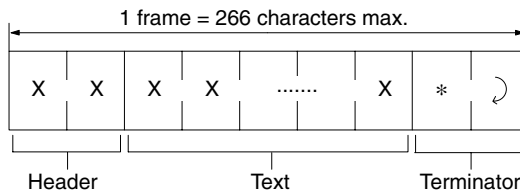
No.	Command	Abbr.	Processing	Page
1	Read	RD	Read data from or write data to DC. If DC is not present, return error response.	34
2	Write	WT		35
3	Auto read	AR	Wait until DC approaches, and read or write.	36
4	Auto write	AW		37
5	Polling auto read	PR		38
6	Polling auto write	PW		40
7	Auto command processing cancel	AA	Cancel auto command (auto read or auto write) processing before completion.	42
8	Data management command	MD	Return test message sent from host computer as response data without change.	43, 44
9	Test	TS	Check the data of the DC's memory. Records the number of overwriting operations on the EEPROM.	45
10	Abort (reset)	XZ	Restore initialization condition of ID Controller immediately after power application. There is no response. Do not use abort command while communicating down.	45
11	Undefined command response	IC	This is the response returned by the ID Controller when it receives an undefined command from the host computer.	46

Note Only upper-case letters can be used to write commands. If lower-case letters are used, a command error will occur.

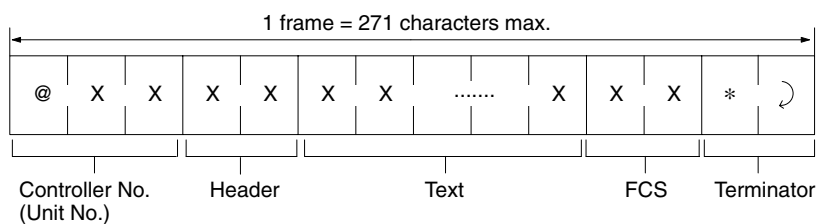
3-3-2 Command Format

The following explains the format of commands sent from the host computer to the ID Controller.

For 1 to 1 Procedure



For 1 to N Procedure



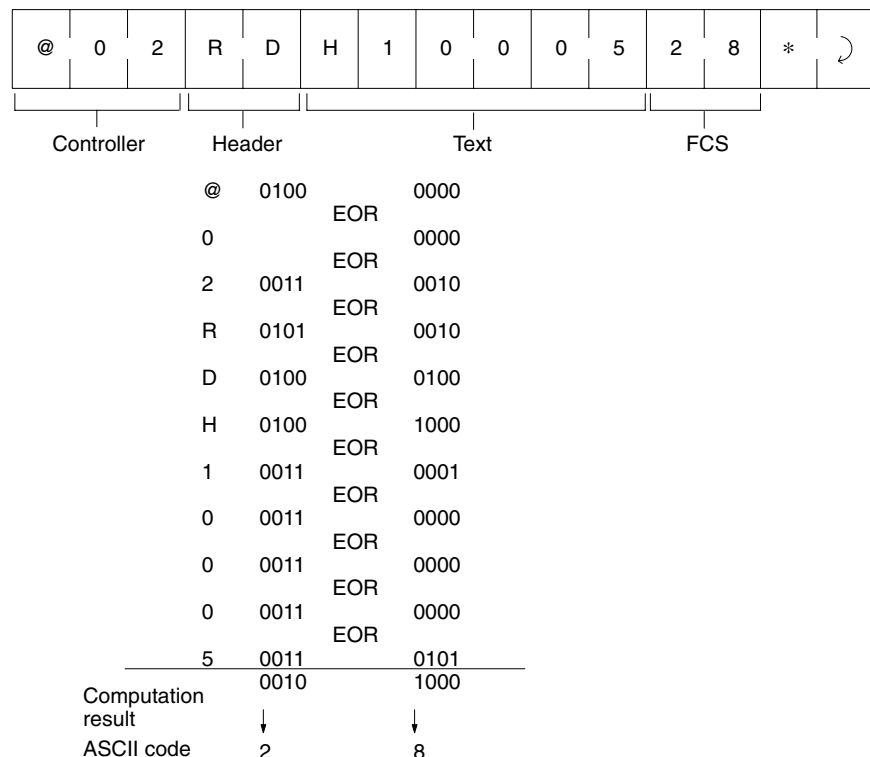
Name	Contents
Header	This contains the 2-character abbreviation for the command function (see <i>Command Response Table, page 29</i>). If it is a response, the same abbreviation as that of the command sent is entered here.
Text	This contains the command response. <ul style="list-style-type: none"> • ASCII/Hexadecimal Code Specification • Destination R/W Head No. Specification • Head Address • Write Data/Read No.
Terminator	This indicates end of command response.
Controller no.	Only used for 1 to N procedure, a Controller numbers 00 to 15 is added after @ mark.
FCS (see note 1)	Only used for 1 to N procedure, horizontal parity check is used.

- Note**
1. See 3-3-3 FCS Computation Procedure (V600-CA2A-V□ Only) for details on the FCS (frame check sequence).
 2. The V600-CA1A-V□ with an RS-232C interface can be used for the 1 to 1 and 1 to N (N = 1 only) procedure. The V600-CA2A-V□ with an RS-422 interface can be used for the 1 to 1 and 1 to N (N = 1 to 16) procedure.
 3. A controller number must be designated decimally within a range between @00 and @15.

3-3-3 FCS Computation Procedure (V600-CA2A-V□ Only)

FCS operates by converting the 8-bit data representing the exclusive OR of the codes for the characters from the head of the frame (@ mark) to the final character of text into two characters of ASCII code.

Example:



3-3-4 FCS Computation Program Example (V600-CA2A-V□ Only)

See the test program example (page 49) for an example of an FCS computation program for transmission. An example of an incoming data FCS check subroutine is given below.

```

1000 *****FCSCHECK*****
1010 *FCSCHECK
1020 Q=0:FCSP$="OK"
1030 PRINT RESPONSE$
1040 LENG$=LEN (RESPONSE$)-3
1050 FCSP$=MID$ (RESPONSE$.LENG$+1, 2) . . . . . Response data FCS
1060 FOR I=1 TO LENG$ . . . . . FCS computation range
1070 Q=ASC (MID$ (RESPONSE$, I, 1) XOR Q
1080 NEXT I
1090 FCSD$=HEX$ (Q)
1100 IF LEN (FCSD$)=1 THEN FCSD$="0"+FCSD$ . . . . . FCS computed by software
1110 IF FCSD$<>FCSP$ THEN FCSP$="ERR"
1120 PRINT "FCSD$="FCSD$, "FCSP$="FCSP$, "FCCK$="FCCK$: . . . OK for correct FCS
                                     ERR for in correct FCS
1130 RETURN
    
```

Note In this example, CR (CHR\$(13)) is not included in RESPONSE\$. To insert it, change line 1040.

3-3-5 Data Code Specification

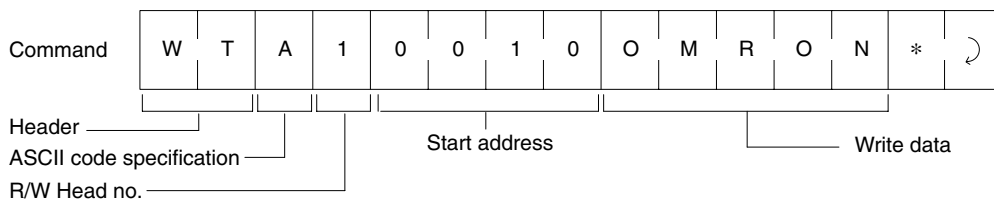
The command needs to include a specification indicating how the data to be read or written is to be handled, either as ASCII code character data, or as hexadecimal code numerical data.

ASCII Code Specification

- When the data length is set to seven bits using the ID Controller DIP switches (page 81), this specifies ASCII code, and when the data length is set to eight bits, this specifies JIS code.
- One character of data occupies exclusively one byte of DC memory (one address) in either ASCII code.

ASCII Code Specification Example

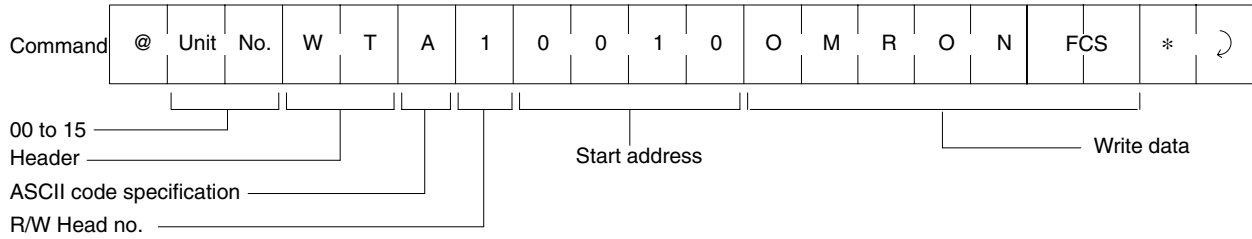
For 1 to 1 procedure



Data Carrier Memory Address

0010	4	F	"O"
0011	4	D	"M"
0012	5	2	"R"
0013	4	F	"O"
0014	4	E	"N"

For 1 to N Procedure



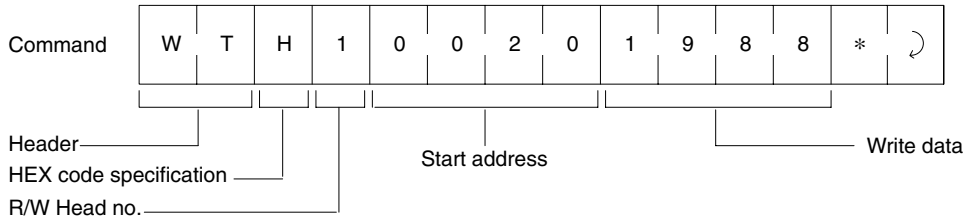
Note Refer to *Appendix B* for the ASCII code.

Hexadecimal Code Specification

- Character 1 is handled as hexadecimal numerical data. Thus, only characters 0 to F can be accepted.
- Data character 2 occupies exclusively one byte (one address) of DC memory as is, and consequently it is extremely important to ensure that all write commands are specified in two-character units (even number). If an odd number of data characters are specified by mistake, this causes an error.

Hex Code Specification Example

For 1 to 1 procedure

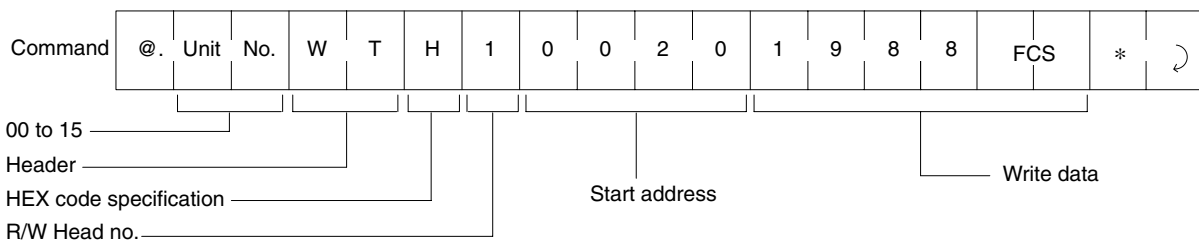


Data Carrier Memory Address

0020	1	9
0021	8	8

← 1 byte →

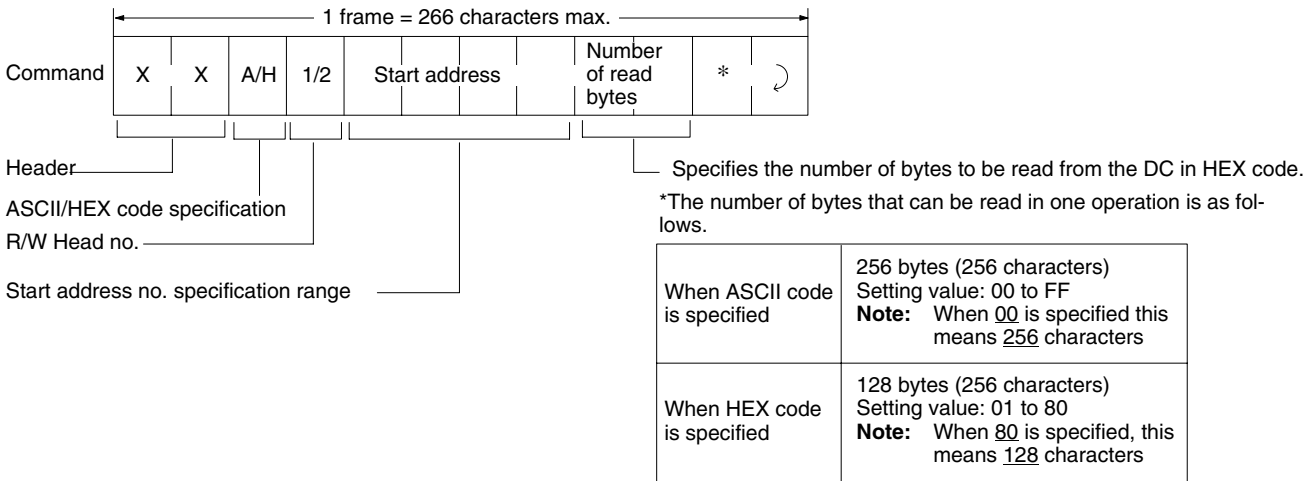
For 1 to N Procedure



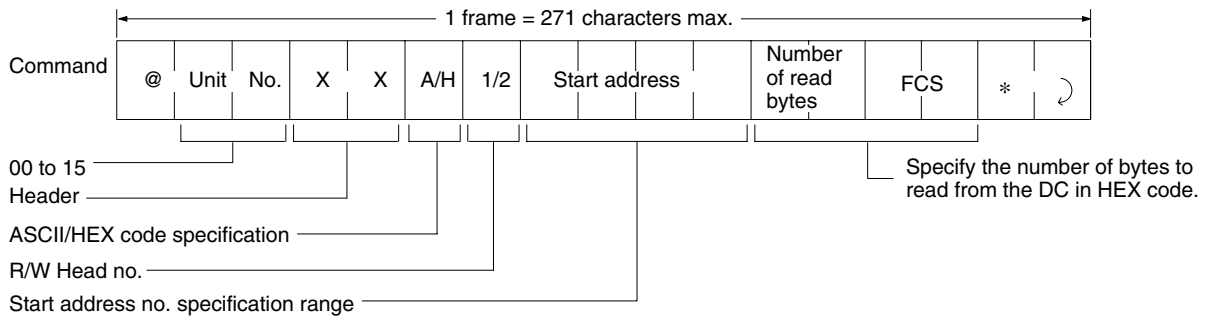
3-3-6 Address and Number of Bytes Specifiable Ranges

Read Commands

For 1 to 1 Procedure

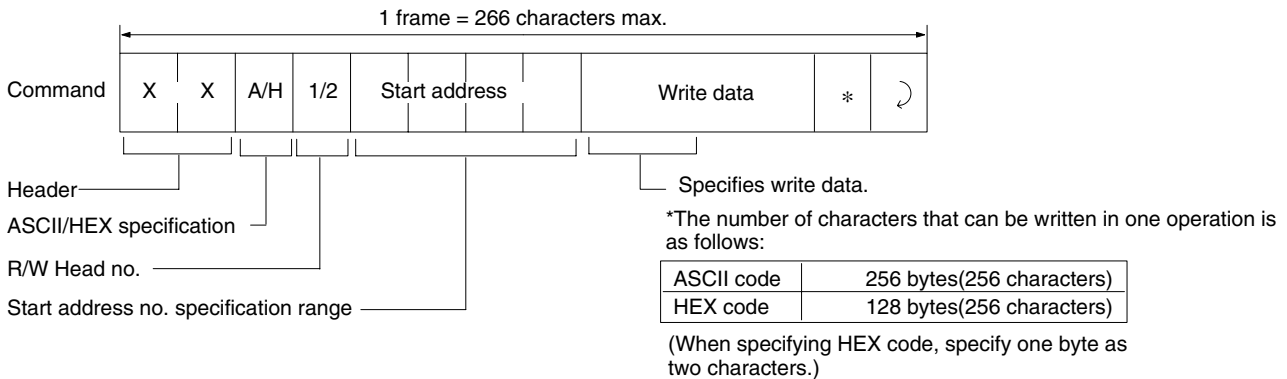


For 1 to N Procedure

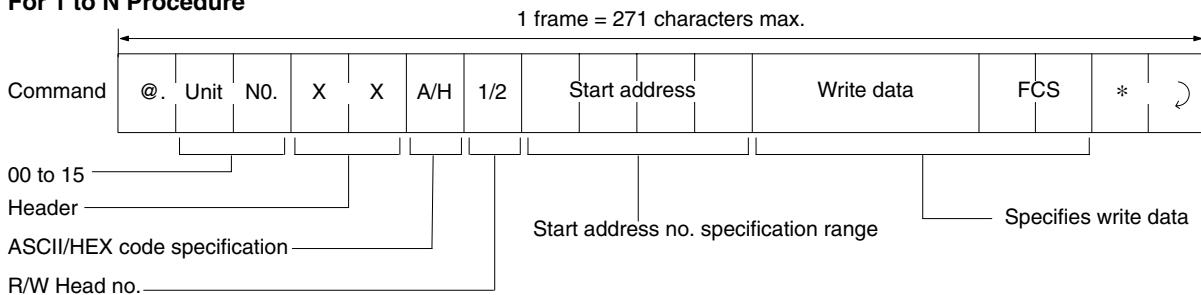


Write Commands

For 1 to 1 Procedure



For 1 to N Procedure



Note Addresses 0000 and 0001 represent the production date registration area, and consequently data cannot be written to these addresses.

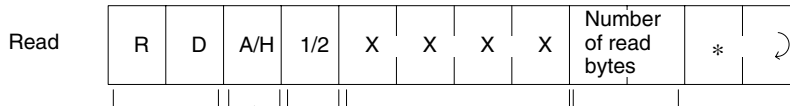
3-4 Command Types and Responses

3-4-1 Read (RD)

Data is read from the DC. If the DC is not present, an error response (end code: 72 = DC not present) is returned.

Command Format

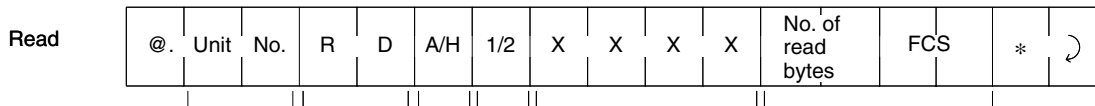
For 1 to 1 Procedure



Header
 ASCII/HEX code specification
 A: ASCII code
 H: HEX code
 R/W Head no.
 Start address no. specification range

Specify the number of bytes to be read in HEX code.
 The number of bytes that can be read in one operation is as follows:
 ASCII code specification: 256 bytes (256 characters)
 HEX code specification: 128 bytes (256 characters)
Note: Refer to the previous page for information on the setting values.

For 1 to N Procedure

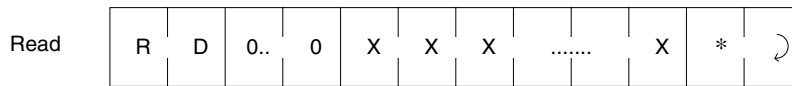


00 to 15
 Header
 ASCII/HEX code specification
 A: ASCII code
 H: HEX code
 R/W Head no.

Start address no. specification range
 Specify the number of bytes to be read in HEX code.
 The number of bytes that can be read in one operation is as follows:
 ASCII code specification: 256 bytes (256 characters)
 HEX code specification: 128 bytes (256 characters)
Note: Refer to the previous page for information on the setting values.

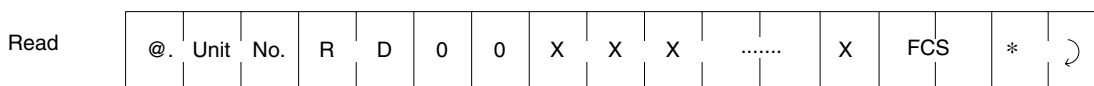
Response Format

For 1 to 1 Procedure



Header
 Read data
 End code (see page 47)
 00: Normal completion

For 1 to N Procedure



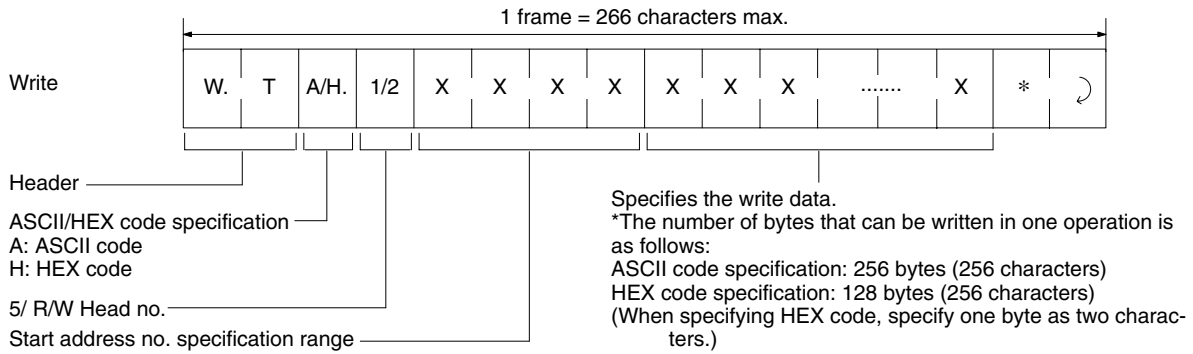
00 to 15
 Header
 End code (see page 47)
 00: Normal completion

3-4-2 Write (WT)

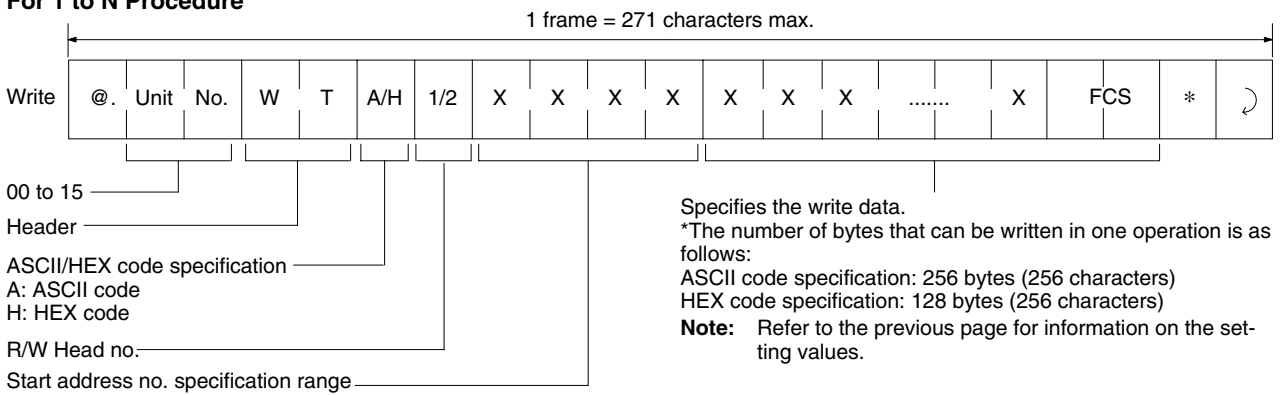
Data is written to the DC. If the DC is not present, an error response (end code: 72 = DC not present) is returned.

Command Format

For 1 to 1 Procedure

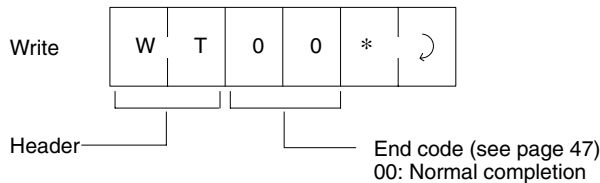


For 1 to N Procedure

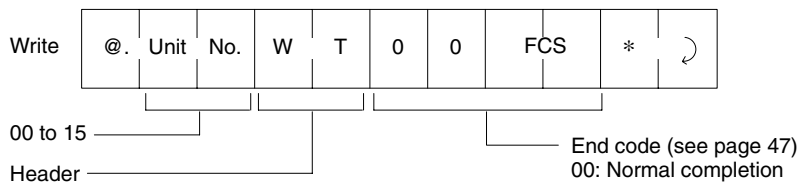


Response Format

For 1 to 1 Procedure



For 1 to N Procedure

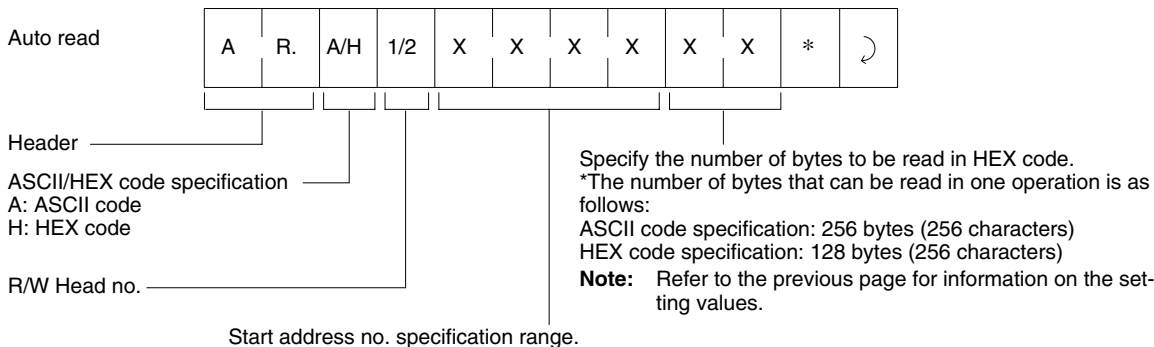


3-4-3 Auto Read (AR)

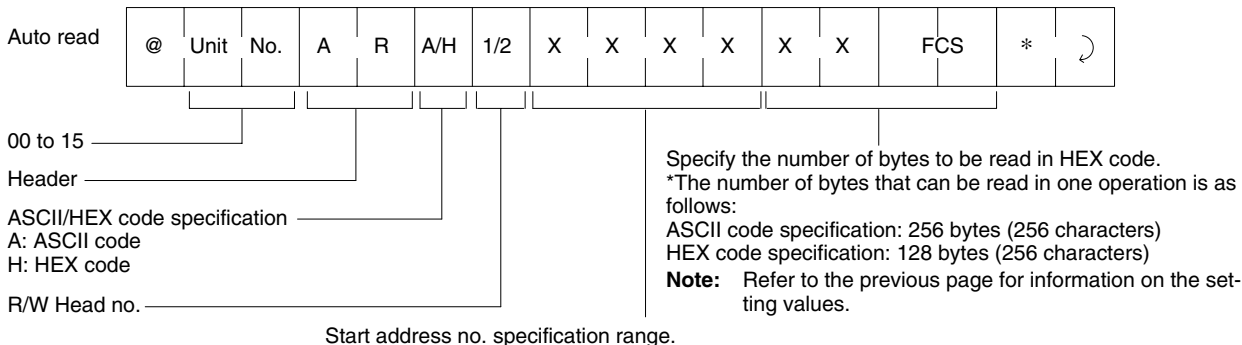
This is a command to wait for the approach of the DC, and then read the data. After local communications are completed, the ID Controller returns the response. The host computer cannot send commands to the other R/W Head until the response has been received.

Command Format

For 1 to 1 Procedure

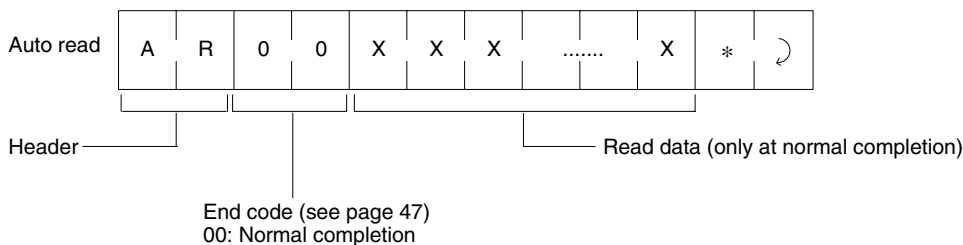


For 1 to N Procedure

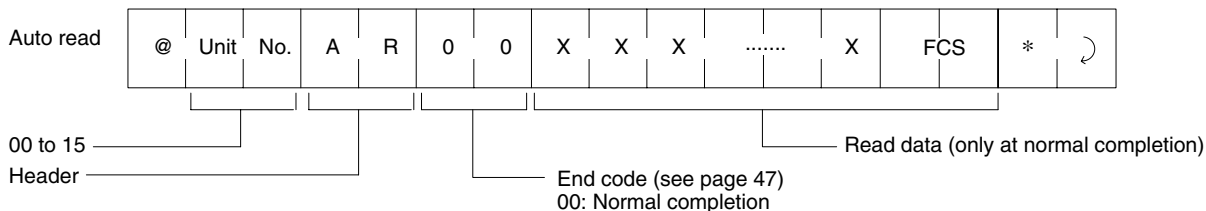


Response Format

For 1 to 1 Procedure



For 1 to N Procedure

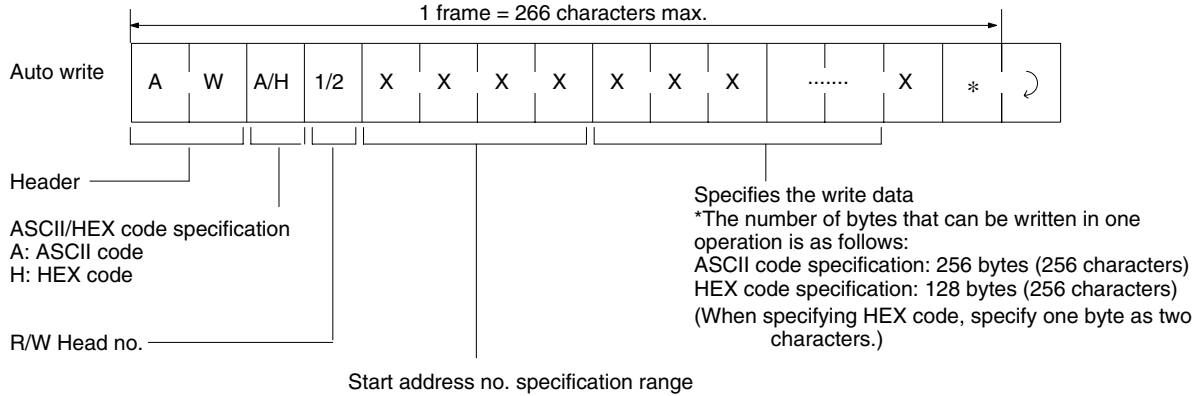


3-4-4 Auto Write (AW)

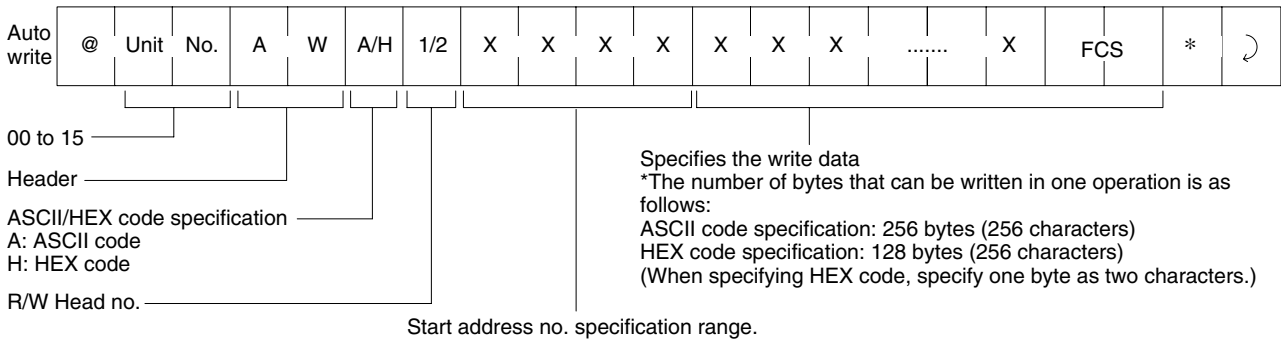
This is a command to wait for the approach of the DC, and then write the data. After local communications are completed, the ID Controller returns the response. The host computer cannot send commands to the other R/W Head until the response has been received.

Command Format

For 1 to 1 Procedure



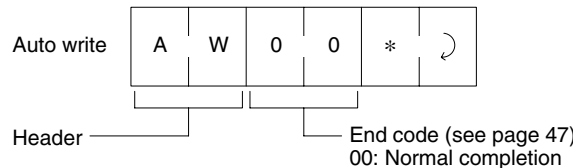
For 1 to N Procedure



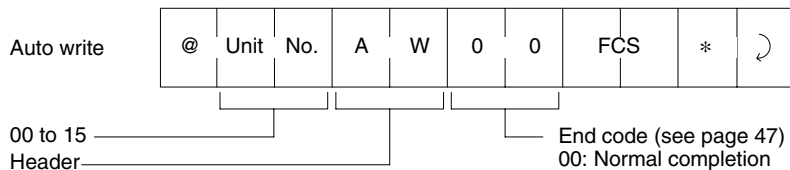
Note Addresses 0000 and 0001 are the production date registration area, and consequently data cannot be written to these addresses.

Response Format

For 1 to 1 procedure



For 1 to N procedure

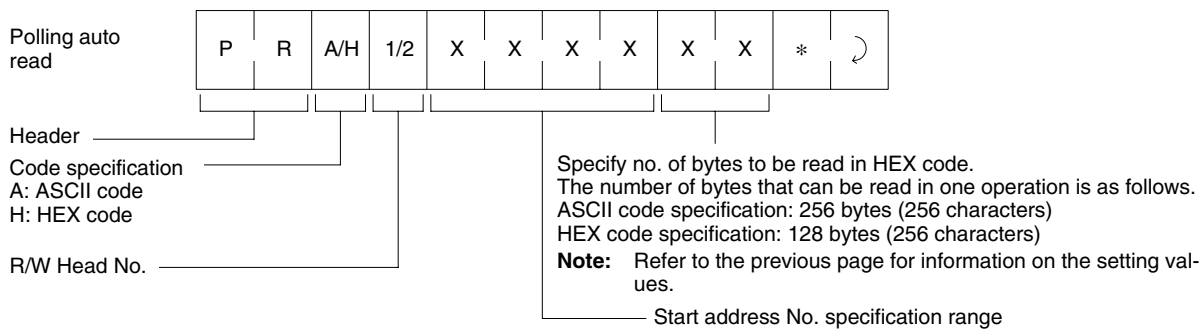


3-4-5 Polling Auto Read (PR)

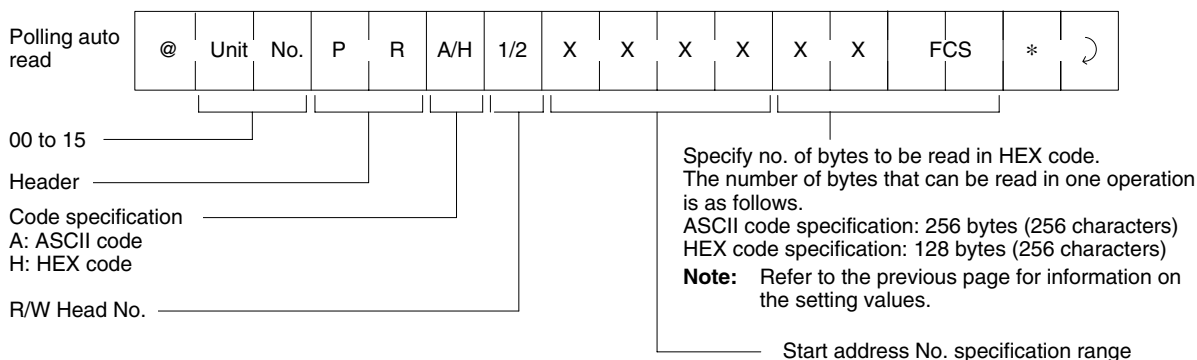
Immediately after the host computer sends a polling auto command, the ID Controller returns a response indicating that a command has been received. Subsequently, after waiting for the approach of the DC, the ID Controller reads the data. During this time, the host computer can use subcommands to query the command processing results. It can also send commands to the other R/W Head.

Command Format

For 1 to 1 procedure

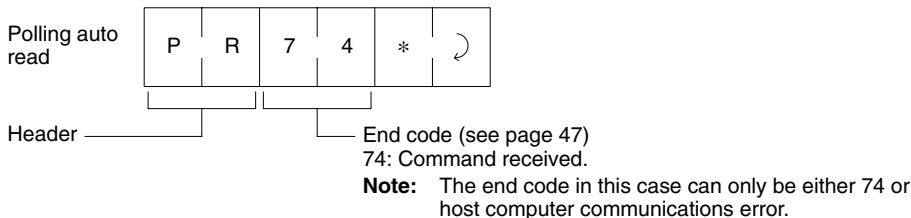


For 1 to N procedure

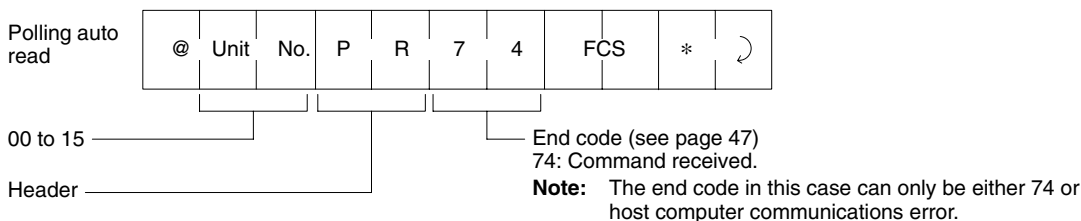


Response Format

For 1 to 1 procedure

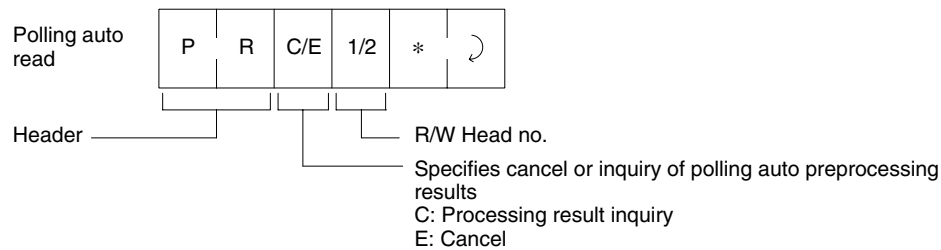


For 1 to N procedure

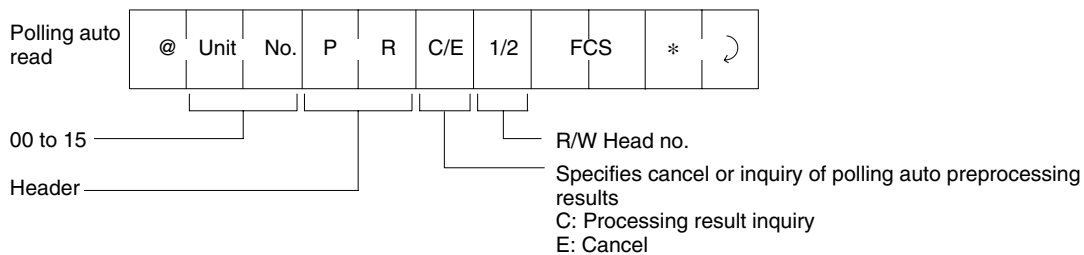


Subcommand Format

For 1 to 1 procedure

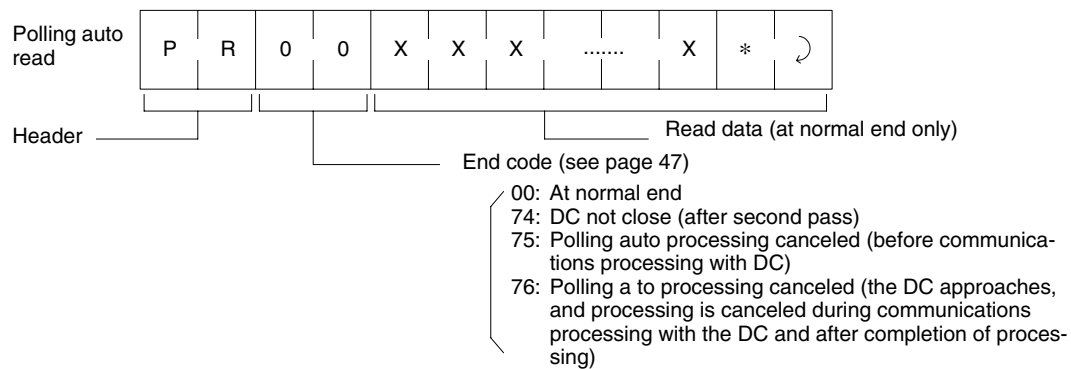


For 1 to N procedure

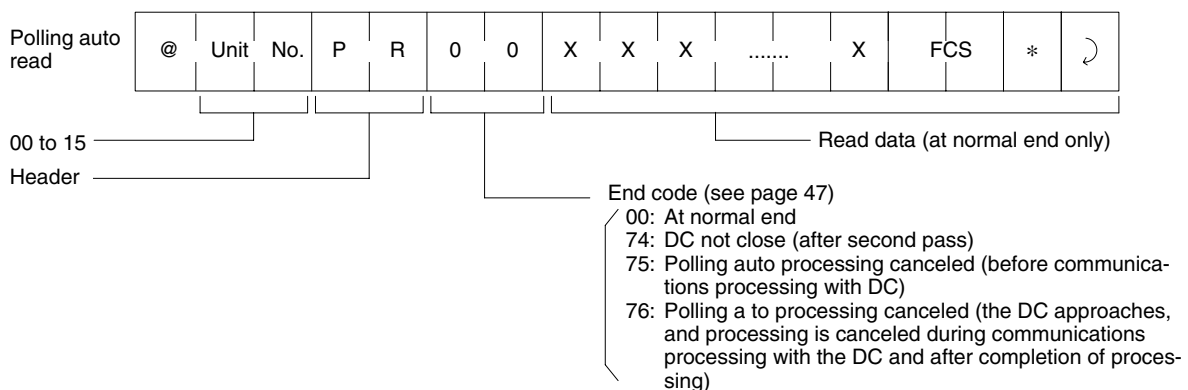


Subcommand Response Format

For 1 to 1 procedure



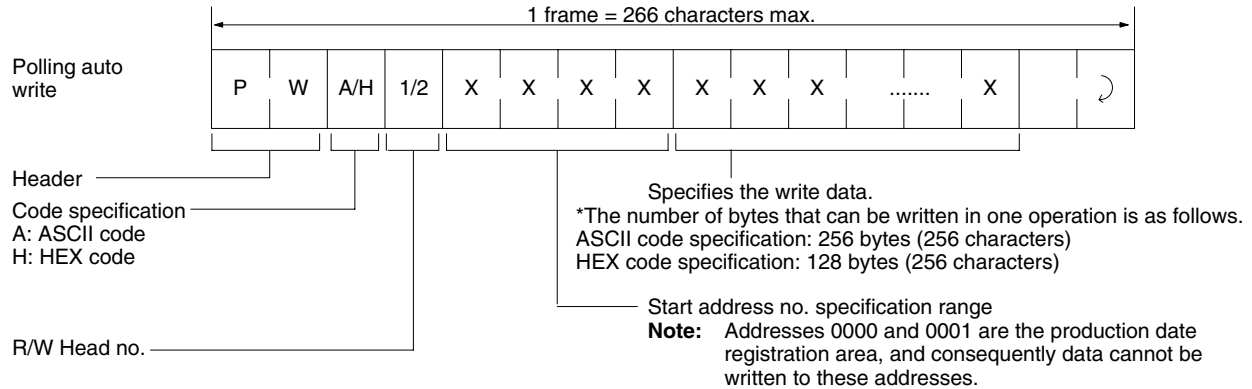
For 1 to N procedure



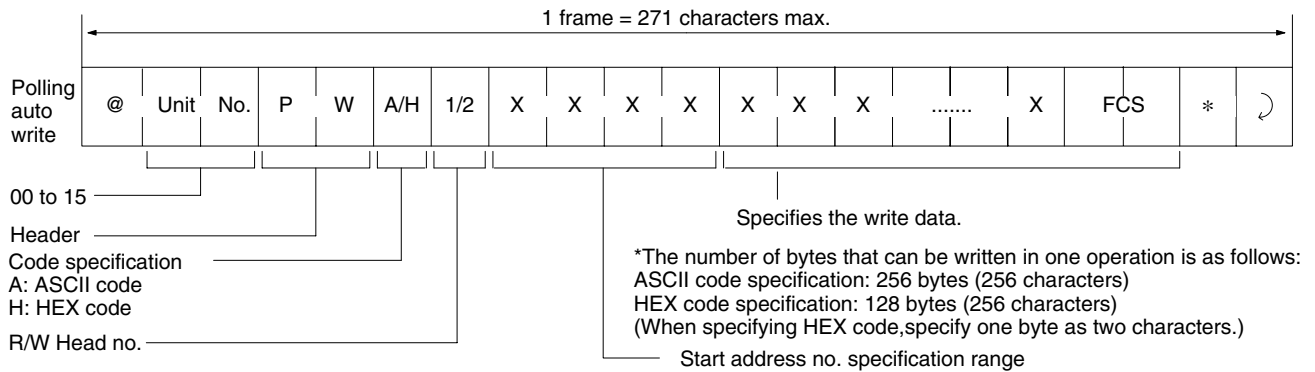
3-4-6 Polling Auto Write (PW)

Immediately after the host computer sends a polling auto command, the ID Controller returns a response indicating that a command has been received. Subsequently, after waiting for the approach of the DC, the ID Controller writes the data. During this time, the host computer can use subcommands to query the command processing results. It can also send commands to the other R/W Head.

For 1 to 1 procedure

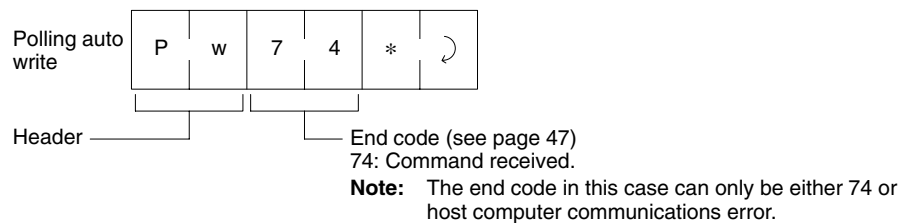


For 1 to N procedure

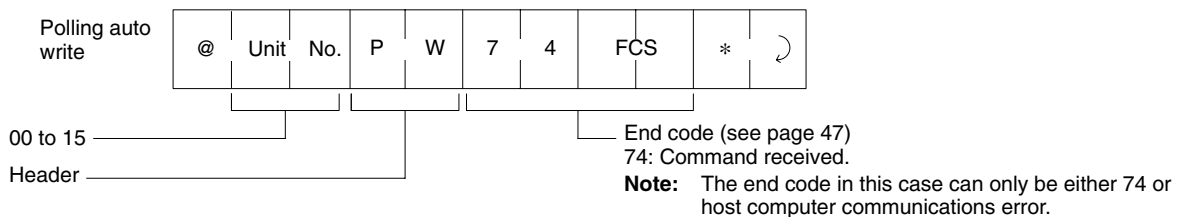


Response Format

For 1 to 1 procedure

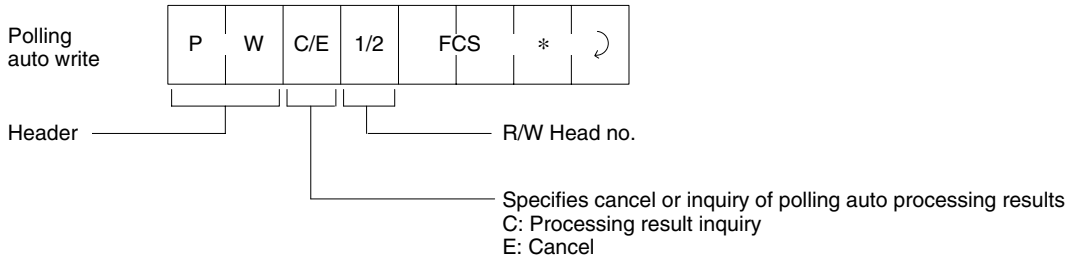


For 1 to N procedure

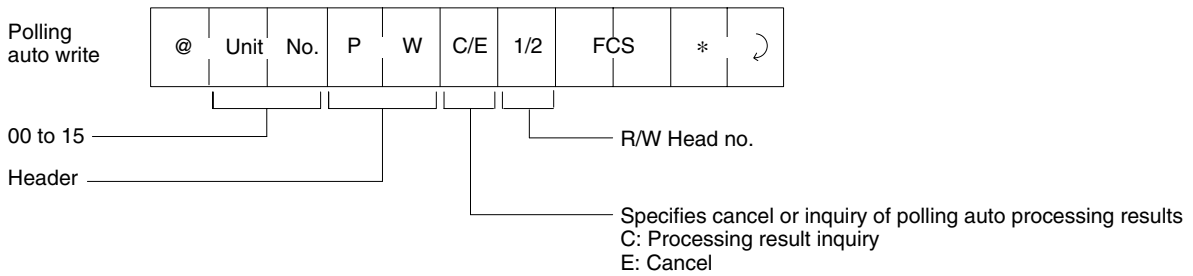


Subcommand Format

For 1 to 1 procedure

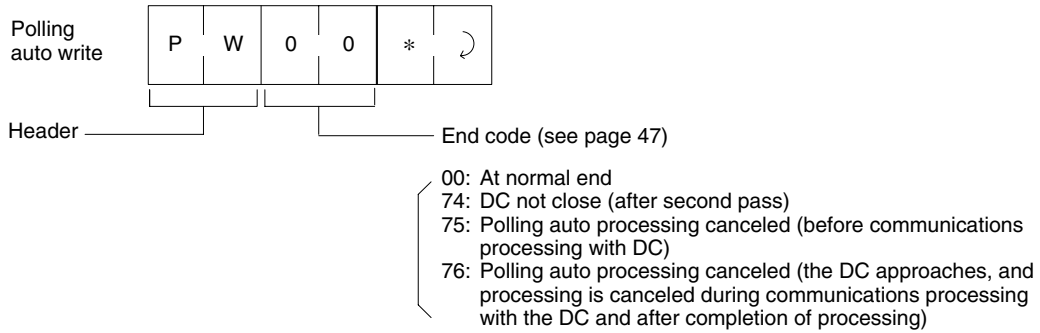


For 1 to N procedure

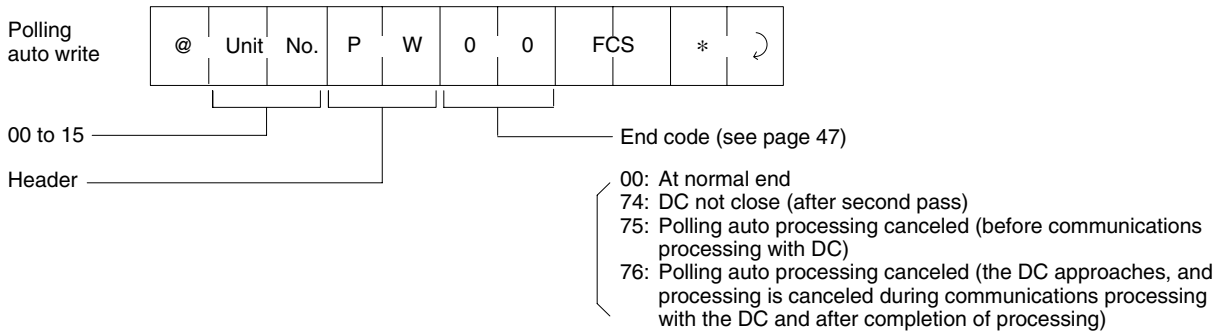


Subcommand Response Format

For 1 to 1 procedure



For 1 to N procedure

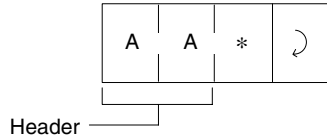


3-4-7 Auto Command Processing Cancel (AA)

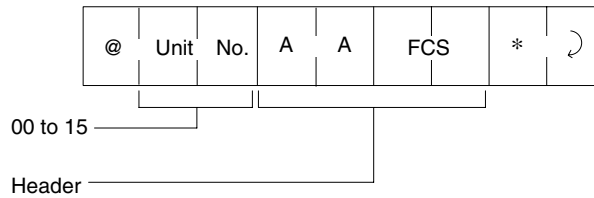
When in the response waiting condition, while auto command (auto read and auto write) processing is being executed, it is possible to cancel this and restore the command waiting condition.

Command Format

For 1 to 1 procedure

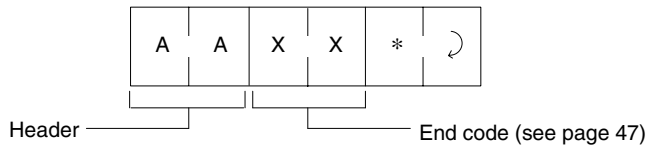


For 1 to N procedure



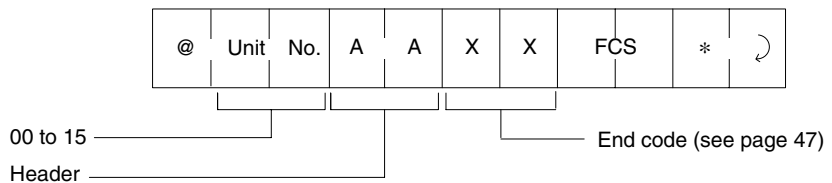
Response Format

For 1 to 1 procedure



- 14: Auto-command processing has not been executed.
- 75: Auto command processing has been cancelled.(DC has not arrived.)
- 76: Processing is suspended and canceled during execution of auto command(auto write:some of DC data may be rewritten)

For 1 to N procedure

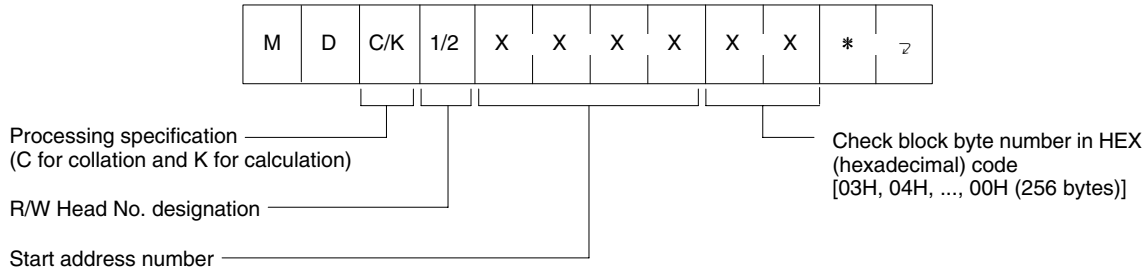


3-4-8 Management Data Check (MD C/K)

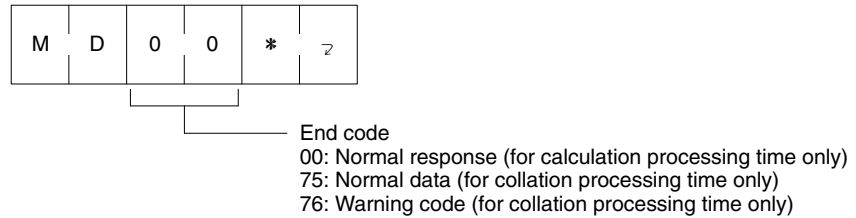
This command makes it possible to write or collate the CRC code in a check block that the user designates. The CRC code is calculated using the formula $X^{16} + X^{12} + X^5 + 1$ (refer to 3-2-5 DC Memory Check Function).

1 to 1 Procedure

Command Format

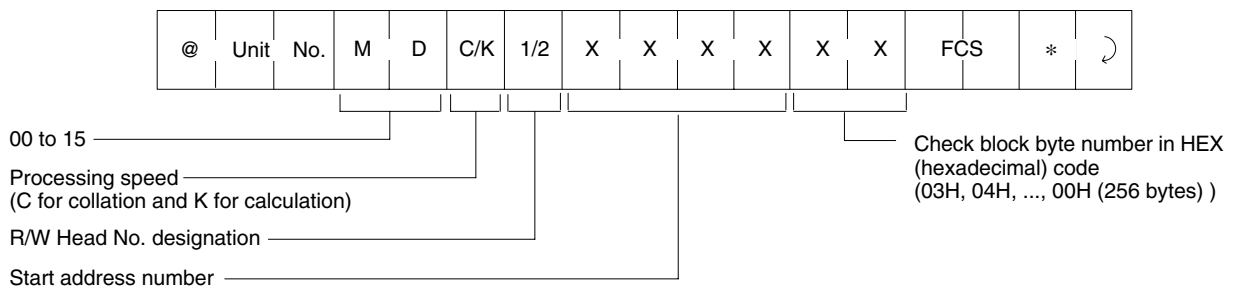


Response Format

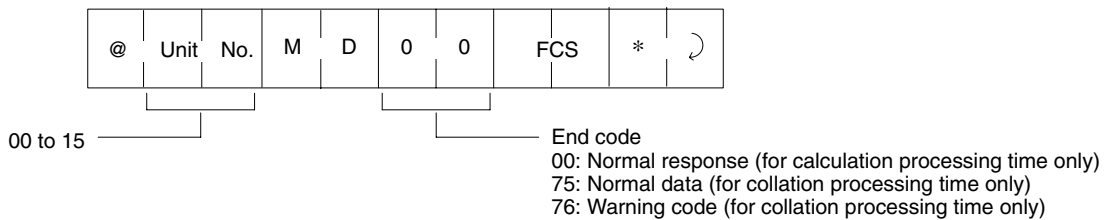


1 to N Procedure

Command Format



Response Format



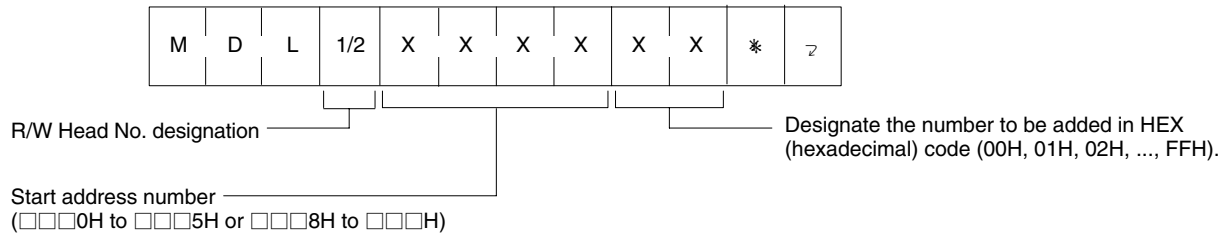
Note The number of check block bytes required is the bytes of the check code calculation area plus two bytes. Refer to 3-2-5 DC Memory Check Function for details.

3-4-9 Management Data Limit (MDL)

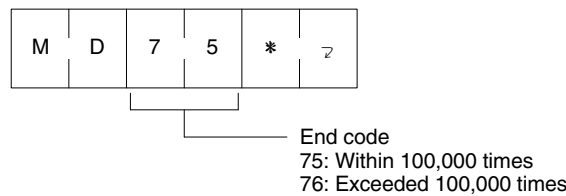
This command is used to manage the number of DC overwriting operations on the EEPROM of the ID Controller. Whether or not the number of DC overwriting operations has exceeded 100,000 can be found by adding the number of DC overwriting operations to the management area data designated by the user.

1 to 1 Procedure

Command Format

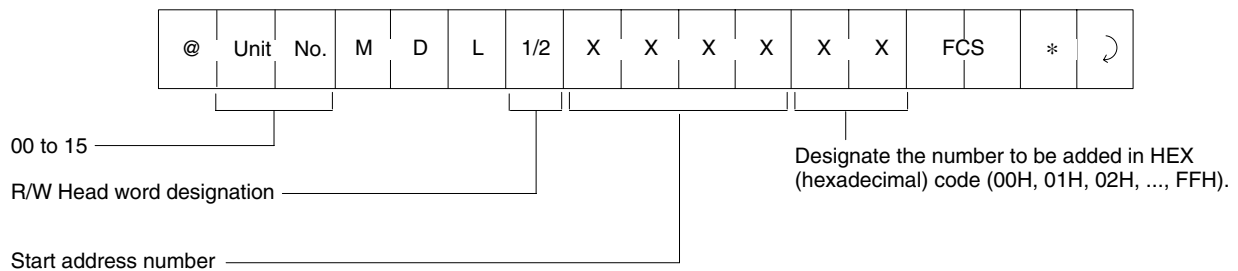


Response Format

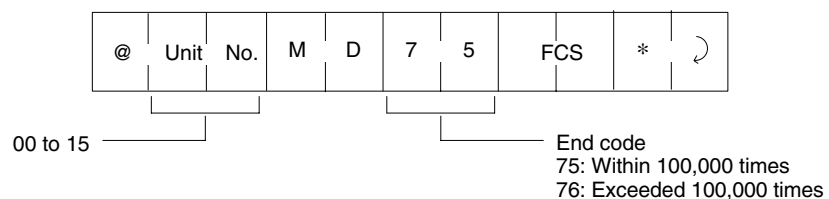


1 to N Procedure

Command Format



Response Format



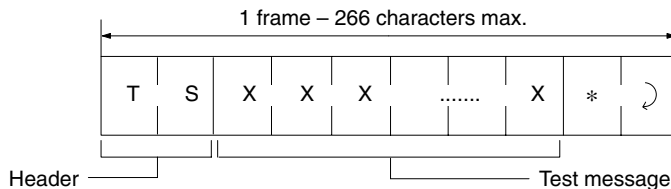
Note Refer to 3-2-4 Data Carrier Usage Level Check Function for details.

3-4-10 Test Command (TS)

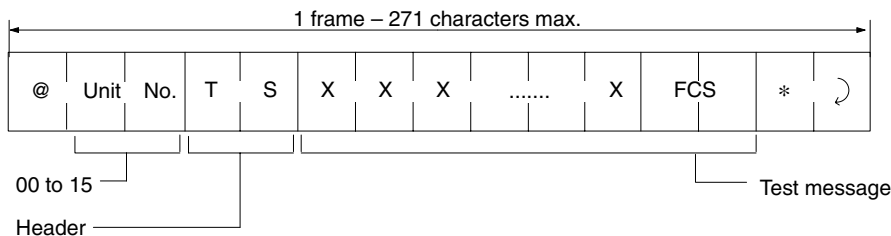
The test message sent from the host computer is returned without change. The test command is used for such purposes as test communications with the host computer.

Command Format

For 1 to 1 procedure

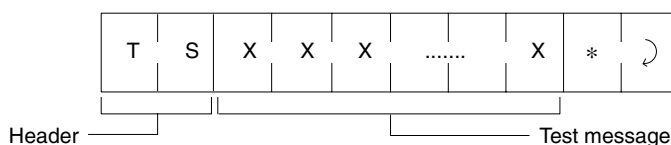


For 1 to N procedure

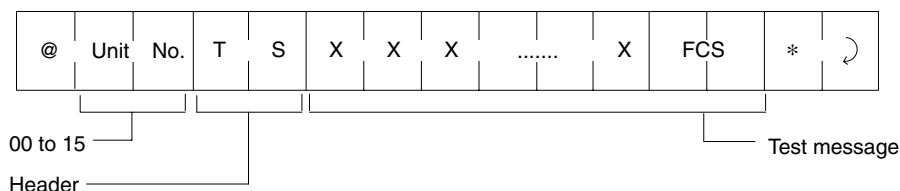


Response Format

For 1 to 1 procedure



For 1 to N procedure

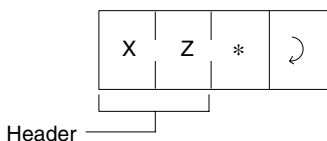


3-4-11 Abort Command (XZ)

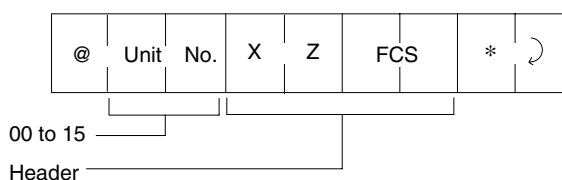
If a problem results in the response not being returning during communications with the host computer or during local communications, the abort command can be used to restore the ID Controller to the command waiting condition. There is no response to the abort command.

Command Format

For 1 to 1 procedure



For 1 to N procedure



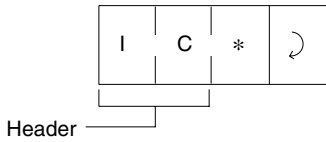
Note After the ID Controller receives the abort command, it requires more than 100 ms before it can accept the next command.

3-4-12 Undefined Command Response (IC)

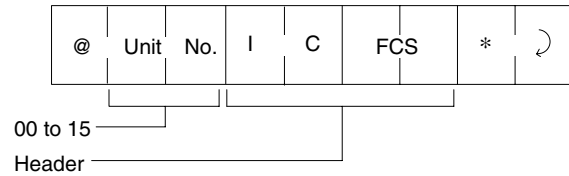
This is the response returned when the command header cannot be decoded.

Response Format

For 1 to 1 procedure



For 1 to N procedure

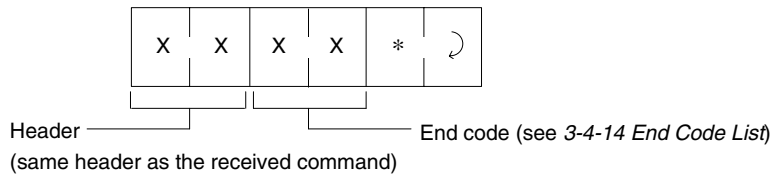


3-4-13 Error Response

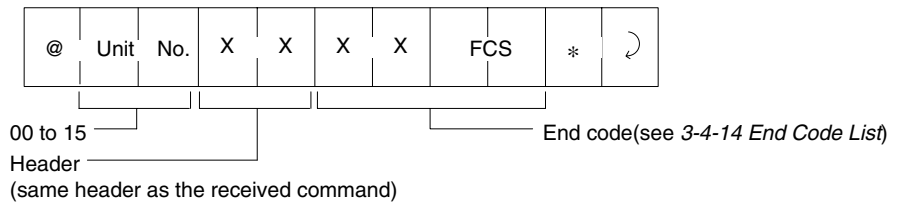
When an error occurs during communications with the host computer or during down communications, the end code is used to indicate the nature of the error.

Response Format

For 1 to 1 procedure



For 1 to N procedure



3-4-14 End Code List

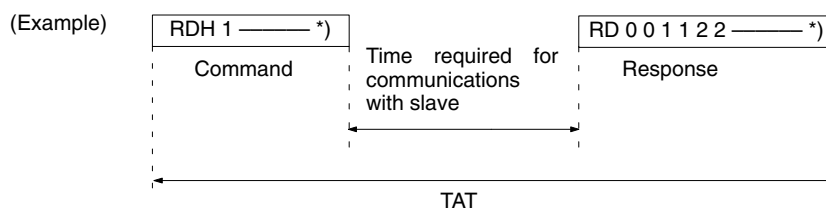
End codes are given in two digits as hexadecimal numbers.

Type	End code	Name
During normal operation	00	Normal end code
	7B	Low battery voltage warning (battery need to be replaced) (see note 1)
	74	Command received, DC not close (see notes 2 and 3)
	75	Command autoprocessing canceled (before processing communications with DC)
	76	Command autoprocessing canceled (DC is near and processing is canceled during or after communications)
Error in communications with host computer	10	Parity error
	11	Framing error
	12	Overflow error
	13	FCS error (only for 1 to N connection)
	14	Command input error
	18	Frame length maximum error
Error in local communications	70	DC communications error
	71	Disagreement error
	72	DC not present
	7A	Address too high
	7C	R/W Head not connected
	7D	Write protect error
DC memory warning	75	Normal end code returned (with no error) after data check command or MDL command was executed
	76	Error code returned after data check command or MDL command was executed

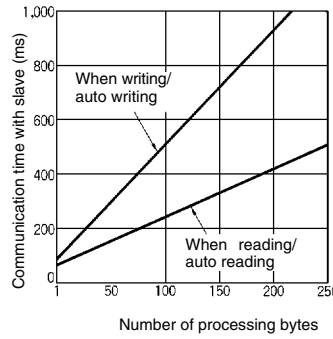
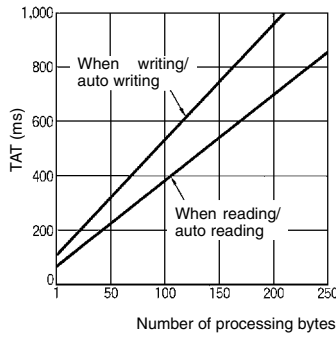
- Note**
1. Processing is normal when 7B as an end code has been returned. If the voltage of the battery is low and no communications are available, an error response such as 72 will be returned.
 2. When a polling auto command is sent, the ID Controller promptly returns a “command received” response (74).
 3. When a polling auto command is sent to query processing results, the ID Controller returns a “DC near” response (74) if the DC is not present. Refer to 6-3 Error Lists for more details on the errors.

3-5 Communication Time

The time required for communications varies with the DC memory type (SRAM or EEPROM). Furthermore, if the memory is EEPROM, communications time varies with the slave communications mode setting. The communications time consists of TAT (turn around time) and slave communications time. TAT is the time required for the host computer to receive a response after it has finished sending a command. Slave communications time is the time required for communications between the R/W Head and DC and is exclusive of host communications time. Slave communications time is used as a reference when calculating the moving speed of an auto command.



3-5-1 DC SRAM (Reference)



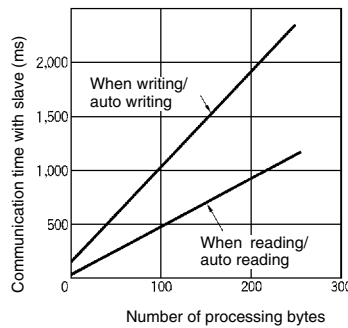
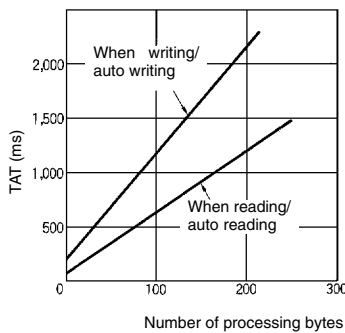
Formula (msec)

	Time Required for Communication with Slave
Read	$T=1.8N+48.4$
Write	$T=4.2N+86.5$

N: Number of processing bytes

3-5-2 DC EEPROM (Reference)

Communications Distance Priority Mode (SW 2-1 OFF)

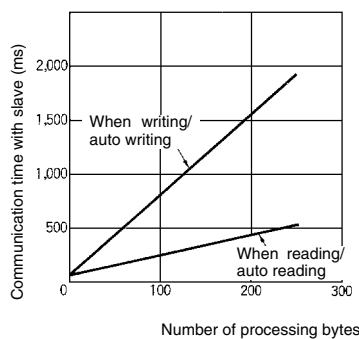
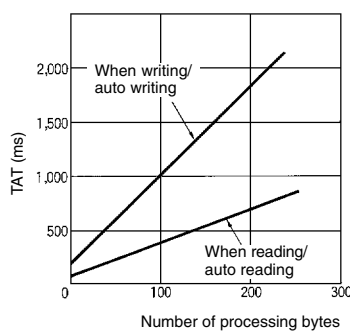


Formula (msec)

	Time Required for Communication with Slave
Read	$T=4.3N+64.6$
Write	$T=8.7N+167.1$

N: Number of processing bytes

Communications Time Priority Mode (SW 2-1 ON)



Formula (msec)

	Time Required for Communication with Slave
Read	$T=1.8N+79.0$
Write	$T=7.1N+180.4$

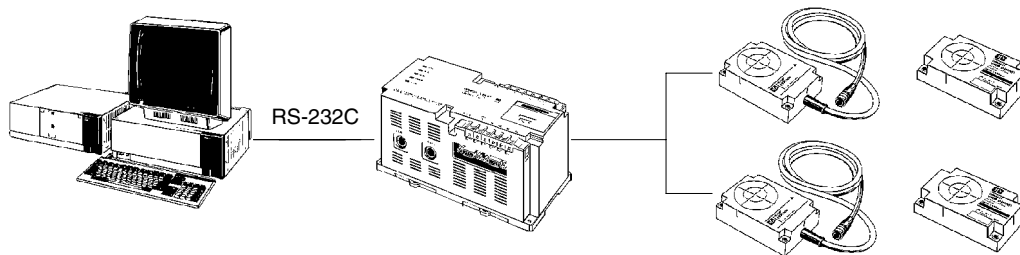
N: Number of processing bytes

- Note**
1. The TAT data values are for a host communications speed set to 9,600 bps with 8-bit length, 1 stop bit, and odd parity. The data is sent continuously with no spaces.
 2. The number of TAT data bytes is the number of code-designated ASCII bytes.

3-6 Communications Program Example

3-6-1 Serial System Link to Host Computer

System Configuration Example (1 to 1 Procedure)



BASIC Program Example

This is an example of a program that uses write commands to write data from the DC Head 1 in hexadecimal code. Specify the write address in the range 0006_H to 07FF_H, and the write data in two-character units, up to 256 characters. Be sure to correctly set the ID Controller communications format by setting its DIP switches to conform to the communications format with the host computer to which it is connected.

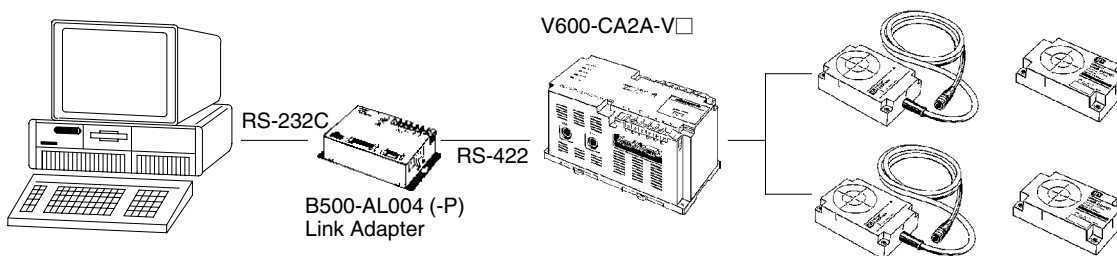
```

10 CLS
20 OPEN "COM1:9600, E, 8, 1, CS0, DSO, CDO, PE" AS #1
30 WIDTH #1,255
40 PRINT "EXECUTING WRITE COMMAND"
50 INPUT "WRITE ADDRESS (HEX DATA:0006 TO 07FF)"; WA$
60 INPUT "WRITE DATA (HEX DATA:2-CHARACTER UNITS)"; WD$
70 TX$="WTH1"+WA$+WD$+"*"+CHR$(&HD)
80 PRINT TX$
90 PRINT #1, TX$;
100 INPUT #1, RX$
110 PRINT "RS DATA=";RX$
120 GOTO 40
    
```

Note Above BASIC Program is for use with an IBM PC/AT or compatible computer.

3-6-2 Example of Basic Program with Host Computer's Time-up Functions

System Configuration



BASIC Program Example

```

10 OPEN "COM1:9600, E, 8, 1, CS0, DSO, CDO, PE" AS#1 . . . . . RS-232C open
20 NG=0:1=0:CNT=0:PRINT
40 T$="@00TS0123456789ABSDEF" . . . . . Test data
50 GOSUB*FCSSET
70 TXD$=T$+FCS$+"*"
    
```

```

80 PRINT "TXD$=";TXD$
90 PRINT #1, TXD$+CHR$(&HD); . . . . . Send command
100 IF LOC(1) <> 0 THEN 140 . . . . . Decision as to whether response was received
110 CNT=CNT+1
120 IF CNT=1000 THEN 1000 . . . . . Time up time set according to value compared to CNT
130 GOTO 100
140 INPUT #1, RXD$ . . . . . Receive response
150 IF RXD$ <> TXD$ THEN 2000 . . . . . Decision as to whether normal termination occurred
160 PRINT "RXD$="RXD$+"_____OK"
170 GOTO 20
1000 '***** TIME UP *****
1010 CNT=0
1020 ER$(NG)="TIME UP"
1030 NG=NG+1
1040 IF NG=3 THEN 3000 . . . . . Number of retries set to 3
1050 GOTO 80
2000 '***** ERROR RESPONSE *****
2010 ER$(NG)=RXD$+"_____NG"
2020 NG=NG+1
2030 IF NG=3 THEN 3000 . . . . . Number of retries set to 3
2040 GOTO 80
3000 '***** ERROR MESSAGE *****
3010 PRINT "*** ERROR OCCURRED ***"
3020 PRINT "RXD$-1=";ER$(0)
3030 PRINT "RXD$-2=";ER$(1)
3040 PRINT "RXD$-3=";ER$(2)
3050 GOTO 20
4000 '***** CALCULATE FCS ***** . . . . . FCS computation routine
4010 * FCSSET
4020 L=LEN(T$)
4030 A=0
4040 FOR J=1 TO L
4050 TJ$=MID$(T$,J,1)
4060 A=ASC(TJ$)XOR A
4070 NEXT J
4080 FCS$=HEX$(A)
4090 IF LEN(FCS$)=1 THEN FCS$="0"+FCS$
4100 RETURN

```

Note Above BASIC Program is for use with an IBM PC/AT or compatible computer.

SECTION 4

Monitor Unit Operation

This section provides the commands and procedures required for Monitor Unit operations.

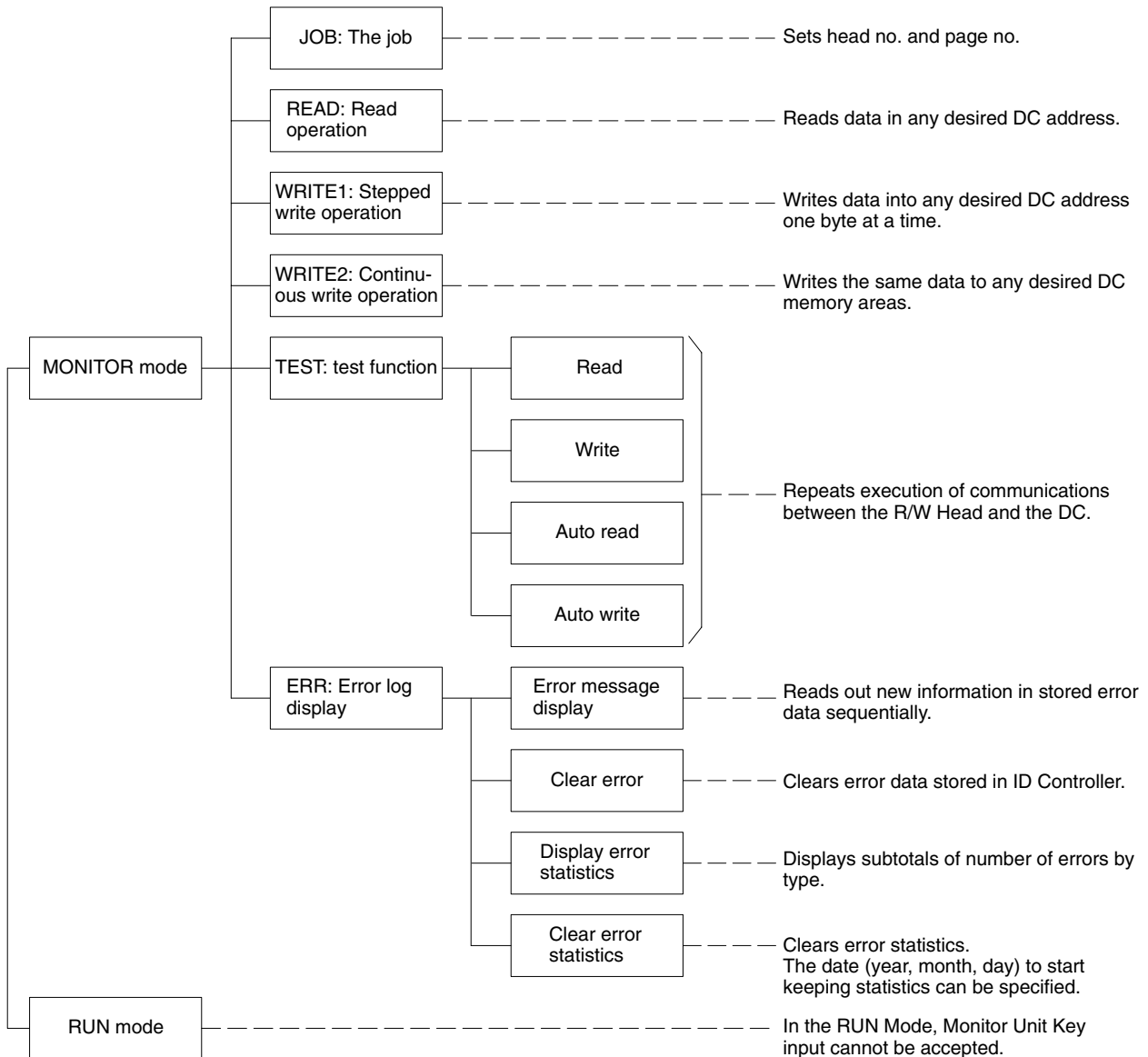
4-1	Using Monitor Unit (V600-P01)	52
4-1-1	Monitor Unit Functions	52
4-1-2	Mounting the Monitor Unit	53
4-1-3	Nomenclature	53
4-1-4	Preparations for Operations in Monitor Mode	54
4-2	Monitor Unit Operation List	55
4-2-1	Basic Operations	55
4-2-2	Data Read and Write Operations	56
4-2-3	Operation Test at System Startup	56
4-2-4	Reading Error Data	57
4-3	Basic Operations	57
4-3-1	Changing Operation Mode	57
4-3-2	Job Specification (JOB)	58
4-3-3	Address Setting (ADRS)	59
4-3-4	Data Specification (DATA)	60
4-4	Data Read and Write Operations	61
4-4-1	Read	61
4-4-2	Step Write	63
4-4-3	Continuous Write (WRITE2)	64
4-5	Operation Test (TEST)	65
4-5-1	Test Read	66
4-5-2	Test Write	67
4-5-3	Test Auto Read	68
4-5-4	Test Auto Write	69
4-6	Reading Error Information (ERR)	70
4-6-1	Reading Error Data	71
4-6-2	Reading Error Statistics	72
4-6-3	Clear Error Data	73
4-6-4	Clear Error Statistics	74

4-1 Using Monitor Unit (V600-P01)

The Monitor Unit is a monitoring tool mounted on the ID Controller. It can be used during system startup to check communications with the DC, to read or write data to the DC, and to read any error messages.

4-1-1 Monitor Unit Functions

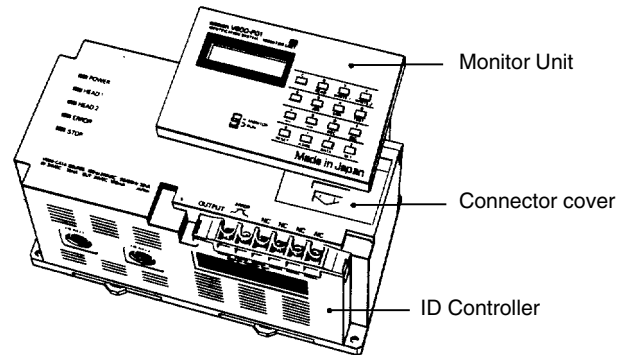
The Monitor Unit has the following functions which are executed in the MONITOR Mode.



Note Remove the Monitor Unit before starting operations.

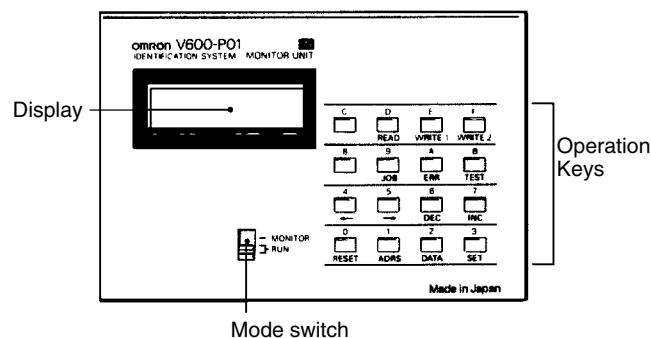
4-1-2 Mounting the Monitor Unit

The Monitor Unit is attached by sliding the ID Controller connector cover in the direction of the arrow on the cover. Press the four tabs on the back of the Monitor Unit down until they lock to make sure that it is mounted properly and securely.



- Note**
1. The Monitor Unit can be mounted while power is applied to the ID Controller. Note, however, that the ID Controller mode when the Monitor Unit is not mounted is the RUN Mode. This means that when the Monitor Unit mode switch is set to MONITOR Mode when the Monitor Unit is mounted on the ID Controller, the ID Controller's mode will change from the RUN Mode to the MONITOR Mode. Special care must be exercised at this point.
 2. If power is applied to the ID Controller with the Monitor Unit attached, information showing that power is being applied is displayed on the Monitor Unit display, but this operation has no effect on operation of the device.
 3. There are three positions on the mode switch, two of which specify the RUN Mode. It does not matter which setting is used.
 4. When the Monitor Unit is removed, the ID Controller reverts to the RUN Mode, regardless of which mode it was set in.

4-1-3 Nomenclature



Display

All data is displayed here in the MONITOR Mode. In the RUN Mode, only "RUN" is displayed.

Mode Switch

This is used to switch the operation mode of the ID Controller.

Operation Keys

These are used to select functions and execute operations and also include numerical keys.

■ Key Designations

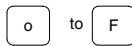
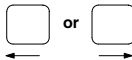
- Function selection



Operation



Numbers

**■ English/Japanese Character Selection**

Note There is a beeper in the ID Controller, which activated when a mistake is made in the Monitor Unit key operations, or when read or write operations cannot be performed (because DC is not present or other reasons).

4-1-4 Preparations for Operations in Monitor Mode

The following information provides the relationships between various settings before the execution of read, write, or test operations in the MONITOR Mode.

Operation		Read	WRITE 1, stepped write	WRITE 2, continuous write	Test read	Test, auto read	Test write	Test auto write
Setting								
JOB specification	Head no. (HEAD)	Setting required	Setting required	Setting required	Setting required	Setting required	Setting required	Setting required
	Page no. (PAGE)	Setting required	Setting required	Setting required	While significant, setting can be omitted (see note 1)	While significant, setting can be omitted (see note 1)	Setting required	Setting required
ADRS, address	Start address (a)	Setting required	Setting required (see note 2)	Setting required (see note 2)	While significant, setting can be omitted (see note 1)	While significant, setting can be omitted (see note 1)	Setting required (see note 2)	Setting required (see note 2)
	End address (\bar{a})	---	---	Setting required (see note 2)	While significant, setting can be omitted (see note 1)	While significant, setting can be omitted (see note 1)	Setting required (see note 2)	Setting required (see note 2)
DATA (d)		---	Setting required	Setting required	---	---	Setting required	Setting required

JOB Specification

The job specification includes the specifications of the R/W Head numbers and page numbers required for all read or write operations.

ADRS (Address) Settings

This requires setting the start address (a) and the end address (\bar{a}). It is extremely important to ensure that the start address does not exceed the end address. If it does, only the start address will be effective.

DATA setting

For a write operation, one byte of the specified data is written to the DC in the area defined by the start and end addresses.

- Note**
1. Data setting is not required for an operation test with the test read or test auto read command to check the relationship of the position.
 2. If the DC's memory capacity is more than 256 bytes, data cannot be written to address 00 or 01 when page 0 is set with a page number because these addresses are used to register the production month and year of the DC. Nothing can be written to addresses 0002 to 0005 because these addresses are used as a write protected area.
- or If the DC's memory capacity is 256 bytes or less, no data can be written to address 00 when page 0 is set with a page number because this address is used as a write protected area.

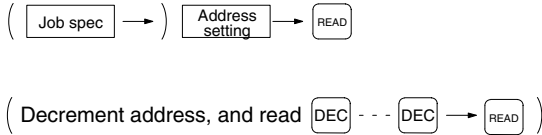
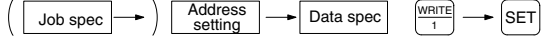
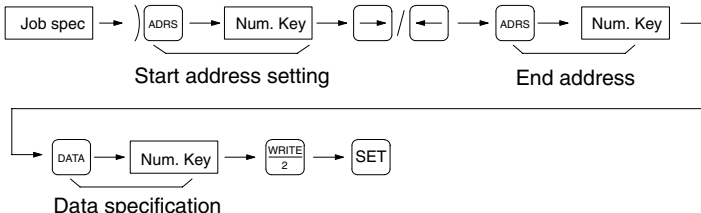
4-2 Monitor Unit Operation List

4-2-1 Basic Operations

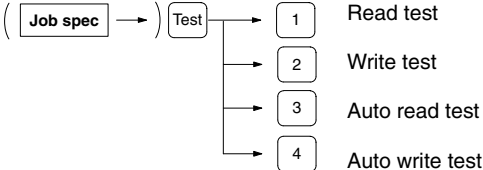
Operation mode	Description	Basic operation procedure	Page
Changing operation mode	Switches ID Controller operation mode	<ul style="list-style-type: none"> • MONITOR Mode • RUN Mode 	57
Job specification	Specifies head and page numbers required for given operations		58
Numerical keys	Used for setting address, specifying data, and selecting functions	<ul style="list-style-type: none"> • Address and data specifications <ul style="list-style-type: none"> • Function selection 	58
Address setting	Sets the address from which data is read or to which data is written in the range 00 to FF.	<ul style="list-style-type: none"> • Start address <ul style="list-style-type: none"> • End address 	59
Data specification	Specifies the 8-bit data (00 to FF) to be written to the DC.		60

Note Monitor Unit read and write data is limited to HEX code.

4-2-2 Data Read and Write Operations

Operation mode	Description	Basic operation procedure	Page
Read (READ)	Data from any desired address is read from DC.		61
Step write (WRITE1)	One byte of data is written to any desired address in the DC.		63
Continuous write (WRITE2)	The same data is written to the desired continuous series of addresses in the DC.		64

4-2-3 Operation Test at System Startup

Operation mode	Description	Basic operation procedure	Pages
Select test parameter	Selects operation to test from among read, auto read, write, and auto write.		65 to 69

4-2-4 Reading Error Data

Operation mode	Description	Basic operation procedure	Page
Error logging function selection	Selects ID Controller error logging function		70
Read error data	Up to 30 errors occurring in the RUN Mode are stored, and new occurrences are displayed in the order of occurrence along with head numbers and error codes.		71
Read error statistics	Subtotals of errors occurring in RUN Mode are displayed by type.		72
Clear stored error data	Stored error data is cleared.		73
Clear error statistics	Error statistics are cleared, and the data (year, month, day) for starting collection of statistics is specified.		74

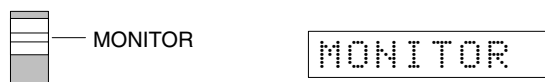
4-3 Basic Operations

4-3-1 Changing Operation Mode

The following describes how to switch the ID Controller operation mode. By pressing the Left or Right Arrow Key when MONITOR is displayed, the English or Japanese display can be selected. The selected display will be on hold until the Left or Right Arrow Key is pressed again.

Relationship between Mode Switch and Display English characters or Japanese characters can be selected.

Monitor Mode The Monitor Unit key operations can only be used in the MONITOR Mode. Communications to the host computer stop when the MONITOR Mode is entered.



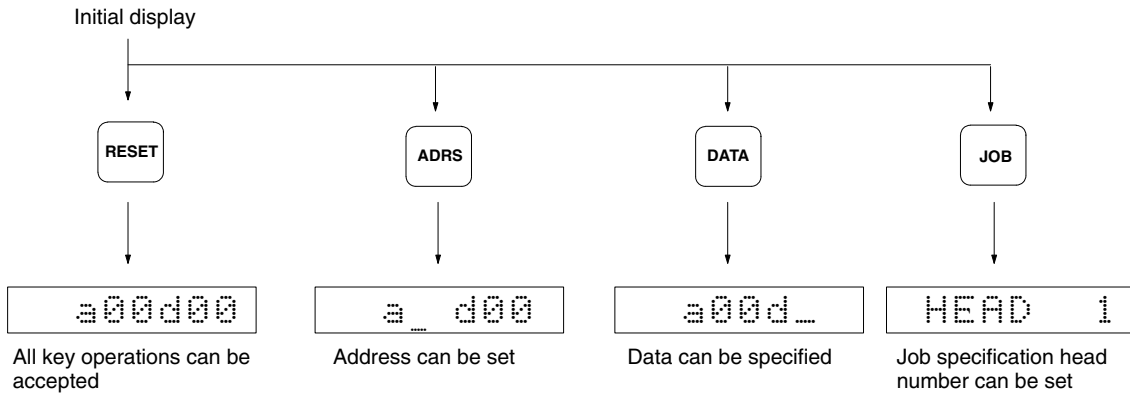
Run Mode

In the RUN Mode, "RUN," is always displayed and key inputs are not accepted. There are two switch positions for the RUN Mode, and operation is the same at both settings.



Key Assignments in Monitor Display

If the mode switch is set to monitor, "MONITOR" is displayed. When this is displayed, only the RESET, DATA, ADRS, and JOB Keys can be accepted.

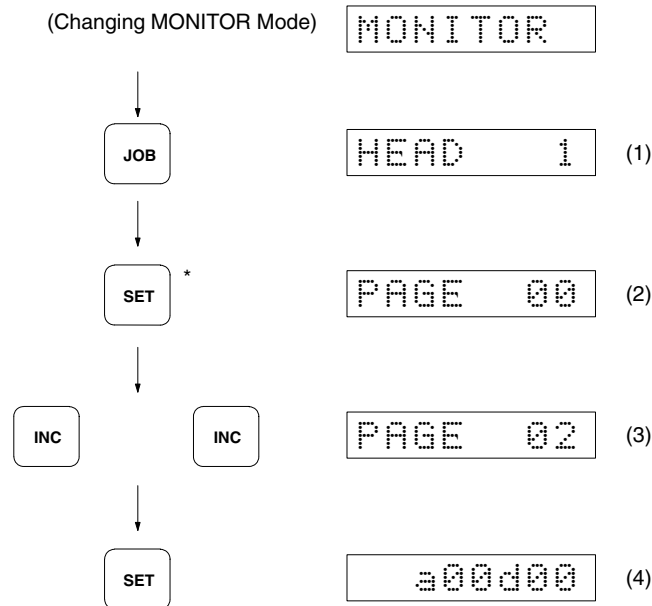


4-3-2 Job Specification (JOB)

This enables setting of the head number and page number for data reading, writing and testing in the MONITOR Mode.

Operation Procedure

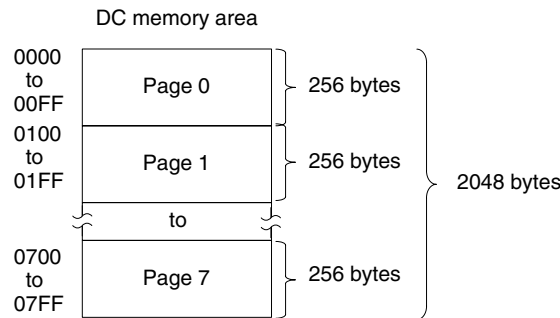
The following is an example specifying R/W Head 1 and Page 2 (DC memory area addresses 0200 to 02FF).



The JOB Key is effective when the MONITOR Mode initial display is shown. Press the RESET Key to move from another operation and create the job specification.

- 1, 2, 3...**
1. When the JOB Key is pressed, "HEAD1" is displayed. If R/W Head 1 is to be set, press the SET Key. If R/W Head 2 is to be set, press the INC/DEC Key once and then press the SET Key.
 2. When the Set Key is pressed, "page0" is displayed.
 3. Press the INC Key twice and specify page 2.
 4. Press the SET Key to set the page number to 2, and then the display changes to address/data.

- Note**
1. The head number is specified using the INC/DEC Key. The numerical keys are not effective.
 2. A page number is the number of a division in the DC memory area (see page 21).

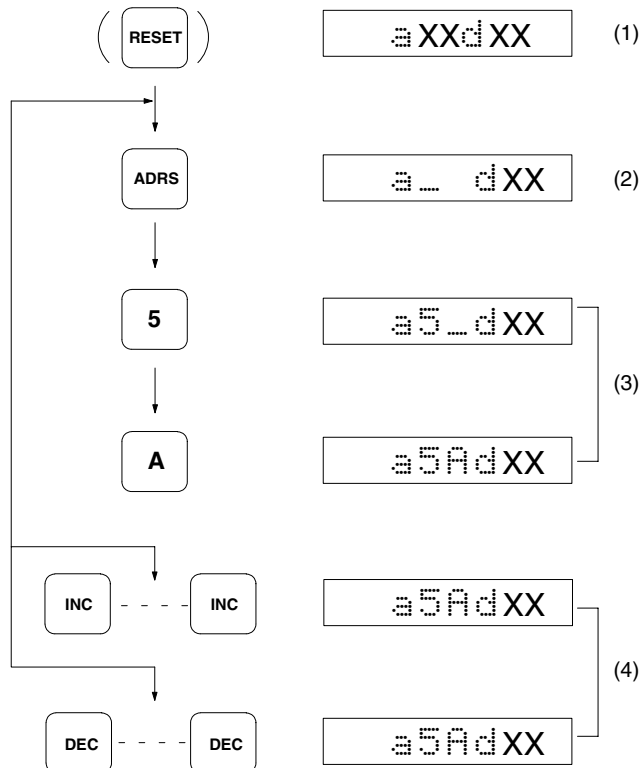


4-3-3 Address Setting (ADRS)

This enables the setting of the start address for data reading, writing, and testing.

Operation Procedure

Start address: 5A in this example



- 1, 2, 3...
1. The address setting procedure must start from the address/data display.
 2. When the ADRS Key is pressed, the address display section goes blank, and the cursor is shown at the upper digit position.
 3. Specify the address in two digits using the numerical keys.

Note If a mistake is made during key operations, press the ADRS Key again and specify the address correctly using the numerical keys.

4. Subsequent address settings can be made using the INC (increment) Key, or the DEC (decrement) Key.

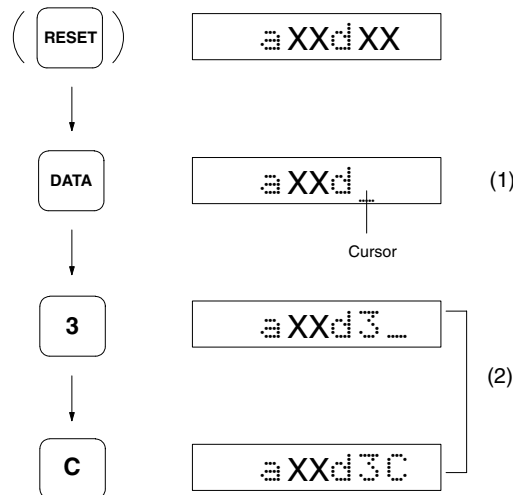
- Note**
1. The XX positions in the display are for the numerical data in the range 00 to FF.
 2. Addresses are displayed in two digits of hexadecimal numbers in the range 00 to FF. Since the page number was set at 2 previously in page 58, address 5A means address 025A in the DC memory area.
 3. To set an address on a different page, first specify the page number using the job specification procedure.

4-3-4 Data Specification (DATA)

When writing data to the DC, specify the data in two hexadecimal digits in the range 00 to FF.

Operation Procedure

The following procedure is an example showing how to specify 3C as the data.



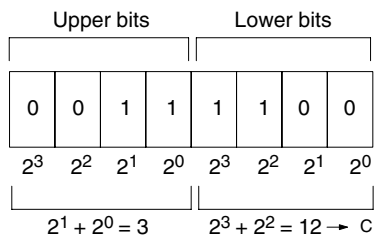
Data specification is performed in the address/data display.

- 1, 2, 3...
1. When the DATA Key is pressed, the data display section goes blank, and the cursor appears at the upper digit.
 2. Specify the data in the order upper digit, lower digit.

Note If a mistake is made during key operations, press the DATA Key again and specify the address correctly using the numerical keys.

- Note**
1. Data contents: Each address location contains two digits in hexadecimal code comprising eight bits. The upper four bits and lower four bits represent hexadecimal code in the range 0 to F, thus the upper digit is 16¹ and the

lower digit is 16^0 . After the procedure above, the address location looks like this.



2. Valid operations on data values: The following four operations can be performed on the data once it has been specified.

- WRITE1: Step write
- WRITE2: Continuous write
- TEST (write): Write test
- TEST (auto write): Auto write test

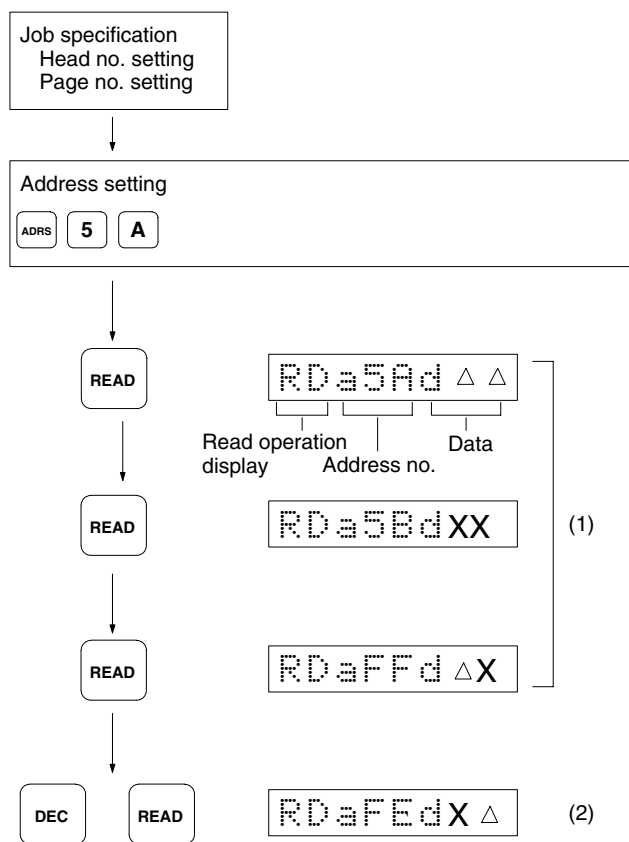
4-4 Data Read and Write Operations

These operations are used to read data from or write data to the DC in the offline condition. Before executing these operations, check that the R/W Head is connected, and check for the presence or absence of the DC.

4-4-1 Read

This is used to read data to the Monitor Unit from the desired DC address.

Operation Procedure



(Cancel operation by pressing RESET)

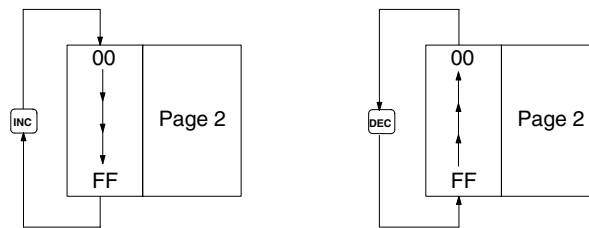
Data read by the read operation contains the job specification head and page numbers. If the start address is not set, the data in address 00 is read.

- 1, 2, 3...**
1. When the READ Key is pressed, "RD" (read operation) appears on the display, and the data in the specified address is shown at the right end of the display. If the READ Key is pressed again, the address is incremented, and the next data can be read.

Note If no R/W Head is connected, if the DC is not in the communications range, or if a communication error occurs, an error code is displayed (see page 95). When this happens, use the horizontal cursor keys to display the error message.

2. Use the INC/DEC Key to increment or decrement the address, and then press the READ Key to read the data. To read data from an address of a different page, start the procedure from the job specification.

Note 1. If the INC/DEC Key is pressed, and the address exceeds the 00 to FF range:

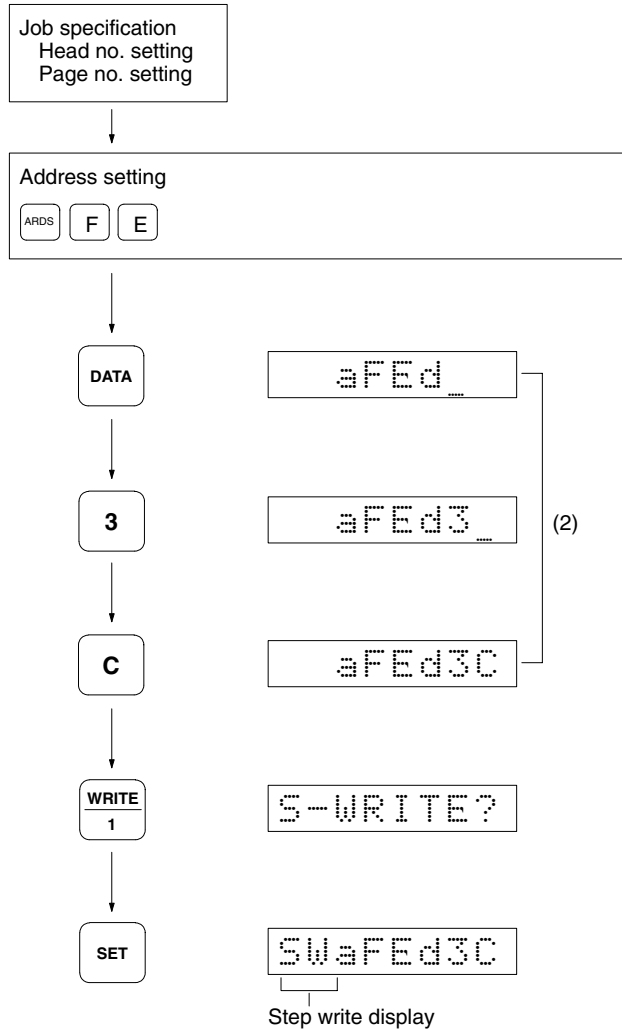


2. If the address is FF when the INC Key is pressed, the setting returns to address 00 of the same page.
3. If the address is 00 when the DEC Key is pressed, the setting moves to address FF of the same page.

4-4-2 Step Write

This is used to write one byte of data to the desired DC address.

Operation Procedure



(Cancel operation by pressing)

The step write operation writes the job specification head and page numbers.

- 1, 2, 3...** 1. Specify the address.

Note Page 0 addresses 00 and 01 are reserved for registration of the production data (year, month, day), and data cannot be written in this area. Note also when using this function that addresses 02 to 05 are write protected (see page 22).

2. Press the DATA Key and specify one byte of data (two hexadecimal digits).
3. When the WRITE1 Key is pressed, "S-WRITE?" is shown at the left end of the display.
4. When the SET Key is pressed, data is written to the specified DC address.

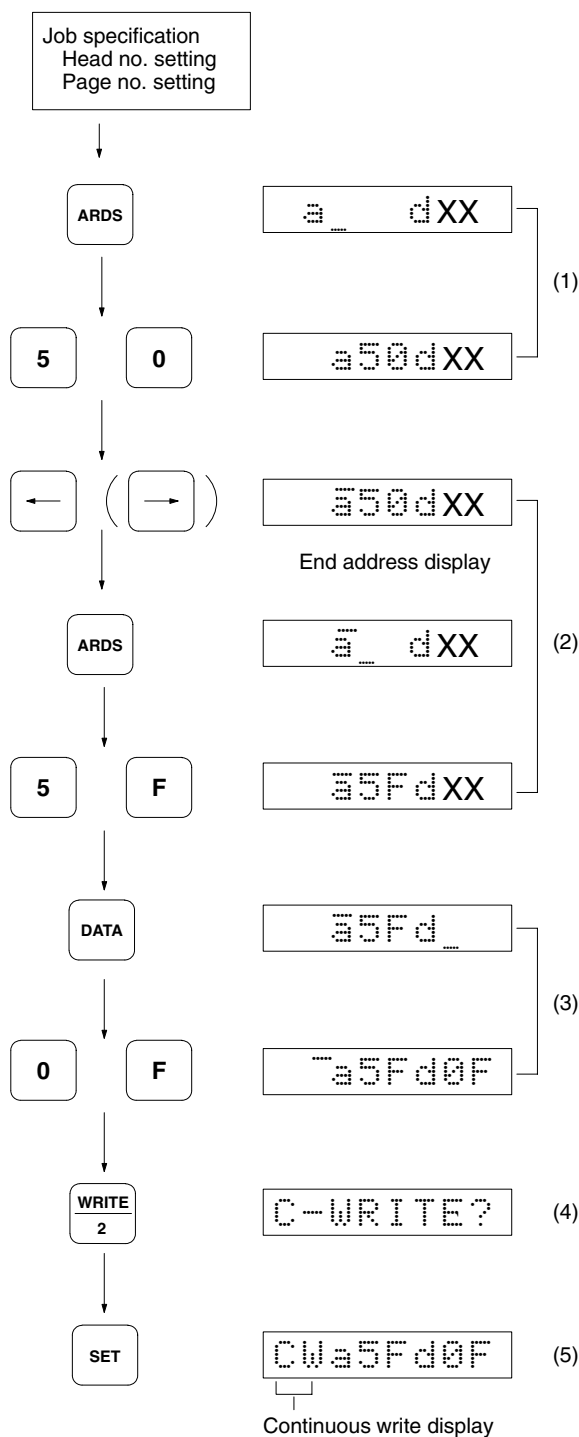
Note If no R/W Head is connected, if the DC is not in the communications range, or if a communication error occurs, an error code is displayed (see page 95). When this happens, use the horizontal cursor keys to display the error message.

4-4-3 Continuous Write (WRITE2)

This is used to write the same one byte of data to a continuous series of DC addresses.

Operation Procedure

The example shows the procedure for writing 0F into locations 50 to 5F.



(Cancel operation by pressing **RESET**)

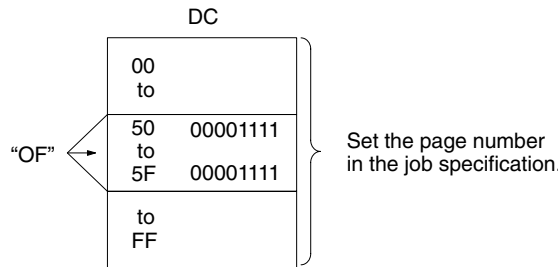
The continuous write operation writes the job specification head and page numbers.

- 1, 2, 3... 1. Specify the start address.

2. Specify the end address. When either of the horizontal cursor keys is pressed, the display changes to the end address.

- Note**
- a) Ensure that the start address does not exceed the end address.
 - b) In the case of a DC with SRAM, page 0 addresses 00 and 01 are reserved for registration of the production date (year, month, day), and data cannot be written in this area. Note also when using this function that addresses 02 to 05 are write protected (see page 22).

3. Specify the data to be written. The example below shows the procedure for writing 0F to all 16 addresses 50 to 5F.



- 4. When the WRITE2 Key is pressed, "C-WRITE?" is shown at the left end of the display.
- 5. When the SET Key is pressed, the same data is written to all the specified DC addresses.

Note If no R/W Head is connected, if the DC is not in the communications range, or if a communication error occurs, an error code is displayed (see page 95). When this happens, use the horizontal cursor keys to display the error message.

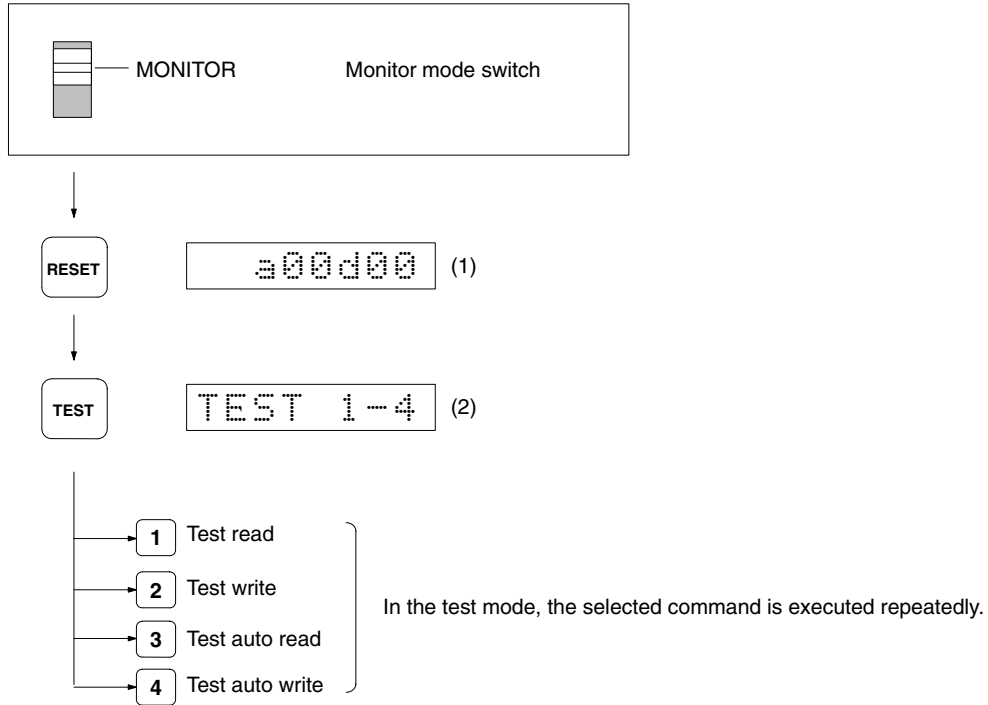
4-5 Operation Test (TEST)

When checking the installation of the R/W Heads and the DC, TEST can be used to initiate communications to establish the type of installation relationship and the relative speeds. Test commands are available for read, write, auto read, and auto write operations.

Preparations for Executing Test Commands

The job specification head and page numbers are objects of the test commands. If the job specification has already been made, check the respective settings. If the job specification has not been made, the test commands use Head 1 and Page 0. Note that if the start and end addresses have been set, the entire area they define is used by the test commands.

Test Menu Selection

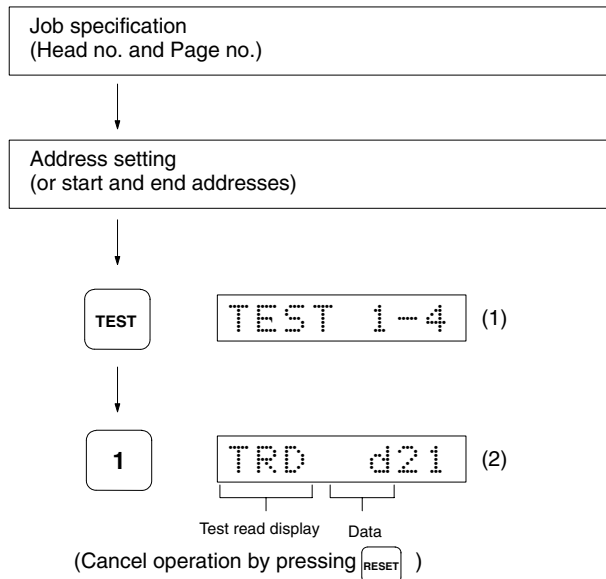


- 1, 2, 3...**
1. The TEST Key is not effective when MONITOR is shown on the display, so press the RESET Key.
 2. When the TEST Key is pressed, the command selection menu appears in the test mode. Use numerical keys 1 to 4 to select the command.

4-5-1 Test Read

Data in the specified DC address (or area defined by start address to end address) is repeatedly read out.

Operation Procedure



- 1, 2, 3...**
1. Press the TEST Key.
 2. When the Key 1 is pressed, test read is initiated, and the data is read out.

If the start address is set, only the data in that location is displayed.
 While the read test is in progress, the data in the display flashes every second, and the ID Controller head number display indicator also flashes every second.

Note When an error occurs in communications between the DC and a R/W Head, the error code is displayed (see page 95). When this happens, use the horizontal cursor keys to display the error message.

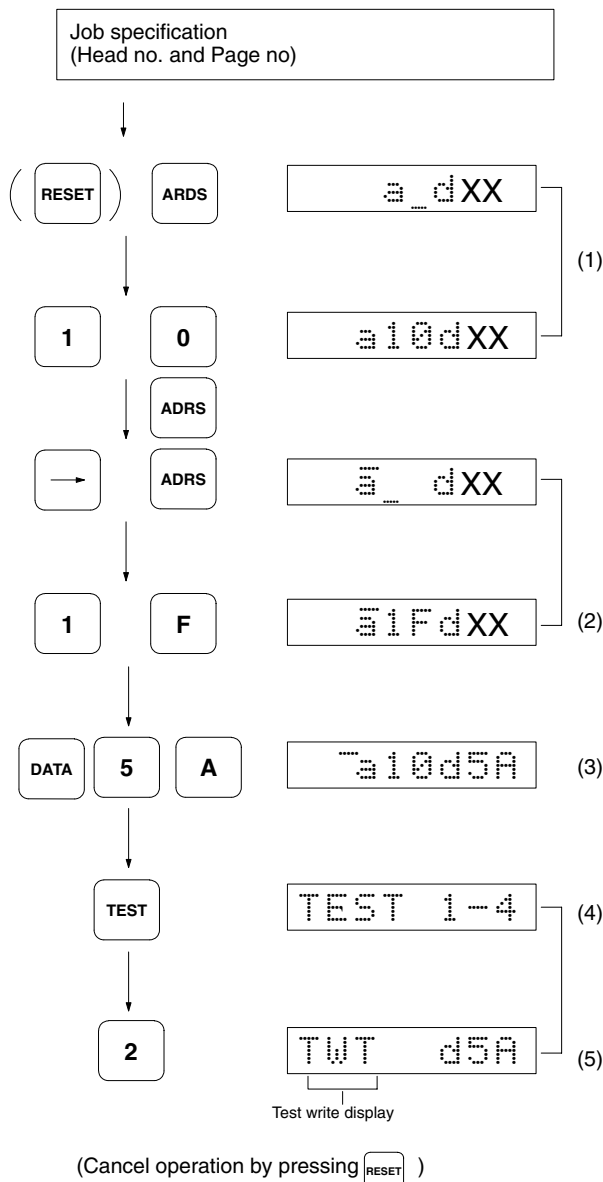
Note If the address setting is incorrect (start address > End address), then only the contents of the start address location are read.

4-5-2 Test Write

One byte of data is written to the specified DC address (or locations from start address to end address) repeatedly.

Operation Procedure

This example shows the procedure for writing 5A into locations 10 to 1F.



1, 2, 3... 1. Specify the address(es) to which data is to be written.

Note In the case of a SRAM DC, data cannot be written to addresses 00 and 01 on Page 0. In this example, data is written to address 10.

2. Specify the write end address. If the start address exceeds the end address, then data is written only to the start address location.
3. Specify the data.
4. When the TEST Key is pressed, the test menu is shown on the display.
5. When Key 2 is pressed, the write test is initiated, and if operation is normal, the write data is displayed.

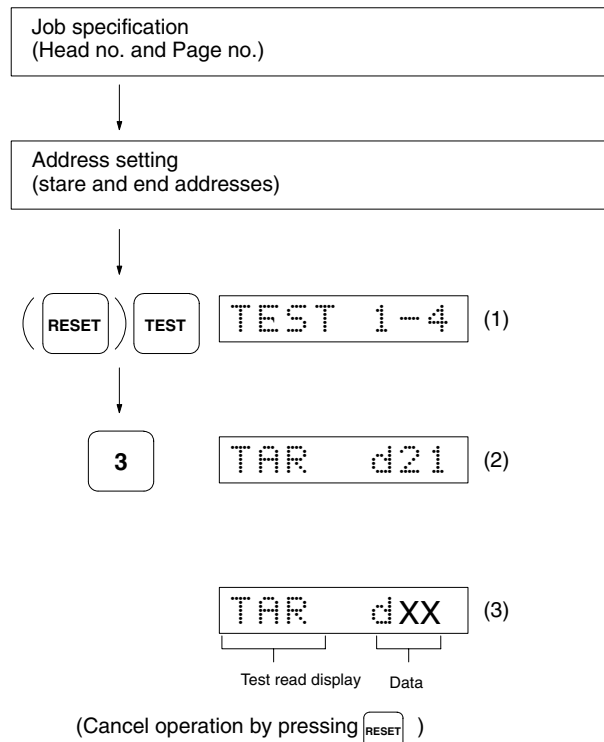
Note If operation is abnormal, and error code is displayed (see page 95). When this happens, use the horizontal cursor keys to display the error message.

4-5-3 Test Auto Read

Data is repeatedly read out from any memory area defined by specified start and end addresses from the DC while it is in motion.

The step number of the received data can be set to any value in the range 1 to FF (256 bytes maximum), enabling a total communications test checking relationships between installation positions, speeds, and other parameters.

Operation Procedure



- 1, 2, 3...**
1. When the TEST Key is pressed, the test menu is shown on the display.
 2. Press Key 3 to select auto read, and TAR is shown on the display. This indicates the DC waiting condition, and the indicator on Head 1 or 2 lights at this time.
 3. The DC approaches the operation range, and once processing is completed, the data in the location of the specified address (start address) is displayed. The Head 1 or 2 indicator now flashes. When an error code is displayed, use the horizontal cursor keys to display the error message.

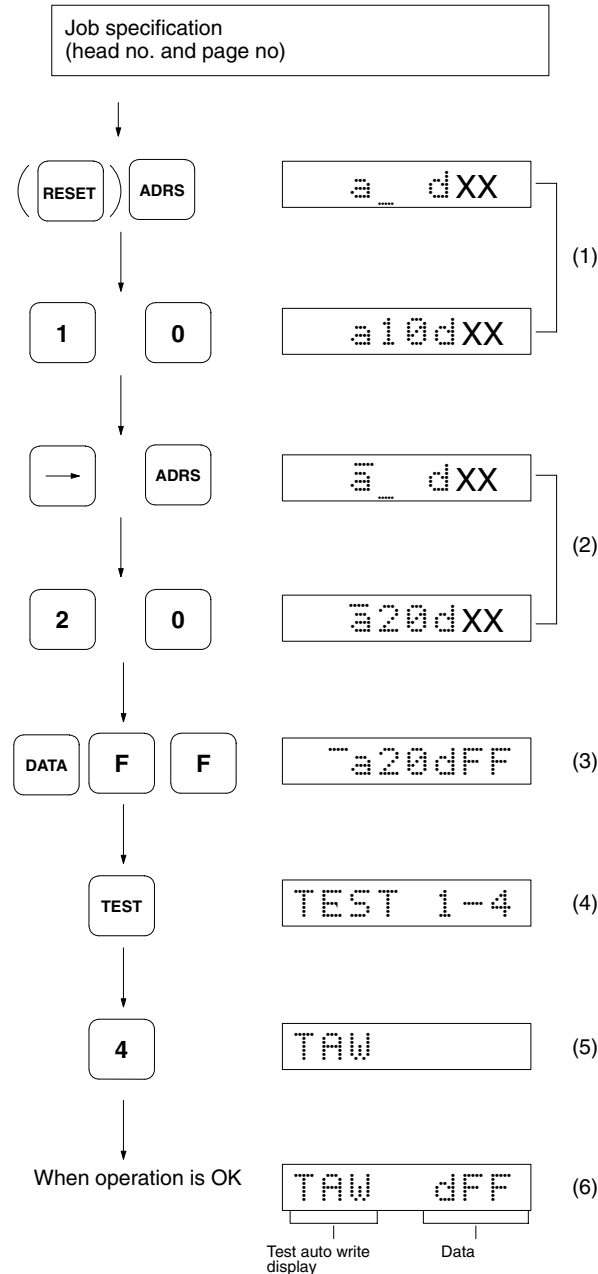
Note Ensure that the start address does not exceed the end address before pressing the TEST Key to read data from several addresses.

4-5-4 Test Auto Write

One byte of data is written repeatedly to any memory area defined by specified start and end addresses from the DC while it is in motion. The step number of the send data can be set to any value in the range 1 to FF (256 bytes maximum), enabling a total communications test checking relationships between installation positions, speeds, and other parameters.

Operation Procedure

This example shows the procedure for writing FF into locations 10 to 20.



(Cancel operation by pressing (RESET))

- 1, 2, 3...**
1. Specify the start address.
 2. Specify the end address.
 3. Specify the data.
 4. When the TEST Key is pressed, the test menu is shown on the display.

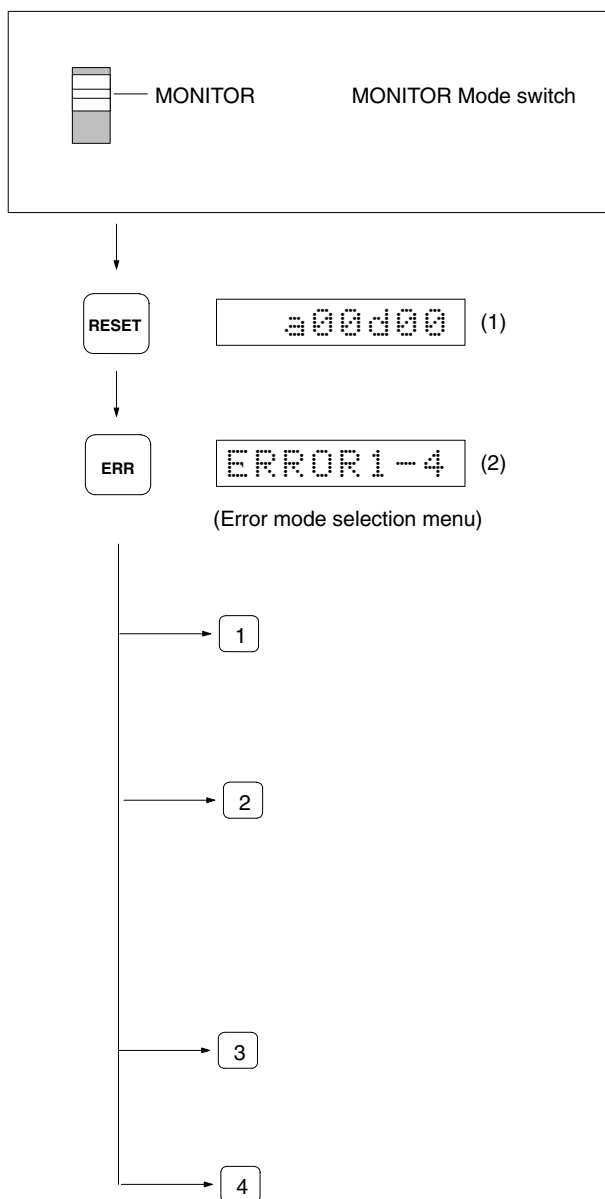
5. Press Key 4 to select auto write, and then TAW is shown on the display. Head 1 indicator lights now.
6. When the DC enters the operation range, the specified data is sent to the memory area defined by the start and end addresses, and Head 1 indicator flashes while processing occurs.

Note When only TAW is shown on the display, and no data is displayed, this indicates the DC waiting condition. When an error code is displayed, use the horizontal cursor keys to display the error message.

4-6 Reading Error Information (ERR)

All communications, system, and other errors occurring in the RUN Mode are stored in the ID Controller RAM. The latest error statistics (30 items maximum) can be read or cleared using the Monitor Unit.

Error Logging Menu Selection

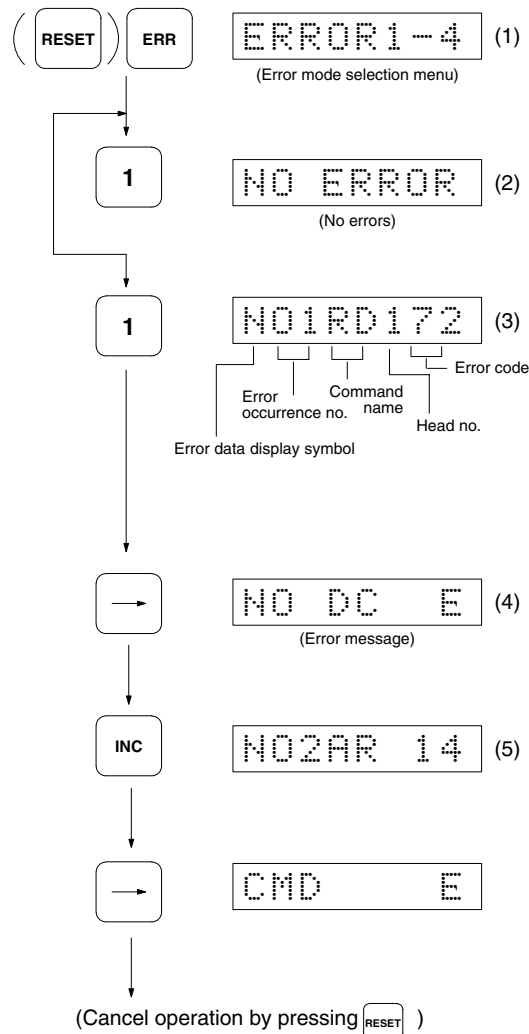


- 1, 2, 3...** 1. The ERR Key is not effective when MONITOR is shown on the display, so press the RESET Key to display the address and data.

- When the ERR Key is pressed, the error mode selection menu appears on the display. Use numerical keys 1 to 4 to select the error mode.

4-6-1 Reading Error Data

The ID Controller has a memory area designated for data storage of errors occurring in the RUN Mode. This memory area can store up to 30 items of error occurrence data, and if this number is exceeded, data is written over the first item and continues on sequentially. The read command can be used to read data from the newest items.



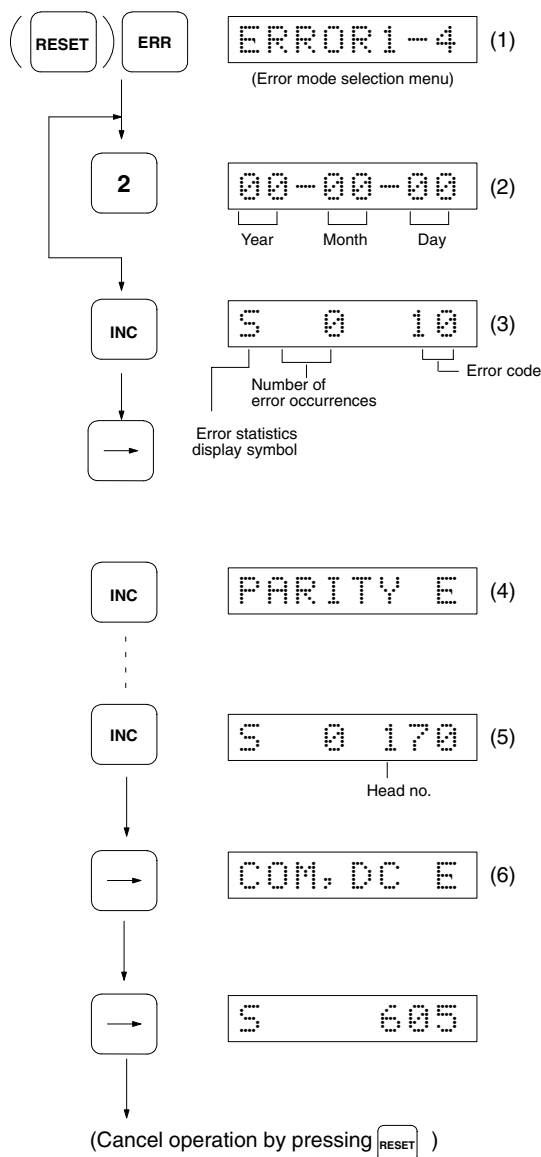
- 1, 2, 3...**
- When the ERR Key is pressed, the error menu is shown on the display.
 - When Key 1 is pressed, error data can be read. If there are no errors, NO ERROR appears on the display. When the RESET Key is pressed, address/data display is restored.
 - If there are errors, they are read out sequentially from the latest error.
 - While the error code is being displayed, use the horizontal cursor keys to display the error messages. When one of the horizontal cursor keys is pressed again, error code display is restored.
 - Press the INC Key to display the errors in order. Press the DEC Key to perform the reverse operation.

Note Error data (up to 30 items) and error statistics are stored in the ID Controller RAM. Data storage is supported by a maintenance-free back-up capacitor, and data is preserved for approximately 20 days (at 25°C) after power to the ID Controller is turned off.

4-6-2 Reading Error Statistics

Each time an error occurs, the ID Controller increments the subtotal for the given type of error. MCBF figures are also calculated simultaneously, and up to 999 data items are stored in the designated memory area. The error statistics read command enables supervision of error occurrence conditions, and therefore makes it possible to perform system operation condition diagnosis on a regular basis.

Operation Procedure



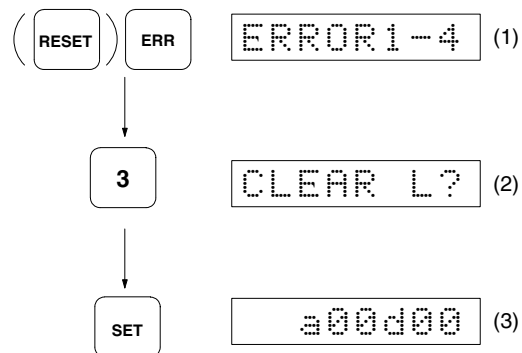
- 1, 2, 3...**
1. When the ERR Key is pressed, the error menu is shown on the display.
 2. When Key 2 is pressed, the error statistics can be read. The first time this selection is made, the display is used to specify the data (year, month, day) when statistics collection is about to start.

3. When the INC Key is pressed, the number of error occurrences for the first error code 10 is displayed. The maximum number of occurrences that can be counted for each error code is 999.
4. While the error code is being displayed, use the horizontal cursor keys to display the error messages. When a horizontal cursor key is pressed again, the error code display is restored.
5. Press the INC Key to read the error occurrence conditions sequentially. Press the DEC Key to perform the reverse operation.
6. After displaying occurrence conditions for all errors, press the INC Key to display the MCBF. MCBF is obtained by dividing the total number of host commands by the total number of occurrences of communications errors (see note below).

Note This includes all communications errors with the host computer, R/W Head, DC, and other devices.

4-6-3 Clear Error Data

Error data is cleared from memory.



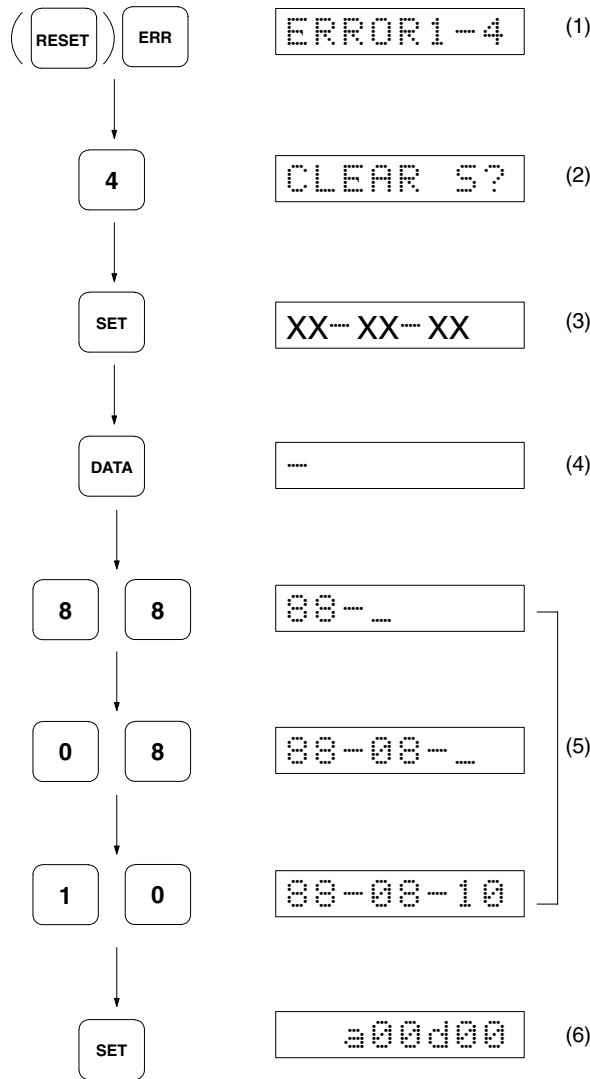
- 1, 2, 3...**
1. When the ERR Key is pressed, the error menu is shown on the display.
 2. Press the 3 Key.
 3. When the SET Key is pressed, the error data is cleared, and address/data display is restored.

Note To cancel the error data clear command, press the SET Key before pressing the RESET Key.

4-6-4 Clear Error Statistics

This procedure is used to clear error statistics from memory, and to specify the new date (year, month, day) to start collecting statistics. Here we take August 10, 1988, as an example.

Operation Procedure



- 1, 2, 3...**
1. When the ERR Key is pressed, the error menu is shown on the display.
 2. Press the 4 Key.
 - Note** To cancel the error data clear command, press the SET Key before pressing the RESET Key.
 3. When the SET Key is pressed, error statistics data is cleared, and the format for specifying the new data (year, month, day) when statistics collection is to begin is shown on the display.
 - Note** If this data does not need to be changed, press the RESET Key.
 4. When the DATA Key is pressed, the cursor appears at the left end of the display, and the date can now be specified.
 5. Use numerical keys 0 to 9 to specify the date. Keys A to F are effective, but if these are used, the setting value cannot be guaranteed.
 6. When the SET Key is pressed, the date is set, and address/date display is restored.

SECTION 5

Installation and Wiring

This section provides installation and pre-operation setting procedures.

5-1	Installation Environment	76
5-1-1	Location	76
5-1-2	Panel Installation Position	76
5-2	ID Controller Installation	76
5-2-1	Direct Attachment to Panel	76
5-2-2	DIN Rail Attachment	77
5-3	Wiring Procedures	78
5-3-1	Power Supply and Ground Line Wiring	78
5-3-2	Input/Output Line Wiring Precautions	78
5-3-3	Removing Terminal Cover	79
5-3-4	Wiring Processing Precautions	80
5-4	DIP Switch Settings	81
5-4-1	Removing Connector Cover	81
5-4-2	DIP Switch Settings	81
5-5	RS-232C Interface	84
5-5-1	Assembling and Connecting Communications Connector	84
5-5-2	Connector Assembly	85
5-5-3	Insertion and Removal of Connector	86
5-6	RS-422 Interface	86
5-6-1	Connections Between ID Controllers for 1 to N Connection	87
5-6-2	Connection to Host Computer	87
5-6-3	Assembling and Connecting Communications Connector	88
5-6-4	Connector Assembly Procedure	88
5-6-5	Insertion and Removal of Connector	90

5-1 Installation Environment

The V600-CA1A-V□/2A-V□ ID Controller is a high-reliability control system that is resistant to variations in environmental conditions. Nevertheless, it is important to observe the following precautions during installation to increase reliability and ensure that all system functions can be used to the utmost.

5-1-1 Location

Do not install the ID Controller in locations subject to the the following conditions.

- Ambient temperature varies outside the range -10°C to 55°C , or temperature varies rapidly thus causing condensation.
- Relative humidity varies outside the range 35% to 85%.
- Presence of corrosive gases, combustible gases, dust, saline atmosphere, or steel particles.
- Possibility of vibration or direct impacts to ID Controller.
- Exposure to direct sunlight.
- Exposure to water, oil, or chemical sprays.

5-1-2 Panel Installation Position

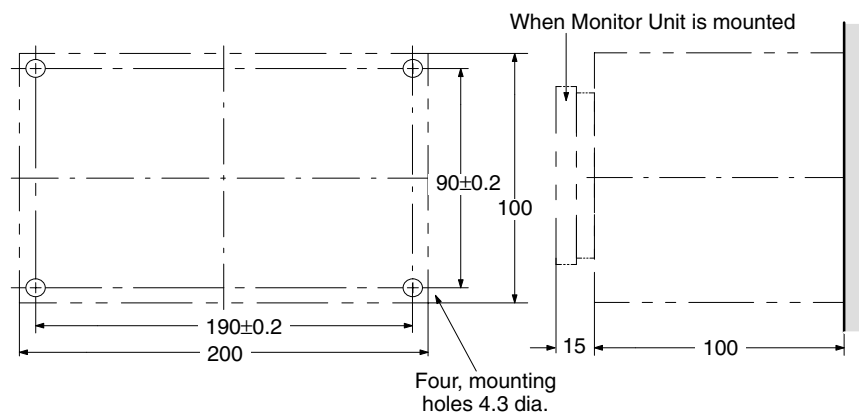
The ID Controller operates under ambient temperatures in the range -10°C to 55°C . It also requires the following conditions.

- Sufficient space for ventilation.
- Avoid installation in the vicinity of equipment such as heaters, transformers, or high-capacity resistors that generate large amounts of heat.
- Install a control fan or cooler in case the ambient temperature rises above 55°C .
- Note that when the Monitor Unit is mounted, the acceptable range for the ambient temperature is only 0°C to 40°C .
- Memory is backed up by built-in capacitors, which will maintain memory for 20 days at a temperature of 25°C , but note that if the ambient temperature increases above this level, the number of days memory is maintained decreases. At 65°C , memory is maintained for only about two days.

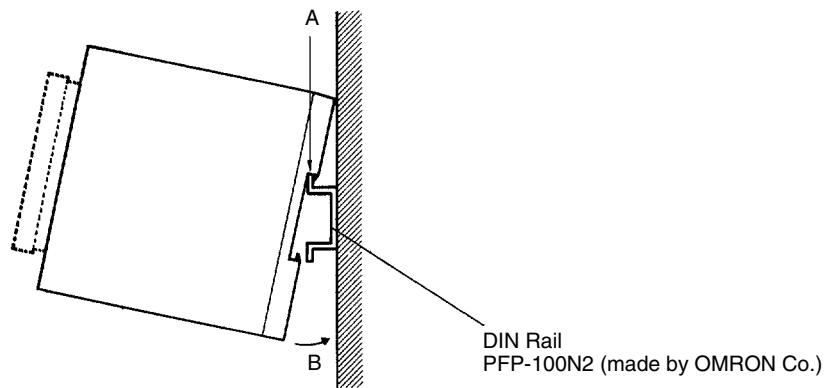
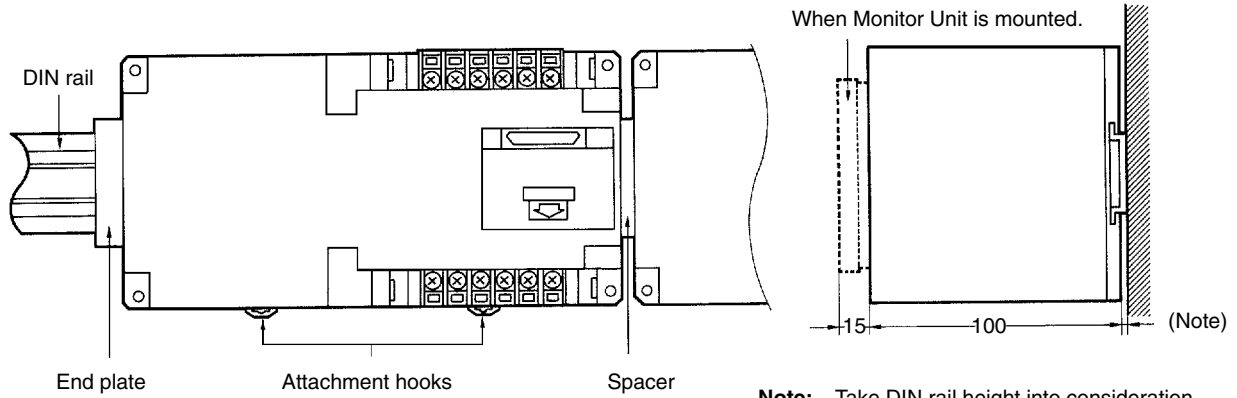
5-2 ID Controller Installation

5-2-1 Direct Attachment to Panel

When installing the ID Controller so that it is directly mounted to the panel, it is extremely important to use flat washers and to secure the ID Controller with M4 screws.



5-2-2 DIN Rail Attachment

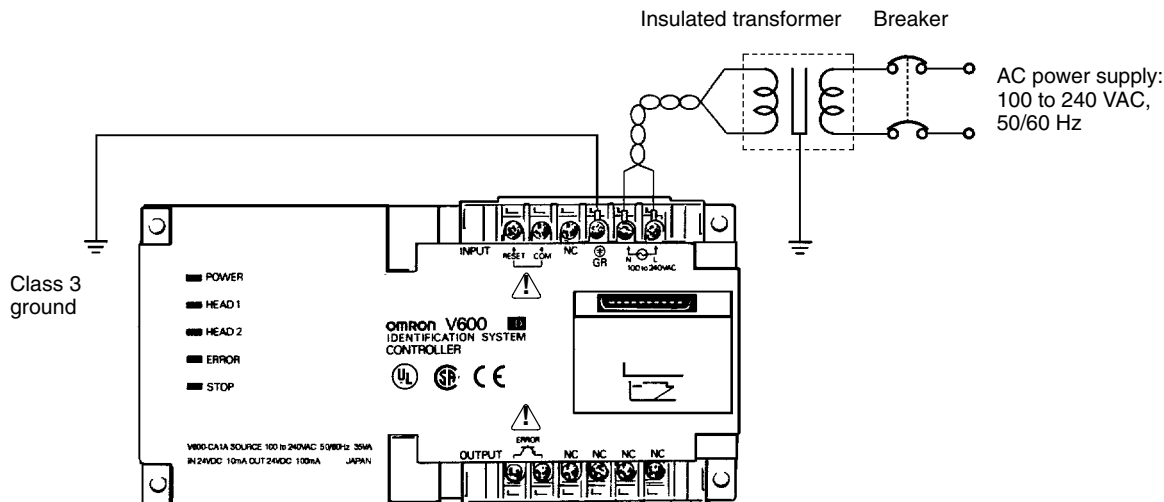


- 1, 2, 3...**
1. When attaching the ID Controller to a DIN rail, first attach at A, then push in direction B to mount the ID Controller.
 2. To remove the ID Controller from the DIN rail, pull the attachment hooks forward.

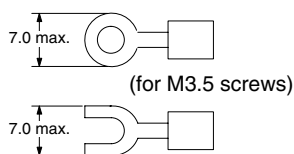
5-3 Wiring Procedures

5-3-1 Power Supply and Ground Line Wiring

The ID Controller conforms to IEC1010-1, EN61010-1, UL3101, and CSA1010-1. Therefore, field wiring is readily available.



- The screws used on the power supply and the protective conductor terminal are M3.5 self-tapping screws. If a crimp-on terminal is to be used, select one from those shown below. Ensure that the binding torque is about 8 kg • cm.



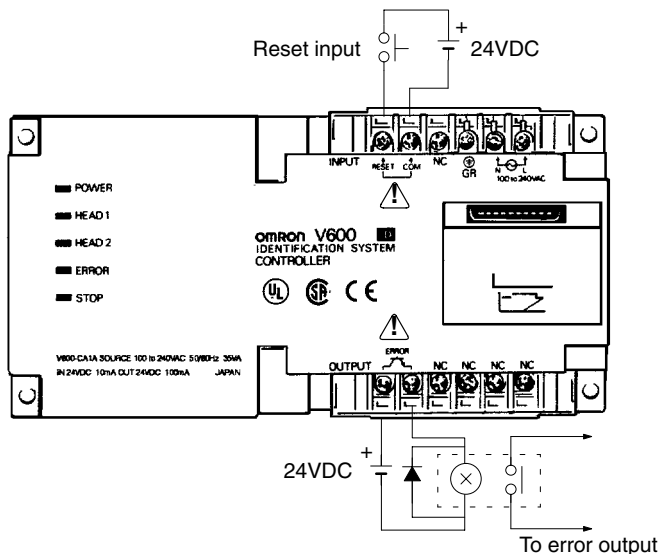
- Ensure that the line voltage is in the range of 100 to 240 VAC. It is also extremely important to ensure that the permissible voltage variation range of 85 to 264 VAC is not exceeded.
- The ID Controller has internal components to deal with noise from the power line, and supplying power via a 1:1 insulated transformer drastically attenuates ground noise.
- The ID Controller power consumption is less than 35 VA using the maximum configuration, but when setting up the power supply, note that there is a surge current of approximately 15 A (at 100 VAC) when power is applied to the system.
- Use a power cable with at least a 2-mm² cross-section with no voltage drop. It is recommended that the power wires be twisted for use.
- To prevent electric shocks and improve noise resistance, independently ground the ID Controller at a resistance of less than 100 Ω.
- Do not use the open terminal (NC terminal).

5-3-2 Input/Output Line Wiring Precautions

Reset Signal Input

- Take sufficient care to ensure that the input voltage does not exceed the maximum applied voltage (26.4 V). Exceeding the permissible voltage level will damage the equipment.

- Lay the input line away from high-voltage equipment or power lines to improve noise resistance of the lines.



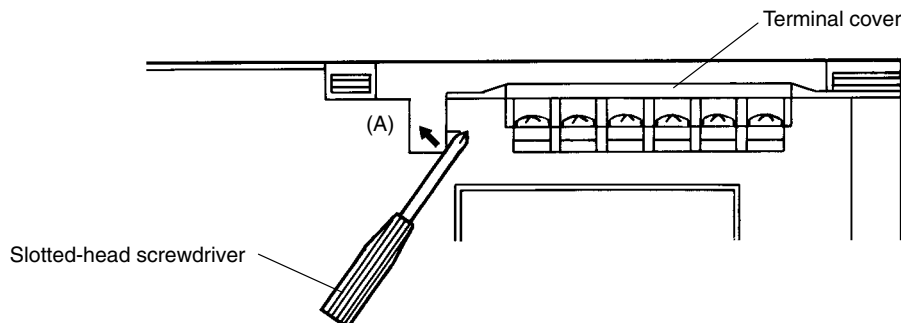
Error Signal Output Wiring

- The output section maximum switching capacity is 100 mA at 24 VDC (+10%, -15%). Applying voltages or loads that exceed the switching capacity will damage the equipment.
- It is recommended that auxiliary relays (100 mA max. at 24 VDC) be used in the output circuit.

Note The reset signal input terminal and error signal output terminal will be supplied from an SELV source in accordance with IEC1010-1 Annex I-I.

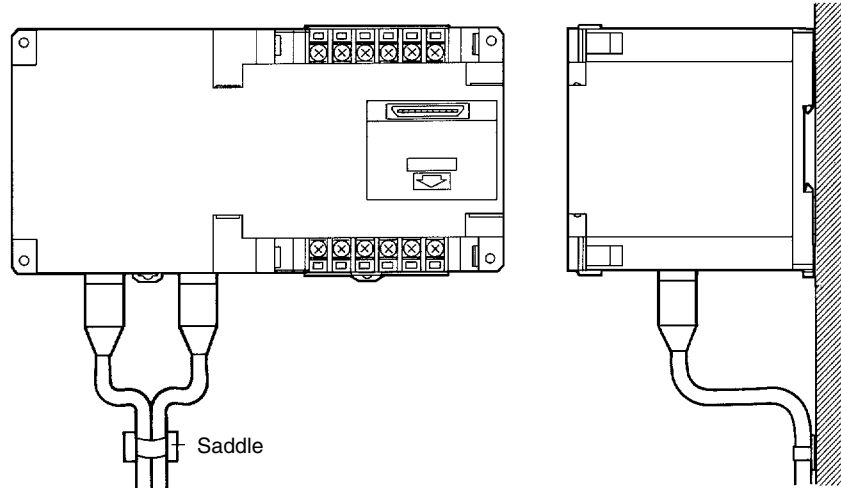
5-3-3 Removing Terminal Cover

The terminal cover must be removed with a slotted-head screwdriver in the direction (A).



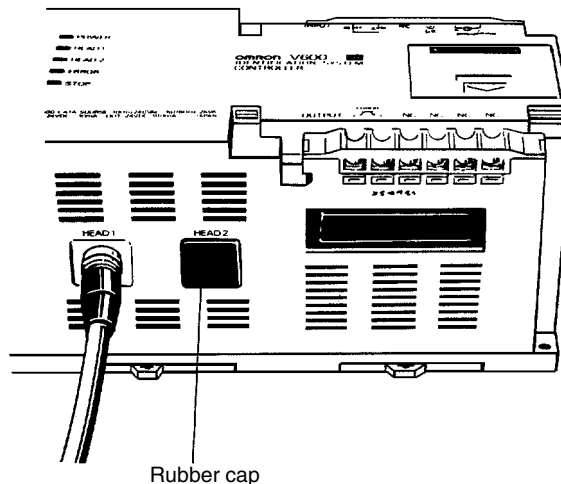
5-3-4 Wiring Processing Precautions

Applying excessive external forces to connectors while they are connected to the system can cause damage to the connectors and internal PCBs, or cause cable wiring disconnections. Thus, it is important to provide at least 10 cm of space under the ID Controller to protect the connectors from external forces originating from the right or left. Also, the cables should be secured using a saddle or similar fixture to ensure that forces applied to the cables are not transmitted to the connectors.



Lay the R/W Head cables away from other power lines.

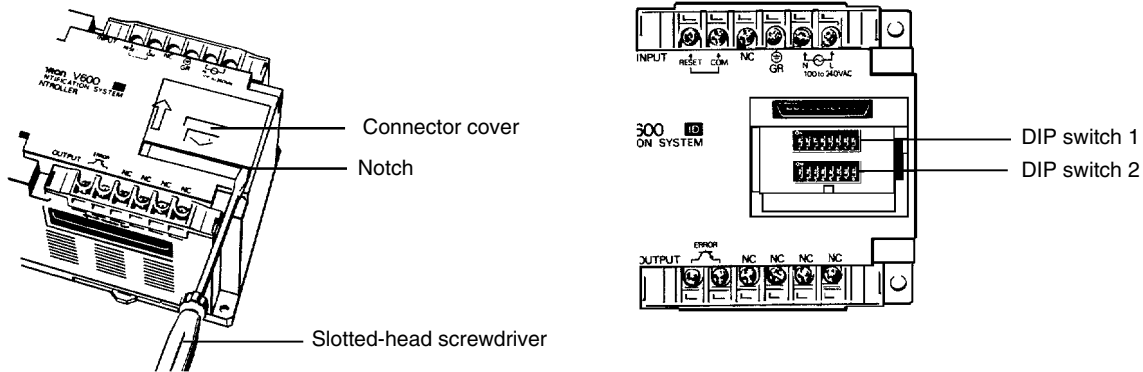
Up to two R/W Heads can be connected, but if only one R/W Head is connected, it is extremely important to cover the unused connector on the ID Controller with the rubber cap provided.



5-4 DIP Switch Settings

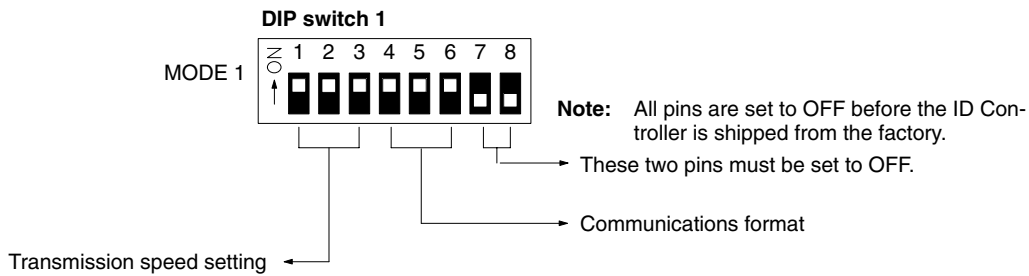
Remove the Monitor Unit connector cover on the top of the ID Controller to make the hardware settings for the communications interface. Check the host computer communications specifications carefully and be sure to make the settings correctly.

5-4-1 Removing Connector Cover



Slide the connector cover upwards, and insert a slotted-head screwdriver into the notch at the right end of the cover to remove it.

5-4-2 DIP Switch Settings



Transmission Speed Setting

Pin 1	Pin 2	Pin 3	Transmission speed (BPS)
0	1	1	1,200
1	0	0	2,400
1	0	1	4,800
1	1	0	9,600
1	1	1	19,200

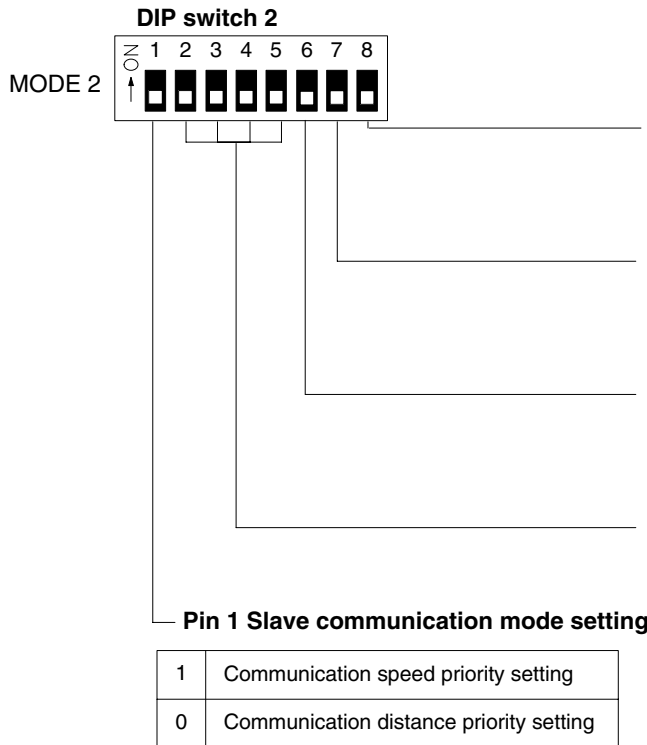
Communications Format

Pin 4	Pin 5	Pin 6	No. of bits for data length (see note 1)	No. of stop bits	Parity setting (see note 2)
0	0	0	7	2	E
0	0	1	7	2	O
0	1	0	7	1	E
0	1	1	7	1	O
1	0	0	8	2	N
1	0	1	8	1	N
1	1	0	8	1	E
1	1	1	8	1	O

- Note**
1. Set the data length to 7 bits to select the ASCII code and 8 bits to select the JIS 8-digit code.
 2. Set the parity setting to E to designate the even parity and O to designate the odd parity. Set the parity setting to N if no parity is designated.

Note It is extremely important to turn off the power to the ID Controller before making the DIP switch settings. DIP switch settings are acted upon at power supply startup, and consequently changing DIP switch settings while the system is in operation will have no effect.

Use the connector provided as an accessory as the communications connector. The user must provide the connecting cable. If a connector other than the accessory connector is to be used, see the list of applicable connector model numbers at the end of this manual.



Pin 8 (V600-CA2A-V□ only)

1	Termination resistor connected (ID Controller transmission side)
0	Termination resistor not connected

Pin 7 (V600-CA2A-V□ only)

1	Termination resistor connected (ID Controller transmission side)
0	Termination resistor not connected

Pin 6

1	1 to N procedure
0	1 to 1 procedure

ID Controller unit number settings

Pin 2	Pin 3	Pin 4	Pin 5	Unit No.
0	0	0	0	Unit 0
0	0	0	1	Unit 1
0	0	1	0	Unit 2
0	0	1	1	Unit 3
0	1	0	0	Unit 4
0	1	0	1	Unit 5
0	1	1	0	Unit 6
0	1	1	1	Unit 7
1	0	0	0	Unit 8
1	0	0	1	Unit 9
1	0	1	0	Unit 10
1	0	1	1	Unit 11
1	1	0	0	Unit 12
1	1	0	1	Unit 13
1	1	1	0	Unit 14
1	1	1	1	Unit 15

Ensure that there is no duplication of unit number.

Pin 1 Setting

Pin 1 setting is effective only when the user has access to a EEPROM DC (with no battery). Pin 1 setting has nothing to do with a SRAM DC (with a built-in battery). Refer to *R/W Head and Data Carrier Operation Manuals* for details.

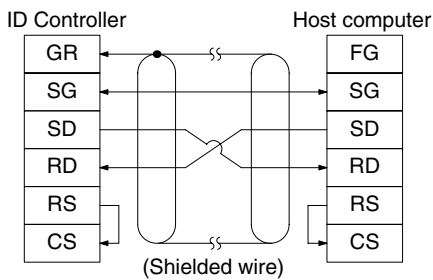
Pin 6 Setting

When selecting the 1 to N procedure on the V600-CA1A-V□ and RS-232C Interface, N must be 1. In this case, it is possible to add a check code FCS.

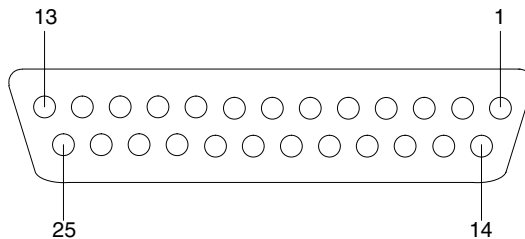
5-5 RS-232C Interface

The following settings must be made when the V600-CA1A-V□ is used.

Signal name	Abbr.	Signal direction		Pin no.
		Input	Output	
Safety ground or earth ground	GR	---	---	1
Signal ground or common return line	SG	---	---	7
Send data	SD	---	Required	2
Receive data	RD	Required	---	3
Request send	RS	---	Required	4
Can send	CS	Required	---	5
Data terminal ready	ER	---	Required	(20)



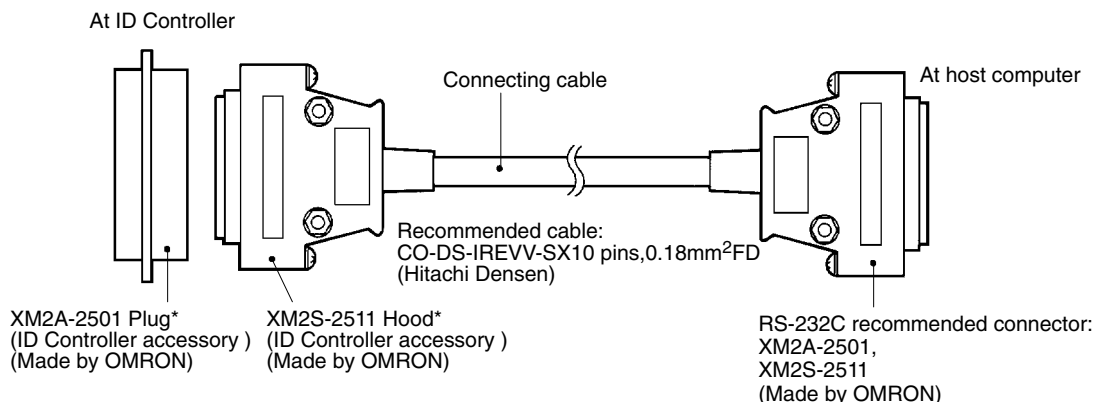
Pin Arrangement (Soldering-side View)



- Note**
1. Ground the shielded wire at only one end, either the ID Controller or the host computer to prevent mis-operation. The diagram at the upper-left is a wiring example with the shielded wire grounded at the ID Controller.
 2. Make an internal short between pins 4 (RS) and 5 (CS) before using the connector.

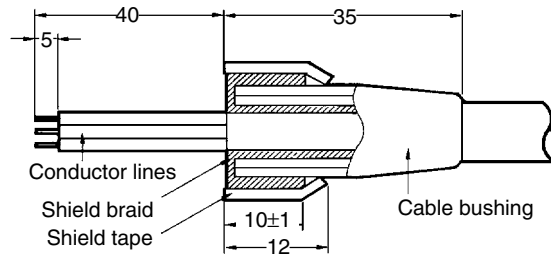
5-5-1 Assembling and Connecting Communications Connector

Use the connector provided as an ID Controller accessory as the communications connector. The user must provide the connecting cable and the host computer connector. The OMRON ID Controller Connector is protected from electromagnetic interference (EMI).

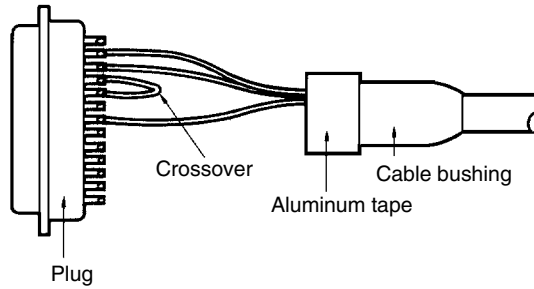


5-5-2 Connector Assembly

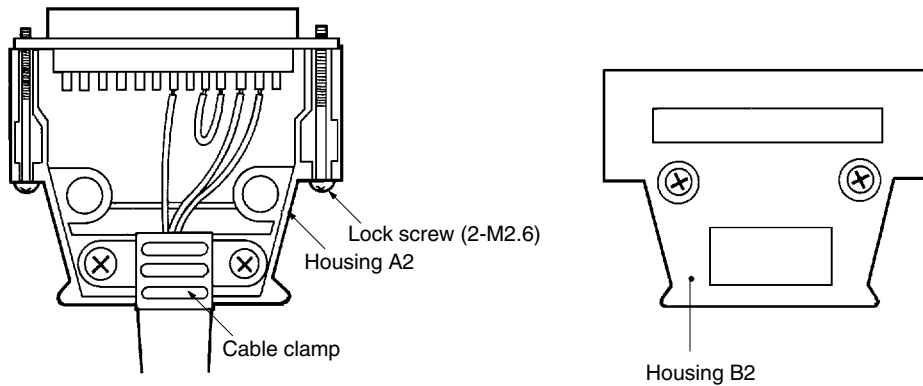
1, 2, 3... 1. Perform cable terminal processing.



2. Solder conductor lines and plug pins.



3. Set the hood housing A2 onto the plug, and fix the aluminum tape section with a clamp.



4. Tighten the two connector holding screws, and then cover this with housing B2 to complete the connector assembly.

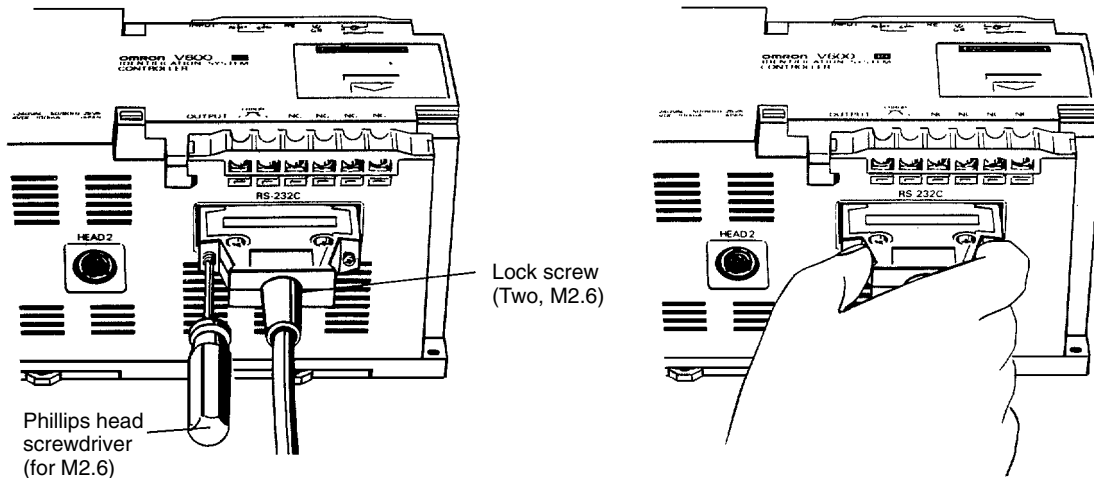
- Note**
1. First pass the cable through the cable bushing.
 2. Unwind the shielded braid and turn back over the cable bushing. Unwind 10 mm of the shielded braid and turn back over the cable bushing.
 3. Wrap the lines with sealing tape.

Pin no.	Abbr.	Name
1 (see note 1)	GR	Ground
7	SG	Signal ground
2	SD	Send data
3	RD	Receive data
4 (note 2)	RS	Request send
5 (see note 2)	CS	Can send
20	ER	Data terminal ready

- Note**
1. GR is grounded to the connector hood and connected to the ID Controller ground via the connector hood, and consequently connection to pin 1 is not necessary.
 2. Short pins 4 (RS) and 5 (CS) using a crossover line.

5-5-3 Insertion and Removal of Connector

It is extremely important to hand-hold the connector to attach and insert it properly. After inserting the connector, take a Phillips head screwdriver and fully tighten the two lock screws. To remove the connector, completely unscrew the two lock screws, and take out the protruding section of the connector hood by hand and pull it straight out. If it is difficult to remove, hold the ID Controller down with one hand and pull carefully on the connector with the other.

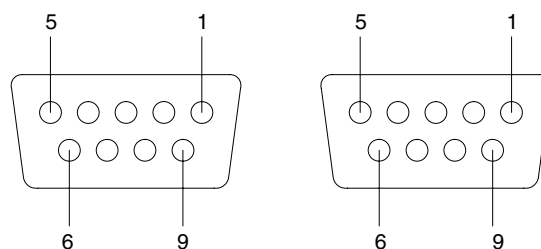


5-6 RS-422 Interface

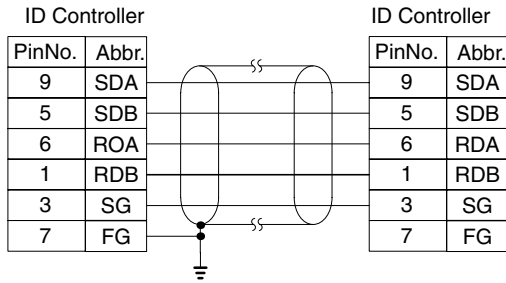
The following settings must be made when the V600-CA2A-V□ is used.

Signal name	Abbr.	Signal direction		Pin no.
		Input	Output	
Safety ground or earth ground	FG	---	---	7
Signal ground or common return line	SG	---	---	3
Send data 1	SDA	---	Required	9
Receive data 2	SDB	---	Required	5
Receive data 1	RDA	Required	---	6
Receive data 2	RDB	Required	---	1

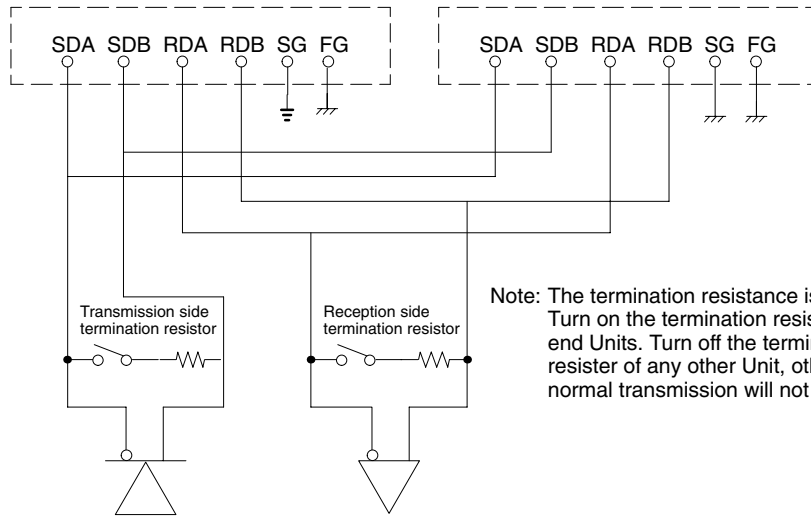
Pin Arrangement (Soldering-side View)



5-6-1 Connections Between ID Controllers for 1 to N Connection



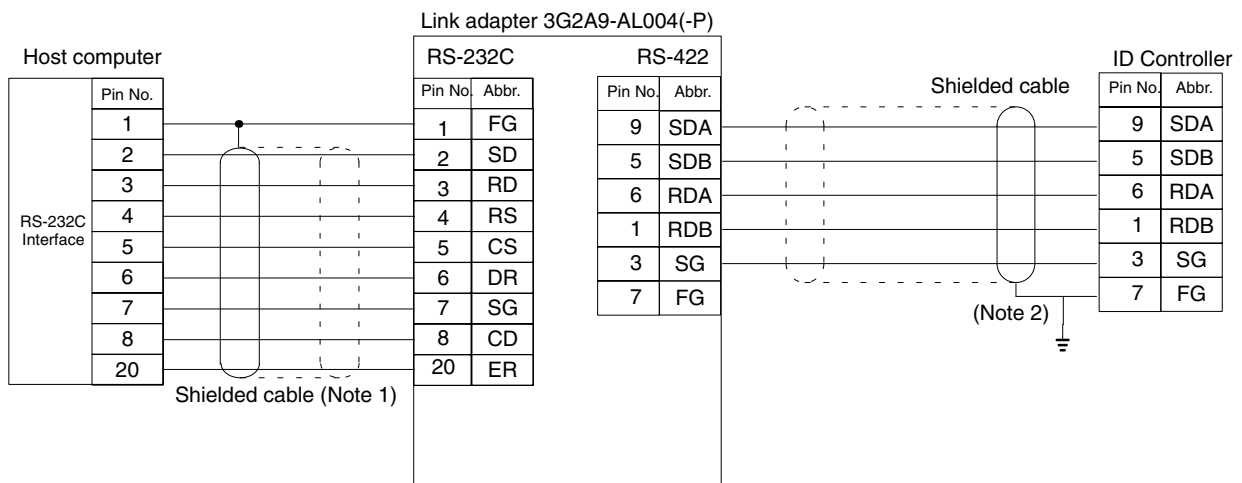
Note: Ground either end of the shielded wire to prevent the ID Controllers from malfunctioning. Do not ground both ends of the shielded wire, otherwise the ID Controllers may not operate properly. When using an EMI-preventive connector (provided with the ID Controller), connect the ground line to the connector hood and not to the connector pin.



Note: The termination resistance is 220 Ω. Turn on the termination resistors of the end Units. Turn off the termination resistor of any other Unit, otherwise normal transmission will not be possible.

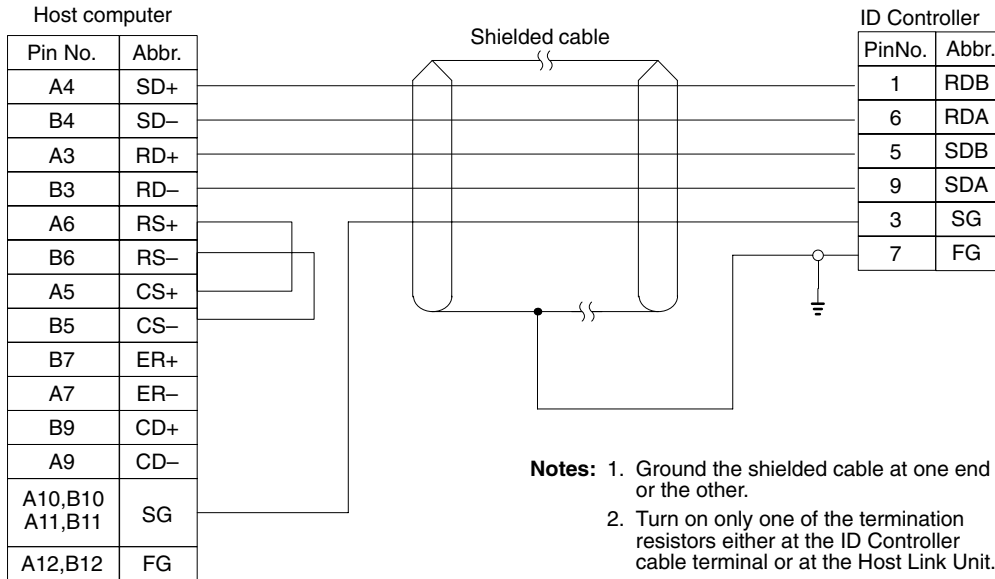
5-6-2 Connection to Host Computer

Host Computer with Built-in RS-232C Interface



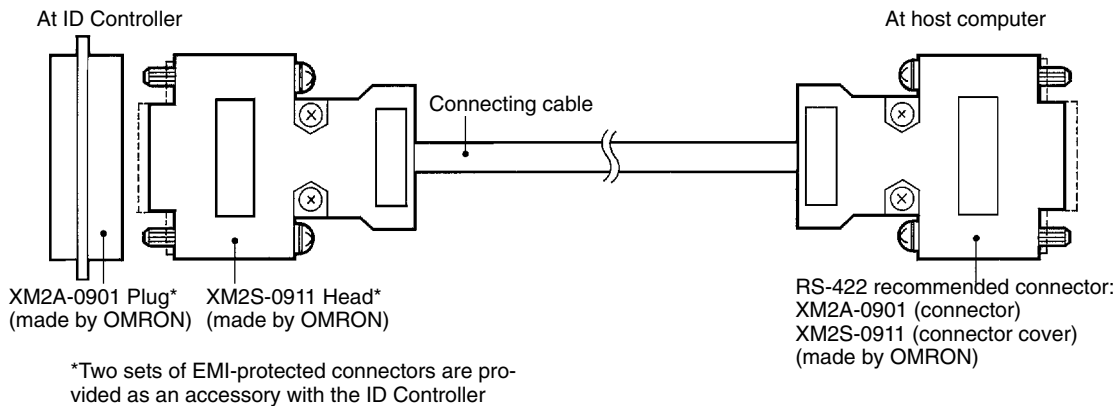
Notes: 1. Connection example of shielded cable grounded at host computer.
 2. Connection example of shielded cable grounded at ID Controller.

Host Computer with Built-in RS-422 Interface



5-6-3 Assembling and Connecting Communications Connector

Use the connector provided as an accessory with the ID Controller for the communications connector. The user must provide the connecting cable and the host computer connector. The OMRON ID Controller connector is protected from electromagnetic interference (EMI).



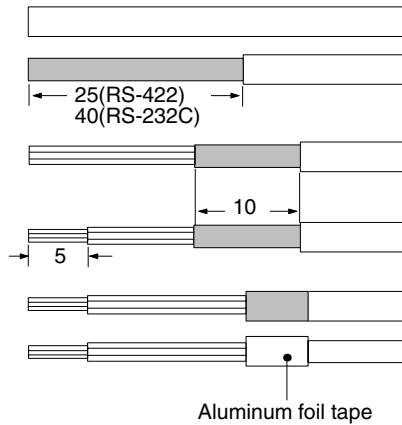
5-6-4 Connector Assembly Procedure

Perform cable end processing. Refer to the drawings below for the lengths of each type of cable end processing.

End of Shielded Cable Connected to FG

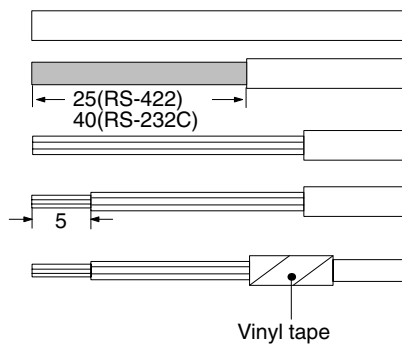
- 1, 2, 3... 1. Cut cable at required length.
2. Use a razor blade to remove the sheath. Avoid damaging the shielded lines (braid) when cutting off the sheath.
3. Cut shielded cable using scissors.
4. Bare each line using a stripper.
5. Bend the shielded lines back.

6. Cover the bent back lines with aluminum foil tape.



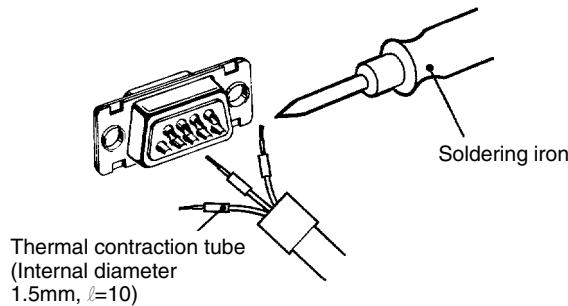
End of Shielded Cable Unconnected to FG

- 1, 2, 3... 1. Cut cable at required length.
 2. Use a razor blade to remove the sheath.
 3. Cut shielded cable using scissors.
 4. Bare each line using a stripper.
 5. Cover the cut section of the shielded cable with vinyl tape.

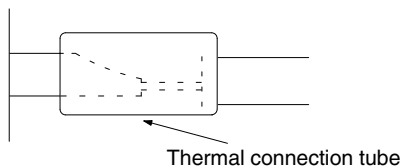


Soldering

- 1, 2, 3... 1. Place a thermal contraction tube on each line.
 2. Perform preliminary soldering on each line and connector terminal.
 3. Perform soldering on each line.

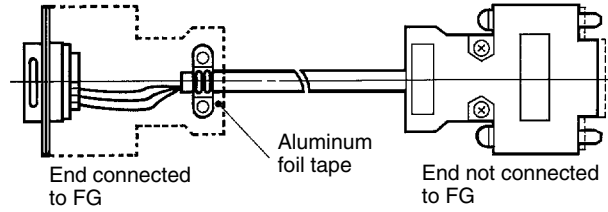


4. Pull back thermal contraction tubes to soldered sections, then use a jetter to apply heat to contract them.



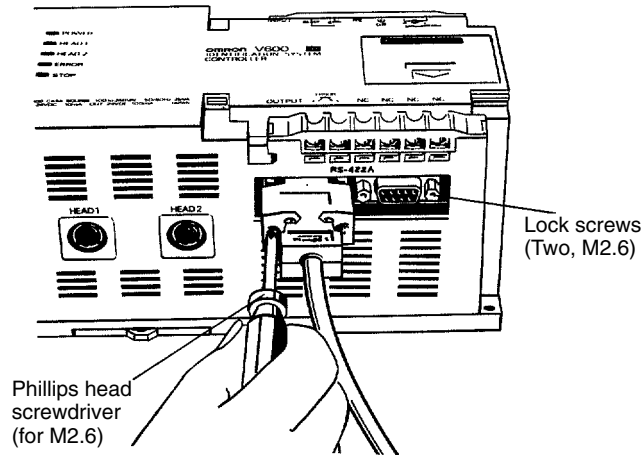
Hood Assembly

Assemble the connector hood.



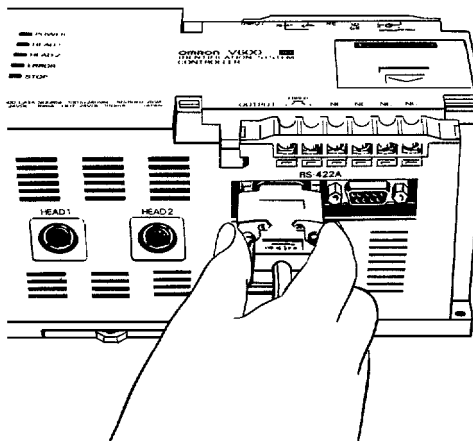
5-6-5 Insertion and Removal of Connector

It is extremely important to hand-hold the connector to attach and insert it properly. After inserting the connector, take a Phillips head screwdriver and fully tighten the two lock screws.



To remove the connector, completely unscrew the two lock screws, and take out the protruding section of the connector hood by hand and pull it straight out.

If it is difficult to remove, hold the ID Controller down with one hand and pull carefully on the connector with the other.



SECTION 6

Diagnosis and Maintenance

This section provides diagnosis and maintenance procedures as well as solutions to possible problems and abnormalities.

6-1	Test Operation	92
6-1-1	Checklist	92
6-1-2	Test Operation Procedure	92
6-1-3	Using Monitor Unit for Offline Test	93
6-1-4	Communications Test with Host Computer	93
6-2	Diagnostic Functions	93
6-2-1	Abnormalities	93
6-2-2	Indications During Operation and Output Conditions	94
6-3	Error Lists	95
6-3-1	Communications Errors	95
6-3-2	Host Communications Errors	95
6-3-3	Local Communication Errors	96
6-3-4	System Errors	96
6-4	Dealing with Abnormalities	97
6-4-1	Noise	97
6-5	Maintenance and Inspections	97
6-5-1	Inspection Parameters	98
6-6	Troubleshooting	99
6-6-1	Main Troubleshooting Flowchart	99
6-6-2	System Connection Troubleshooting Flowchart	100
6-6-3	Host Communications Troubleshooting Flowchart	101
6-6-4	Local Communications Troubleshooting Flowchart	102
6-6-5	External Environment Troubleshooting Flowchart	103

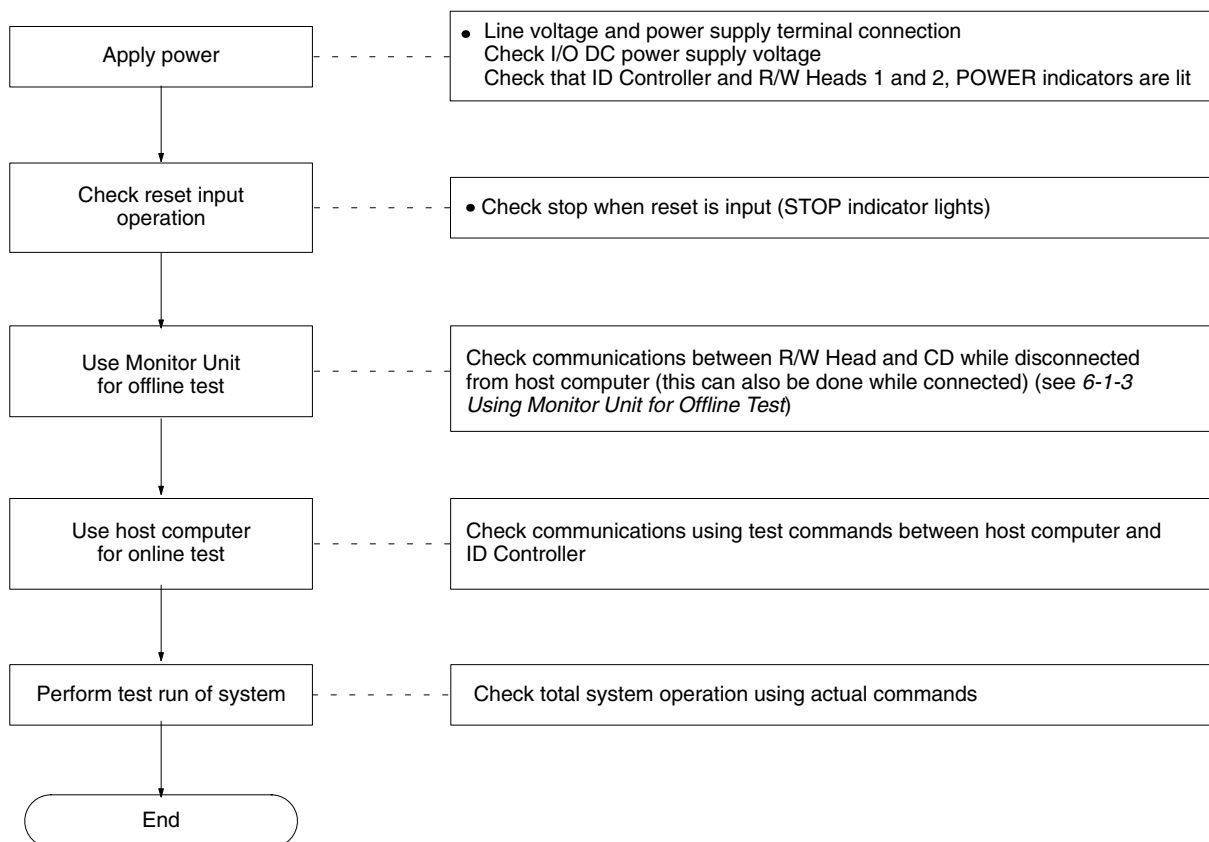
6-1 Test Operation

6-1-1 Checklist

Check the following items before performing the test operation.

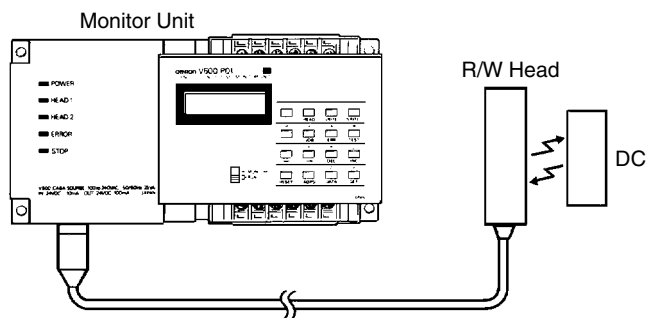
No.	Check items	Checks	Page
1	Power supply and I/O line connections	Has wiring been done correctly? Are the terminal screws loose?	78
2	DIP switch settings	Have settings been made correctly according to communications specifications?	81
3	R/W Head connection	Are R/W Heads connected correctly?	80
4	DC positioning	Are DCs and R/W Heads correctly positioned? Refer to the <i>R/W Head and Data Carrier Operation Manuals</i> for details.	
5	Connections to host computer	Is RS-232C or RS-422 connector connected correctly?	84, 88

6-1-2 Test Operation Procedure



6-1-3 Using Monitor Unit for Offline Test

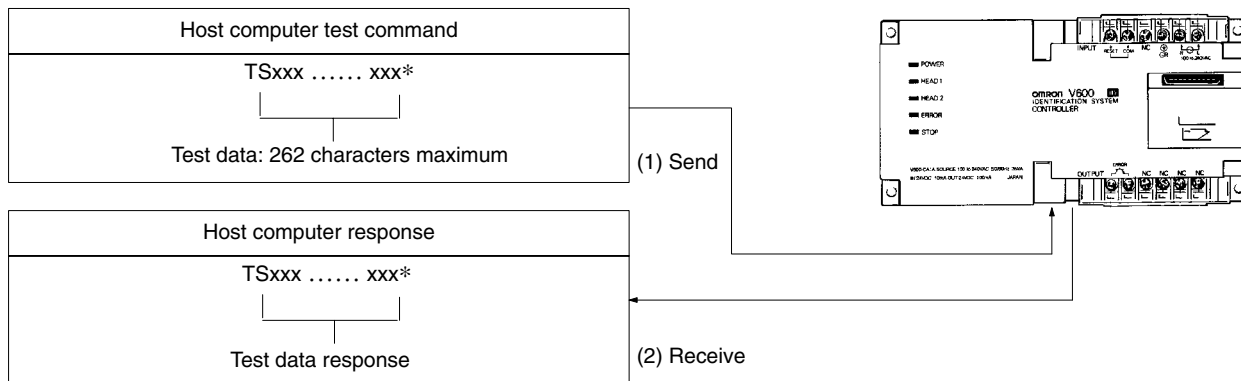
The Monitor Unit can be used to test communications between the R/W Heads and the DCs with the ID Controller disconnected from the host computer. Use this test to check the installation positions and speeds prior to performing test operations (see *Appendix C Offline Test and Auto Read/Auto Write*).



Read, write, auto read, and auto write operations can be performed in the Monitor Unit test mode. See *Section 4 Monitor Unit Operation* and *Appendix C Offline Test and Auto Read/Auto Write* for operation methods.

6-1-4 Communications Test with Host Computer

The test command can be used to test communications between the ID Controller and the host computer. Perform this test to check cable connections and computer processing operations prior to performing the full system test operation. Write a simple communications program on the host computer to send the test command (TS). If the communications system is normal, the ID Controller will return the test data it received without change.



6-2 Diagnostic Functions

The ID Controller has various diagnostic functions to deal with abnormal situations and to reduce system down time. If an abnormality occurs, the details can be read by mounting the Monitor Unit.

6-2-1 Abnormalities

Abnormalities detectable by the ID Controller are generally classified into operation termination abnormalities and operation continuation abnormalities.

Operation Termination Abnormalities

When abnormalities occur in the ID Controller hardware, CPU operation stops, and the ERROR and STOP indicators light. When this happens, the error output goes on. Also, if the external stop input reset is turned on, the CPU stops, and the STOP indicator lights. When this happens, the error output goes off.

Operation Continuation Abnormality

When an abnormality occurs in communications between the ID Controller and the host computer or a R/W Head, the ERROR indicator lights. Up to 30 files of abnormality data are stored, and if this number is exceeded, old abnormality data is erased from the beginning to make room for the new data. If the Monitor Unit is used, apart from reading the details of these errors, it is also possible to get the subtotals of the number of error occurrences by type.

6-2-2 Indications During Operation and Output Conditions

Condition	Parameter	Details	Indicators					Error
			POWER	HEAD1	HEAD2	ERROR	STOP	
Normal Operation	Waiting for data transmission or reception	---	Lit	Not lit	Not lit	Not lit	Not lit	OFF
	Data transmission or reception in progress	In communication with R/W Head 1	Lit	Lit	Not lit	Not lit	Not lit	OFF
		In communication with R/W Head 2	Lit	Not lit	Lit	Not lit	Not lit	OFF
Operation termination abnormality	CPU abnormality	System program abnormality	Lit	Not lit	Not lit	Lit	Lit	ON
	Memory abnormality	System memory abnormality	Lit	Not lit	Not lit	Lit	Lit	ON
Continuation abnormality	Communications abnormality	Abnormality in communications with host computer or PC Abnormality in communications with R/W Head	Lit	Not lit	Not lit	Lit	Not lit	OFF
Emergency Stop	Reset processing	Reset input is turned on	Lit	Not lit	Not lit	Not lit	Lit	OFF

6-3 Error Lists

6-3-1 Communications Errors

Type	Error code	Name	Error message	Description
Host communications errors	10	Parity error	PARITY E	There exists an abnormality in communications between the host computer and the ID Controller.
	11	Framing error	FRAMING E	• Communications format setting mistake.
	12	Overrun error	OVERRUN E	• Mis-operation due to influence of noise.
	14	Command input error	CMD E	There exists a mistake in the command format.
	18	Frame length maximum error	FRAME E	Either the command or the data length exceed 266 characters.
Local communications errors	70	DC communications error	COM, DC E	There exists an abnormality in communications between R/W Heads and DCs. • Problem with positioning due to DC speed or distance. • Obstacles causing mis-operation.
	71	Disagreement error	VERIFY E	Read or write processing could not be done correctly.
	72	DC not present	NO DC E	DC was not present within communications range when execution of write or head commands was attempted.
	7A	Address too high	ADRS E	An address has been specified which falls outside the DC memory area.
	7C	R/W Head not connected	R/W H E	R/W Head is not connected.
	7D	Write protect error	PROTECT E	The production date (year, month, day) area or the write protected area has been specified by a write command.

- Host communications errors are errors which occur during communications between the host computer and the ID Controller.
- Local communications errors are errors which occur during communications between the ID Controller and R/W Heads/DCs.
- All error data is stored in the ID Controller, and error codes and error messages can be read using the Monitor Unit (see *Section 4 Monitor Unit Operation*).

6-3-2 Host Communications Errors

The ID Controller can detect the six types of host communications errors given above in the following way.

- Vertical parity and overrun errors are detected in character units, FCS errors and frame length maximum errors are detected in frame units.
- When one of the above errors is detected, reception of an invalid command is assumed and processing of that command is not performed, and the error response is returned immediately after recognition of a carriage return <>.
- For the frame length maximum error, when the 272nd character is received, reception is interrupted and an error response is returned.
- If incoming data is suspended for two seconds while command reception is underway, a reception interruption error response is returned. When this happens, there is no carriage return, thus resulting in a format error.

6-3-3 Local Communication Errors

The following six types of error are detected in local communications between the ID Controller and the Data Carrier.

Data Carrier Communications Error

This includes communications errors like parity errors.

Verification Error

Data written is read out and a reference check is performed for write commands. When the read data does not agree with the written error, a verification error occurs.

Data Carrier Not Present Error

This occurs when the Data Carrier is not present during execution of command processing. This error is not detected for auto commands and polling auto commands.

Address Too High

This occurs when the value specified for the address exceeds the Data Carrier memory area capacity.

R/W Head Not Connected

This error occurs when the R/W Head is not connected or it is damaged when execution of command processing is attempted.

Write Protect Error

This occurs when an attempt is made to write data to the Data Carrier production data area or the write protected area.

Warning code	Name	Description
7B	DC battery low	The voltage of the DC's built-in battery is low.
76	Excessive overwriting operations on DC	The number of overwriting operations checked by the MDL command has exceeded 100,000.
76	DC memory check error	A memory error is detected when the MDC command is executed.

Note These warnings are not recorded by the ID Controller.

6-3-4 System Errors

Error code	Name	Error message	Description and cause	
90	Power disconnection during command processing	P OFF CMD	Power is disconnected during command execution.	After applying power once again, execute the command again.
91	Power disconnection during write processing	P OFF WT	Power was disconnected during execution of a write or auto write operation.	
92	CPU abnormality	CPU E	There may an influence of noise due to an abnormality in the ID Controller. Turn off the power and apply it once again.	
93	Memory abnormality	C.NEM E	Turn reset input on. (If normal operation cannot be restored, use a replacement.)	

System error (operation termination error) data can be checked on the Monitor Unit, but cannot be checked on the PC.

6-4 Dealing with Abnormalities

The following three items are usual causes of problems in the ID Controller.

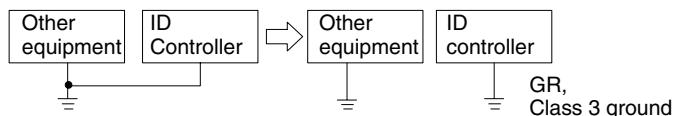
- Noise. Take countermeasures to deal with noise.
- Breakdowns in external equipment, in which case repairs are required.
- ID Controller breakdown, in which case repairs are required.

6-4-1 Noise

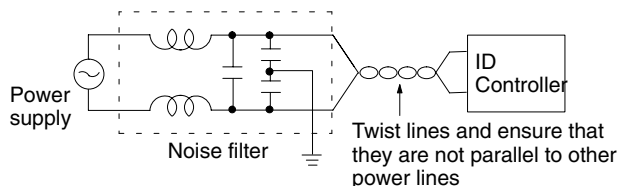
When system mis-operation occurs due to noise, refer to the following table to take appropriate countermeasures to eliminate the influence of noise.

No.	Problem conditions	Probable cause	Action
1	Occurs with large capacity motor, transformers, or capacitors when power is applied.	Instantaneous voltage drop in power supply system due to large-scale load surge current	There exists an abnormality in communications between R/W Heads and DCs. Check communications speed, distance, and obstacles.
		Common mode noise due to above cause	Supply power via a 1:1 non-grounded insulated transformer. Avoid common grounds with other large-scale loads, and ground the ID Controller independently.
2	Occurs irregularly	Noise on power lines	Supply power via a 1:1 non-grounded insulated transformer or a noise filter.
3	Mis-operation such as turning input signal on when it is off	Induced noise in input wiring	Lay input signal grounds away from other power lines. If noise effects are large, insert inside metal line pipes or use shielded cables.

Improving Ground



Dealing with Power Supply Noise



6-5 Maintenance and Inspections

Daily and other regular inspections are required to keep the ID Controller functions operating at optimal levels. The ID Controller main sections are configured from IC components, and consequently there are almost no consumable items, but the following problems may occur due to environmental or operating conditions.

- Excessive voltage or excessive current causing element deterioration.
- Use in high ambient temperature locations can cause long term stress leading to the deterioration of elements.
- Deterioration of insulation due to humidity, dust, or deterioration in connector connections.
- Corrosive gas causing bad connector connections or corroding elements.

6-5-1 Inspection Parameters

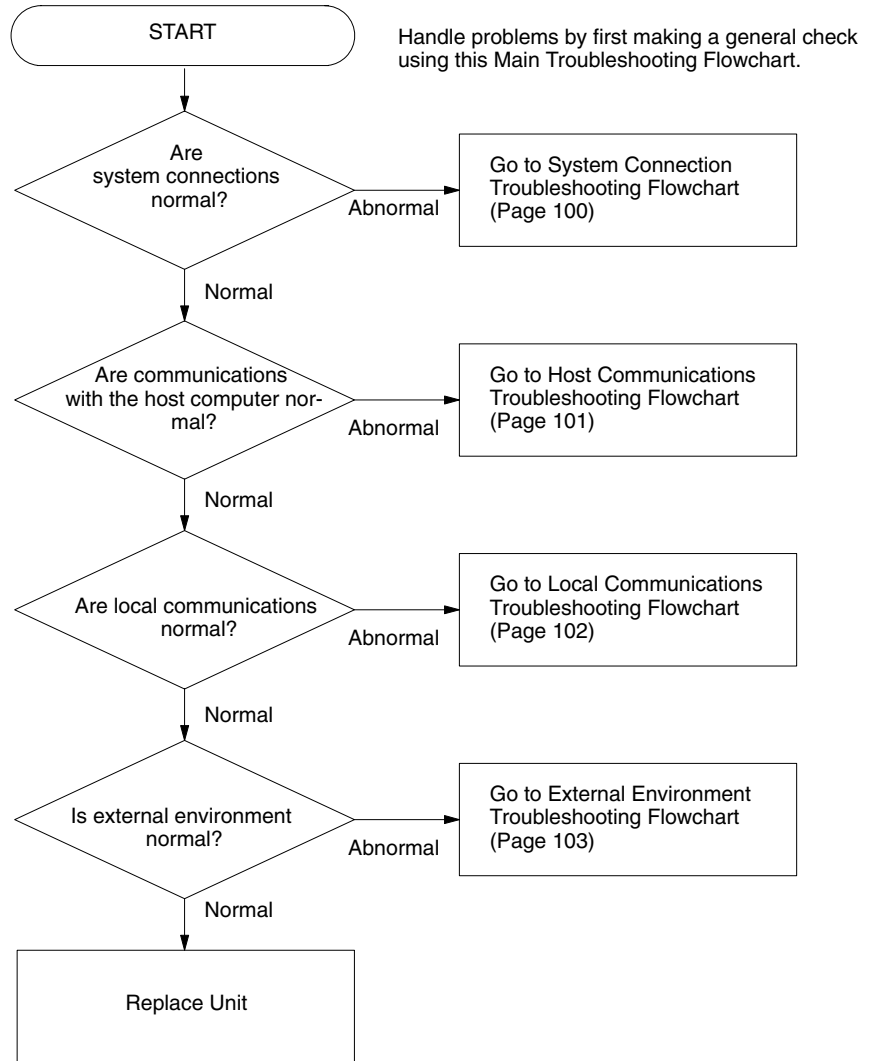
No.	Inspection parameters	Inspection description	Criteria	Remarks
1	Line voltage variation	(i) Determine whether it's within standards by checking power supply terminal strip.	Line voltage should be within specified range.	Tester
		(ii) Is there frequent instantaneous power drops or sudden voltage fluctuations?	Voltage variation should be within specified range.	Power supply analyzer
2	Ambient environment: (i) Temperature. (ii) Humidity. (iii) Vibration and impacts. (iv) Dust. (v) Corrosive gas	(i) and (ii): Within specifications? (iii) Is there vibration or impact transmitted from machinery? (iv) Is dust or foreign matter is adhered to controller, and has it accumulated? (v) Is the metal casing discolored or corroded?	(i) -10°C to 55°C . (ii) 35% to 85%. (iii) Within specified range. (iv) There should be none. (v) There should be none.	Maximum and minimum thermometer, humidity measuring equipment
3	Panel condition: (i) Is there adequate air flow? (ii) Is packing damaged on hermetically shielded configuration?	(i) Is the natural air flow/forced air flow/cooling operating well?	There should be good air flow and the temperature within the panel should be within -10°C to 55°C .	---
		(ii) Is the packing attached to the panel coming off or damaged?	---	---
4	I/O power supply: (i) Voltage variation. (ii) Ripple.	Are measurements of the terminal strips in each I/O section within specifications?	It should be within the specified range.	Tester, oscilloscope
5	Installation conditions	(i) Are all devices secured properly? (ii) Are all connectors completely inserted? (iii) Are the screws on the terminal strips loose? (iv) Is the wiring about to break? (v) Is distance between DC and R/W Heads within specified range?	There should be no looseness. Locks and screws should be tight. --- --- ---	---
6	DC battery life check	Check DC production date	It should be within the specified range.	---
7	Error logging check	Check error data	---	---

Note The DCs have built-in lithium batteries for memory backup. When the batteries are drained or become unusable, please dispose of properly as it is extremely dangerous to burn them. Fires must be avoided.

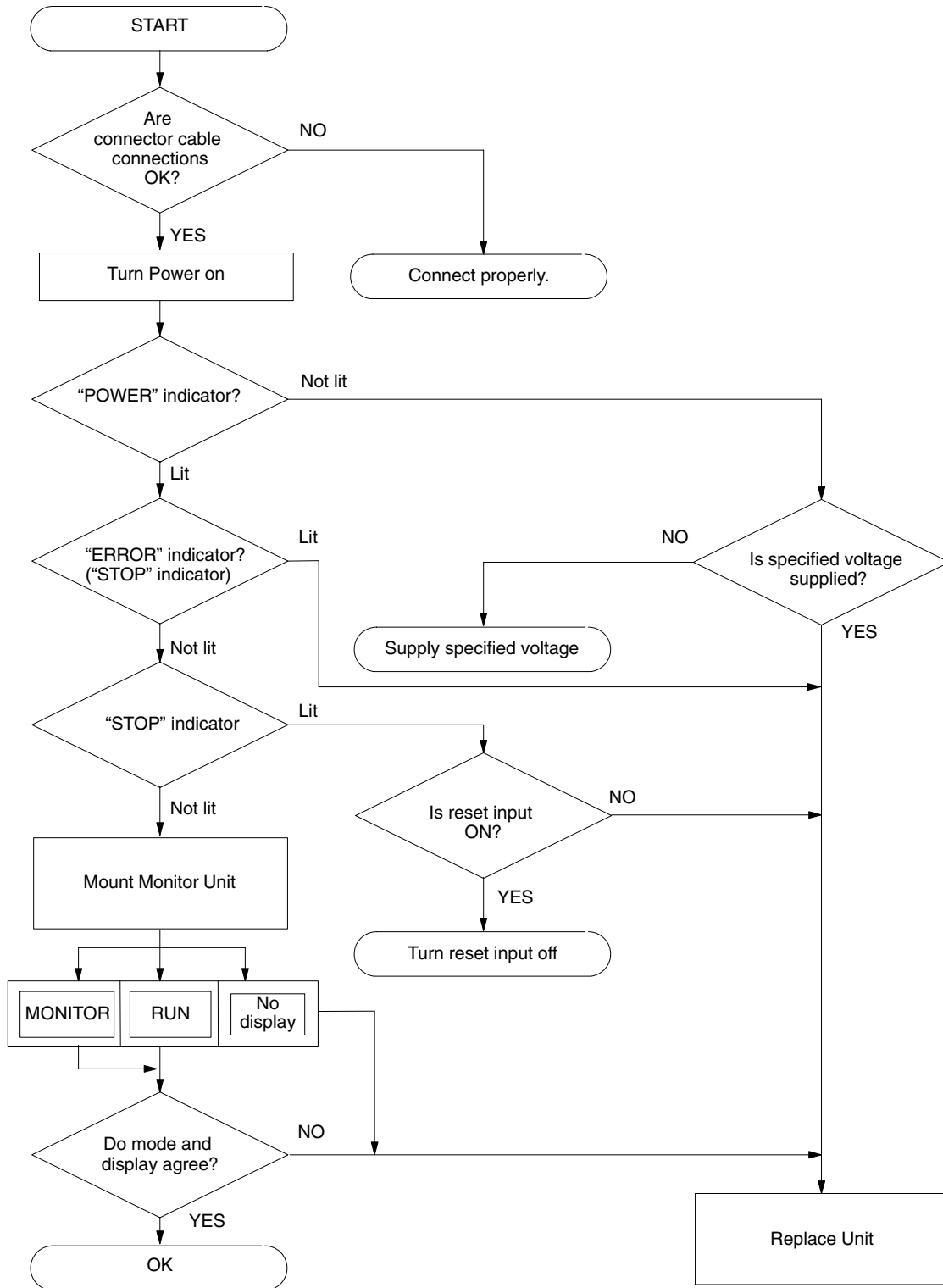
6-6 Troubleshooting

When abnormalities occur, it is important to make the following checks to determine completely the nature of the problem, determine whether there is any possibility of reoccurrence, and to find out if there is any relation to other devices.

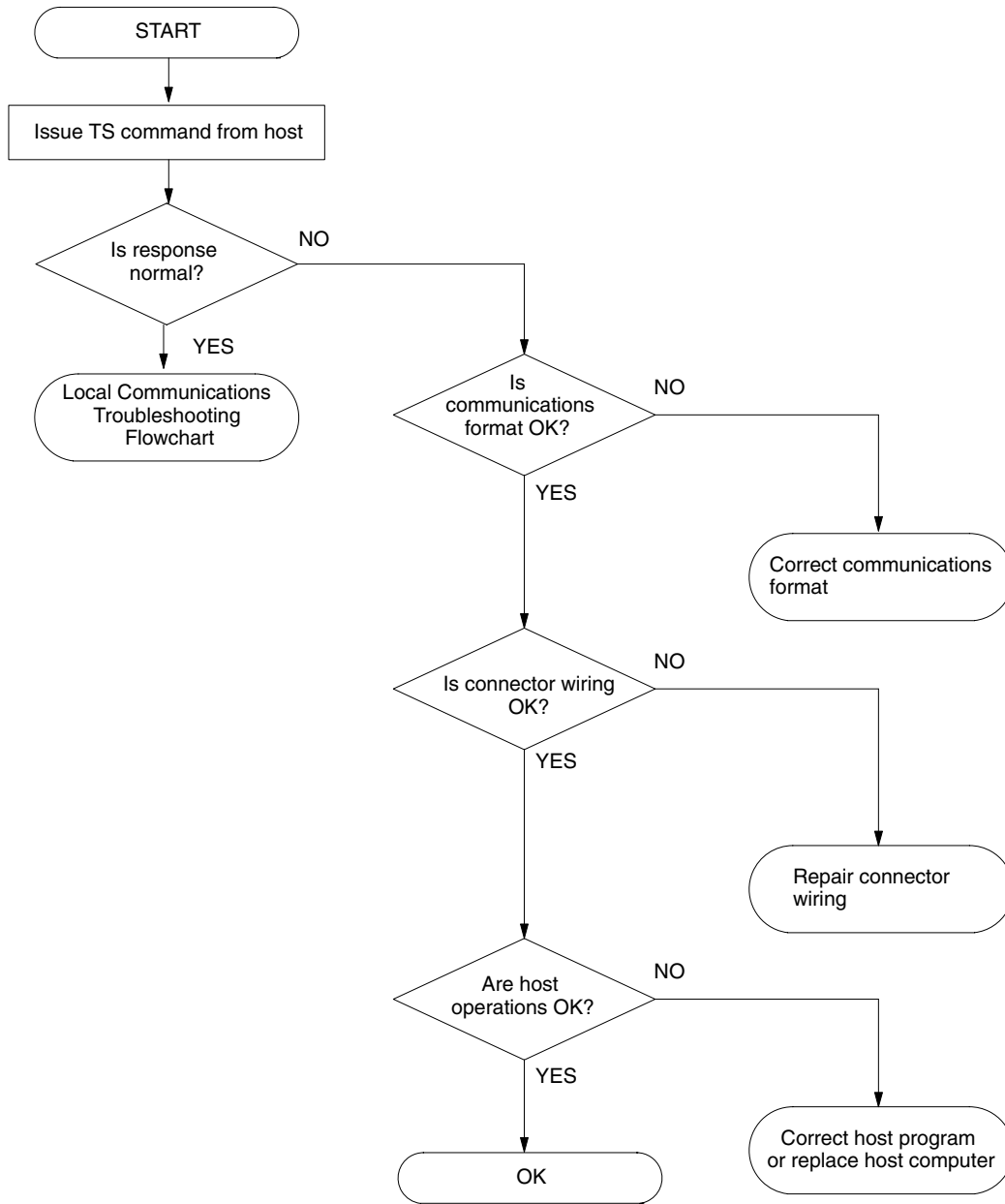
6-6-1 Main Troubleshooting Flowchart



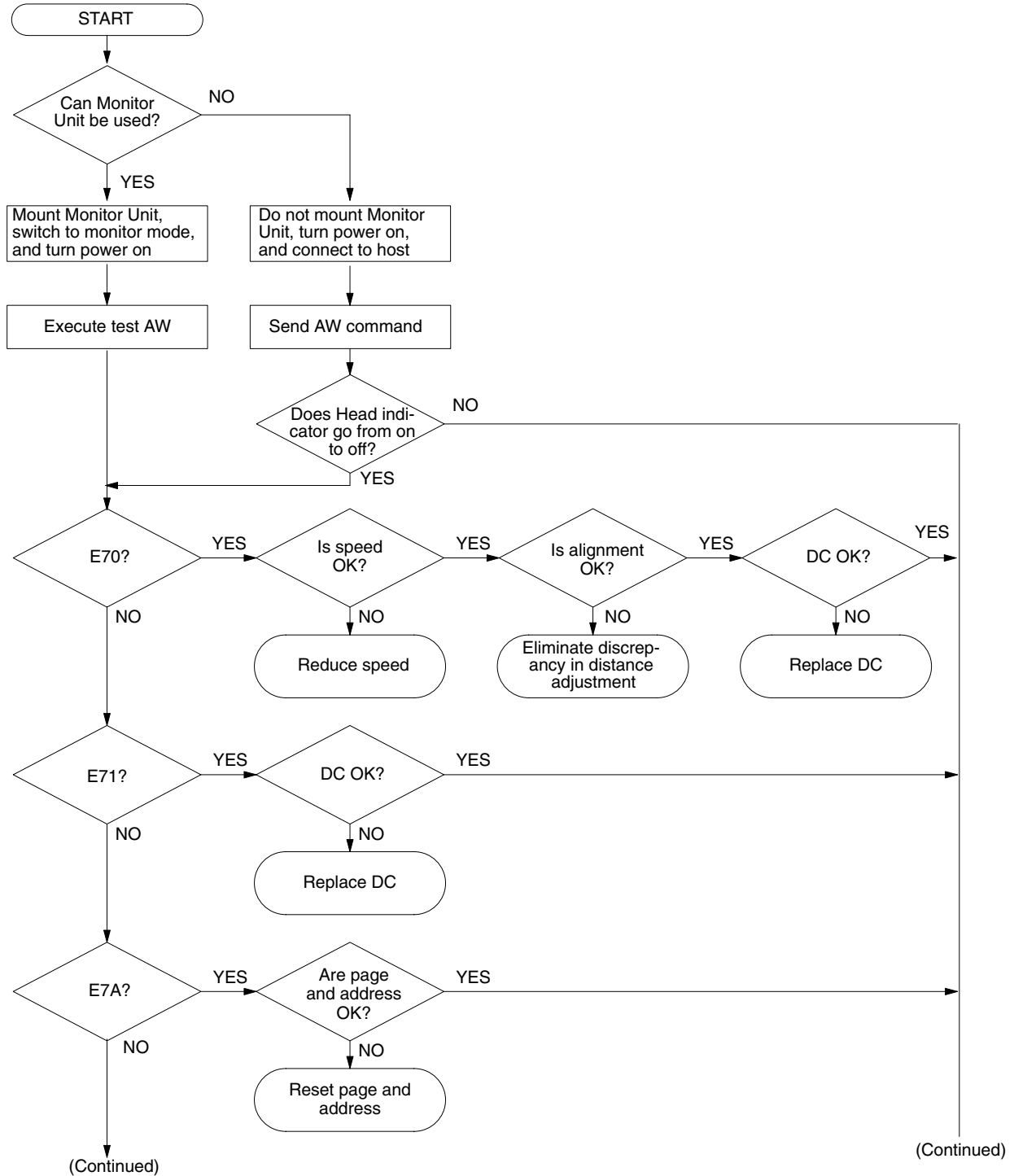
6-6-2 System Connection Troubleshooting Flowchart

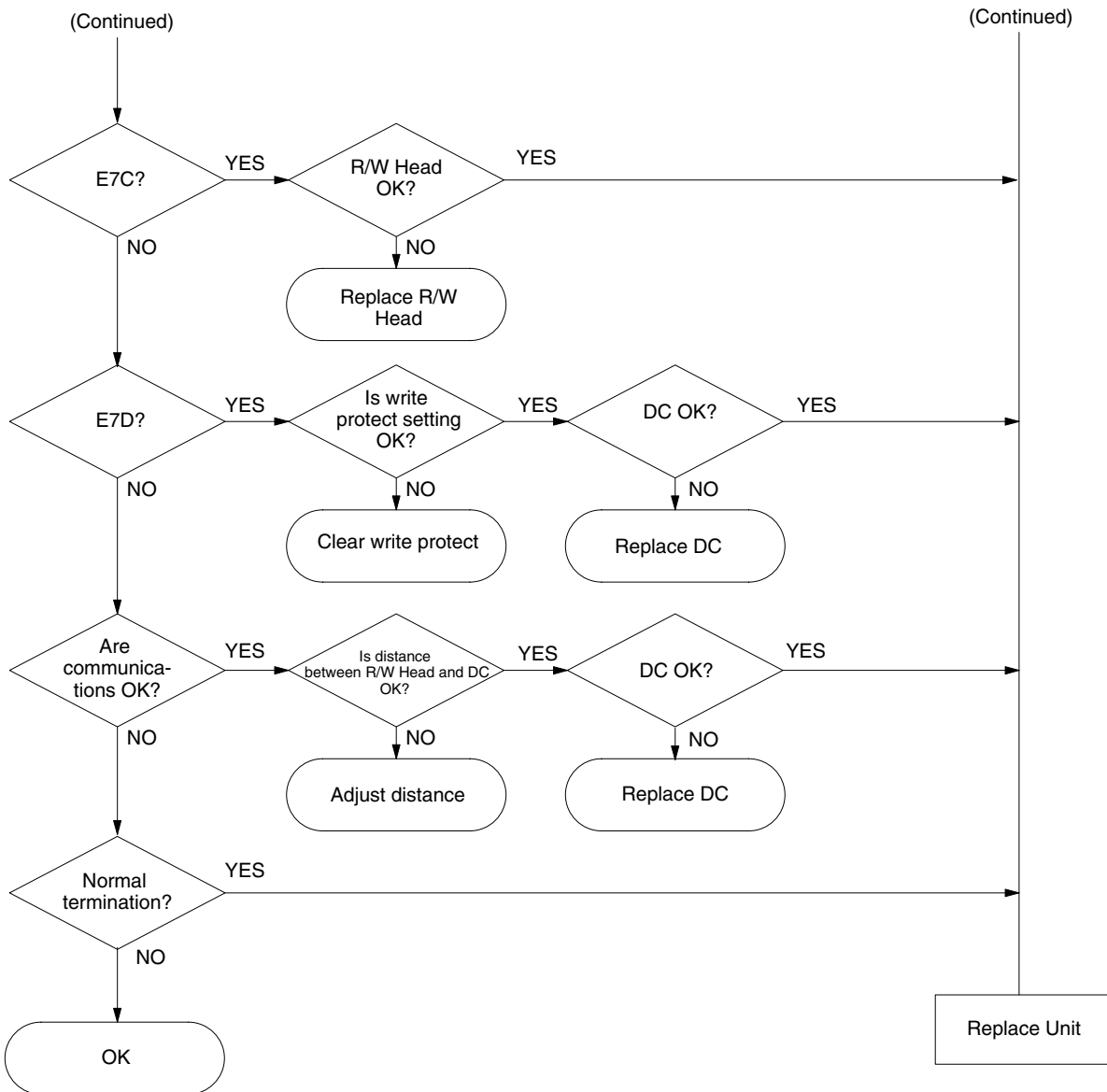


6-6-3 Host Communications Troubleshooting Flowchart

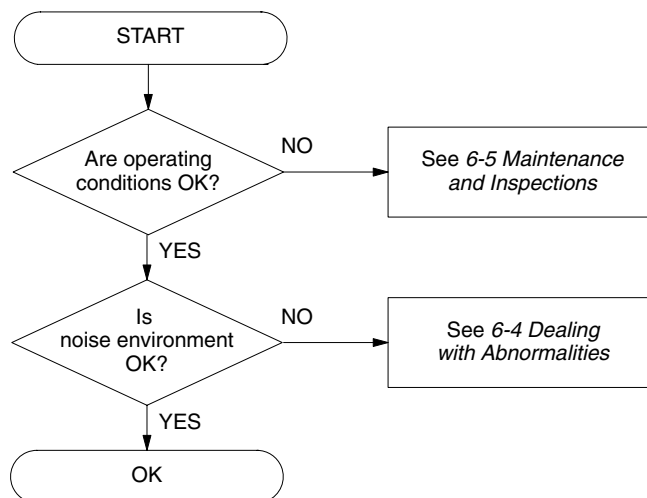


6-6-4 Local Communications Troubleshooting Flowchart





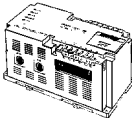

6-6-5 External Environment Troubleshooting Flowchart



Appendix A

Standard Models

ID Controller and System Components

Product	Specification	Model number	Remarks
ID Controller 	Serial interface, 100 to 240 VAC power supply	V600-CA1A-V□	RS-232C interface
		V600-CA2A-V□	RS-422 interface
Monitor Unit 	—	V600-P01	—

Appendix B Codes

JIS 8 Code List (ASCII List)

Higher digits		b8~b5																			
Lower digits		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111				
b4~b1	Row	Column																			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
0000	0	NUL	TC ₇ (DLE)	(SP)	0	@	P	`	p	↑	↑	Undef.	-	夕	≡	↑	↑				
0001	1	TC ₁ (SOH)	DC ₁	!	1	A	Q	a	q			。	ア	チ	ム						
0010	2	TC ₂ (STX)	DC ₂	"	2	B	R	b	r			「	イ	ツ	メ						
0011	3	TC ₃ (ETX)	DC ₃	#	3	C	S	c	s			」	ウ	テ	モ						
0100	4	TC ₄ (EOT)	DC ₄	\$	4	D	T	d	t			、	エ	ト	ヤ						
0101	5	TC ₅ (ENQ)	TC ₈ (NAK)	%	5	E	U	e	u			。	オ	ナ	ユ						
0110	6	TC ₆ (ACK)	TC ₉ (SYN)	&	6	F	V	f	v	Undefined	Undefined	ヲ	カ	ニ	ヨ	Undefined	Undefined				
0111	7	BEL	TC ₁₀ (ETB)	'	7	G	W	g	w			↑	↑	ア	キ			ヌ	ラ	↑	↑
1000	8	FE ₀ (BS)	CAN	(8	H	X	h	x			↓	↓	イ	ク			ネ	リ	↓	↓
1001	9	FE ₁ (HT)	EM	)	9	I	Y	i	y			ウ	ケ	ノ	ル					
1010	10	FE ₂ (LF)	SUB	*	:	J	Z	j	z			エ	コ	ハ	レ						
1011	11	FE ₃ (VT)	ESC	+	;	K	[	k	{			オ	サ	ヒ	ロ					
1100	12	FE ₄ (FF)	IS ₄ (FS)	,	<	L	¥	l	l			ヤ	シ	フ	ワ						
1101	13	FE ₅ (CR)	IS ₃ (GS)	-	=	M	]	m	}			ユ	ス	ヘ	ン					
1110	14	S0	IS ₂ (RS)	.	>	N	^	n	~			ヨ	セ	ホ	”		↓				
1111	15	S1	IS ₁ (US)	/	?	O	-	o	DEL	↓	↓	ツ	ソ	マ	°	↓	Undef.				

- Note**
1. The code at the 5th row, 12th column is “\” in ASCII code.
 2. Do not use FE₅(CR) and undefined area as data.

Appendix C

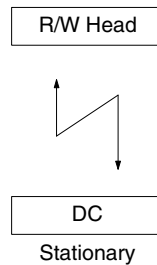
Auto Read/Auto Write

Use of Auto Read and Auto Write Commands

In general, read and write commands are used while DCs are stationary. Auto commands are used while DCs are in motion.

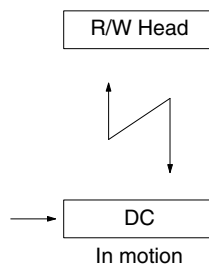
Read and Write Commands

- Communications distance can be greater than when DC is in motion, and so accurate communications can be performed.

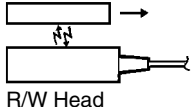
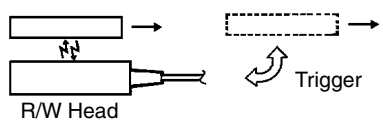


Auto Read and Auto Write Commands

- When the auto commands are used, DC proximity is detected automatically.
- If DC motion is slow and positioning is accurate, communications can be done with few limitations on distance.
- When an auto command is sent while the DC is stationary, the DC Not Present indication is not issued.



Application Example of Command

Item	Application	Description	Note
<p>Command transmission by timer</p>	<p>Transmits next auto command after response is returned.</p>  <p>R/W Head</p>	<ul style="list-style-type: none"> - When DC passes through the communications area of R/W Head at fixed intervals. - If a long time elapses before next DC arrives. - Overlapping of the same communication with the same DC can be avoided if wait time during which DC leaves the communication area elapses after the end of communication. 	<ul style="list-style-type: none"> - Keep transportation speed constant. - Valid only for systems where communication is not made more than once with same DC. - Make sure that another DC does not pass through the area.
<p>Trigger</p>	<p>Transmits next auto command when a trigger is received after a response is returned.</p>  <p>R/W Head</p> <p>Trigger</p>	<ul style="list-style-type: none"> - For example, auto command is transmitted after end of processing for preceding process is confirmed. - Trigger must be input before the next DC approaches. 	<ul style="list-style-type: none"> - Trigger processing is necessary. - Make sure that the trigger is accurately input.

Appendix D

Conformity to Standards

UL (Underwriters' Laboratories Inc.)



Listing Mark

UL3101

File No. E41515

CSA (Canadian Standard Association)



Listing Mark

CSA1010.1

File No. LR46463

EC Directives

We hereby declare that the following products are in conformity with the requirements of the EC Directives listed below:

Identification System

V600-CA1A/2A-V2 ID Controllers

V600-H□□-□ Read/Write Heads

V600-D□□□-□ Data Carriers

No. of Directive: 89/336/EEC

Title of Directive: Electromagnetic Compatibility

No. of Directive: 73/23/EEC

Title of Directive: Low Voltage Safety

The above referenced products conform to the following standards:

Electromagnetic Compatibility

EMI (Electromagnetic Interference)

Radiated EN50081-2: 1994 / EN55011: 1991

EMS (Electromagnetic Susceptibility)

Electrostatic Discharge EN50082-2: 1995 / EN61000-4-2: 1995

RF Electromagnetic Field EN50082-2: 1995 / ENV50140: 1994

RF Common Mode EN50082-2: 1995 / ENV50141: 1994

Electrical Fast Transient Burst EN50082-2: 1995 / EN61000-4-4: 1995

Power-Frequency Magnetic Field EN50082-2: 1995 / EN61000-4-8: 1993

Electrical Safety

EN61010-1: 1993

IEC1010-1: 1990 / A1: 1992 / A2: 1995

Technical Data

Intended Environment: Industrial

1. Type designation: V600-CA1A/2A-V2
2. Host interface: CA1A-V2: RS-232C
CA2A-V2: RS-422
3. Number of Read/Write Heads connectable: 2 channels
4. Rated power supply voltage: 100 to 240 VAC, 50/60 Hz
5. Acceptable power supply voltage: 85 to 264 VAC
6. Power consumption: 35 VA max.
7. Dielectric strength: 1,500 VAC, between live parts and protective grounding conductor
3,700 VAC, between primary and secondary circuits
8. Ambient air temperature: Operating -10° to 55°C
Storage -25° to 65°C
9. IP degree (IEC60529): IP30 (for inner-panel installation)
10. Pollution degree: 2 (controlled environment)
11. Electromagnetic Compatibility (EMC)
 - a) Field Withstandability: 10 V/m
 - b) RF Common Mode: 10 V
 - c) Electrostatic Discharge Withstandability: 4 kV (Contact)
8 kV (Air)
 - d) Fast Transient Withstandability: 2 kV (DC power)
1 kV (Signal line)
 - e) Radiated Emission: Class A, Group 1

Model Legend

- ID Controllers

V600-CA1A/2A-V2-□
I II III IV

- I – V600: Inductive Identification System
- II – CA1A/2A: Two Read/Write Heads connectable
-CA1A: Serial interface (RS-232C)
-CA2A: Serial interface (RS-422)
– AC power supply model
- III – V2: Version 2
- IV – □: Blank – Standard model
Suffix(es) – For marketing purposes

• Read/Write Heads

V600-H □ □ □ - □
 I II III IV V

- I – V600: Inductive Identification System
- II – H: Read/Write Head
- III – □: Shape – 0 or 1 Square type
 – 5 Cylindrical type
- IV – □: Serial number
- V – □: Blank – Standard model
 Suffix(es) – For marketing purposes

• Data Carriers

V600-D □ □ □ □ - □
 I II III IV V VI

- I – V600: Inductive Identification System
- II – D: Data Carrier
- III – □: Memory Capacity – 2 2K bytes
 – 8 8K bytes
 – 23 256 bytes
- IV – □: Memory type – K SRAM
 – P EEPROM
- V – □: Serial number
- VI – □: Blank – Standard model
 Suffix(es) – For marketing purposes

FCC (Federal Communications Commission)

FCC Part 15 Subpart B

For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement placed in a prominent location in the text of the manual:

Note This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. Z044-E1-03B


The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	June 1990	Original production
2	May 1993	This manual has been extensively rewritten and reformatted. Numerous additions and deletions were made.
3	August 1998	Information relating to EC Directives added throughout the manual. V600-CA1A-V□ and V600-CA2A-V□ added throughout the manual. “FA ID System” changed to “RFID System” throughout the manual. Pages 48, 49: <i>3-6-2 Example of BASIC Program Using SYSMAC WAY Commands</i> removed. Page 79: <i>5-3-3 Removing Terminal Cover</i> added. <i>Appendix D Conformity to Standards</i> added.
3A	June 2000	Page 10: <i>Indication for shock resistance</i> changed. Back cover: <i>Address</i> changed.
03B	April 2004	Page v: Replaced.

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Cat. No. Z044-E1-03B

V600 RFID System V600-CA1A-V□/V600-CA2A-V□ Serial Interface ID Controller OPERATION MANUAL

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