Honeywell

CPL Communication DCP550 Instruction Manual

EN1I-6154
Issue 1 (07/94)

This manual is used with the following manual:
EN1I-6121: DCP550 – Installation & Configuration

WARRANTY

The Honeywell device described herein has been manufactured and tested for correct operation and is warranted for a period of one year.

TECHNICAL ASSISTANCE

If you encounter a problem with your unit, please review all the configuration data to verify that your selections are consistent with your application (i.e., Inputs, Outputs, Alarms, Limits, etc.). If the problem persists after checking the above parameters, you can get technical assistance by calling the following:

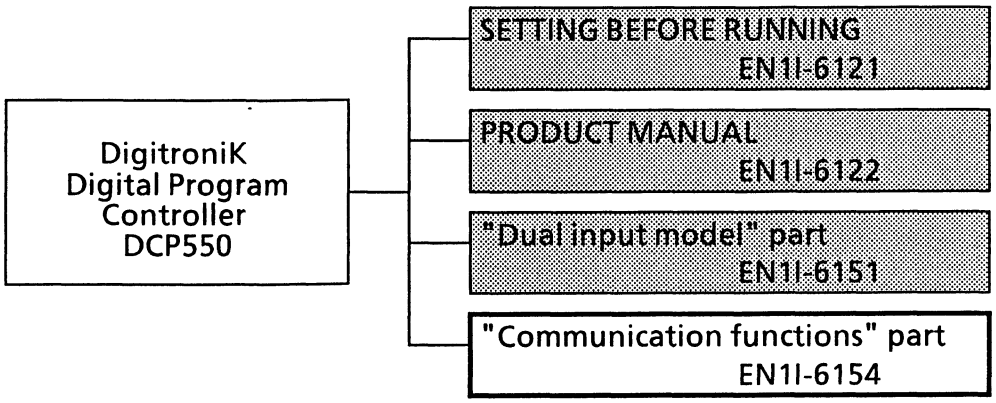
In the U.S.A.:	*1-800-423-9883*
In other countries:	*See Honeywell Service Center addresses*

Introduction

Thanks for the choice of the DigitroniK Digital Program Controller DCP550.
This instruction manual not only outlines the communication functions of the DCP550, but also describes its wiring methods, communication procedure, communication data table, trouble-shooting, and communication specifications.
The items required for the DCP550 communication functions to be properly used are given in this manual.
Persons in charge of design or maintenance of operation panels or equipment using the DCP550 communication functions should read this manual without fail.

Positioning of this instruction manual

This instruction manual is essential to data exchange with a personal computer or the like, or a control system configuration, using the communication functions of the DigitroniK instruments.
This instruction manual provides descriptions on the wiring methods, communication procedure, troubleshooting concerning communication, and communication specifications of the DigitroniK instruments.
The instruction manuals for the DigitroniK instruments are classified into the following parts.



"Instruction manual for DigitroniK Instruments" EN1I-6121, EN1I-6122,EN1I-6151

Persons in charge of hardware design, maintenance, and operation of control panels or equipment using the DigitroniK instruments should read these manuals without fail.

These manuals outlines the DigitroniK instrument products and describes their panel mounting, and wiring methods, setting and operating methods, maintenance and inspection, trouble-shooting, and hardware specifications.

Configuration of the instruction manual

This instruction manual consists of eight chapters, in which the respective items are described as shown below.

1. **Communication functions**
   Communication functions and model numbers of the DigitroniK instruments
2. **Wiring**
   RS-232C and RS-485 wiring methods to make communication between the DigitroniK instruments and other equipment
3. **Setting**
   Setting for communication of DigitroniK instruments
4. **Communication Procedure**
   Communication procedure, message configuration, data read/write and signal timing
5. **Communication Data Table**
   Table of various data addresses used for communication of DigitroniK instruments
6. **Communication Program for Master Station**
   Communication program example of DigitroniK instruments using N88BASIC in PC-9800 series personal computer.
7. **Troubleshooting**
   Check points required if the DigitroniK instrument communication should not operate normally.
8. **Specifications**
   Communication specifications for the DigitroniK instruments

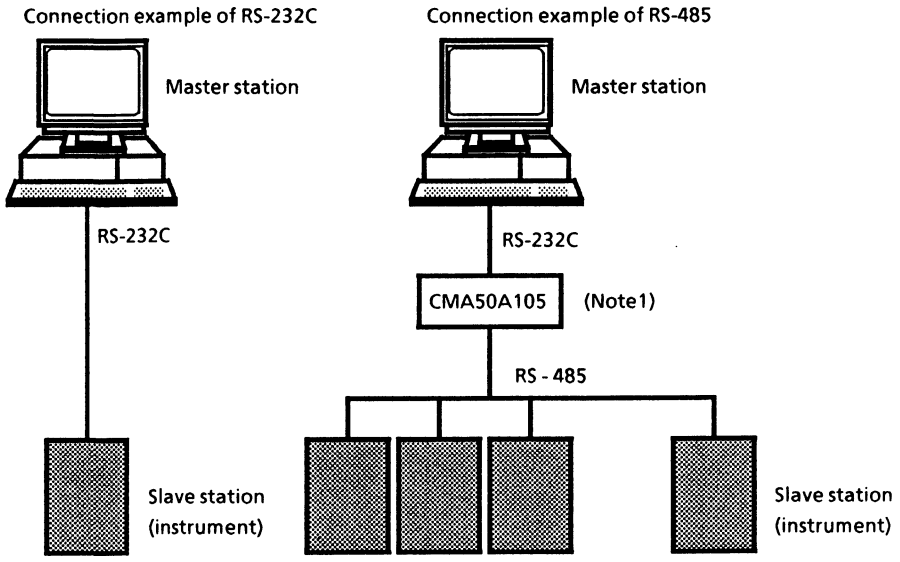
APPENDIX
Code table and network configuration using the RS-232C/RS-485 converter CMA50

Contents

Appendix

1. Communication functions

- In the RS-232C system, one master station (called a host computer for which a personal computer or the like is used) and the instrument are connected mutually in the form of 1 to 1. At this time, one instrument only can communicate with one master station.
  The "instrument address" must then be set to make communication.
- In the RS-485 system, up to 31 instruments can be connected with one master station. The "station addresses" are then used to identify mate stations for communication.
- The communication procedure and format are in common to the RS-232C and RS-485 systems.
- When the following procedure is completed during communication, various data for the instrument can be read or written.
  (1) The master station (host computer) transmits an instruction message to a slave station (instrument).
  (2) The master station receives a response message from the slave station.
- Instructions from master station to slave station are classified into two types; "read" and "write".
- The type of read/write data can be optionally selected by "data address".



Connection between master station and slave station

(Note1)
- When the master station is MA500 DIM, or CMC410, it can be connected with up to 16 slave stations.

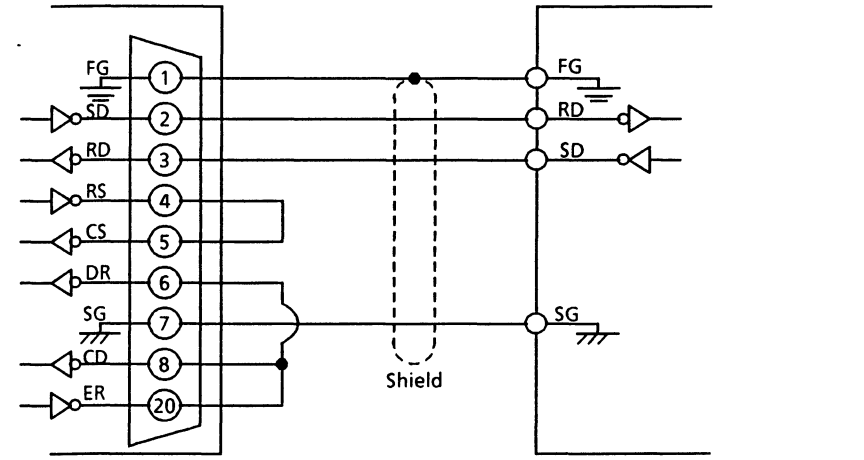
(Note2)
- The CMA50A105 is an RS-232C/RS-485 converter made by Yamatake-Honeywell.
- The high function type CMC410 series are also available as RS-232C/RS-485 converters.

2. Wiring

2-1 RS-232C Connection

The DigitroniK instrument with the RS-232C communication function is wired for communication as shown below.

- Connection with the master station in the form of 1 to 1.
  This instrument is provided with four communication terminals (RD, SD, SG, and FG). Data may not be output unless the other kind terminals of the master station side RS-232C interface are short-circuited as shown in the figure below.
  Usually, the pin array of the RS-232C connector of a personal computer, or the like is as shown below (Terminal mode). In a rare case, pins (2) and (3), (4) and (5), and (6) and (20) may be replaced with each other, respectively (MODEM mode).
  Check the RS-232C pin array by referring to the instruction manual for the host computer.



Example of connection using Honeywell CBL-RS232Z08

RS-232C connector signals (25 pins)

Pin No	JIS abbreviation	Usual name	Signal direction Host-Instrument
1	···	FG	
2	SD	TxD	→
3	RD	RxD	←
4	RS	RTS	→
5	CS	CTS	←
6	DR	DSR	←
7	SG	GND	
8	CD	DCD	←
20	ER	DTR	→

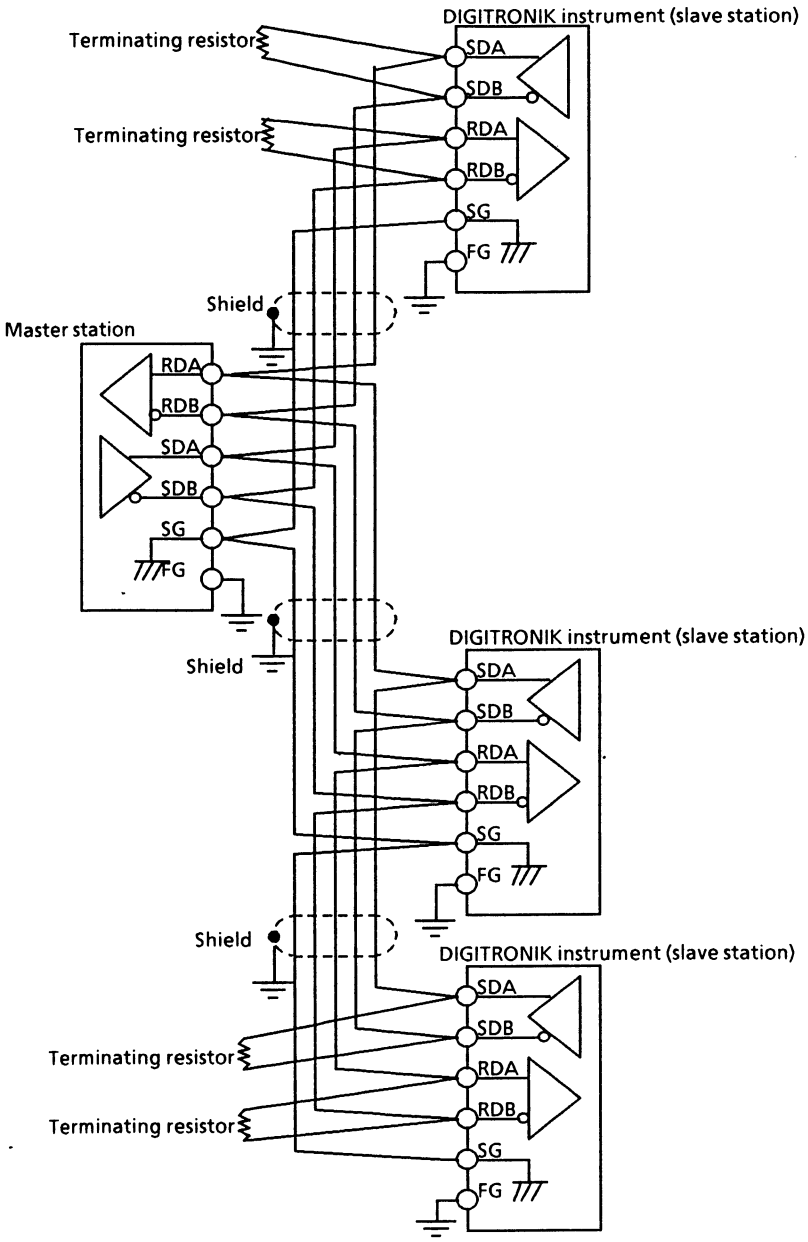
(9 pins)

Pin No	JIS abbreviation	Usual name	Signal direction Host-Instrument
1	CD	DCD	←
2	RD	RxD	←
3	SD	TxD	→
4	ER	DTR	→
5	SG	GND	
6	DR	DSR	←
7	RS	RTS	→
8	CS	CTS	←

2 - 2 RS-485 Connection

■ 5-wires system

When the DigitroniK instruments with the communication functions in compliance with the RS-485 are used in the 5-wires system, they are connected, for example, as follows;

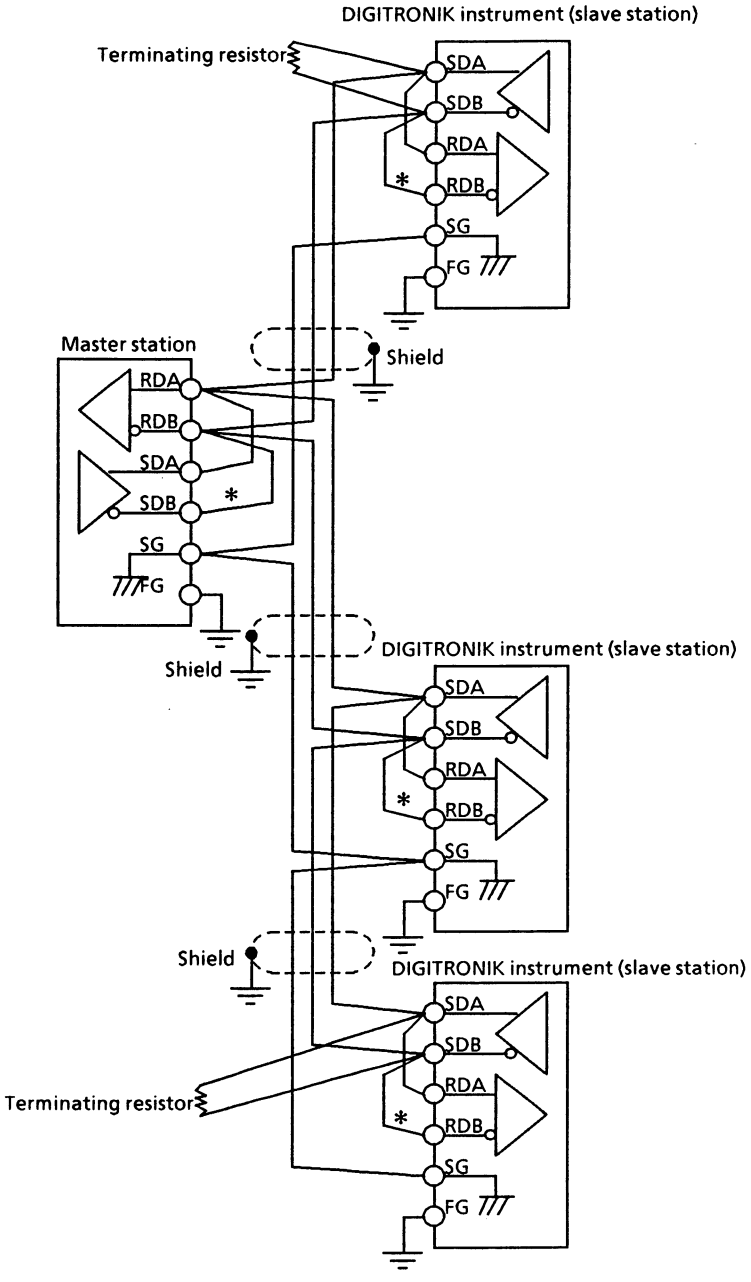


Connect two terminating resistors of 150Ω±5%, 1/2W min. to the instrument at each end of the transmission line. Also connect the shield wires to FG at one place.

In the 5-wires system, the Honeywell CMA50A105 can be used as a converter in the master station. It can also be used as a converter in the slave station when the number of the slave stations is only one, but cannot be used as a converter in a slave station when two or more slave stations are used.

■ 3-wires System

The DigitroniK instruments with the communication functions in compliance with the RS-485 can also be used in the 3-wires system. An example of connection methods in such a case is shown below.



Connect one terminating resistor of 150Ω±5%, 1/2W min. to the instrument at each end of the transmission line.

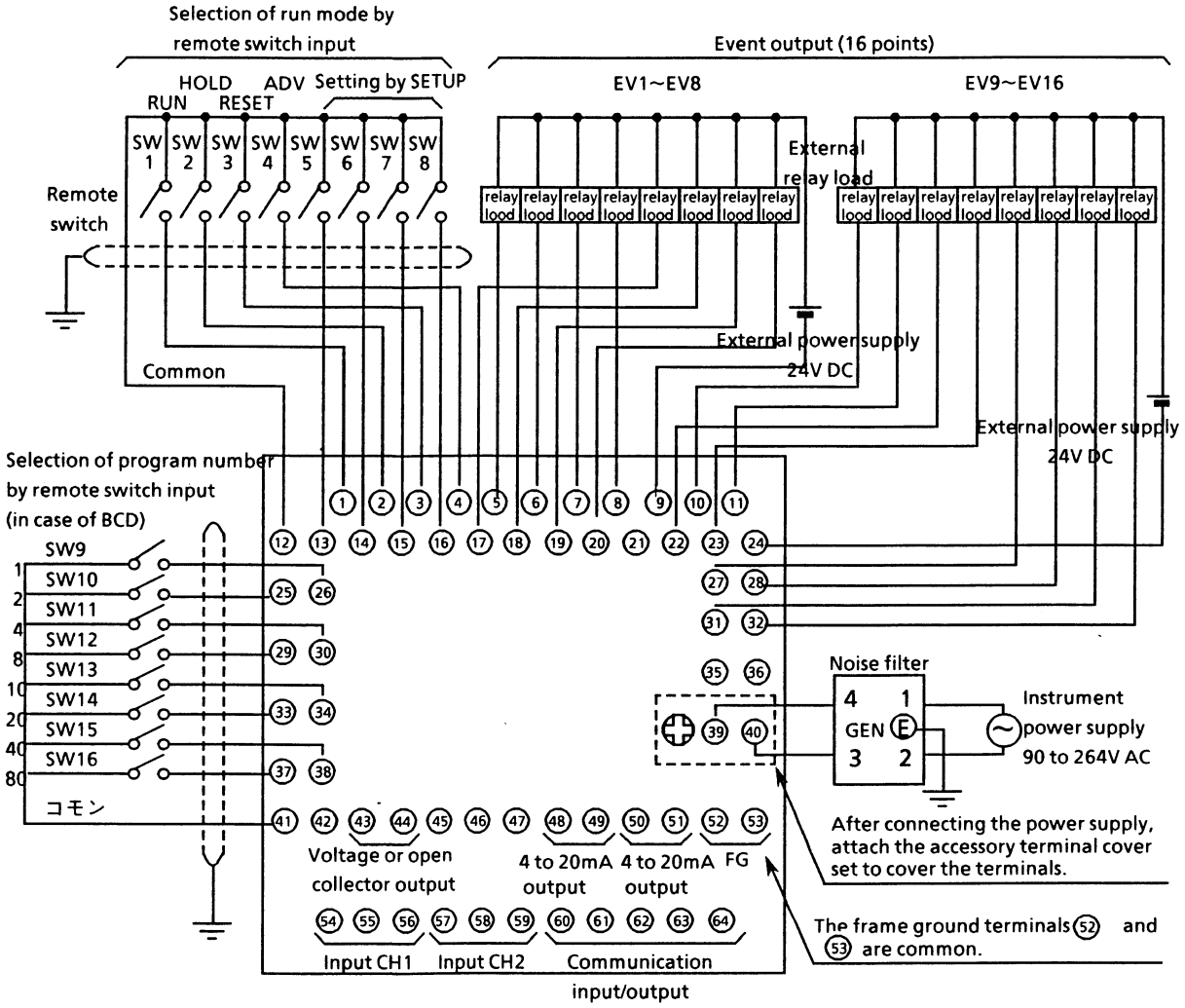
Also connect the shield wires to FG at one place.

In the 3-wires system, the Honeywell CMA50A105 cannot be used as a converter in the master station or slave station.

In an instrument equipped with only three RS-485 terminals, the asterisked (*) wiring is done internally.

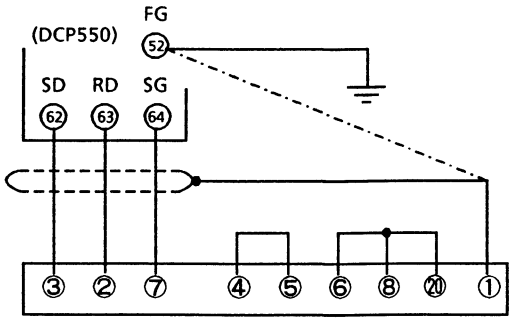
2 - 3 Terminal array of DCP550

The terminal array of the DCP550 with the communication functions is as follows;



● Communication input/output terminals

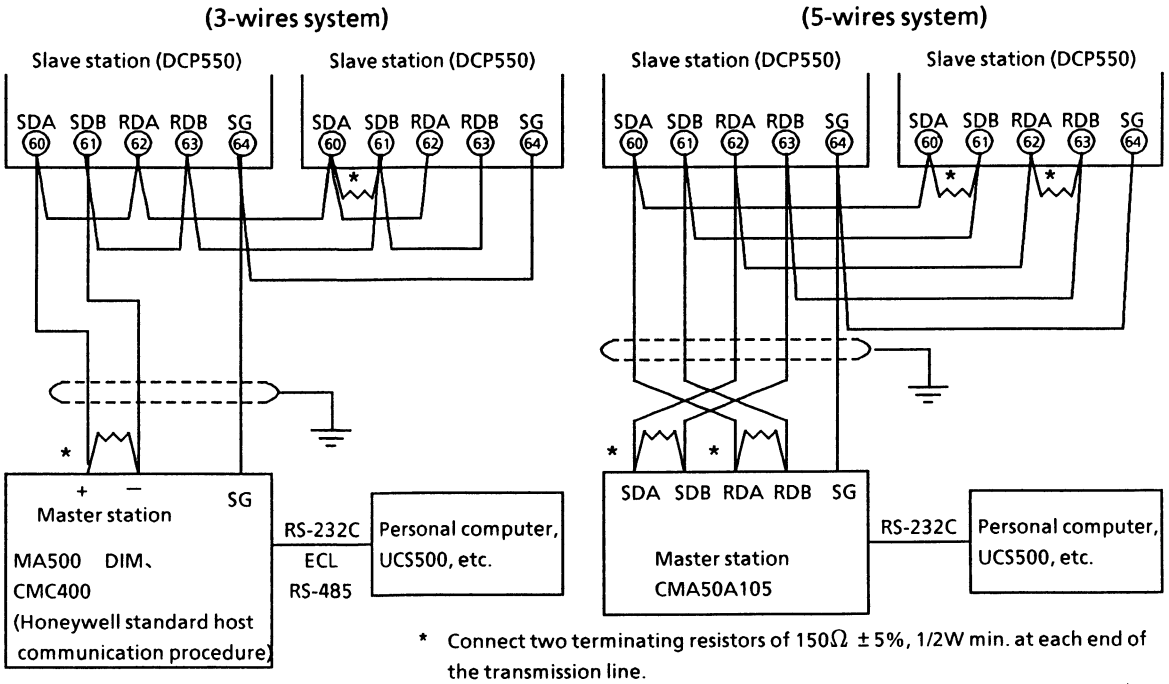
In case of RS-232C



Pin Nos. of RS-232C connector of personal computer (DTE), etc.

Notes
- The DCP550 is of a MODEM connection type (DCE), in which data is transmitted from the SD terminal, and received from the RD terminal.
- Short-circuit the RS-232C terminals (4)-(5), (6)-(8)-(20) of the personal computer, respectively, as shown in the figure above.
- When the same computer signal is handled through the RS-232C terminals (1) and (7) disconnect the chain line shown in the above diagram. When the same computer signal is handled through the RS-232C terminals (1) and (7), don't connect the sleeve wiring marked FG anywhere.

In case of RS-232C



* Connect two terminating resistors of 150Ω ±5%, 1/2W min. at each end of the transmission line.
When the master station is DIM or CMC410, it can be connected with up to 16 slave stations.

3. Setting

3 - 1 SETUP Items of DCP550

Code	Item	Setting at delivery from factory	Setting range
C76	Station address	0	0~127
C77	Baud rate	0	0 : 9600 1 : 4800 2 : 2400 3 : 1200
C78	Character format	0	0 : 8bits, even parity, 1 stop bit 1 : 8 bits, no parity, 2 stop bits
C79	Communication protocol	0	0 : CPL 1 : ST200 (without PV trend) 2 : ST200 (with PV trend)

3 - 2 Initialize

Before starting communication, initialize the communication conditions for the DigitroniK instrument and master station.

■ Station address

Set a decimal number within 1 to 127 to the SETUP item C76 of the DigitroniK instrument. In the RS-485 system, set a different address value from the addresses of the other slave stations connected in multi-drop on the same transmission line.

Address 0 is set as an station address at delivery from the factory. Since the communication function is not activated at address 0, be sure to set a value other than 0 to execute communication.

■ Baud rate

Set one of 0 to 3 to the SETUP item C77 of the DigitroniK instrument. At this time, set the same transmission speed value as in the master station.

0: 9600bps (factory setting)
1: 4800bps
2: 2400bps
3: 1200bps

■ Character format

Set 0 or 1 to the SETUP item C78 of the DigitroniK instrument.

At this time, set the same data format as the DigitroniK instrument in the master station.

0: 8 data bits, even parity, 1 stop bit (factory setting)
1: 8 data bits, no parity, 2 stop bits

■ Communication protocol

To execute the CPL communication (Yamatake - Honeywell standard host communication), make sure that 0 is set to the SETUP item C79.

0 is set as the communication protocol at delivery from the factory.

4. Communication procedure

4 - 1 Outline of communication procedure and messages

The outline of communication procedure, and the concept of message configuration are given in this paragraph.

■ Communication procedure

The communication procedure used is given below in simple expression.

(1) The master station transmits a request message to a slave station to designate the mate instrument for communication.

(2) The slave station processes the request message and executes read and write.

(3) Further, the slave station transmits a response message according to the contents of processing.

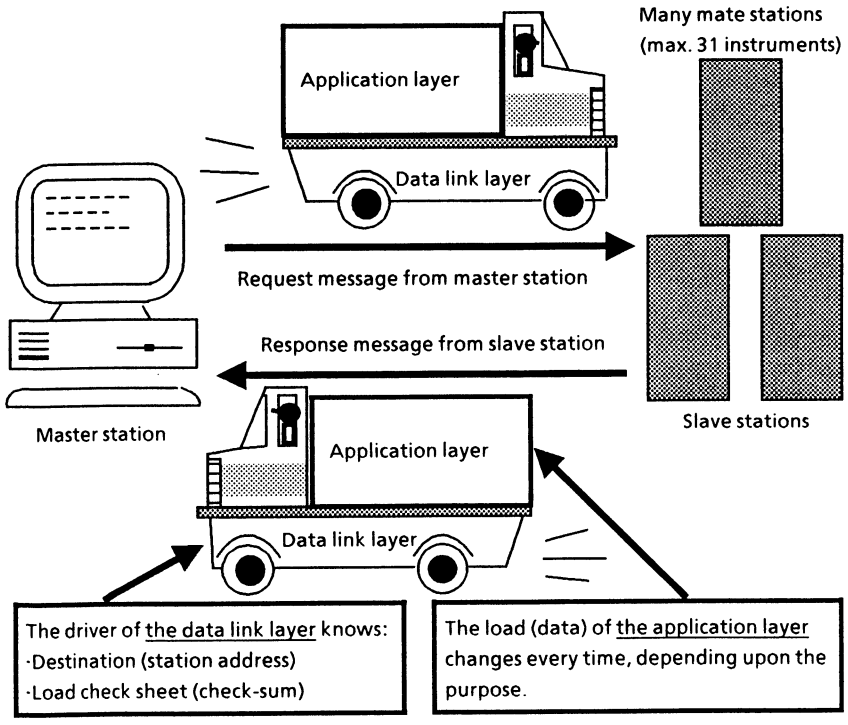
(4) The master station receives the response message and executes processing.

■ Configuration of message

One message consists of two layers as shown below. This is common to the request message from the master station and response message from a slave station.

- Data link layer
  - · This layer has the basic information required for communication.
  - · This layer has the destination of communication message and message check information.
- Application layer
  - · A layer for data read and write
  - · The contents change, depending upon the purpose.

The individual layers are detailed in the following items.



■ Definite examples

Definitely, the messages are as shown below.

● In case of read request

·Request message

STX	0	1	0	0	X	R	S	,	1	0	0	1	W	,	2	ETX	9	A	CR	LF

Data link layer　　Application layer　　Data link layer

·Response message

STX	0	1	0	0	X	0	0	,	0	,	4	2	ETX	9	4	CR	LF

Data link layer　　Application layer　　Data link layer

● In case of write request

·Request message

STX	0	1	0	0	X	W	S	,	1	0	0	1	W	,	5	8	ETX	5	A	CR	LF

Data link layer　　Application layer　　Data link layer

·Response message

STX	0	1	0	0	X	0	0	ETX	8	2	CR	LF

Data link layer　　Application layer　　Data link layer

The data link layer and application layer are detailed in and after the next paragraph.

■ Concept of data address

This instrument uses the concept of data address to facilitate reading or writing each intended data by addressing.

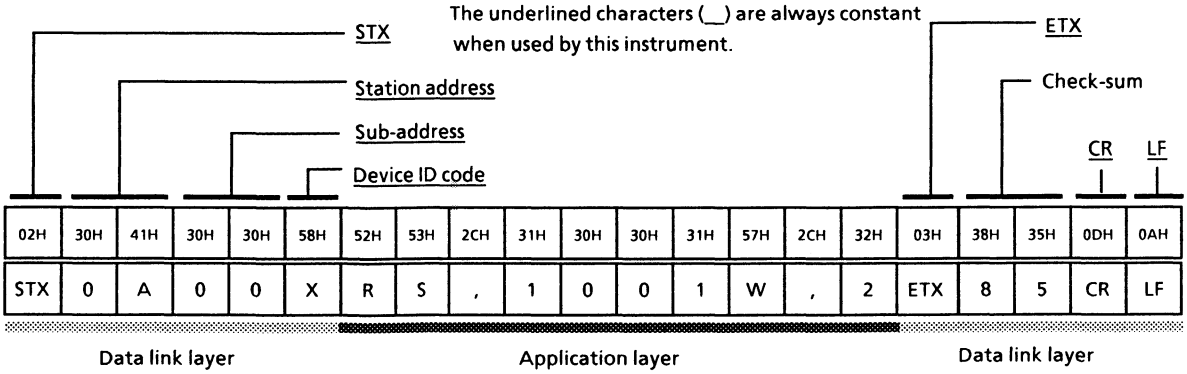
Data A	501W
Data B	502W
Data C	503W
:	:

For the actual correspondence between data and address, see the "Communication Data Table".

4 - 2 Data link layer

■ Description of data link layer

- The data link layer includes eight basic information for transmitting a message.
- The data link layers of a request message and response message have the same structure.



Each function of the data link layer is shown below.

● STX (Start of TeXt)

◆Role : Indicates the head of a message.

◇Description · Fixed at 02H.

· When the instrument receives "STX", it is identified as the first character of a new request message even on the course of any message.

● Station address

◆Role : Designates the destination instrument. Communication with one instrument designated is permitted.

◇Description · If 0 is set as a station address, the communication function is stopped.
Therefore, to make communication be sure to set an address value of 1 or more.

· 2 hexadecimal characters. For details, see the example.

· For the details of setting of the station address, see the"SETTING".

□Example : When the station address of the mate is 10:

(1) 10 (decimal) = 0AH (hexadecimal)

(2) When converted into character codes:
0 = 30H, A = 41H

(3) "0A" (30H, 41H) found in (2) is used as the station address.

◇Caution◇ • Note that the function of the station address differs absolutely from that of the data address of the application layer.

● Sub-address

◇Description: The sub-address is meaningless in this instrument. Be sure to set "00" (30H, 30H) as the sub-address in the same format as in the station address.

● Device ID code

◇Description: The character code "X" (58H) or "x" (78H) only can be designated in this instrument.

● ETX (End of TeXt)

◆Role : Indicates that the application layer existed up to immediately before.

◇Description: Fixed at 03H.

● Check-sum

◆Role : A value to be used to check whether or not the message has been changed due to any error (such as noise) on the course of communication.

◇Description · Two hexadecimal characters

. The preparing method for the check-sum is as follows;

(1) The character codes of the message from STX to ETX are added byte by byte.

(2) The two's complement of the result of addition is taken.

(3) The above value is converted into character codes.

□Example : Description is given below, citing the example of the above request message on the preceding page.

(1) The character codes from STX to ETX are added byte by bytes. The one lower byte of the result of calculation is 7BH.

(2) The two's complement of the result of addition is taken. The result is 85H.

(3) The 85H is converted into character codes. this value is used as the check-sum. The result is "85"; (38H) and (35H).

For the conversion into character codes, see the example of the station address (on the preceding page).

◇Caution◇ • The check-sum in the request message can be omitted, but no check-sum is then included in the response message. The check-sum should not be omitted to assure the proper reception of a message.

● CR and LF (Carriage Return/Line Feed)

◆Role : Indicates the end of a message.

◇Description · "CR" is (0DH), and "LF" is (0AH).

. Be sure to use CR and LF in pair.

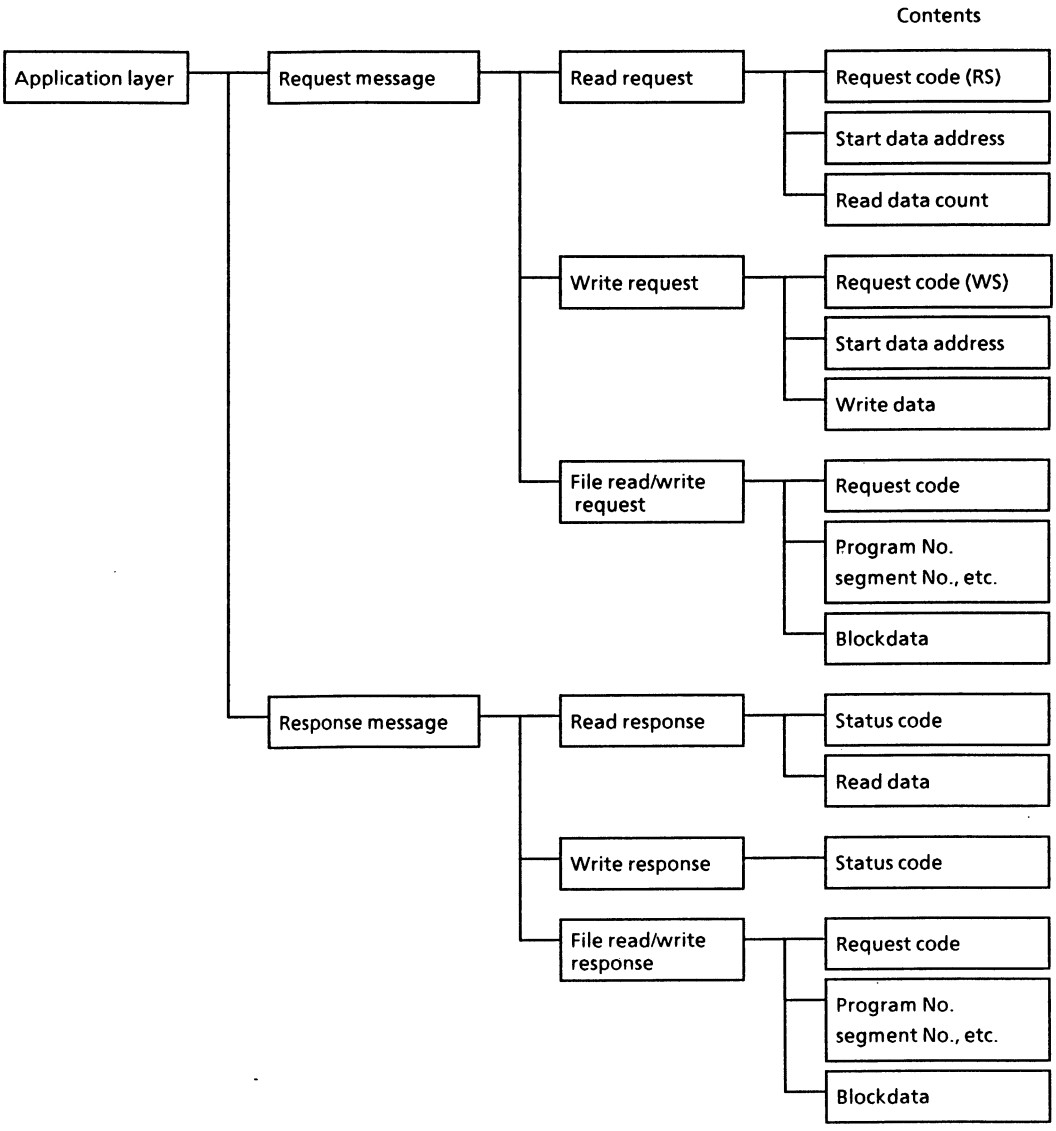
◇Caution◇

- If any of the following errors has occurred in the contents of the data link layer, the instrument does not respond to them.
  - The communication conditions for both stations do not meet each other (such as different transmission speeds, or parity error occurrence).
  - The transmitted station address differs from the station address of the object instrument.
  - The station address is "00".
  - STX, ETX, CR and LF are not placed at the specified positions.
  - The device distinction code is neither "X" nor "x".
  - The station address, sub-address, or check-sum is not two characters long.
  - The calculation result of the check-sum does not meet the check-sum of the message.
  - Non-designated characters are included in the message.
- As for the contents of the data link layer, the same message as the request message of an instrument is set as a response message, except for the check-sum.
- Use the upper-case characters "A" to "F" in the hexadecimal numeric part to be used for the station address and check-sum.

4 - 3 Application layer

■ Outline of application layer

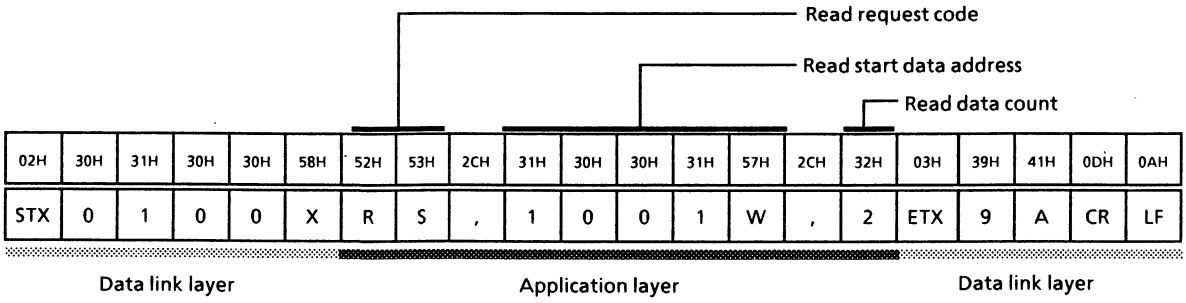
- The application layer includes a request, data, data count, and message decision information (status code).
- The application layers of the request message and response message differ in structure from each other.
- There are three types of request messages; "a read request", "a write request", and "a file read request/file write request".
  The response message includes a response corresponding to each request.
- It can be identified by a status code how the request message has been processed.



4 - 4 Data read

■ Description of read request

- This request permits the contents of continuous data addresses starting with the read start data address designated to be read in one message.
- The application layer of a read request consists of the following three types of data.



- Individual data are partitioned by a comma "," (character code 2CH), respectively.
- An upper-case character code is used for each numeric or character in the application layer.
- Decimal number is used for each numeric.
- Unnecessary "0" or a space cannot be added to each data.
  - ☐Example : The underlined part of "RS, 01001W, 2" is wrong.
  - ☐Example : The underlined parts of "RS, 1001W, 02" are wrong.
  - ☐Example : The above figure indicates an example that two-data information is read from 1001W in one message.

● Read request code (RS)

◆Role : A command which indicates read.

◇Description : Two characters "RS" (52H, 53H).

● Read start data address

◆Role : Designates the start data address from which data is to be read.

◇Description : The correspondence between data address and read data is shown in the "Communication Data Table"

· Be sure to add "W" (57H) immediately after the numeric of the data address.

● Read data count

◆Role : It is designated how many data are read continuously, starting with the designated data address.

◇Caution◇

- For the high limit of the read data count, see the "Communication Data Table".

■ Read response

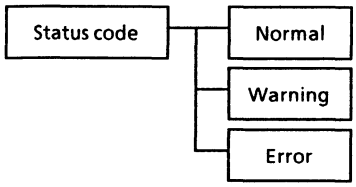
◆Role : When the message in the data link layer is proper, a response message is sent back according to the contents of the request message.

◇Description: All the data in the application layer are expressed in decimal character codes.

● Status code

◆Role : A numeric by which it can be identified how the request message has been processed on the instrument side. Different value is set according to the result of processing.

◇Description: The response message includes a "status code" without fail. The status codes are classified as follows;



* The status code is two decimal digits.

● Normal response/Warning response

◆Role : Sends back the read data.

◇Description: Information in the application layer

· Status code: For the details of the status code, see the "Status code Table".

· Read data : Data are put in by the designated count.

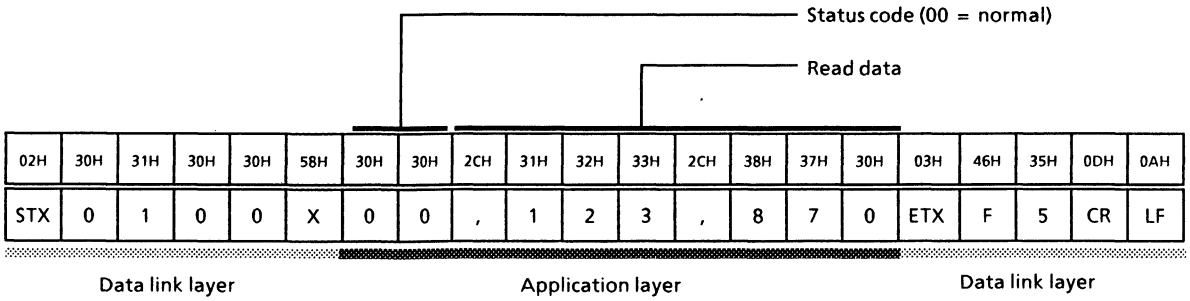
: The decimal point is removed from a numeric to be put in.

☐Example : "55.6" is converted into "556" when it is put in.

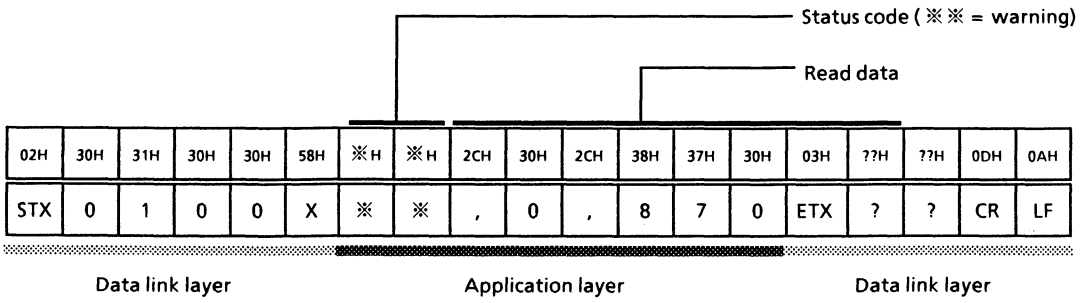
: Individual data are partitioned with a comma (2CH), respectively.

: The range and number of digits of each data depend upon the read data.

☐Example : In case of normal response (when there are two read data, and all the data are read properly)



□Example : In case of warning response (numeric corresponding to the warning code is put in ※※ .)



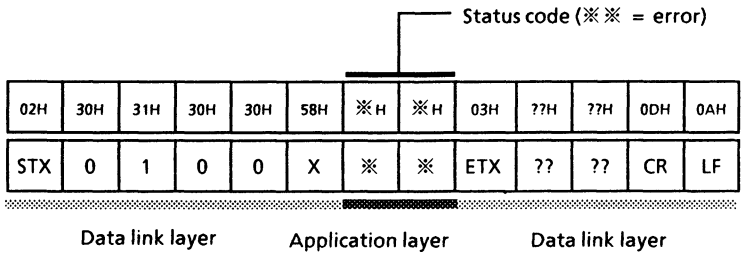
● Error response

◆Role : Indicates that there is an error in the request message, and it cannot be normally read. Therefore, there is no data herein.

◇Description: Information in the application layer.

· Status code: Indicates an error type.
For details, see the "Status code Table".

□Example : In case of error response:



■ Expression of decimal numeric (numeric data)

◆Role : All the numeric part, read count, write value (described in WS command), and read data at the data address follow the rules given below.

(1) When a numeric is negative, add a minus sign "-" (2DH) before the numeric.

□Example : "-123" (2DH, 31H, 32H, 33H)

(2) When a numeric is 0, use one 0.

□Example : "0" (30H)

□Example : "00" (30H, 30H) is wrong.

(3) When a numeric is positive, never add a plus sign "+" before the numeric.

□Example : "+123" (2BH, 31H, 32H, 33H) is wrong.

(4) Never add unnecessary 0 or a space before a numeric.

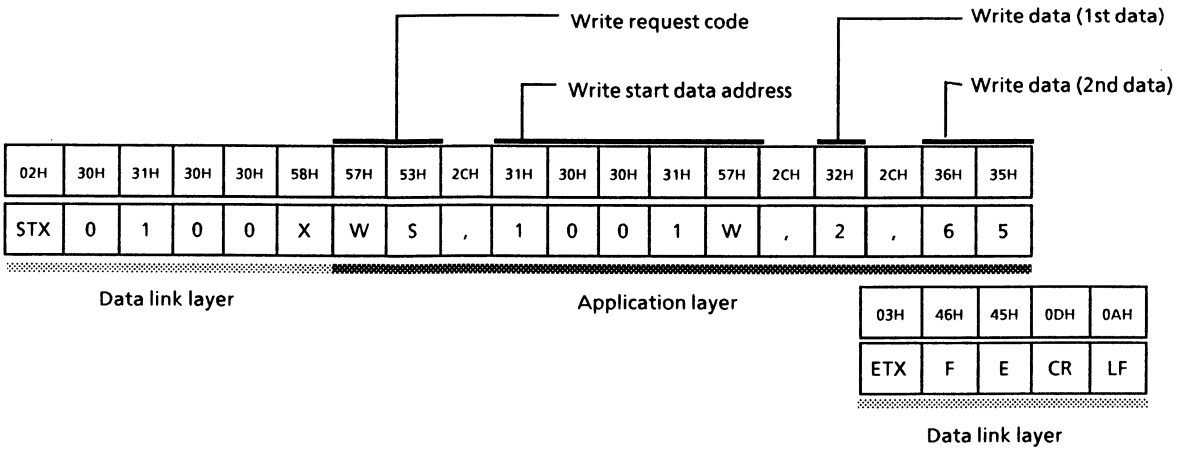
□Example: "0123" (30H, 31H, 32H, 33H) is wrong,

□Example : " 123" (20H, 31H, 32H, 33H)

4 - 5 Data Write

■ Description of write request

- This request permits the contents of continuous data addresses, starting with the designated write start data address to be simultaneously written in one message.
- The application layer of a write request consists of the following three types of data.



- Individual data are partitioned with a comma "," (character code 2CH), respectively.
- The write data count need not be designated.
- An upper case character code is used for each numeric or character in the application layer.
- Decimal number is used for each numeric.
- Unnecessary "0" (30H) or a space cannot be added to each data.
  - ☐Example : The underlined part of "WS, 01001W, 2" is wrong.
  - ☐Example : The underlined parts of "WS, 1001W, 02" are wrong.
  - ☐Example : The above figure shows an example that 2 and 65 are written at addresses 1001W and 1002W, respectively, in one message.

● Write request code (WS)

◆Role : A command which indicates write.

◇Description : Two characters "WS" (57H, 53H)

● Write start data address

◆Role : Designates the start data address for write.

· For the correspondence between the data address and write data, see the "Communication Data Table".

· Be sure to add "W" (57H) after the numeric representing the data address.

● Write data

◆Role : Data to be written at continuous addresses starting with the designated data address.

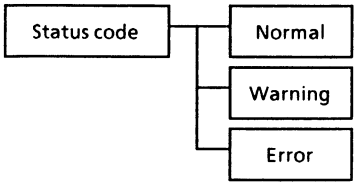
◇Description: The range of a numeric to be written differs, depending upon each data address.

- Individual data are partitioned with a comma (2CH), respectively.
- The data address at which the corresponding data is written is incremented by 1 sequentially, starting with the start data address (see the example given on the preceding page).
- The number of data which can be written in one message is limited. For details, see the Communication Data Table".

■ Write response

◆Role : When the message in the data link layer is proper, the status code only is sent back.

◇Description: The status codes are classified as follows;



* The status code is expressed in two decimal digits.

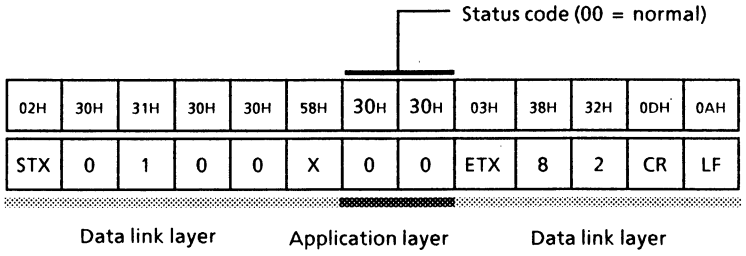
● Normal response/warning response

◆Role : Information concerning the result of processing the write request message is sent back.
Only the normal status code or warning status code is sent back.

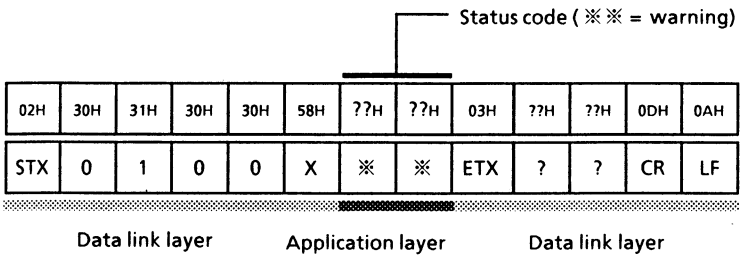
◇Description: Information in the application layer

- Status code: A numeric by which it can be identified how the request message has been processed on the instrument side.

□Example: An example of normal response (when all data are properly written)



☐Example : In case of warning response (numeric corresponding to the warning code is put in ※※.)



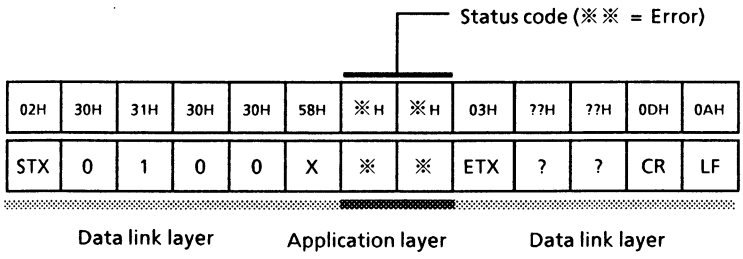
● Error response

◆Role : Only the error status code is sent back.

◇Description : Information in the application layer

· Status code : Indicates that there is an error in the request message, and write processing cannot be done.
For details, see the "Status code Table".

☐Example : In case of error response (numeric corresponding to the error code is put in ※※).



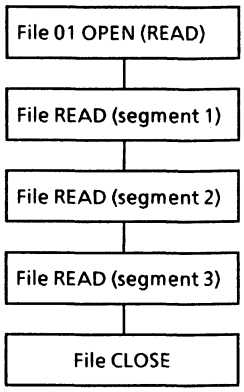
4 - 6 File READ/WRITE (program pattern)

Description is given below on the program pattern, citing an example of request/response.
In this example, it is assumed that the slave station address is 01, and there is no check-sum.
The program pattern can be processed by the file operation of the Yamatake-Honeywell Standard Host Communication Procedure (CPL).
More than one file cannot be opened simultaneously.

The file operations of the DCP550 are classified into the following types:

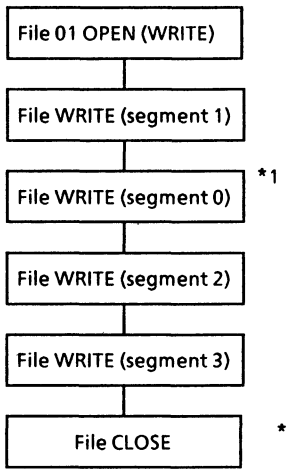
1. File OPEN
2. File CLOSE
3. File Block READ
4. File Block WRITE
5. File DELETE

Flow example of file read
(Segments 1, 2 and 3 of program No.1 are read.)



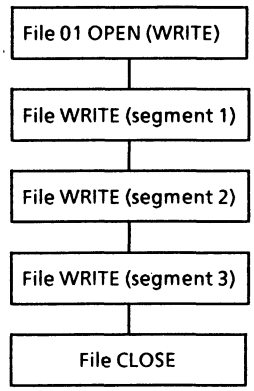
(File DELETE can be used independently.)

Flow example of file write
In case of new preparation
(Segments 1, 2 and 3 of program No.1 are written.)



*1

Flow example of file write
In case of rewrite
(Segments 1, 2 and 3 of program No.1 are written.)



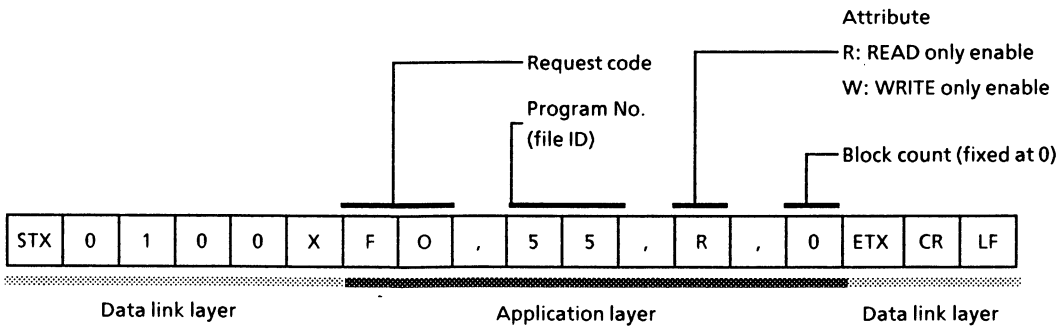
*1 Segment 0 cannot be used initially.

When an operator operates a program pattern from the console, or makes a memory card operation, the OPEN request causes an error end.
If an operator makes a program pattern operation from the console during file OPEN, an error end occurs.
When an operator makes a memory card operation, a file being OPENED is automatically CLOSED.
The program numbers of the DCP550 can be designated by the following methods.

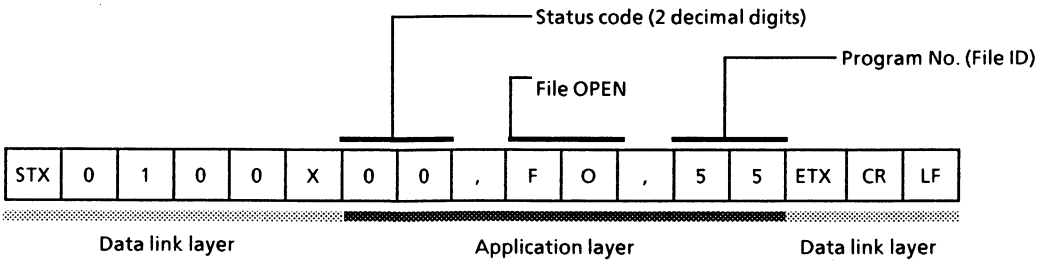
Program No.1 channel 1 side __ Program No.1
Program No.1 channel 2 side __ Program No.2
Program No.2 channel 1 side __ Program No.3
Program No.2 channel 2 side __ Program No.4
Program No.49 channel 1 side __ Program No.97
Program No.49 channel 2 side __ Program No.98

■ File OPEN

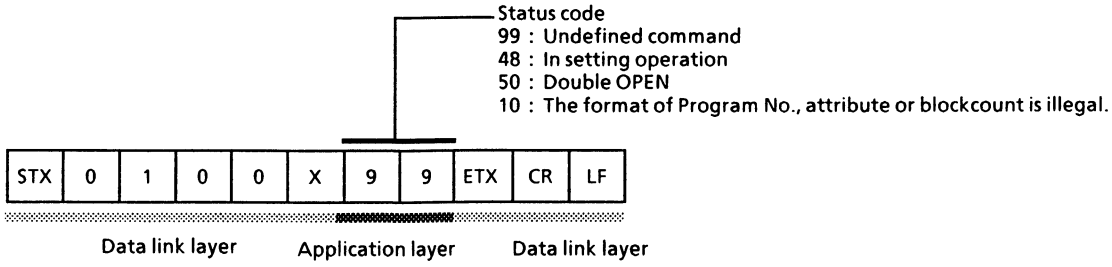
● OPEN request (FO command)



● Normal response

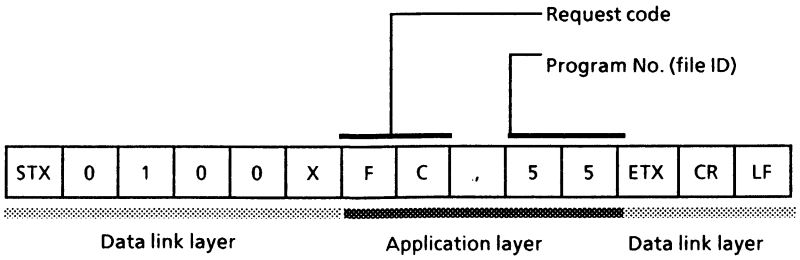


● Error response

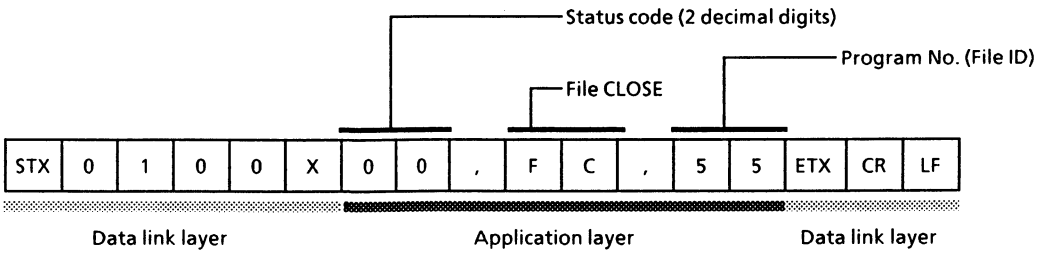


■ File CLOSE

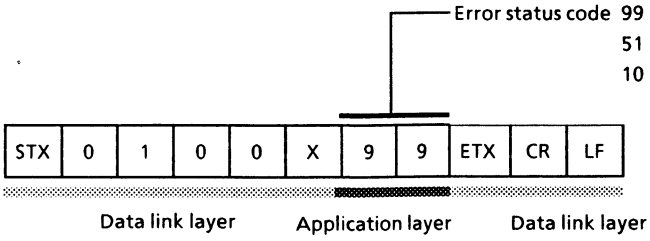
● CLOSE request (FC command)



● Normal response

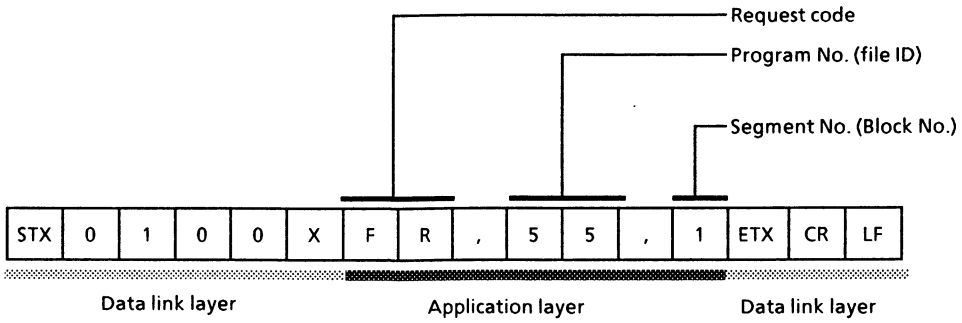


● Error response

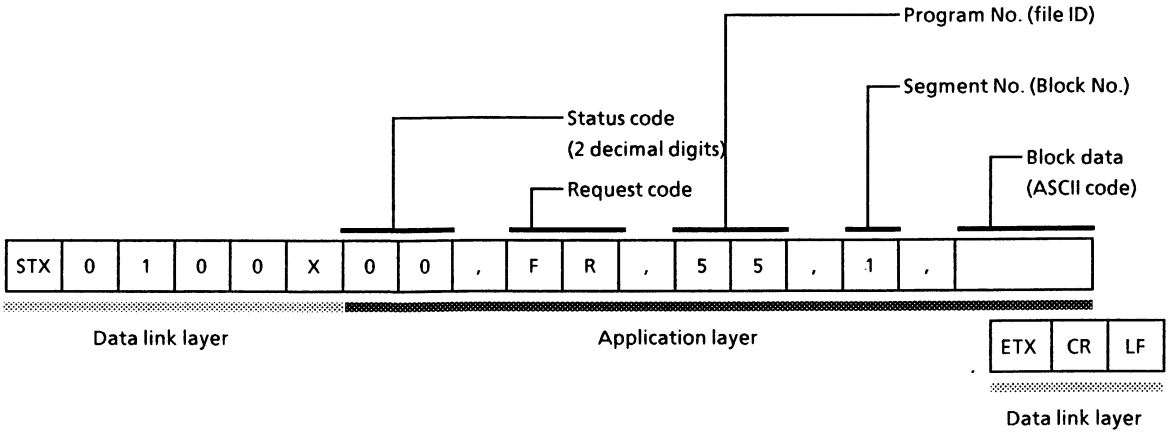


■ File block READ

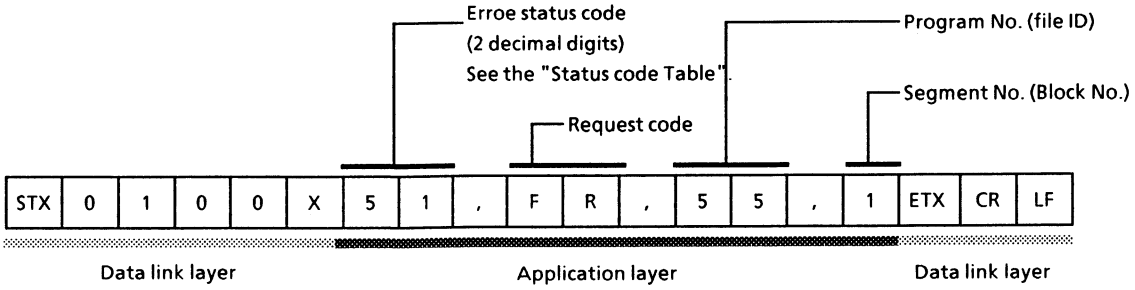
● Block READ request (FR command)



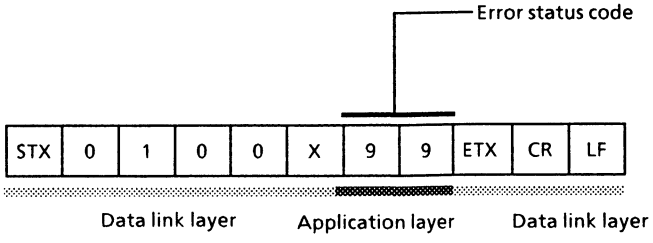
● Normal response



● Error response (1)



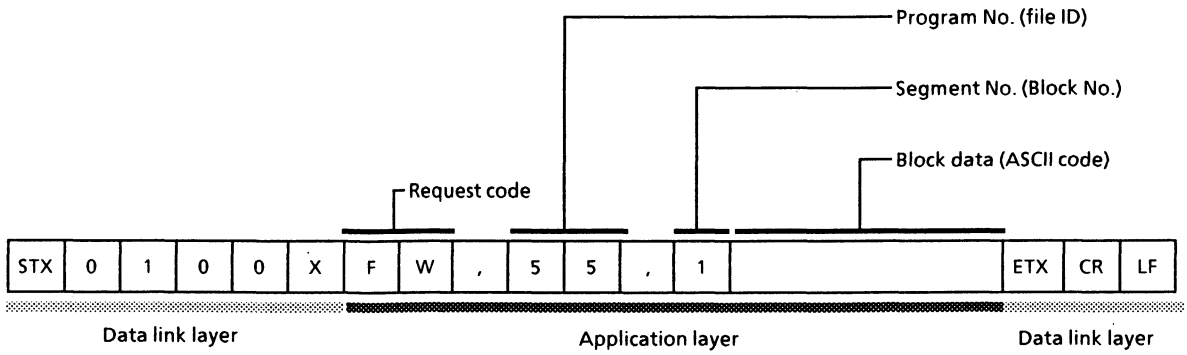
● Error response (2)



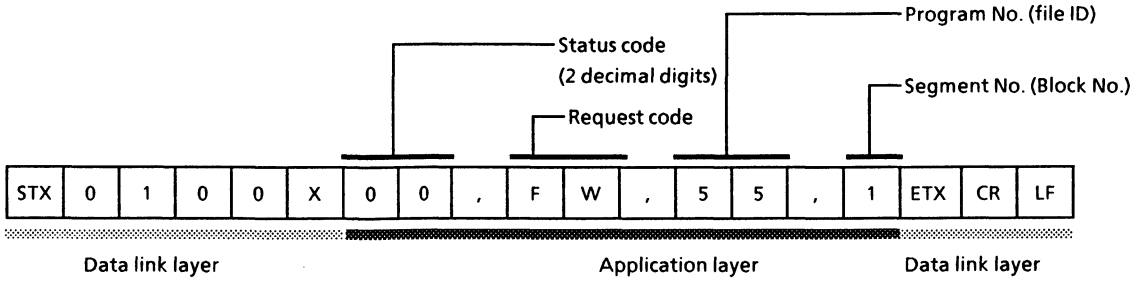
99 : Undefined command
51 : File is not OPEN.
10 : The format of Program No., attribute and block count is illegal.

■ File block WRITE

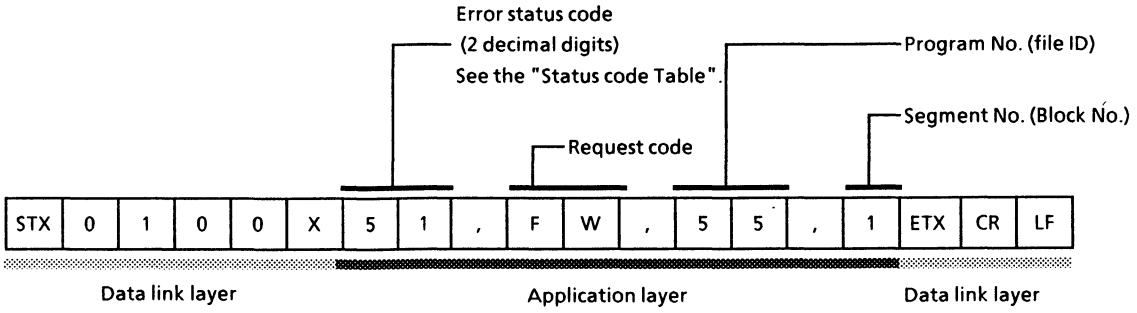
● Block WRITE request (FW command)



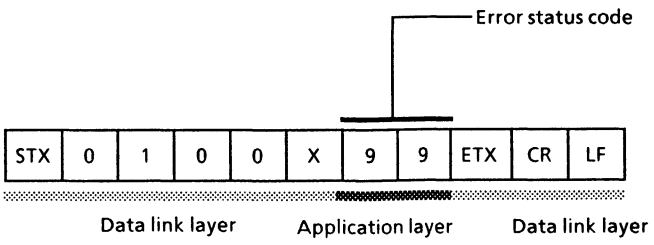
● Normal response



● Error response (1)



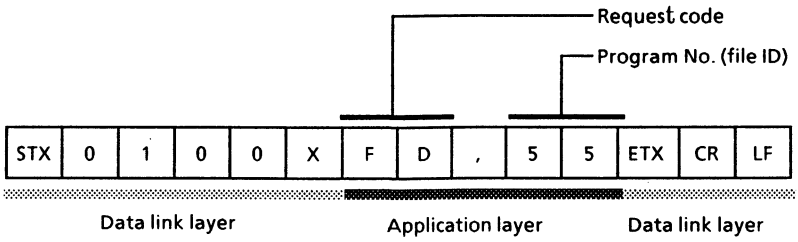
● Error response (2)



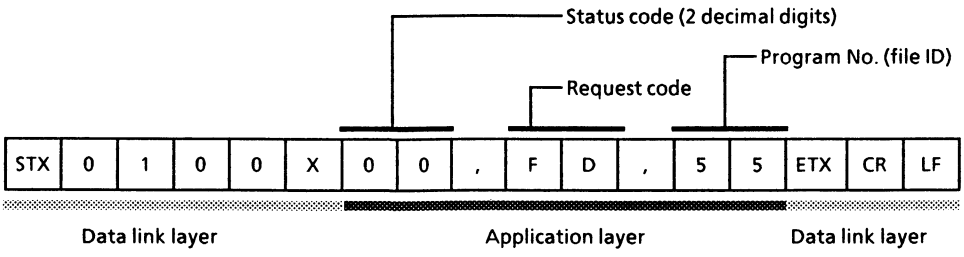
99 : Undefined command
51 : File is not OPEN.
10 : The format of Program No., attribute, and block count is illegal.

■ File DELETE (deletion)

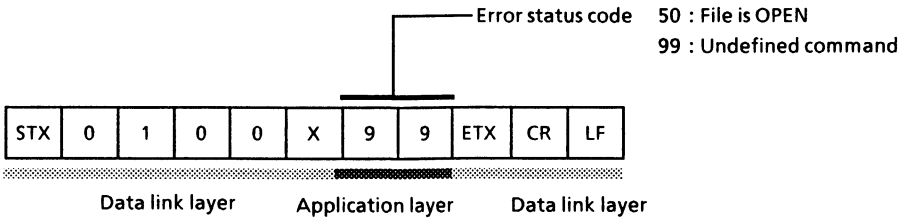
● File DELETE request (FD command)



● Normal response (inticates that the deletion operation ends)



● Error response



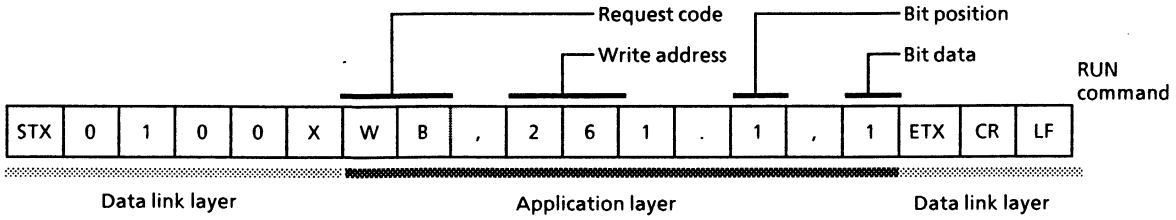
- Execute the file DELETE in a CLOSE status.
- It takes 1sec max. to delete a file.
- After the file DELETE is completed, the normal response is sent back.
- When a file has been already deleted, the normal response is sent back.
- The program being run currently cannot be deleted (except for the constant value mode).

4 - 7 Run operation

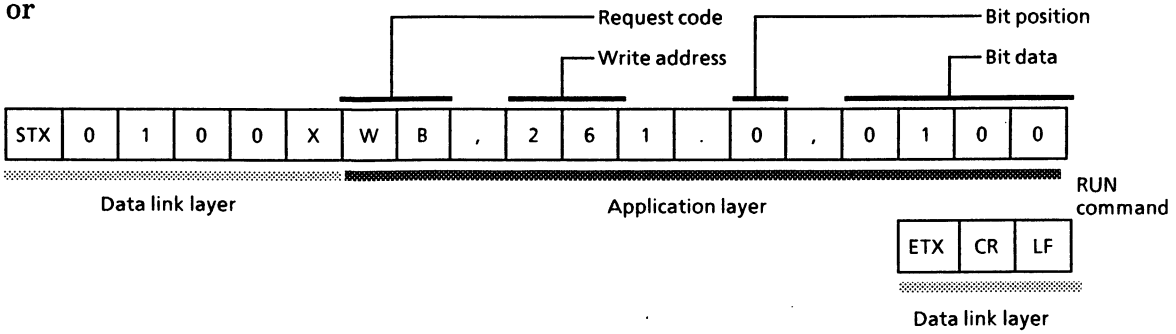
The run operation is executed by the bit write request or write request.
In the run operation, more than one write operation are ineffective, and only the extreme LSB side operation is processed effectively. The run operation cannot also be executed over two or more words.

● Bit write request (WB command)

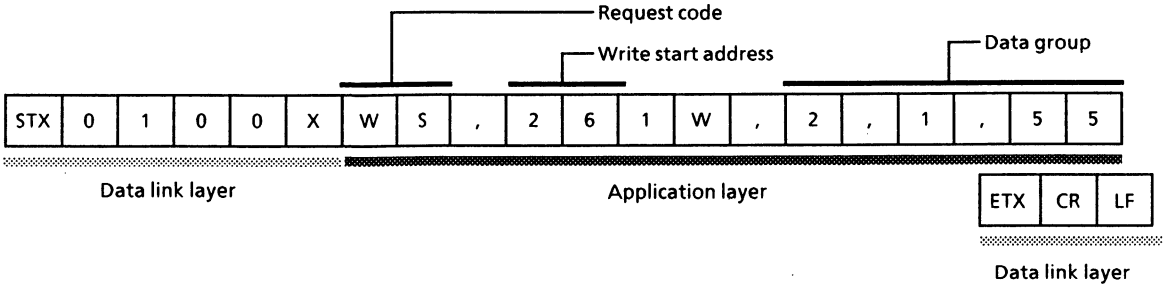
Only the bit write of the run operation (1) and run operation (2) is effective under the WB command.



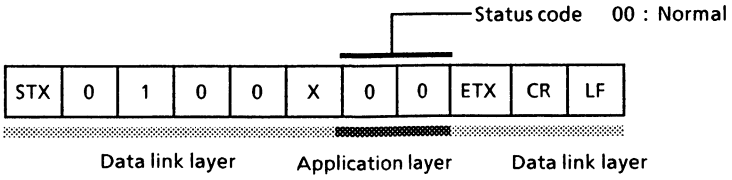
or



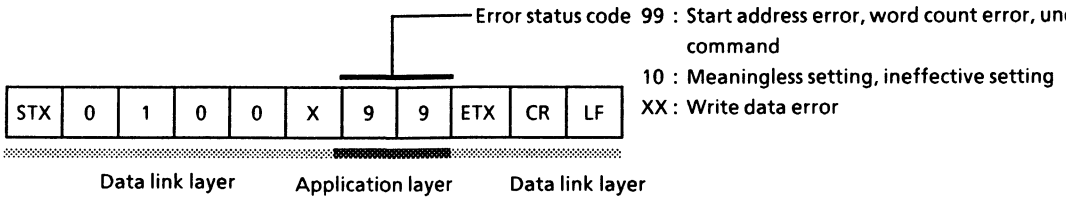
● Write request (WS command)



● Normal end



● Error end



◇Caution◇

- It takes 1sec max. before the RUN mode starts after the DCP550 receives the RUN command in the READY status and sends back a normal response. This time changes, depending upon the internal processing status of the DCP550

Status 1 and Status 2 can be obtained by reading the same address. (See 5 "Communication Data Table".)

Address	Data item	Data (decimal)	Read data
261W	Run operation (1)		Status 1
262W	Run start segment No.	0 to 99	Segment No.
263W	Run start program No.	0 to 99 (0 to 49 in DCP552)	Program No.
264W	Manual MV	-50 to 1050	MV
265W	Run operation (2)		Status 2
281W	Run operation (1) (for DCP552)		Status 1
282W	Run start segment No. (for DCP552)	0 to 99	Segment No.
283W	Run start program No. (for DCP552)	0 to 49	Program No.
284W	Manual MV (for DCP552)	-50 to 1050	MV

In the run operation, the 1st word or 5th word is a request flag of 16 bits. The run operation can be done by writing at this address. This is achieved by the usual write request or bit write request.

If the run operation (1) and run operation (2) are designated simultaneously, only the run operation (1) is processed, and the run operation (2) is ignored.

The run operation can be checked by reading the status 1.

A response is sent back after checking if the run operation is accepted, and the time required for it is 100 to 200ms.

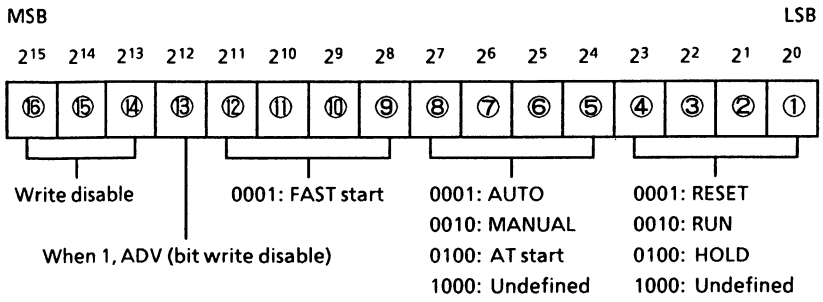
When the segment No. data and program No. data corresponding to the 2nd and 3rd words, respectively, are designated independently in the READY status, the run start program No. and run start segment No. are changed.
These data indicated on the LED indicators on the console are then also changed.
These data may be used in combination with RUN or advance request.

The functions in such cases are shown on the table given on the next page.
In any other cases, these data are ignored.
The data in and after the 4th word are ignored.
When only the program No. is designated, the segment is set to 1.

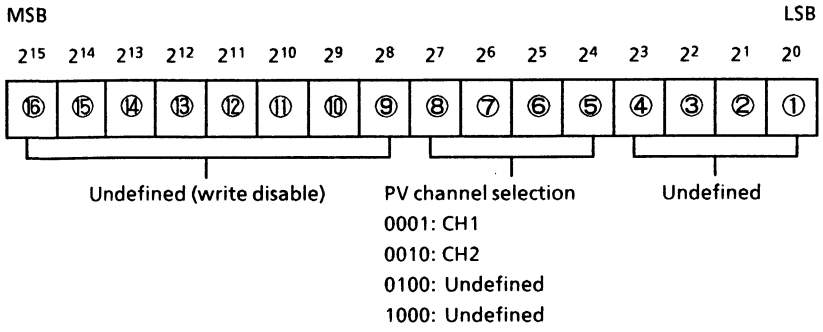
As for the MV of the 4th word, MV in the MANUAL mode should be designated or it should be used in combination with MANUAL request.
In any other case, this data is ignored.
The data in and after the 5th word are also ignored.

■ Run operation bit definition (command)

● Run operation (1)



● Run operation (2)



The PV channel selection is effective (when C25 = 1 and C26 = 0) only when remote changeover is set in the PV2 channel model of DCP550. However, this is operated when the D1 input is turned OFF since the D1 input has priority.

Run operation	SEG No.	PRG No.	MAN MV	Operation of DCP550
RESET	Ignore	Ignore	Ignore	RREADY status is set.
RUN (Note 1)	Necessay	Necessary	Ignore	In READY status, RUN starts with PRG No. and SEG No. given to the left.
	None	None	None	In READY status, RUN starts with PRG No. and SEG No. already selected.
RUN	Ignore	Ignore	Ignore	In HOLD status, RUN starts.
HOLD	Ignore	Ignore	Ignore	In RUN status, HOLD is set.
ADV (Note 3)	Necessary	None	None	In RUN, or HOLD status, SEG No. given to the left becomes a start point.
	Necessary	Necessary	Ignore	In RUN or HOLD status, PROG No. and SEG No. given to the left become a start point.
MANUAL	Ignore	Ignore	None	In AUTO status, it is changed over to MANUAL status.
	Ignore	Ignore	Necessary	In AUTO status, it is changed over to MANUAL status, and MV given to the left is set. In MANUAL status, MV given to the left is set. During AT execution, AT is interrupted.
AUTO	Ignore	Ignore	Ignore	In MANUAL status, it is changed over to AUTO status. During AT execution, AT is interrupted.
FAST	Ignore	Ignore	Ignore	FAST starts (RUN, FAST, READY, FAST)
AT START	Ignore	Ignore	Ignore	AT starts. (Note 2)
CH1				CH selected for PV is set to 1CH.
CH2				CH selected for PV is set to 2CH.

(Note 1) ① When PRG No. and SEG No. are not set to the program, the READY status cannot be changed over to RUN.
② The READY status cannot be changed over to RUN during key operation.

(Note 2) When the following conditions are all satisfied, AT starts.
① SETUP C21 = 1 or 2
② PARA PA08 = 1 or 2 in any status of RUN, HOLD and END.
PARA PA08 = 3 or 4 in READY status.

(Note 3) ADV is accepted only as shown in the following examples.
WS, 261W, 4096, 20 (ADV to segment 20).
WS, 261W, 4096, 20, 2 (ADV to segment 20 of program 2)

4 - 8 Status code table

■ Normal and warning ends

Status code	Contents and action	Occurrence command	Type
00	Normal	All commands	Normal
01	Normal (last segment)	Block READ	Normal
99	Start address error Word count error Undefined command	Parameter · ASCII · READ Parameter · WRITE File OPEN	Error
10	Start address error Word count error Undefined command	Parameter · WRITE	Error
	Program No. error File attribute error Block count format error	File OPEN Block READ Block WRITE	
21	Set disable data is attempted to be written, using the set value of other parameter. Write is continued without writing data at the relevant word address.	Parameter · WRITE	Warning
27	Write is attempted to write inhibit word. Write is continued without writing data at relevant address.	Parameter · WRITE	Warning
47	Memory protect	ParameterWRITE File DELETE Block WRITE	Error
48	In operator file operation/in setting operation/in instrument run	File OPEN Parameter write operation Run command	Error
49	In memory card operation	All commands	Error
50	Double OPEN	File OPEN	Error
51	File is not OPEN	Block READ Block WRITE	Error
52	No remaining segment	Block WRITE	Error
53	No remaining subfunction	Block WRITE	Error
54	R/W violation	Block READ Block WRITE	Error
55	No segment exists	Block READ Block WRITE	Error
57	Data out of range	Block WRITE ParameterWRITE	Error

4 - 9 Timing specifications

■ Timing specifications for request message and response message

When a slave station is connected with the master station directly or via CMA50, the following precautions should be observed concerning the transmit timings of an request message from the master station and a response message from the slave station.

● Response monitor time

The maximum response time required from the end of transmitting an request message from the master station to the start of receiving a response message from the slave station is 2sec (section (1)). Therefore, the response monitor time should be set to 2sec.

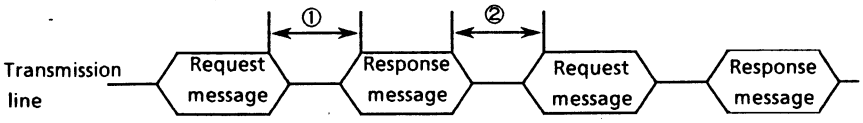
Generally, when the response monitor time reaches time up, the request message is retransmitted.

For details, see the "Communication Program for Master Station".

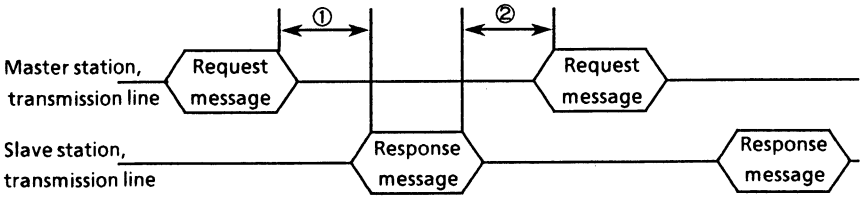
● Transmit start time

A wait time of 10ms or more is required before the master station starts to transmit the next request message (to the same slave station or a different slave station) after the end of receiving a response message (section (2)).

- RS-485 3-wires system



- RS-485 5-wires system and RS-232C

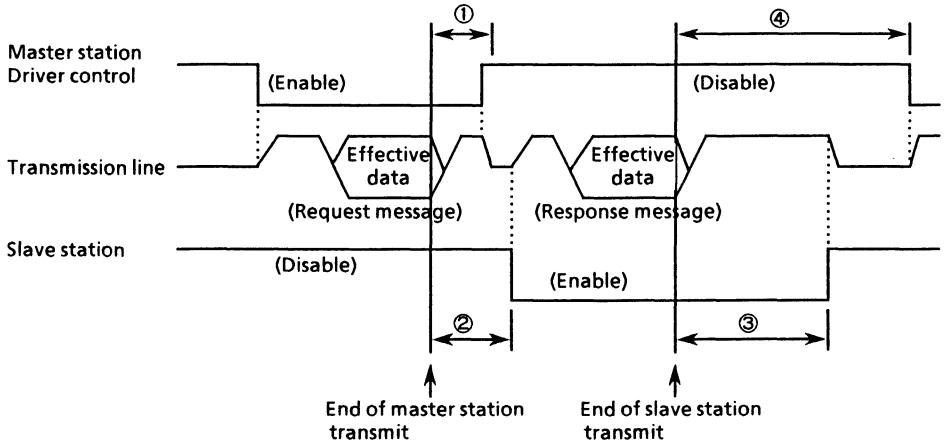


① End of master station transmit - Request interval time of slave station = 2000ms max.

② End of slave station transmit - Request interval time of master station = 10ms max.

■ RS-485 driver control timing specification

When the transmit/receive of the RS-485 3-wires system is directly controlled by the master station, utmost care should be exercised about the following timing.



① Transmit end of master station - Driver disable time = 500μs max.
② Receive end of slave station - Driver enable time = 1ms min.
③ Transmit end of slave station - Driver disable time = 10ms max.
④ Receive end of master station - Driver enable time = 10ms min.

5. Communication data table

5 - 1 Preliminary knowledge of communication data handling

■ Types and formats of communication data

● Types of communication data

The communication data are classified into the following types.

- Run status : Data indicating the run status of instrument. (PV, alarm, etc.)
- SETUP : Data for setting the status of instrument before running (setting of input range, etc.).
- PARA : Data to be changed/operated during running.
- PID : Data for setting PID constants, output limiter, etc.
- Event conf. : Data for setting an event type and other event outputs.
- Constant value control setting: Data for setting SP, PID constants, etc. to be used in the constant value control mode.
- Program pattern (block data): Data for setting the run pattern such as SP, and TIME.
- Program status: Bit data indicating whether the program patterns (99 patterns max.) inside the DCP550 have already been set or have not been set yet.
- Tag name : Individual names of program patterns (max. 99 patterns) inside the DCP550.

These data are communication every data type.

● Format of communication data

The communication data are classified into the following formats.

- Numeric data : Data indicating numerics (PV, SP, etc.)
- Bit data : Data, each bit of which is given meaning (alarm, etc.). The bit data must be composed during transmit, and be decomposed during receive.

■ Data address

The data addresses are allocated as shown in the table below.

Communication data	Offset	Address DCP551	Address DCP552
Run status	255	256 to 275	256 to 295
SETUP	300	301 to 390	301 to 390
PARA	400	401 to 490	401 to 500
PID	600	601 to 696	601 to 696
Event conf.	500	501 to 596	501 to 596
Constant value control setting	700	701 to 708	701 to 716
Pattern status	1200	1201 to1207	1201 to1207
Tag name	1209	1210 to1605	1210 to1605
PARA (DCP552)	1700	–	1701 to1720
PID for CH2 (DCP552 only)	1800	–	1801 to1896
Data for synchronizing operation (DCP552)	2000	–	2001 to2003

■ Data read/write count

The data count which can be continuously read/written by once communication is predetermined as shown in the table below.

Category	Data count
Read	1 to 32
Write	1 to 32

Among the continuous data, any data which do not exist due to difference in model number are handled as shown below.

- Read : 0 is read as a dummy data (warning end).
- Write : Not written (warning end).

■ Data unit and decimal point position

A decimal point is not added to read/write data.
The unit or decimal point position is predetermined every data.
For the unit and decimal point position of each data, see the instruction manual for the main unit of instrument.

Example : When data to be read/written is numeric value 105, its unit or decimal point position is automatically determined by the data address, the SETUP item of the instrument and the others.
Therefore, the numeric data 105 is expressed as 10.5%, 105°C, or the like according to the data address of data to be read/written.

5 - 2 Communication data table

The address and read/write (R/W) enable status of each data are determined as shown in the table below.

- Meaning of symbols in R/W column
  - ○ : Read/write enable
  - × : Read/write disable
  - ▲ : Read enable, however, fixed value depending upon the instrument.
  - □ : Read/write enable, however, a blank area.
  - ● : Enable only in the DCP552 carbon potential model.
  - ★ : Enable only in the DCP552 general purpose model.

Code	Address	Item	DCP551		DCP552	
			R	W	R	W
C01	301W	CH1 PV range type	○	○	○	○
C02	302W	CH1 temperature unit	○	○	○	○
C03	303W	CH1 PV decimal point position	○	○	○	○
C04	304W	CH1 Linear decimal point position	○	○	○	○
C05	305W	CH1 Linear low limit	○	○	○	○
C06	306W	CH1 Linear high limit	○	○	○	○
C07	307W	CH1 CJ compensation	○	○	○	○
C08	308W	CH1 Square root operation	○	○	○	○
C09	309W	CH1 Square root operation dropout	○	○	○	○
C10	310W	CH1 CJ bias	○	○	○	○
C11	311W	CH2 PVrange type	○	○	○	★
C12	312W	CH2 Temperature unit	○	○	○	★
C13	313W	CH2 PV decimal point position	○	○	○	★
C14	314W	CH2 Linear decimal point position	○	○	○	★
C15	315W	CH2 Linear low limit	○	○	○	★
C16	316W	CH2 Linear high limit	○	○	○	★
C17	317W	CH2 CJ compensation	○	○	○	★
C18	318W	CH2 Square root operation	○	○	○	★
C19	319W	CH2 Square root operation dropout	○	○	○	★
C20	320W	CH2 CJ bias	○	○	○	★
C21	321W	Control output model	○	○	○	○
C22	322W	——	□	×	□	×
C23	323W	CH1 Control action	○	○	○	○
C24	324W	CH2 Control action	□	×	○	○
		PV channel changeover	○	○	□	×
C25	325W	Changeover type (low temperature, high temperature)	○	○	□	×
C26	326W	Changeover system	○	○	□	×
C27	327W	Changeover point	○	○	□	×
C28	328W	Dead zone, changeover width	○	○	□	×
C29	329W	Selection at power ON	○	○	□	×
C30	330W	PV equalizer	○	○	○	○
C31	331W	CH1 Run end status	○	○	○	○
C32	332W	CH1 MV in READY status	○	○	○	○
C33	333W	CH1 Manipulated variable setting at PV overrange	○	○	○	○
C34	334W	CH1 Manipulated variable at PV overrange	○	○	○	○
C35	335W	CH1 Manual changeover action	○	○	○	○

Code	Address	Item	DCP551		DCP552	
			R	W	R	W
C36	336W	CH1 Preset manual value	○	○	○	○
C37	337W	CH2 Run end status	□	×	○	○
C38	338W	CH2 MV in READY status	□	×	○	○
C39	339W	CH2 Manipulated variable setting at PV overrange	□	×	○	○
C40	340W	CH2 Manipulated variable at PV overrange	□	×	○	○
C41	341W	CH2 Manual changeover action	□	×	○	○
C42	342W	CH2 Preset manual value	□	×	○	○
C43	343W	Run continue enable power failure time	○	○	○	○
C44	344W	Carbon potential operation type	□	×	○	●
C45	345W	CH1 Current output type (auxiliary output)	○	○	○	○
C46	346W	CH1 CP output 4mA setting	○	○	○	○
C47	347W	CH1 CP output 20mA setting	○	○	○	○
C48	348W	CH2 Current output type (auxiliary output)	○	○	○	○
C49	349W	CH2 CP output 4mA setting	○	○	○	○
C50	350W	CH2 CP output 20mA setting	○	○	○	○
C51	351W	CH3 CP output type	○	○	○	○
C52	352W	CH3 CP output 4mA setting	○	○	○	○
C53	353W	CH3 CP output 20mA setting	○	○	○	○
C54	354W	CH4 CP output type	○	○	○	○
C55	355W	CH4 CP output 4mA setting	○	○	○	○
C56	356W	CH4 CP output 20mA setting	○	○	○	○
		Programming indication				
C57	357W	Event	○	○	○	○
C58	358W	PID, output limiter	○	○	○	○
C59	359W	Others (1)	○	○	○	○
C60	360W	Others (2)	○	○	○	○
C61	361W	Programming system	○	○	○	○
C62	362W	Programming time unit	○	○	○	○
C63	363W	Time indication (5-digits LED indication)	○	○	○	○
C64	364W	Event number split (start number for CH2)	□	×	○	○
C65	365W	CH1 SP decimal point position	○	○	○	○
C66	366W	CH1 Low limit of SP limit	○	○	○	○
C67	367W	CH1 High limit of SP limit	○	○	○	○
C68	368W	CH2 SP decimal point position	□	×	○	○
C69	369W	CH2 Low limit of SP limit	□	×	○	○
C70	370W	CH2 High limit of SP limit	□	×	○	○
		Remote switch input				
C71	371W	SW5	○	○	○	○
C72	372W	SW6	○	○	○	○
C73	373W	SW7	○	○	○	○
C74	374W	SW8	○	○	○	○
C75	375W	SW9 to 16 (program selection)	○	○	○	○

Code	Address	Item	DCP551		DCP552	
			R	W	R	W
C76	376W	Communication address	○	×	○	×
C77	377W	Transmission speed (bps)	○	×	○	×
C78	378W	Communication code	○	×	○	×
C79	379W	Communication protocol	○	×	○	×
C80	380W	———	—	—	○	×
C81	381W	Instrument code	▲	×	▲	×
C82	382W	ROM ID	▲	×	▲	×
C83	348W	ROM version	▲	×	▲	×
C84	384W	Data version	▲	×	▲	×
C85	385W	CPU, PV board ID	▲	×	▲	×
C86	386W	I/D board ID	▲	×	▲	×
C87	387W	Option board	▲	×	▲	×
C88	388W	———	□	×	○	×
C89	389W	———	□	×	○	×
C90	390W	———	□	×	○	×

■ PARA setting

Code	Address	Item	DCP551		DCP552	
			R	W	R	W
PA01	401W	Key lock	○	×	○	×
PA02	402W	Memory protect	○	×	○	×
PA03	403W	2-channels simultaneous indication	□	×	○	○
PA04	404W	2-channel synchronous mode	□	×	○	○
PA05	405W	Program auto load	○	○	○	○
PA06	406W	———	□	×	□	×
PA07	407W	———	□	×	□	×
PA08	408W	CH1 Auto tuning	○	○	○	○
PA09	409W	CH1 Auto tuning MV low limit	○	○	○	○
PA10	410W	CH1 Auto tuning MV high limit	○	○	○	○
PA11	411W	CH1 SP bias	○	○	○	○
PA12	412W	CH1 PV filter	○	○	○	○
PA13	413W	CH1 PV bias	○	○	○	○
PA14	414W	CH1 MV variation limit	○	○	○	○
PA15	415W	CH1 Time proportional cycle	○	○	○	○
PA16	416W	CH1 ON/OFF control differential	○	○	○	○
PA17	417W	CH1 PID operation initialized MV substitute value	○	○	○	○
PA18	418W	———	□	×	□	×
PA19	419W	———	□	×	□	×
PA20	420W	———	□	×	□	×
PA21	421W	CH2 SP bias	□	×	○	○
PA22	422W	CH2 PV filter	○	○	○	○
PA23	423W	CH2 PV bias	○	○	○	○
PA24	424W	CH2 MV variation limit	□	×	○	○
PA25	425W	———	□	×	□	×
PA26	426W	CH2 ON/OFF control differential	□	×	○	○
PA27	427W	CH2 PID operation initialized MV substitute value	□	×	○	○
PA28	428W	———	□	×	○	×
PA29	429W	———	□	×	○	×
PA30	430W	———	□	×	○	×

- PA01/02 cannot be changed by communication, but changed by key operation.
- When PA01 is set, key operation is locked.
- When PA02 is set, keys and communication are locked.
  Once locked, it cannot be released by communication.
  In such a case, set PA02 to 0 by key operation.

Code	Address	Item		DCP551		DCP552	
				R	W	R	W
		Event ON delay					
PA31	431W	Group 1	Event number	○	○	○	○
PA32	432W		Delay time	○	○	○	○
PA33	433W	Group 2	Event number	○	○	○	○
PA34	434W		Delay time	○	○	○	○
PA35	435W	Group 3	Event number	○	○	○	○
PA36	436W		Delay time	○	○	○	○
PA37	437W	Group 4	Event number	○	○	○	○
PA38	438W		Delay time	○	○	○	○
PA39	439W	FAST scale factor		○	○	○	○
PA40	440W	Temperature correction value for carbon potential operation		□	×	○	●
PA41	441W	EG1 lamp indication event		○	○	□	×
PA42	442W	EG2 lamp indication event		○	○	□	×
PA43	443W	CH1 PID operation initialize		○	○	○	○
PA44	444W	PV2indication mode		□	×	○	●
PA45	445W	CH1 G. soak wait time		□	×	○	○
PA46	446W	CH2 G. soak wait time (for CH1 in DCP551)		○	○	○	○
PA47	447W	——		□	×	□	×
PA48	448W	——		□	×	□	×
PA49	449W	——		□	×	□	×
PA50	450W	——		□	×	□	×
PA51	451W	PV1 equalizer No.1 correction point		▲	×	▲	×
PA52	452W	PV1 Equalizer No.1 correction quantity		○	○	○	○
PA53	453W	PV1 equalizer No.2 correction point		○	○	○	○
PA54	454W	PV1 Equalizer No.2 correction quantity		○	○	○	○
PA55	455W	PV1 equalizer No.3 correction point		○	○	○	○
PA56	456W	PV1 Equalizer No.3 correction quantity		○	○	○	○
PA57	457W	PV1 equalizer No.4 correction point		○	○	○	○
PA58	458W	PV1 Equalizer No.4 correction quantity		○	○	○	○
PA59	459W	PV1 equalizer No.5 correction point		○	○	○	○
PA60	460W	PV1 Equalizer No.5 correction quantity		○	○	○	○
PA61	461W	PV1 equalizer No.6 correction point		○	○	○	○
PA62	462W	PV1 Equalizer No.6 correction quantity		○	○	○	○
PA63	463W	PV1 equalizer No.7 correction point		○	○	○	○
PA64	464W	PV1 Equalizer No.7 correction quantity		○	○	○	○
PA65	465W	PV1 equalizer No.8 correction point		○	○	○	○
PA66	466W	PV1 Equalizer No.8 correction quantity		○	○	○	○
PA67	467W	PV1 equalizer No.9 correction point		○	○	○	○
PA68	468W	PV1 Equalizer No.9 correction quantity		○	○	○	○
PA69	469W	PV1 equalizer No.10 correction point		▲	×	▲	×
PA70	470W	PV1 Equalizer No.10 correction quantity		○	○	○	○

Code	Address	Item	DCP551		DCP552	
			R	W	R	W
PA71	471W	PV2 Equalizer No.1 correction point	▲	×	▲	×
PA72	472W	PV2 Equalizer No.1 correction quantity	○	○	○	○
PA73	473W	PV2 Equalizer No.2 correction point	○	○	○	○
PA74	474W	PV2 Equalizer No.2 correction quantity	○	○	○	○
PA75	475W	PV2 Equalizer No.3 correction point	○	○	○	○
PA76	476W	PV2 Equalizer No.3 correction quantity	○	○	○	○
PA77	477W	PV2 Equalizer No.4 correction point	○	○	○	○
PA78	478W	PV2 Equalizer No.4 correction quantity	○	○	○	○
PA79	479W	PV2 Equalizer No.5 correction point	○	○	○	○
PA80	480W	PV2 Equalizer No.5 correction quantity	○	○	○	○
PA81	481W	PV2 Equalizer No.6 correction point	○	○	○	○
PA82	482W	PV2 Equalizer No.6 correction quantity	○	○	○	○
PA83	483W	PV2 Equalizer No.7 correction point	○	○	○	○
PA84	484W	PV2 Equalizer No.7 correction quantity	○	○	○	○
PA85	485W	PV2 Equalizer No.8 correction point	○	○	○	○
PA86	486W	PV2 Equalizer No.8 correction quantity	○	○	○	○
PA87	487W	PV2 Equalizer No.9 correction point	○	○	○	○
PA88	488W	PV2 Equalizer No.9 correction quantity	○	○	○	○
PA89	489W	PV2 Equalizer No.10 correction point	▲	×	▲	×
PA90	490W	PV2 Equalizer No.10 correction quantity	○	○	○	○
PA91	491W	——			□	×
PA92	492W	(A1 tuning over)			□	×
PA93	493W	Auto tuning			○	★
PA94	494W	Auto tuning MV low limit			○	★
PA95	495W	Auto tuning MV high limit			○	★
PA96	496W	PID operation initialize			○	○
PA97	497W	CP operation correction			○	●
PA98	498W	CP value (PV) indication low limit value			○	●
PA99	499W	CP value (PV) indication, high limit			○	●
PA100	500W	Gas constant			○	●

PARA setting (continued) (PA101 to PA120)

Code	Address	Item	DCP551		DCP552	
			R	W	R	W
PA101	1701W	CP operation correction, No.1 correction point			▲	×
PA102	1702W	CP operation correction, No.1 correction quantity			○	●
PA103	1703W	CP operation correction, No.2 correction point			○	●
PA104	1704W	CP operation correction, No.2 correction quantity			○	●
PA105	1705W	CP operation correction, No.3 correction point			○	●
PA106	1706W	CP operation correction, No.3 correction quantity			○	●
PA107	1707W	CP operation correction, No.4 correction point			○	●
PA108	1708W	CP operation correction, No.4 correction quantity			○	●
PA109	1709W	CP operation correction, No.5 correction point			○	●
PA110	1710W	CP operation correction, No.5 correction quantity			○	●

Code	Address	Item	DCP551		DCP552	
			R	W	R	W
PA111	1711W	CP operation correction, No.6 correction point			○	●
PA112	1712W	CP operation correction, No.6 correction quantity			○	●
PA113	1713W	CP operation correction, No.7 correction point			○	●
PA114	1714W	CP operation correction, No.7 correction quantity			○	●
PA115	1715W	CP operation correction, No.8 correction point			○	●
PA116	1716W	CP operation correction, No.8 correction quantity			○	●
PA117	1717W	CP operation correction, No.9 correction point			○	●
PA118	1718W	CP operation correction, No.9 correction quantity			○	●
PA119	1719W	CP operation correction, No.10 correction point			▲	×
PA120	1720W	CP operation correction, No.10 correction quantity			○	●

■ Event conf. setting

ASCII address	Item	LED indication	DCP551		DCP552	
			R	W	R	W
501W	Event 1 Type	E01-t	○	○	○	○
502W	Event 1 Auxiliary data 1	E01-1	○	○	○	○
503W	Event 1 Auxiliary data 2	E01-2	○	○	○	○
504W	Event 2 Type	E02-t	○	○	○	○
505W	Event 2 Auxiliary data 1	E02-1	○	○	○	○
506W	Event 2 Auxiliary data 2	E02-2	○	○	○	○
・ ・ ・	Events 3 to 15 are also the same as the above.					
546W	Event 16 Type	E16-t	○	○	○	○
547W	Event 16 Auxiliary data 1	E16-1	○	○	○	○
548W	Event 16 Auxiliary data 2	E16-2	○	○	○	○
・ ・ ・	Events 17 to 32 are optional.					

When the event type 23 (code event with timer) is set, 254 (FEH) is set for the event types of the second onward set to be used for more than one output point.

When the event type 18 (code event), 88 (program No. binary code), 89 (segment No. binary code), 90 (program No. BCD code) or 91 (segment No. BCD code) is set, 255 (FFH) is set for the event types of the second onward set to be used for more than one output points.

The event types of the second onward are automatically set by the above-mentioned setting.

Example : When event type = 18 and auxiliary setting 1 = 8 are set, any other setting cannot be done for the events 2 to 8.

When the auxiliary setting 1 is not provided, but the auxiliary setting 2 is provided, 0 is set to the auxiliary setting 1.

Example : WS, 501W, 96, 0, 100

■ PID setting (for channel 1 of DCP551, DCP552)

ASCII address	Item	LED indication	DCP551		DCP552	
			R	W	R	W
601W	Group 1 Proportional band (P)	P - 1	○	○	○	○
602W	Group 1 Integral time (I)	I - 1	○	○	○	○
603W	Group 1 Derivative time (D)	d - 1	○	○	○	○
604W	Group 1 Manual reset	rE- 1	○	○	○	○
605W	Group 1 Output low limit	oL- 1	○	○	○	○
606W	Group 1 Output high limit	oH- 1	○	○	○	○
607W	Group 2 Proportional band (P)	P - 2	○	○	○	○
608W	Group 2 Integral time (I)	I - 2	○	○	○	○
609W	Group 2 Derivative time (D)	d - 2	○	○	○	○
610W	Group 2 Manual reset	rE- 2	○	○	○	○
611W	Group 1 Output low limit	oL- 2	○	○	○	○
612W	Group 1 Output high limit	oH- 2	○	○	○	○
・ ・ ・ ・	Group 3 to Group 9 are the same as the above.					
655W	Group A1 Proportional band (P)	P -A1	○	○	○	○
656W	Group A1 Integral time (I)	I -A1	○	○	○	○
657W	Group A1 Derivative time (D)	d -A1	○	○	○	○
658W	Group A1 Manual reset	rE-A1	○	○	○	○
659W	Group A1 SP section high limit	SH-A1	○	○	○	○
660W	Group A1 SP for AT	tS-A1	○	○	○	○
661W	Group A1 Proportional band (P)	P -A2	○	○	○	○
662W	Group A1 Integral time (I)	I -A2	○	○	○	○
663W	Group A1 Derivative time (D)	d -A2	○	○	○	○
664W	Group A1 Manual reset	rE-A2	○	○	○	○
665W	Group A2 SP section high limit	SH-A2	○	○	○	○
666W	Group A2 SP for AT	tS-A2	○	○	○	○
・ ・ ・ ・	Group A3 to Group A7 are the same as the above.					

■ PID setting (for channel 2 of DCP552)

Address	Data item	LED indication	R	W
1801W	Group 1 Proportional band (P)	P - 1	○	○
1802W	Group 1 Integral time (I)	I - 1	○	○
1803W	Group 1 Derivative time (D)	d - 1	○	○
1804W	Group 1 Manual reset	rE- 1	○	○
1805W	Group 1 Output low limit	oL 1	○	○
1806W	Group 1 Output high limit	oH- 1	○	○
1807W	Group 2 Proportional band (P)	P - 2	○	○
1808W	Group 2 Integral time (I)	I - 2	○	○
1809W	Group 2 Derivative time (D)	d - 2	○	○
1810W	Group 2 Manual reset	rE- 2	○	○
1811W	Group 1 Output low limit	oL- 2	○	○
1812W	Group 1 Output high limit	oH- 2	○	○
⋮	Group 3 to Group 9 are the same as the above.			
1855W	Group A1 Proportional band (P)	P -A 1	○	○
1856W	Group A1 Integral time (I)	I -A 1	○	○
1857W	Group A1 Derivative time (D)	d -A 1	○	○
1858W	Group A1 Manual reset	rE-A 1	○	○
1859W	Group A1 SP section high limit	SH-A 1	○	○
1860W	Group A1 SP for AT	tS-A 1	○	○
1861W	Group A1 Proportional band (P)	P -A2	○	○
1862W	Group A1 Integral time (I)	I -A2	○	○
1863W	Group A1 Derivative time (D)	d -A2	○	○
1864W	Group A1 Manual reset	rE-A2	○	○
1865W	Group A2 SP section high limit	SH-A2	○	○
1866W	Group A2 SP for AT	tS-A2	○	○
⋮	Group A3 to Group A7 are the same as the above.			

■ Constant value control setting

Address	Data item	LED indication	R	W
701W	Constant value control changeover (Note)	ConSt	○	○
702W	SP	SP	○	○
703W	Proportional band (P)	P	○	○
704W	Integral time (I)	I	○	○
705W	Derivative time (D)	d	○	○
706W	Manual reset	rE	○	○
707W	Output low limit	oL	○	○
708W	Output high limit	oH	○	○

Note : When the constant value control mode is set by the write request (when 1 is written at 701W), PV/SP indication is given on the LED indicator, and the LCD indicator is initialized into an output indication.

■ Constant value control setting (for channel 2 of DCP552)

Address	Data item	LED indication	R	W
709W	Constant value control changeover (Note)	ConSt	○	○
710W	SP	SP	○	○
711W	Proportional band (P)	P	○	○
712W	Integral time (I)	I	○	○
713W	Derivative time (D)	d	○	○
714W	Manual reset	rE	○	○
715W	Output low limit	oL	○	○
716W	Output high limit	oH	○	○

Note : When the constant value control mode is set by the write request (1 is written at 709W), the LED indicator indicates PV/SP, and the LCD indicator is initialized to the output indication.

■ Run status (DCP551)

In the run status, read operation can be done, but write operation cannot be done. However, data can be written only at the addresses from status 1 to status 2 by the run operation command. (See para 4-7 "Run Operation".)

Address	Data item	Function in write operation	R	W
256W	Alarm	Write disable	○	×
257W	Events 1 to 16 output status		○	×
258W	Events 17 to 32 output status		○	×
259W	PV		○	×
260W	SP		○	×
261W	Status 1	Run operation (1)*	○	○
262W	Segment No.	Run start segment No.	○	○
263W	Program No.	Run start program No.	○	○
264W	MV	Manual MV	○	○
265W	Status 2	Run operation (2)*	○	○
266W	Segment progress time	Write disable	○	×
267W	Run progress time (unit: minute)		○	×
268W	Residual run time (unit: minute)		○	×
269W	Run lapse time (integrated)		○	×
270W	CH1 PV		○	×
271W	CH2 PV		○	×
272W	PID group No.		○	×
273W	Output limiter group No.		○	×
274W	Cycle execution count		○	×
275W	Repeat execution count		○	×

* See para 4-7 "Run Operation".

The decimal point positions of PV, CH1 PV, and CH2 PV are set by SP (C65), PV1 (C3, C4) and PV2 (C13, C14), respectively.Particularely, note that a decimal point position different from the indication is used for PV.

Example: If PV indication is set to 46.5 when C1=0, C2=0, C3=0, and C65=2 (internal PV is set to 46.51):

PV : 4651 $4651 \div 10^2 = 46.51$

CH1 : 465 $465 \div 10^1 = 46.5$

When the decimal point position differs between SP and PV as shown above, the read numerics change The PID group numbers are as follows;

1 to 9 : Group 1 to Group 9

10 to 16 : Group A1 to Group A7

−1 ON-OFF (selected by PID group)

In the constant value mode, the read values of 266 to 269W and 272 to 275W are 0 each.

■ Run status (DCP552)

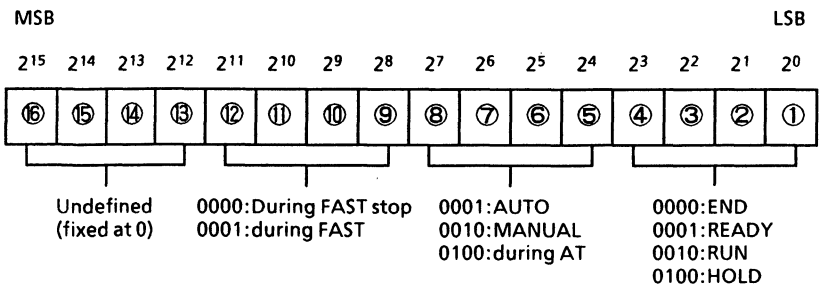
In the run status, read operation can be done, but write operation cannot be done. However, data can be written only at the addresses from status 1 to status 2 by the run operation command.

Address	Data item	Function in write operation	R	W
256W	Alarm	Write disable	○	×
257W	Events 1 to 16 output status		○	×
258W	Events 17 to 32 output status		○	×
259W	PV (CH1)		○	×
260W	SP (CH1)		○	×
261W	Status 1 (CH1)	Run operation (1)*	○	○
262W	Segment No. (CH1)	Run start segment No.	○	○
263W	Program No. (CH1)	Run start program No.	○	○
264W	MV (CH1)	Manual MV	○	○
265W	Status 2 (CH1)	Run operation (2)*	○	×
266W	Segment progress time (CH1)	Write disable	○	×
267W	Run progress time (unit: minute)(CH1)		○	×
268W	Residual run time (unit: minute)(CH1)		○	×
269W	Run lapse time (integrated)(CH1)		○	×
270W	CH1 PV (CH1)		○	×
271W	CH2 PV (CH2)		○	×
272W	PID group No. (CH1)		○	×
273W	Output limiter group No. (CH1)		○	×
274W	Cycle execution count (CH1)		○	×
275W	Repeat execution count (CH1)		○	×
279W	PV(CH2) or CP value	Write disable		
280W	SP (CH2)			
281W	Status 1 (CH2)	Run operation (1)*	○	○
282W	Segment No. (CH2)	Run start segment No.	○	○
283W	Program No. (CH2)	Run start program No.	○	○
284W	MV (CH2)	Manual MV	○	○
285W	Status 2 (CH2)	Run operation (2)*	○	×
286W	Segment progress time (CH2)	Write disable	○	×
287W	Run progress time (unit: minute)(CH2)		○	×
288W	Residual run time (unit: minute)(CH2)		○	×
289W	Run lapse time (integrated)(CH2)		○	×
290W	Alarm 07		○	×
291W	02 sensor impedance (unit: kΩ)		○	×
292W	PID group No. (CH2)		○	×
293W	Output limiter group No.(CH2)		○	×
294W	Cycle execution count (CH2)		○	×
295W	Repeat execution count (CH2)		○	×
296W	Specific client code		○	×
2001W	Status 1 (CH1 & 2)	Run operation (1)*	○	○
2002W	Segment No. (CH2 & 2)	Run start segment No.	○	○
2003W	Program No. (CH2 & 2)	Run start program No.	○	○

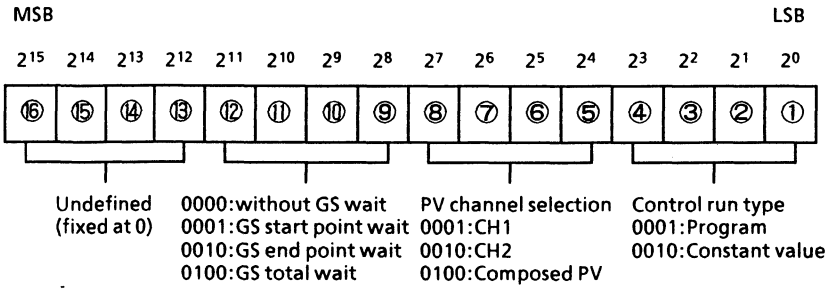
*See para 4-7 "Run Operation".

● Read operation

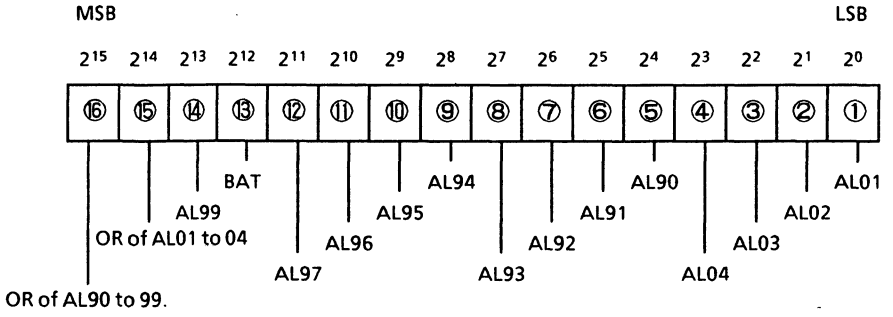
• Status 1



• Status 2



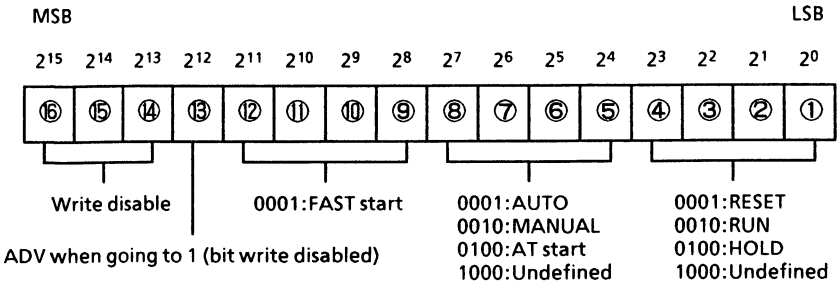
• Alarm



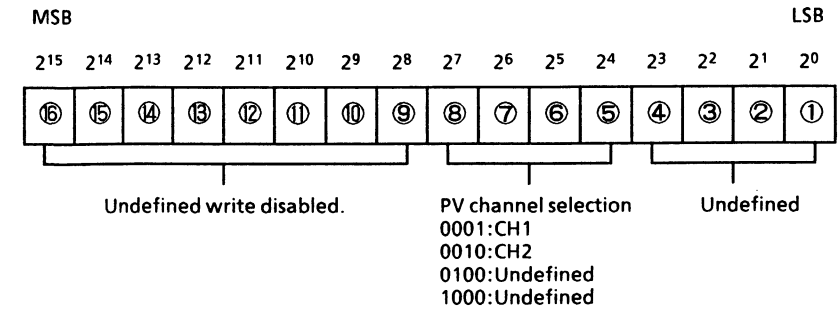
AL01	PV CH1 high limit	AL90	Board conf.	AL94	PARA data	BAT	Battery
AL02	PV CH1 low limit	AL91	Cold junction error	AL95	PID	AL99	ROM
AL03	PV CH2 high limit	AL92	Adjustment data	AL96	Program	OR of AL01 to 04(OR)	
AL04	PV CH2 low limit	AL93	SETUP data	AL97	Event conf.	OR of AL90 to 99(OR)	

● Write operation

• Run operation 1



• Run operation 2



The PV channel selection is effective only when the remote changeover is executed in the PV2 CH model (when C25 = 1 and C26 = 0). However, this is enabled only when the DI input is turned OFF, because the DI input has priority.

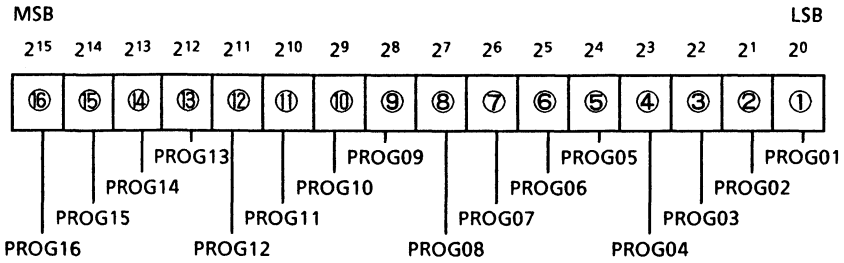
■ Program status

The program status can be read, but cannot be written. The individual bits go to 1 when the respective programs exist.

Address: 1201W to 1207W

Address	Data item (DCP551)	Data item (DCP552)	Function in write operation
1201W	Pogram 1 to 16	1(CH1) to 8(CH2)	None
1202W	Program 17 to 32	9(CH1) to 16(CH2)	
1203W	Program 33 to 48	17(CH1) to 24(CH2)	
1204W	Program 49 to 64	25(CH1) to 32(CH2)	
1205W	Program 65 to 80	33(CH1) to 40(CH2)	
1206W	Program 81 to 96	41(CH1) to 48(CH2)	
1207W	Program 97 to 99	49(CH1) to 49(CH2)	

1201W program 1 to 16



The 1202W to 1207W programs can also be read similarly. The three least significant bits only are effective at the 1207W. (Programs 97 to 99 are shown. The other bits are fixed at 0.)

■ Tag name

The tag name can be read, but cannot be written.

Address: 1210W to 1605W

Address	Data item (DCP551)	Data item (DCP552)	Function in write operation
1210W	Program 1, 1st to 2nd characters	Program 1 (CH1) 1st to 2nd characters	None
1211W	Program 1, 3rd to 4th characters	Program 1 (CH1) 3rd to 4th characters	
1212W	Program 1, 5th to 6th characters	Program 1 (CH1) 5th to 6th characters	
1213W	Program 1, 7th to 8th characters	Program 1 (CH1) 7th to 8th characters	
1214W	Program 2, 1st to 2nd characters	Program 1 (CH2) 1st to 2nd characters	None
1215W	Program 2, 3rd to 4th characters	Program 1 (CH2) 3rd to 4th characters	
1216W	Program 2, 5th to 6th characters	Program 1 (CH2) 5th to 6th characters	
1217W	Program 2, 7th to 8th characters	Program 1 (CH2) 7th to 8th characters	
⋮			
1598W	Program 98, 1st to 2nd characters	Program 49 (CH2) 1st to 2nd characters	None
1599W	Program 98, 3rd to 4th characters	Program 49 (CH2) 3rd to 4th characters	
1600W	Program 98, 5th to 6th characters	Program 49 (CH2) 5th to 6th characters	
1601W	Program 98, 7th to 8th characters	Program 49 (CH2) 7th to 8th characters	
1602W	Program 99, 1st to 2nd characters	None	None
1603W	Program 99, 3rd to 4th characters		
1604W	Program 99, 5th to 6th characters		
1605W	Program 99, 7th to 8th characters		

If a designated program does not exist, 0 is sent back.

To change a tag name since it cannot be written, use each command of program pattern.

Example : Assume that the 1210W data is read when the tag name of Program 1 is PROG01.

"P" is 50H and "R" is 52H, so 5052H becomes 20562.

■ Details of block data

The block data is such that the program data corresponding to the one segment designated by segment No. is converted into two ASCII bytes, each of which is expressed in hexadecimal notation, and these bytes are combined together.
These bytes are not partitioned.
One item of DCP550 program pattern consists of 2 bytes, which are aligned in the order of the upper byte and lower byte.
The segment No.0 differs in the byte count of one block data and item configuration from the segment Nos. 1 to 99.

● Segment 0

Order in block (byte order)	Programming item
1 to 2	PV start type
3 to 4	Cycle run count
5 to 6	Link destination program No.
7 to 14	Tag (8 bytes)

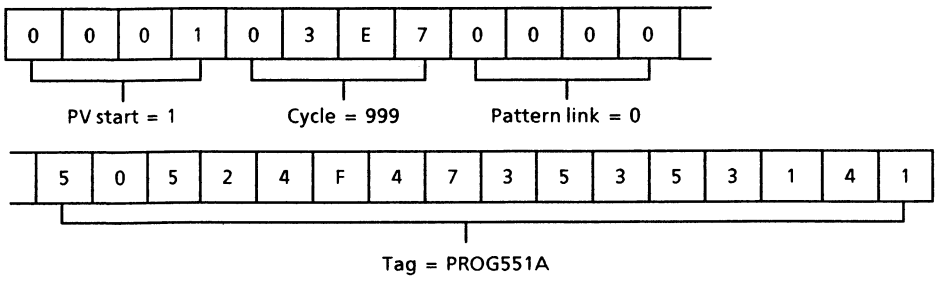
- PV start data
  0 : Non PV start
  1 : Upward PV start
  2 : Downward PV start
  3 : Either upward or downward PV start

- Cycle data
  0 : Non cycle run
  1to10000 : Cycle run count

- Pattern link data
  0 : Non link
  1to99 : Program No. of link destination (0 to 49 in DCP552)

- Tag data
  The range of each one byte is either 20 to 5FH (numeric characters, upper-case alphabetic characters, symbols), or A0 to DFH (katakana symbols).

An example of block data is given below.



◇CAUTION◇ • Data cannot be written in the segment 0 unless written in the segment 1.

● Segments 1 to 99

Order in block (byte order)	Programming item
1 to 2	SP
3 to 4	Time
5 to 6	EV1 1st data
7 to 8	EV1 2nd data
9 to 10	EV2 1st data
11 to 12	EV2 2nd data
13 to 68	1st and 2nd data of EV3 to EV16
69 to 70	Output limiter group No.
71 to 72	PID group No.
73 to 74	Return segment No. of repeat
75 to 76	Repeat count
77 to 78	G. soak type
79 to 80	G. soak width
81 to 82	PV shift

- Time data

  One of time data, θ data, and $\triangle$SP data.

	MSB		LSB
Time data	0	15bit (0 to 30000)	
θData	1	0	14bit (1 to 10000)
$\triangle$SP data	1	1	14bit (0 to 10000)

- Event (EV1 to 16) 1st data

  Setting of time event ON time

  Time data on code event with timer.

  Setting of action points of other events.

  7FFF(H) when no data is set.

  −20000 (B1E0H) when turned OFF.

- Event (EV1 to 16) 2nd data

  Setting of time event OFF time

  Code data of code event with timer +32768 (8000H)

  32767 (= 7FFFH) when no data is set.

  −20000 (B1E0H) when turned OFF.

- Output limiter group data

  0 : Continue

  1 to 9 : Group No.

  10 : A group No. (A1 to A7 groups)

- PID group data

  0 : Continue

  1 to 9 : Group No.

  −1 (=FFFFH) : ON-OFF control

- Repeat return segment data
  0 : Non repeat run
  1 to 99 : Return segment No.
  (A larger number than the write segment cannot be set.)

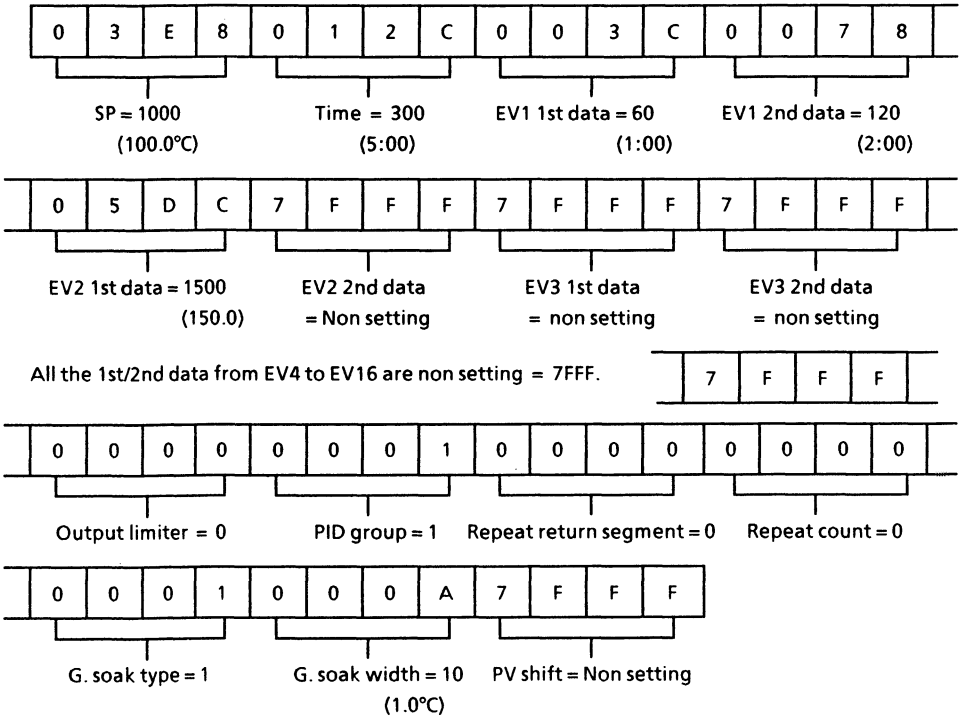
- Repeat data
  0 : Non repeat run
  1 to 10000 : Repeat run count
  When either the repeat return segment data or repeat data is 0, no repeat run is executed.

- G. soak type data
  0 : G. soak setting is not provided.
  1 : Segment start point
  2 : Segment end point
  3 : Total segment

- G. soak width data
  0 to 1000SPU

- PV shift data
  32767 (= 7FFFH) : PV shift setting continues.
  −10000 to 10000SPU

An example of block data is given below. In this example, the time unit is hour/minute. This segment is RAMP-X, the event 1 is a time event, and the event 2 is a PV event.



6. Communication program for master station

6 - 1 Precautions for programming

- The maximum response time of the instrument is 2sec.
  Therefore, set the response monitor time to 2sec.
- If no response is obtained within 2sec, retransmit the same message. When no response remains coming even after making retransmission twice, it should be regarded as a communication error.
- The above-mentioned retransmission is required since a message may not be properly transmitted due to noise or the like during communication.

◇Reference◇ When the device distinction codes "X" and "x" are used alternately during message retransmission from the master station, the received response message can be conveniently identified to be the latest message or preceding one.

6 - 2 Examples of communication program

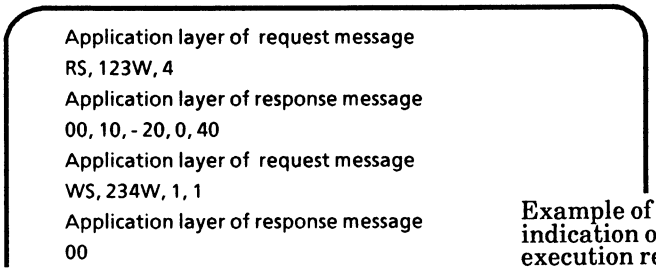
The program examples given in this paragraph are written in NEC PC-9800 Series N88-Japanese BASIC (86) (MS-DOS version).
Since this program is shown as a reference when a user prepares a program, all operations may not always be assured.

■ Before executing the program

Check the instrument communication conditions, and station address. Also set the baud rate of the personal computer to that of the instrument by the SWITCH command of MS-DOS.
For the SWITCH command, see the manual for the MS-DOS.

■ Executing the program

This program is used for data read and data write. When the program is executed, the application layers of the request message and response message communicated are indicated.



● Setting for communication

Set the station address of a mate instrument to "ADDRESS".
Open the RS-232C and call the subroutine *INIT. DATA.

● Data reading

After setting the read start data address to "READ. ADRS" and the read data count to "READ. LEN", call the subroutine *DATA. READ.
This program permits four data to be read from the data address 123. Change the setting so as to meet the instrument used.

● Data writing

After setting the write start data address to "WRITE. ADRS", the write data count to "WRITE. LEN", and the write data to "WRITE. DATA", call the subroutine *DATA. WRITE.
This program permits two data to be written from the data address 234. Change the setting so as to meet the instrument used.

■ Data read/write sample program

◇CAUTION◇ Yamatake - Honeywell won't be absolutely responsible for any trouble caused by applying this program sample.

```
1000 '*************************************************************
1010 '* DATA READ/WRITE SAMPLE PROGRAM (Ver. 1.00)                 *
1020 '*                                                            *
1030 '* Model : NEC PC9801 Series                                  *
1040 '* Language : N88-BASIC                                       *
1050 '* All rights reserved. Copyright(C) 1993, Yamatake Honeywell *
1060 '*************************************************************
1070 '
1080 'Initialize data
1090 *INITIALIZE
1100     DEFINT A - Z
1110     DIM READ.DATA( 100 ), WRITE.DATA('100 )   'Read/write data area
1120     ADDRESS  = 1              'Device address
1130     OPEN "COM:E81NN" AS #1        'Open RS-232C
1140                               '(8bit,Even parity, 1 stop bit)
1150                               '(8bit,No Parity, 2 stop bit"N83NN")
1160                               'Transmission speed must be set up 9600/4800bps)
1170     GOSUB *INIT.DATA
1180 '
1190 'Main routine
1200 *MAIN
1210     'Reading 4 data from the data address 123
1220     READ.ADRS =  123          'Read start data address
1230     READ.LEN  =    4          'Read count
1240     GOSUB *DATA.READ          '<Output>COM.ERROR:Communication error
1250                               '        RESPONSE:End code
1260                               '        READ.DATA(i) (i=0～READ.LEN-1):Read data
1270     '
1280     'Writing 4 data from the data address 234
1290     WRITE.ADRS =  234         'Write start data address
1300     WRITE.LEN  =    2         'Write count
1310     WRITE.DATA(0) = 1         'Write data No.1
1320     WRITE.DATA(1) = 1         'Write data No.2
1330     GOSUB *DATA.WRITE         '<Output>COM.ERROR:Communication error
1340                               '        RESPONSE:End code
1350     GOTO *PROCESS.END
1360 '
1370 'Ending routine
1380 *PROCESS.END
1390     CLOSE #1                  'Close RS-232C
1400     END
1410 '
1420 '********************
1430 '* Read subroutine *
1440 '********************
1450 *DATA.READ
1460     A = READ.ADRS: GOSUB *BIN.TO.ASCII
1470     COMMAND$ = "RS," + A$ + "W,"
1480     A = READ.LEN: GOSUB *BIN.TO.ASCII
1490     COMMAND$ = COMMAND$ + A$
1500     GOSUB *COMMUNICATION
1510     IF COM.ERROR <> 0 OR RESPONSE <> 0 THEN RETURN
1520     A$ = RIGHT$( RECEIVE$, LEN( RECEIVE$ ) - 3 ) + ","
1530     J1 = 1
1540     FOR I = 0 TO READ.LEN - 1
1550         J2 = INSTR( J1, A$, "," )
1560         READ.DATA( I ) = VAL( MID$( A$, J1, J2 - J1 ) )
1570         J1 = J2 + 1
1580     NEXT
1590     RETURN
1600 '
1610 '*********************
1620 '* Write subroutine *
1630 '*********************
1640 *DATA.WRITE
1650     A = WRITE.ADRS: GOSUB *BIN.TO.ASCII
1660     COMMAND$ = "WS," + A$ + "W"
1670     FOR I = 0 TO WRITE.LEN - 1
1680         A = WRITE.DATA( I ): GOSUB *BIN.TO.ASCII
1690         COMMAND$ = COMMAND$ + "," + A$
1700     NEXT
1710     GOSUB *COMMUNICATION
1720     RETURN
1730 '
1740 'ASII characters conversion subroutine
1750 '
```

```
1760 *BIN.TO.ASCII
1770     A$ = STR$( A )
1780     IF LEFT$( A$, 1 ) = " " THEN A$ = RIGHT$( A$, LEN( A$ ) - 1 )
1790     RETURN
1800 '
1810 '****************************
1820 '* Communication subroutine *
1830 '****************************
1840 *COMMUNICATION
1850     COM.RETRY = 3: COM.ERROR = -1
1860     WHILE ( COM.RETRY > 0 AND COM.ERROR <> 0 )
1870         COM.ERROR = 0              'Initializing communication error
1880         WHILE ( LOC( 1 ) ): A$ = INPUT$( 1, #1 ): WEND 'refuse character
1890         GOSUB *SEND.COMMAND        'Send
1891            PRINT "Application layer in request message": PRINT COMMAND$
1900         GOSUB *RECEIVE.COMMAND     'Receive
1901            IF COM.ERROR=0 THEN PRINT "Application layer in response message": PRINT RECEIVE$
1902            IF COM.ERROR=1 THEN PRINT "Time out error"
1903            IF COM.ERROR=2 THEN PRINT "Check sum error"
1904            IF COM.ERROR<0 THEN PRINT "Data link layer error"
1905            PRINT
1910         COM.RETRY = COM.RETRY - 1
1920     WEND
1930     RETURN
1940 '
1950 '********************
1960 '* Send subroutine *
1970 '********************
1980 *SEND.COMMAND
1990     A$ = RIGHT$( "0" + HEX$( ADDRESS ), 2 )
2000     A$ = STX$ + A$ + SUB.ADR$ + DEVICE$ + COMMAND$ + ETX$
2010     GOSUB *MAKE.SUM
2020     SEND$ = A$ + SUM$ + CR$ + LF$
2030     PRINT #1, SEND$;
2040     RETURN
2050 '
2060 '***********************
2070 '* Receive subroutine *
2080 '***********************
2090 'COM.ERROR: Communication error
2100 '   = 0: Normal
2110 '   = 1: Time out error
2120 '   = 2: Check sum error
2130 '   < 0: Data link layer error
2140 '
2150 *RECEIVE.COMMAND
2160     '
2170     'Waiting for STX
2180     A$ = ""
2190     WHILE ( A$ <> STX$ )
2200         RECEIVE$ = ""
2210         GOSUB *RECV.SUB: IF COM.ERROR THEN RETURN
2220     WEND
2230     '
2240     'Waiting for ETX
2250     WHILE ( A$ <> ETX$ )
2260         GOSUB *RECV.SUB: IF COM.ERROR THEN RETURN
2270     WEND
2280     IF SUM.FLAG = 0 THEN SUM$ = "": GOTO *RECV.CR
2290     '
2300     'Waiting for 1'st charcter in check sum
2310     GOSUB *RECV.SUB: IF COM.ERROR THEN RETURN
2320     '
2330     'Waiting for 2'nd character in check sum
2340     GOSUB *RECV.SUB: IF COM.ERROR THEN RETURN
2350     A$ = LEFT$( RECEIVE$, LEN( RECEIVE$ ) - 2 ): GOSUB *MAKE.SUM
2360     IF RIGHT$( RECEIVE$, 2 ) <> SUM$ THEN COM.ERROR = 2: RETURN
2370     '
2380     'Waiting for CR
2390 *RECV.CR
2400     GOSUB *RECV.SUB: IF COM.ERROR THEN RETURN
2410     IF A$ <> CR$ THEN COM.ERROR = -2: RETURN
2420     '
2430     'Waiting for LF
2440     GOSUB *RECV.SUB: IF COM.ERROR THEN RETURN
2450     IF A$ <> LF$ THEN COM.ERROR = -3: RETURN
2460     '
2470     'Checking data link layer
2480     IF MID$(SEND$, 2, 5) <> MID$(RECEIVE$, 2, 5) THEN COM.ERROR = -1: RETURN
2490     RECEIVE$ = MID$( RECEIVE$, 7, LEN( RECEIVE$ ) - LEN( SUM$ ) - 9 )
2500     RESPONSE = VAL( LEFT$( RECEIVE$, 2 ) )
2510     RETURN
2520 '
2530 'Wating for 1 character subroutine
2540 '(Same routine as time out monitoring)
2550 '
```

```
2560 *RECV. SUB
2570     A = 0
2580     WHILE ( 1 )
2590         A$ = TIME$
2600         WHILE ( A$ = TIME$ )
2610             IF LOC(1) THEN A$ = INPUT$(1, #1) : RECEIVE$=RECEIVE$+A$: RETURN
2620             A = A + 1: IF A = TIME. CNT THEN *RECV. ERR
2630         WEND
2640     WEND
2650 *RECV. ERR
2660     COM. ERROR = 1
2670     RETURN
2680 '
2690 'Check sum subroutine
2700 '
2710 *MAKE. SUM
2720     A = 0: SUM$ = ""
2730     IF SUM. FLAG = 0 THEN RETURN
2740     FOR I = 1 TO LEN( A$ )
2750         A = A + ASC( MID$( A$, I, 1 ) )
2760     NEXT
2770     SUM$ = RIGHT$( "0" + HEX$( (-A) AND &HFF ), 2 )
2780     RETURN
2790 '
2800 'Data initializing subroutine
2810 '
2820 *INIT. DATA
2830     STX$ = CHR$( 2 )    'STX code
2840     ETX$ = CHR$( 3 )    'ETX code
2850     CR$  = CHR$( 13 )   'CR code
2860     LF$  = CHR$( 10 )   'LF code
2870     '
2880     SUB. ADR$ = "00"    'Sub address(fixed)
2890     DEVICE$  = "X"      'Device distinction code
2900     SUM. FLAG = 1       'Command checksum =0:none/=1:avairable
2910     TIME. OUT = 2000    'Time out period[msec]
2920     TIME. CNT = 0       'Time out monitoring counter(initial value)
2930     '
2940     'Time out monitoring
2950     '(Same routine as waiting for 1 character subroutine)
2960     A = 0
2970     WHILE ( LOC( 1 ) ): A$ = INPUT$( 1, #1 ): WEND
2980     A$ = TIME$
2990     WHILE ( A$ = TIME$ ): WEND
3000     A$ = TIME$
3010     WHILE ( A$ = TIME$ )
3020         IF LOC( 1 ) THEN *I. LOOP1
3030 *I. LOOP1
3040         TIME. CNT = TIME. CNT + 1: IF TIME. CNT = A THEN *I. LOOP2
3050 *I. LOOP2
3060     WEND
3070     TIME. CNT = (TIME. OUT / 1000!) * TIME. CNT + 1 'Round up
3080     RETURN
3090 '
3100 '--- Last line ---
```

7. Troubleshooting

■ Check items in case communication is disabled

(1) Check whether or not the RS-232C wiring is wrong.

(2) Check the communication conditions the DigitroniK instrument and the host computer.
If any one of the following setting items is different between both stations, communication is disabled.
The underlined items mean that they can be set on the DigitroniK side.

Baud rate	: 1200、 2400、 4800、 9600bps
Data length	: 7, 8, bits
Parity	: No parity, odd parity, even parity
Stop bit	: 1 stop bit, 2 stop bits

(3) Check if the destination address of the command frame transmitted from the host computer meets the address set to the DCP550.
The address of the DCP550 is set to 0 at delivery from the factory. Even when the destination address of the command frame is set to 00 (30H, 30H), the DCP550 does not respond to such a message.

(4) Use the upper-case character codes for all the character codes other than the device distinction code ("X" or "x" in this instrument).

(5) Exercise care about the following points when using the memory cards.
1. Cautions for use of the RAM card.
   - If a file is OPEN during operation of the memory card, an error occurs (error 49).
   - The memory card cannot be operated during OPEN.
2. Host communication is not executed during operation of the EEPROM card (from the start of card operation from the console to the end of communication with the card).
   All communication commands received in the above-mentioned status are rejected.

8. Specifications

■ RS-232C Specifications

Name	Remarks
Transmission mode	Unbalanced type
Transmission line	3-wires system
Signal level	Input data 0 +3V min. Input data 1 −3V max. Output data 0 +5V min. Output data 1 −5V max.
Baud rate (bps)	1200、2400、4800、9600
Transmission distance	15m max.
Communication system	Half duplex
Charactor synchronization method	Start/stop transmission
Data format	8 data bits, 1 stop bit, even parity 8 data bits, 2 stop bits, no parity
Error detection	Parity check, check-sum
Station address	0 to 127 (Communication functions are disabled when set to 0.)
Network type	1:1

■ RS-485 Specifications

Name	Remarks
Transmission mode	Balanced type
Transmission line	5-wires system/3-wire system
Signal level	Input data 0 −0.2V max. Input data 1 +1V min. Output data 0 −0.2V max. Output data 1 +2V min.
Baud rate (bps)	1200、2400、4800、9600
Transmission distance	500m max. (300m when connected with the MA500 DigitroniK interface module)
Communication system	Half duplex
Charactor synchronization method	Start/stop transmission
Data format	8 data bits, 1 stop bit, even parity 8 data bits, 2 stop bits, no parity
Error detection	Parity check, check-sum
Communication address	0 to 127 (Communication functions are disabled when set to 0.)
Network type	1:N (up to 31units, or up to 16 units when connected with MA500 DIM or CMC410)

Appendix

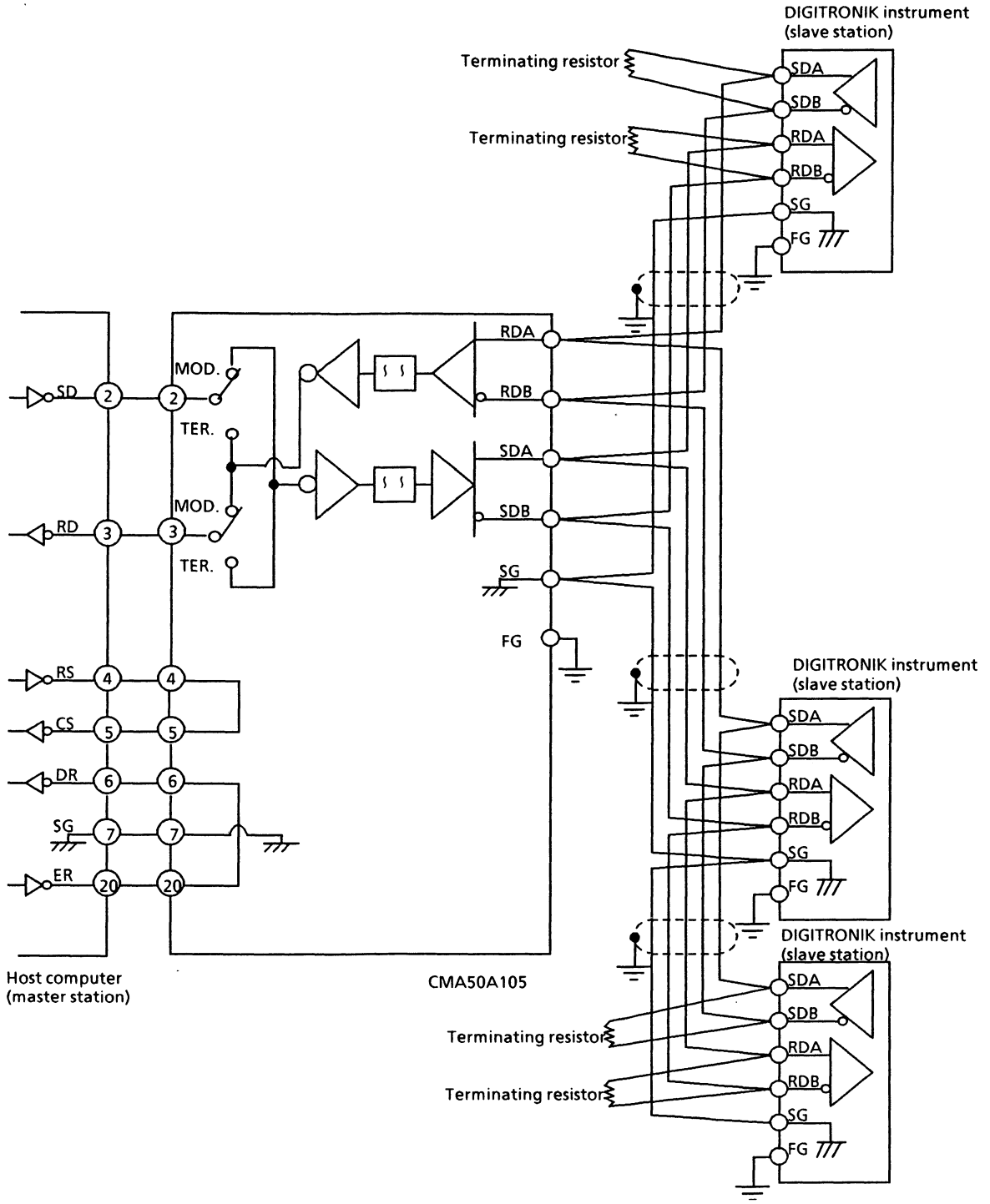
■ Code table

UPPER / LOWER	0	1	2	3	4	5	6	7
0			SPACE	0	@	P	`	p
1			!	1	A	Q	a	q
2	STX		"	2	B	R	b	r
3	ETX		#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A	LF		*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	\	l	|
D	CR		−	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

The shaded part (▒▒) is not used for this communication system. (The codes to be used change every instrument.)

■ Connection with CMA50

The CMA50A105 is available as an RS-232C/RS-485 (5-wires system) converter from Yamatake Honeywell. The following diagram shows an example of wiring, using a straight cable for the host computer in the terminal mode.

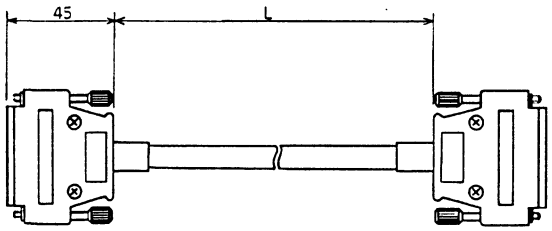


Connect two terminating resistors of 150Ω ±5%, 1/2W min. to the instrument at each end of the communication line.

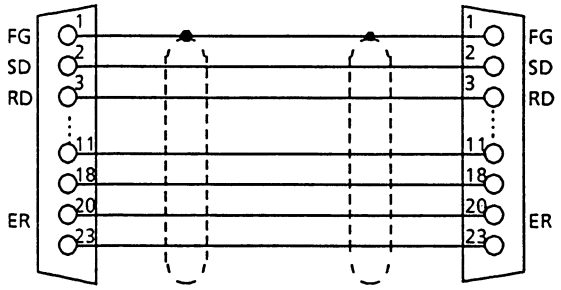
For this network, cable wiring should be done so that the SD of the master station may be connected with the RD of each slave station, and the RD of the master station with the SD of each slave station.
Therefore, set the MODE switch at the front of the CMA50A105 as shown in the table below to meet the pin array (MODEM/TERMINAL) of the host computer side RS-232C connector, and the cable type (cross/straight) to be used.

RS-232C	Cable type	MODE switch
TERMINAL	Straight	MODEM
TERMINAL	Cross	TERMINAL
MODEM	Straight	TERMINAL
MODEM	Cross	MODEM

● RS-232C cable

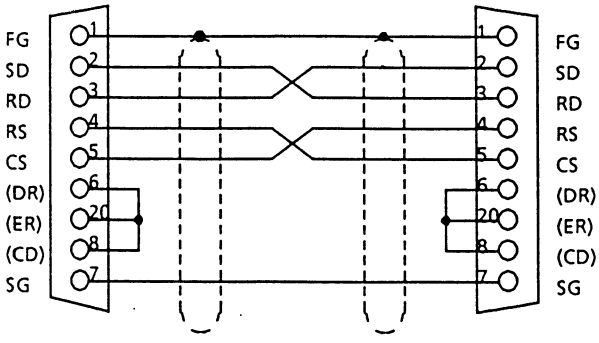


Straight : RS-232C cable having one each D-Sub (25 pins) connector, in which the same number pins are mutually connected like (2) - (2), (3)-(3), at both ends.



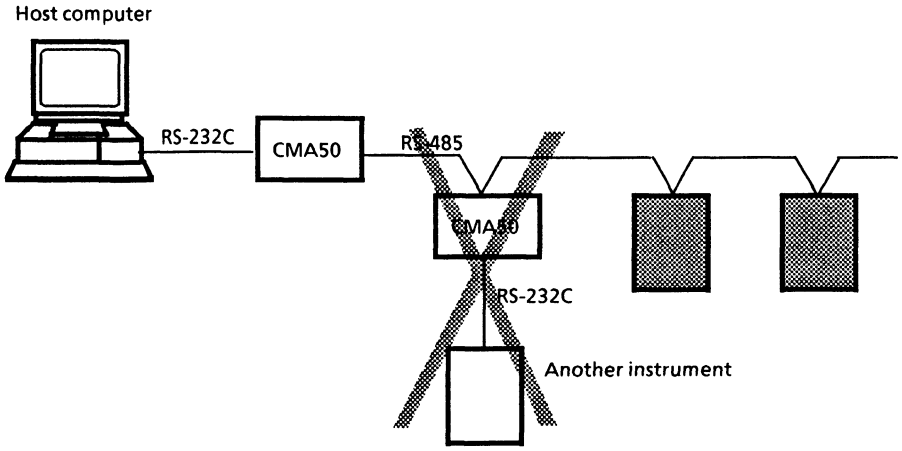
Cable model No.
CBL-RS232M02
L = 2m

Cross : RS-232C cable having one each D-Sub (25 pins) connector, in which the different number pins are cross-connected mutually like (2)-(3) and (3)-(2), on both ends.



Cable model No.
CBL-RS232T02
L = 2m
CBL-RS232T08
L = 8m

The CMA50A105 is not provided with a function to control the RS-485 driver (receiver).
Therefore, the CMA50A105 cannot be used for such a network that the RS-485 driver is connected with the RS-485 driver in another station as shown below.



The CMA50 cannot be used as an RS-485/RS-232C converter in a slave station.

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