Communication Command

RA2000 series

INSTRUCTION MANUAL

1WMPD4003507

A&D Company, Limited

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A&D Company, Limited

Introduction

We thank you for your purchase of our product OMNIACE RA2000 series (RA2300MKⅡ and RA2800A). Please read this manual before operating this instrument. Refer to this manual to operate the LAN interface which is provided as standard in the RA2000 and the RS-232C interface included in the optional RS-232C unit (RA23-142). This manual provides the information necessary to operate the RA2000 series recorder safely. Place this manual within reach of the RA2000 series.

For basic operations, please refer to the RA2000 series Recorder Manual. Please read the user's manual of the PC or modem before connecting the RA2000 series to a PC or modem. If you encounter any problems in the manuals, please contact our sales representative.

This manual covers handling precautions and basic command operations of the RA2000 series communication interface. For operation of basic functions, please refer to the separate-volume manuals listed below.

<RA2300MKⅡ>

Manual	Contents
Instruction Manual MAINFRAME for RA2300MKⅡ	This manual explains functions and how to operate the RA2300A.
Instruction Manual Amplifier Units for RA2000 series	This manual explains how to use and install amp units.

<RA2800A>

Manual	Contents
Instruction Manual MAINFRAME for RA2800A	This manual explains functions and how to operate the RA2800A.
Instruction Manual Amplifier Units for RA2000 series	This manual explains how to use and install amp units.

Before Using

► When opening package

If opening the package in a warm room during the cold season, open the package after it has reached room temperature to avoid any operational failure due to condensation on the surface of the product.

► Examining contents in package

This instrument is delivered after a thorough examination at the factory prior to shipment. However, please examine the product's condition and verify that no obvious shipping damage has occurred after opening the package. Also, examine the specifications of the input units and accessories. If there are any missing or damaged items, please contact our sales representative.

- Turn off the power when the operation is abnormal.
- If it is impossible to trace the cause of an abnormal operation, please contact our sales representative. In this case, let us know in what way the unit was operating incorrectly and what the environmental conditions were.
- The contents of this manual are subject to change without notice.
- This manual is copyrighted with all rights reserved. No parts of this manual may be transcribed or reproduced without written permission.
- Please let us know if there are any points that are unclear or missing in this manual.

Safety Measures - Warnings and Cautions

► To safely use the product

The RA2000 series is a product conforming to the IEC standard safety class I. The recorder is manufactured with safety in mind, however, accidents may occur due to misuse by the user. To avoid such accidents, read this manual carefully before use. Observe the following warnings and cautions when using the interface and remote control functions. To safely use the input units, the following statements are used in this manual to call the readers' attention.

⚠ WARNING	This indicates a condition or practice that could result in personal injury or loss of life, or may result in light injury or physical damage if this equipment is misused due to neglect of a Warning.
⚠ CAUTION	This indicates a condition or practice that could result in light injury or damage to the equipment or other property if this equipment is misused due to neglect of a Caution.

Be sure to observe the following instructions when using this recorder. The warranty does not cover damages resulting from actions contrary to the instructions, cautions, or warnings appearing in this manual.

⚠ CAUTION

► Refer to “17. How to Use Optional Units” in the RA2000 series User’s Manual when the RS-232C is installed in the recorder unit.

► When connecting the LAN/RS-232C cable to the recorder

Always observe the following points. If not observed, the recorder and the devices connected to the recorder may be destroyed.

- **Check to be sure the cable is one specified by A&D.**
  Use shield-type LAN cable.
- **Turn off the power of the recorder before connecting the cable.**
  When connecting the RA2000 series and another instrument, make sure that there is no potential difference between the RA2000 series and the instrument. If there is a potential difference, determine the cause of the potential difference. Cable connection under a potential difference may cause damage to the recorder.
- **Do not insert the connector with more force than necessary.**
  Insert the connector at the right angle and in the right direction. Inserting the connector more forcefully than necessary may lead to damage.

Warranty - General

We ship our products after conducting quality control, which covers from design to manufacturing. It is, however, possible that failures may occur in products. If the product does not operate correctly, please make a check of the power supply, cable connections, or other conditions before returning this product to us. For repair or calibration, contact our sales agency. Before returning, be sure to inform us of the model, serial number, and problematic points. The following is our warranty.

Limited Warranty

(1) Warranty period

One year from our shipment.

(2) Warranty limit

We will repair the defects of our product free of charge within the warranty period; however, this warranty does not apply in the following cases.

1) Damage or faults caused by incorrect use.
2) Damage or faults caused by fire, earthquake, traffic accident, or other natural disasters.
3) Damage or faults caused by a repair or modification that is carried out by someone other than a service representative of A&D.
4) Damage or faults caused by use or storage in environmental conditions that should be avoided.
5) Periodical calibration.
6) Damage or faults caused during transportation.

(3) Liability

We do not assume any liabilities for equipment other than A&D.

Terms and Symbols in This Manual

The terms and symbols used in this manual denote the following.

Term or Symbol	Description
⚠ WARNING	This indicates a condition or practice that could result in personal injury or loss of life, or may result in light injury or physical damage if this equipment is misused due to neglect of a Warning.
⚠ CAUTION	This indicates a condition or practice that could result in light injury or damage to the equipment or other property if this equipment is misused due to neglect of a Caution.
NOTE	This indicates a condition or practice that could result in incorrect operation or damage to data if this equipment is misused due to neglect of a Note.
TIPS	This symbol gives setting restrictions and additional descriptions.
☞	Reference page
This recorder	RA2000 series（RA2300MKⅡand RA2800A） recorder
Memory	Internal memory of RA2000 series When measuring with a Memory Recorder or Multi Recorder, measured data is recorded in this memory.
k (lower case) K (upper case)	A unit of numerical value "k" is used to represent 1000 such as "10 kg". "K" is used to represent 1024 such as "4 K data"

Amp units may be abbreviated as follows in this manual

Symbol	Amp unit name	Model
HRDC	2CH high-resolution DC amp unit	AP11-101
FFT	2CH FFT amp unit	AP11-102
HSDC	2CH high-speed DC amp unit	AP11-103
ACST	2CH AC strain amp unit	AP11-104/104A
EV	Event amp unit	AP11-105
TCDC	2CH TC/DC amp unit	AP11-106/106A
TDC	TC/DC amp unit	AP11-107
FV	F/V converter unit	AP11-108
RMS	2CH vibration/RMS amp unit	AP11-109
DCST	2CH DC strain amp unit	AP11-110
HRZS	2CH zero suppression amp unit	AP11-111

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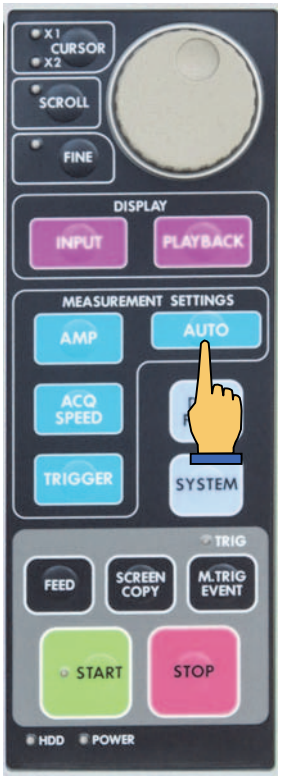
1. Selection of Communication Interface

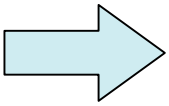
1.1. RA2000 Series Communication Interface Setup

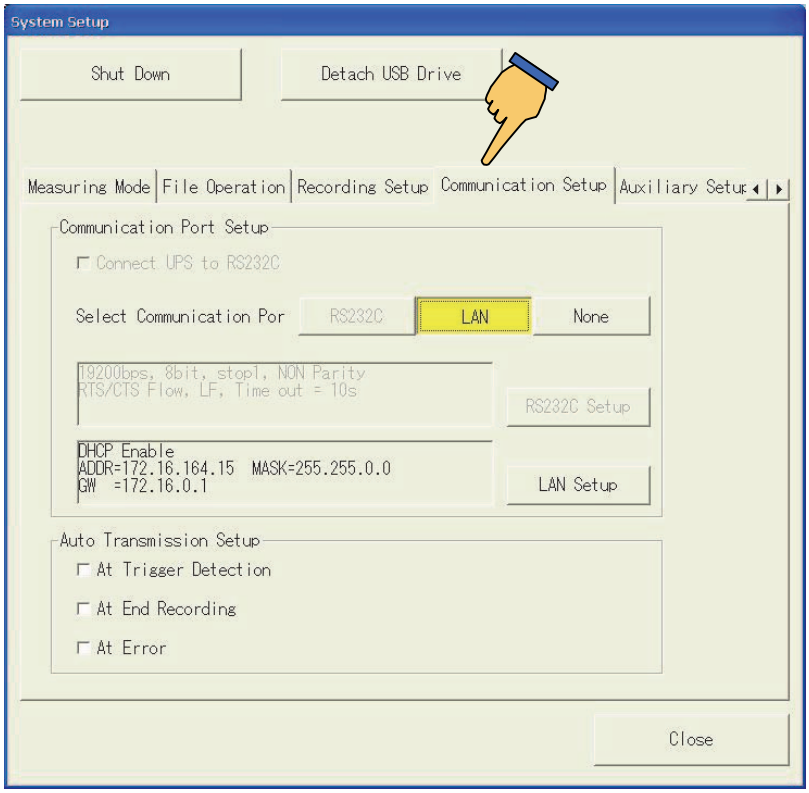
► To control the RA2000 Series using an instrument such as a personal computer via a communication interface, you must allow RA2300MK Ⅱ to conform to the specifications of the communication interface to be used in advance.



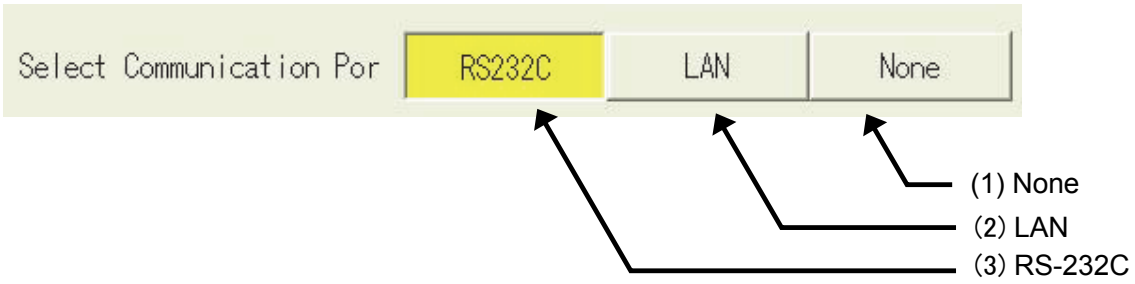
Operation panel

Select communication setup





1.1.1. Overview of communication functions and how to select them



(1) None

Reception of the RS-232C and GP-IB interfaces are neglected and commands are rejected.

(2) LAN

The LAN interface is used.

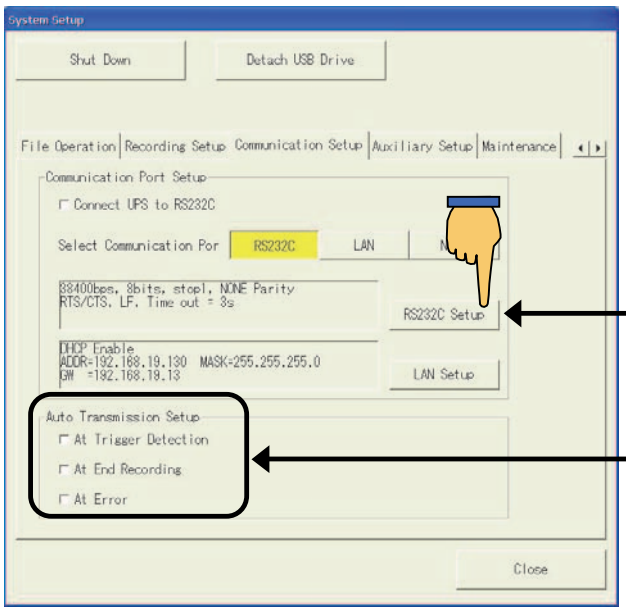
(3) RS-232C

The RS-232C interface is used.

1.2. How to Control RA2000 Series Using RS-232C

► By using the RS-232C interface, it is possible for the host computer to directly control the RA2300MKⅡ.

Select RS-232C and then RS-232C Setup to make the RS-232C settings.

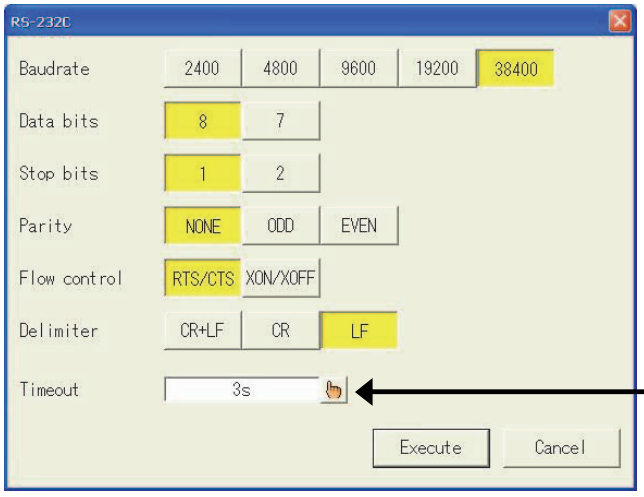


(1) RS-232C Setup

(2) Auto Transmission Setup

(1) RS-232C setup

RS-232C communication protocol is set on the following screen.



Communication speed, data bit, stop bit, parity, flow control, and delimiter are set.

The setup window opens by pressing this button.

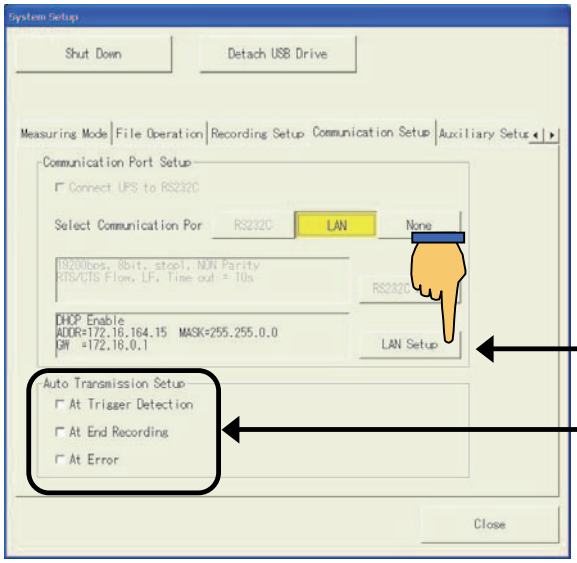
(2) Auto-transmission function

Auto transmission cause is set in Auto Transmission Setup. If specified cause is generated, "!" is sent from the RS-232C interface.

1.3.How to Operate RA2000 Series by Remote Control Using LAN

► The RA2300MKⅡ can be controlled by the host computer directly through the LAN interface.

Select LAN and then LAN Setup to make the LAN settings.

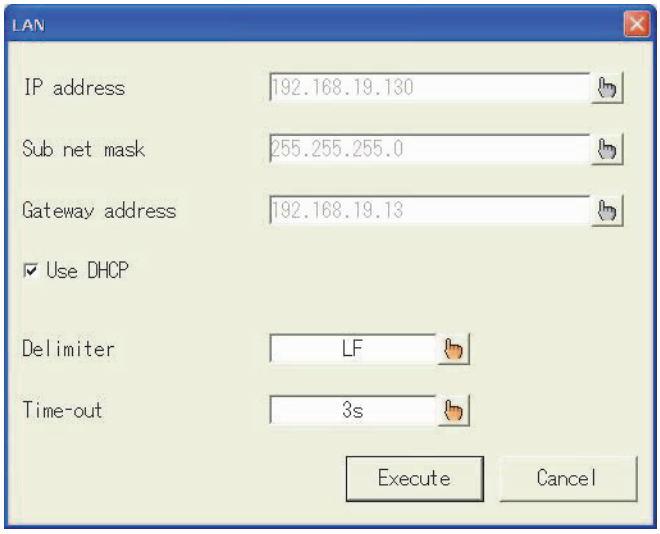


(1) LAN Setup

(2) Auto Transmission Setup

(1) LAN setup

Communication protocol for LAN is set.

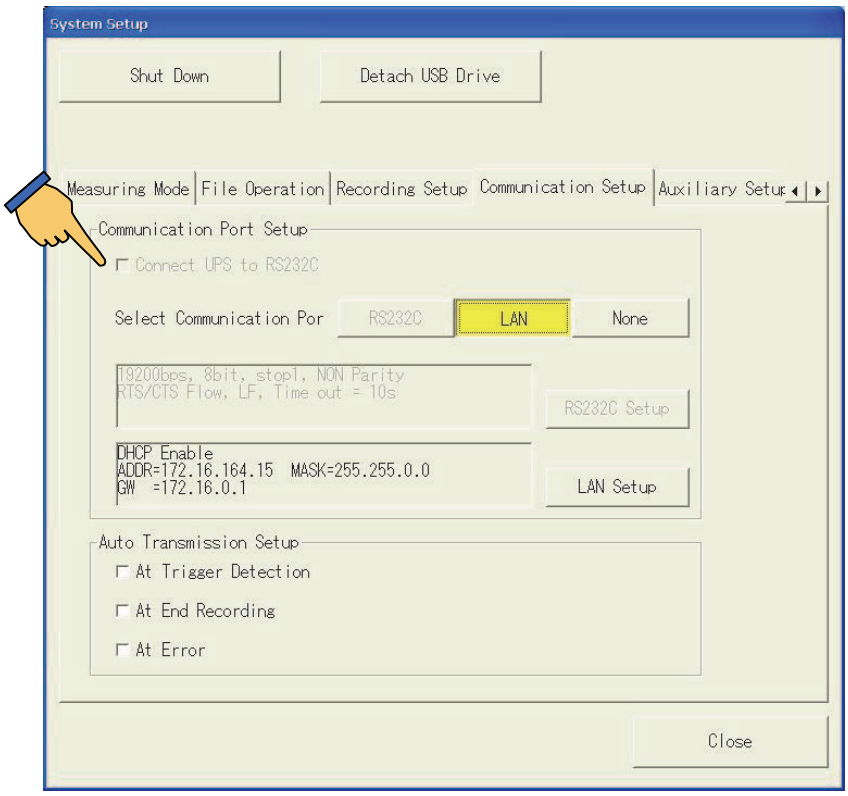


IP address, subnet mask, gateway address, delimiter, and timeout are set. Pressing a key opens the window for settings.

(2) Auto-transmission setup

Auto transmission cause is set in Auto Transmission Setup. If specified cause is generated, “!” is sent from the LAN interface.

1.4. Connection between UPS and RS-232C



When the RA2300MKⅡ is connected to UPS and a tick mark is added to the checkbox for “Connecting UPS to RS-232C”, safety shutdown of the RA2300MKⅡ can be made upon a power outage. After the power supply is resumed, startup is automatically made. If the power outage happens during recording or printing, the operation will be re-started.

For how to connect UPS, refer to the instruction manual for the UPS to be used.

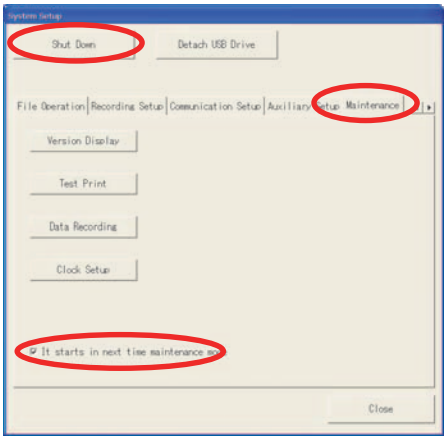
TIPS A special UPS connection cable is necessary when connecting the RA2300MKⅡ with UPS. The RS232C cable of the commercial item cannot be used. Please inquire of our sales representative about UPS and the cable that can be used.

1.5.Set Up File Sharing

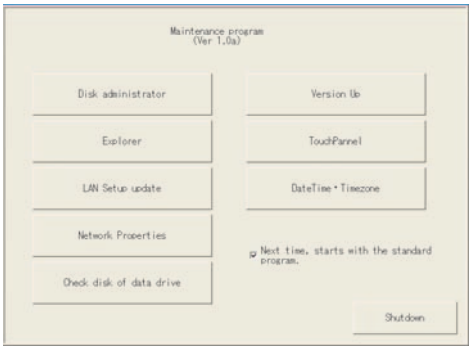
The file sharing allows you to check offline data via LAN connection. You can copy these data on PC and control without external media. To enable the file sharing, do following setting on RA2000 series.

1.5.1.Start up maintenance mode

- Go to SYSTEM and MAINTENANCE.
- Check the box that says, “Next time, start with the maintenance program” then press SHUT DOWN.
- Turn off when Windows shows a message, “It is now safe to turn off your computer.” Then restart RA2300MKⅡ. The maintenance program window opens as below.



Maintenance program window



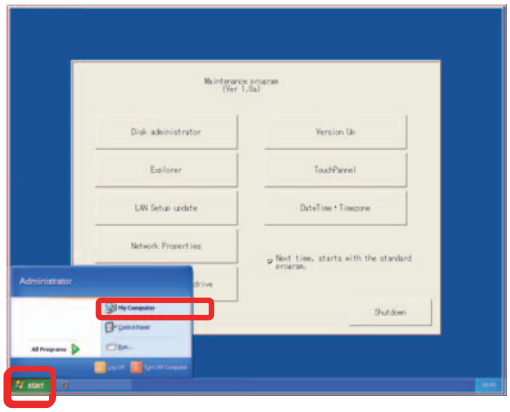
Keep the maintenance program window open and do following settings.

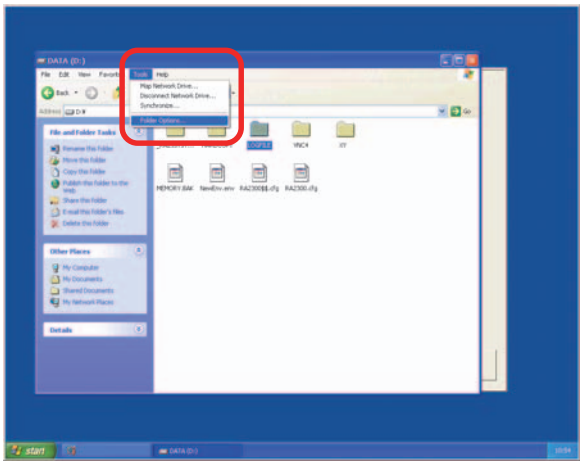
1.5.2.Set up folder options

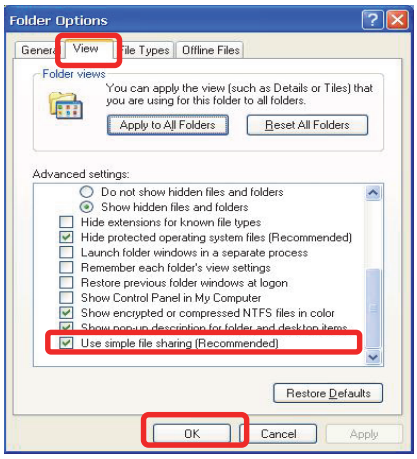
Click “Start” on the lower left corner and open “My Computer.”

Go to “Tool” and “Folder Options” then open “View” tab. Check the box for “Use simple file sharing” that is at the bottom of Advanced settings.

Click OK and finish Folder Option settings.



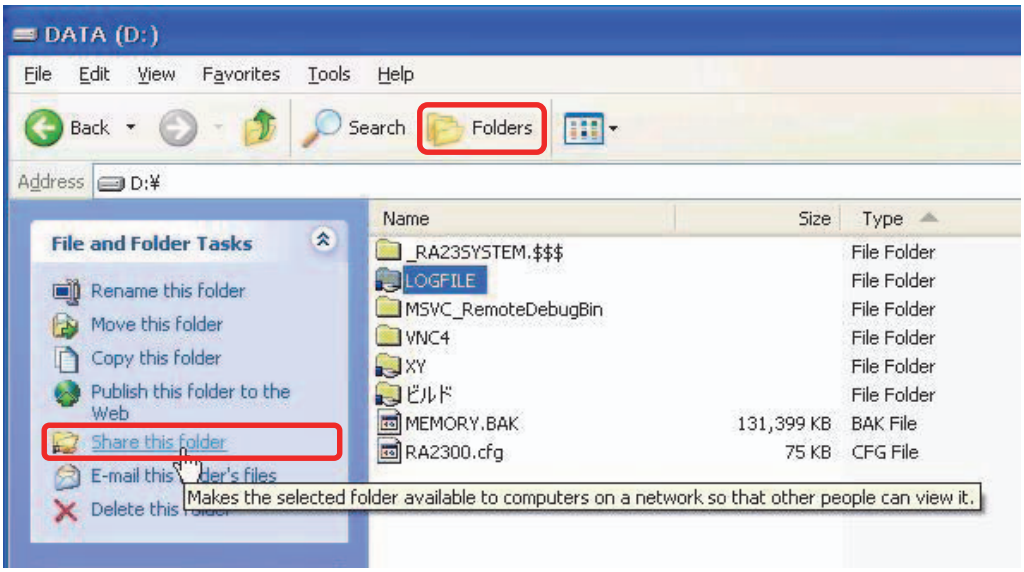




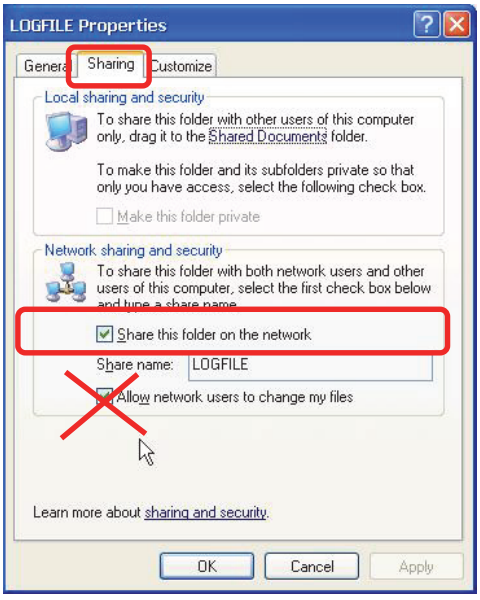
1.5.3.Set Up Files to Share

RA2000 series uses D drive to save data. “LOGFILE” is a default folder as saving destination.
To share files, do setting for each required folder.

- Open **D:DATA** and select a file folder to share.
- Click “Share this folder” on left of the window.
  If different sub-folder is opened, click “Folders” on Windows menu bar.



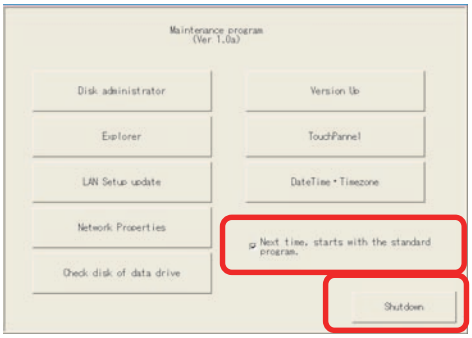
- Open “Sharing” tab on the Properties window.
- Check “Share this folder on the network” on Network sharing and security box.
- Click OK and finish setting.



CAUTIONS:
- Please do not check “Allow network users to change my files” as control from remote PC may influence measuring.
- Please do not share files on **C:CF** drive.

If all settings are completed, press Shutdown on the maintenance program and turn off RA2000 series when it is safe.

Turning RA2000 series on again will start the normal RA2000 series program.



1.6. How to Use NS3300

This software allows you to make various settings such as input range and operation mode in measuring devices connected via LAN from a personal computer (PC). Additionally, the software allows you to monitor data of multiple devices in real time and record the data to the HD in a PC. The recorded data file is easy to be played, CSV-converted, computed, and printed.
* Note: NS3300 ver2.8 is available for both RA2300MKⅡ and RA2800A.

1.6.1. Prior to use NS3000 Unifizer

System requirements: The unifizer is available on IBM PC/AT compatible machines meeting the following requirements:

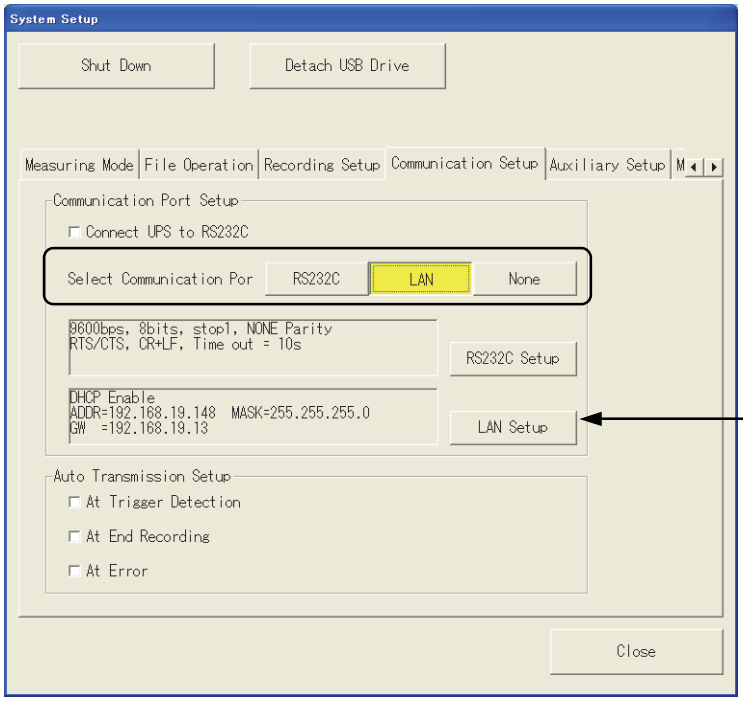
- CPU	Pentium® M 1GHz or faster (CoreTM2 Duo 2 GHz or faster recommended) If Camera used (Visible/Infrared), 1 GB or more is recommended.
- HD available disk space	10 MB of space is needed for the program area. A sufficient free space is also needed for storing data. The maximum size of acquired data files that can be stored is roughly 1/3 of the free space on the hard disk.
- USB port	For installation and protection key
- Display	1024 x 768 pixels or higher
- OS	Windows 2000 (SP4 or later) / Windows XP (SP2 or later) Windows Vista Ultimate (32bit) Windows 7 Ultimate (32bit) / Professional (32bit)

* Windows 2000 and Windows XP are registered trademarks of Microsoft corporation of the United States.
Pentium® is a registered trademark of Intel corporation of the United States.

1.6.2. Communication Settings for Connecting Device

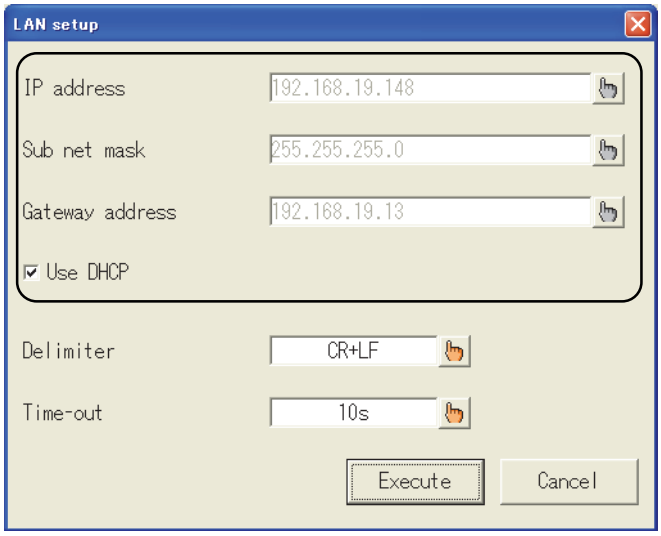
*Note: For **pier to pier communication** between a PC and RA2000 Series without HUB, use a **crossover LAN cable**.

1) Open the “System – Communication Setup” screen of RA2000 series to set up a communication device to be connected.



Protocol setting for LAN

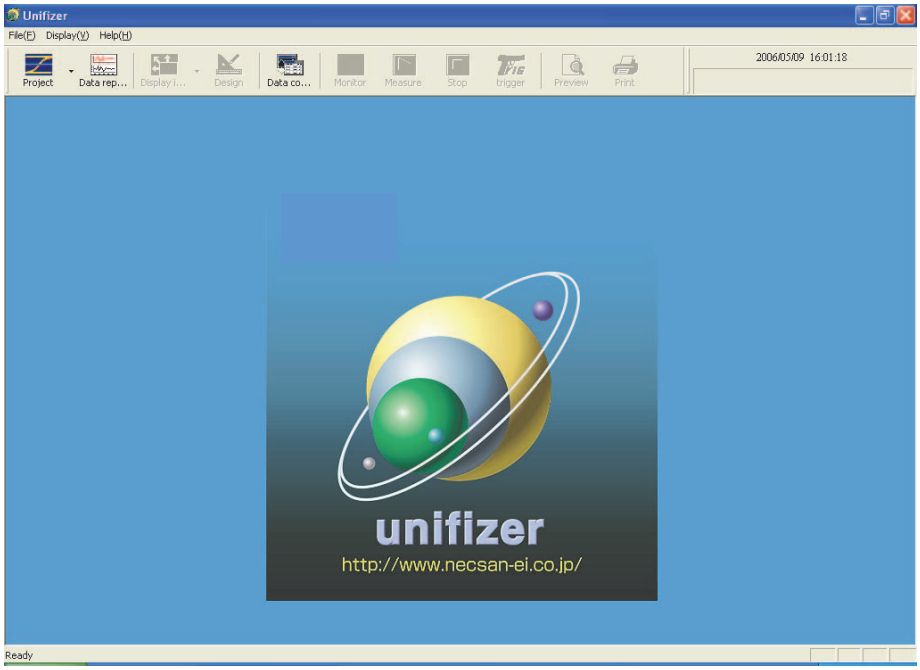
2) Press the “LAN Setup” button on the “System – Communication Setup” screen of RA2000 series to open the next screen for setting.



Make appropriate setting for your network environment.
This IP address must be entered on the connection screen of NS3000.

Note: For **pier to pier communication** to PC, DHCP is not available.
In this case, clear “Use DHCP for LAN setting” and make setting such as IP address directly.

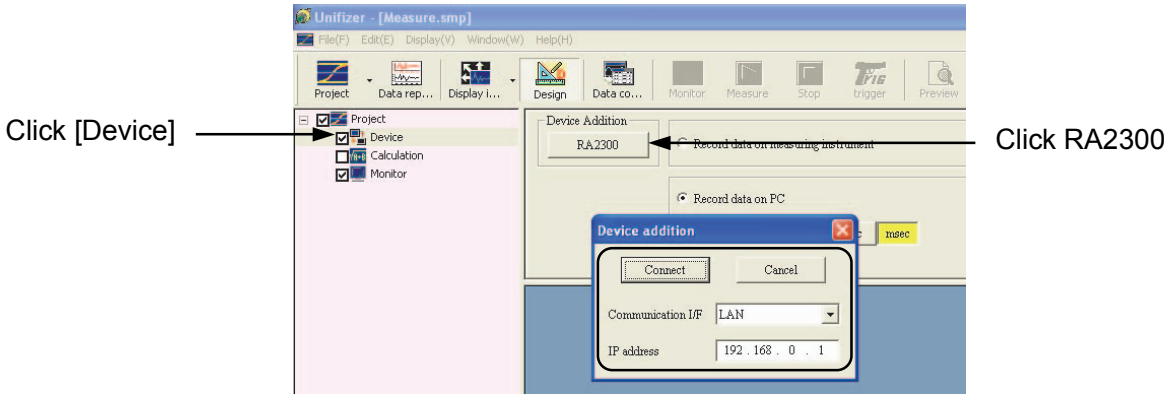
3) Start NS3000
Double-click the shortcut icon of Unifizer.exe on the PC desktop to start the program. If the program starts without any errors, the initial screen is displayed as below.
* Note: Following the instruction manual, install the NS 3000.



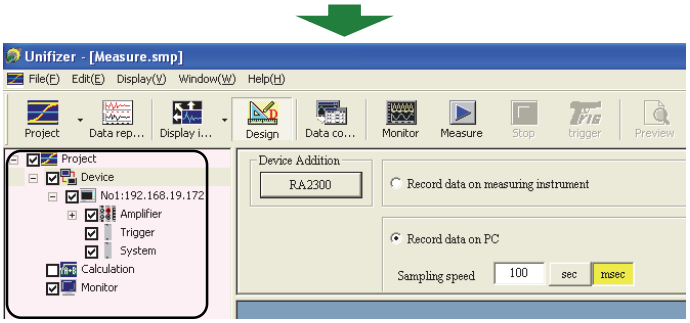
4) Connect to the device

Click the [Device] icon on the tree window to display the additional setting for the device on the advanced setting window.

On this window, set the IP address of the connected device to establish the connection to the device.

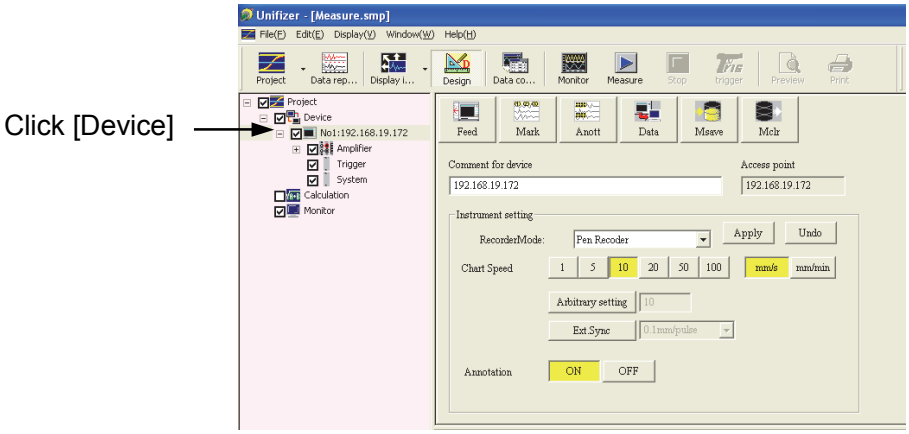


Once the connection is established, the device appears on the tree window as below.



5) Set RA2000A

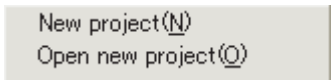
Click to any device icon on the tree to display advanced setting items for the device on the advanced setting window. On this window, set the recording mode, sampling, and others for the recorder.



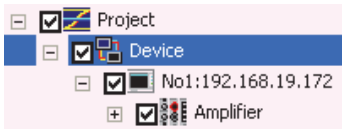
When pressing the [Apply] button, the setting becomes valid and is reflected in the recorder.

When pressing the [Undo] button before accepting, the original settings are returned. However, after accepting, the settings are not returned.

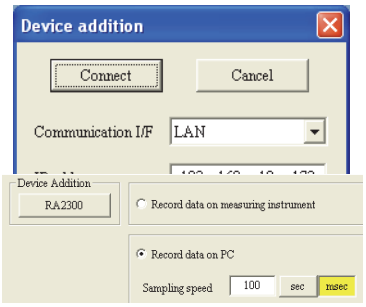
1.6.3. Operating Procedure for basic data recording



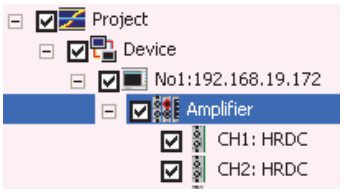
Open the measurement project.



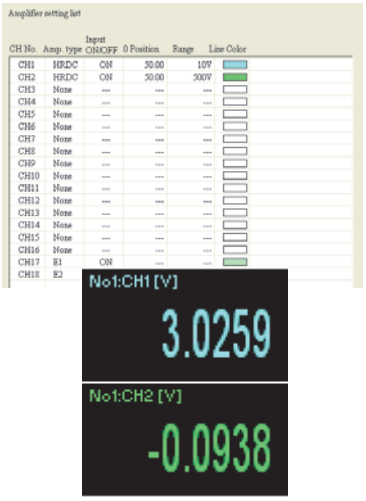
Connect to the instrument.

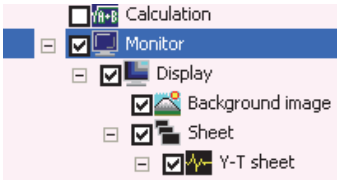


Set recording conditions and sampling speed.



Set input conditions.

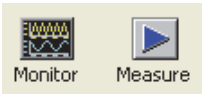


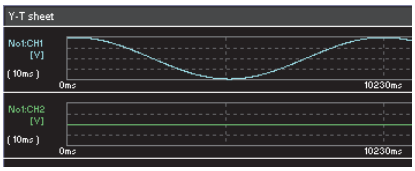


Set data display style.

Check the monitored data.

<Start PC real-time Recording>





Determine how to record data, into the instrument or PC

<Stop PC Real-time Recording>

Start data acquisition.

Finish recording.

1. **Selection of Communication Interface 1-1**

1.1. RA2000 Series Communication Interface Setup 1-2
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1.2. How to Control RA2000 Series Using RS-232C 1-3

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2. Overview of Communication Control

2.1. Local/Remote Control

► The RA2000 Series has two control modes: 1) a local mode that allows control through the control panel and the touch panel, and 2) a remote control mode that allows control only through the communication port.

2.1.1. Local Mode

This is the default state after the power is turned on. Control can be performed either by the control panel and the touch panel, or by input from the remote terminal.

2.1.2. Remote Control Mode

If data is received when a communication function is selected, the RA2000 goes into the remote control mode. Moreover, when a specified auto-transmission cause is generated, the mode enters into the remote control mode. At this time, it is possible to control the RA2000 from the communication interface.

- **Data reception other than [NUL] occurs**

When the RA2000 is switched to remote control mode, **recording continues** and the **remote control mode screen** is displayed. In the remote control mode, **all controls performed via the control/touch are ignored.**

Local mode

or

Remote control mode

2.1.3.Returning to Local Mode

The mode returns to the Local mode upon the reception of escape sequence command **[ESC]-Z**.
Please click the above-shown “Keylock” icon to return manually to local mode.

2.2. Overview of the Communication Commands

► Communication commands to control the RA2000 Series remotely are categorized into three types.

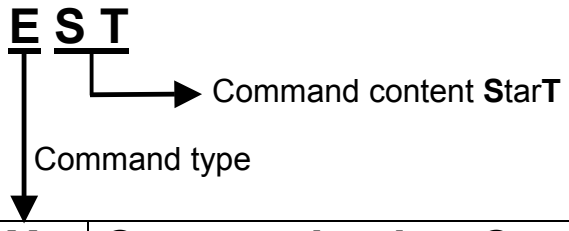
- **Character string command**
  Controls such as settings and recordings are basically performed by string commands. The string commands consist of a 3-character command and parameter string following the command.

- **Escape Sequence Commands**
  The [ESC]+1 character is used as a command. By using these commands, operation/error information of the RA2000 Series can be obtained. This command cannot control settings and operation of the RA2000 Series recorder.

- **1 Byte Control Command**
  Execution is possible by sending a 1-byte control code alone, but functions are limited. The above-mentioned character string commands and escape sequence commands have functions of equal or higher quality.

2.2.1. Format of String Command

The string command consists of a 3-character command and a parameter string following the command. The initial character of the command represents the command type, and the second and third characters represent the contents of the command. The **EST command, which** starts recording, stands for **E**xecute **S**tar**T.**



X	**Communication Control**
S	**Setting**
I	**Read Setting**
E	**Execute**
F	**File/Data Control**
T	**Text**
R	**Read Data**
W	**Write Data**

Input a parameter following the 3-character command. Insert a separator (comma "," or space " ") between parameters. When it is possible to omit parameters, it is necessary to insert commas in sequence instead of parameters in order to clearly indicate that the parameters are omitted. Lastly input a delimiter and operation is complete. Available delimiters are **[CR+LF], [CR], [LF],** etc., and it is necessary to use the same delimiter as that set in the RA2000.

Format Examples of SFT Command (Set Filing Time)

SFT 10,10,0,0 (Delimiter)	Sets recording time to 10 days and 10 hours
SFT ,,,1 (Delimiter)	Sets recording time to 1 second
SFT ,,10,30 (Delimiter)	Sets recording time to 10 minutes and 30 seconds
SFT 10,10,0,0 (Delimiter)	Sets recording time to 10 days and 10 hours

- **Omitting the parameter**

  When the parameter can be omitted, "**Can be omitted**" is specified in the command description. In other cases, parameters cannot be omitted.

2.3. 1-Byte Control Command

► Execution is possible by sending a 1-byte control code alone, but functions are limited. The string commands and escape sequence command, mentioned in the preceding section, have functions of equal or higher quality. Note that usable commands are restricted depending on the communication interface.

- **Example of Basic Program Format**
  PRINT#MAD,CHR$(&H05); (MAD = Line number)

[ENQ] Outputting the status of RA2000

Function	Outputs the status of the RA2000.
Input Format	[ENQ](05h)
Output Format	[NAK](15h): The RA2000 is operating. [ACK](06h): The RA2000 is stopped and is waiting for a command.
Description	When the RA2000 is operating, [NAK](15h) is returned. When the RA2000 is stopped and waiting for a command, [ACK](06) is returned. To see the status of the RA2000 in detail, use the **[ESC]+C command**.

[CAN] Command cancel

Function	Cancels the command that is operating now.
Input Format	[CAN](18h)
Output Format	None
Description	Command that has the same meaning as the ESP command that stops recording. When receiving a command, the command is canceled. When the RA1000 is performing an operation, the operation is terminated. However, an execution operation for amp settings such as auto-scale cannot be terminated.

[DC4] Initializing RA2000

Function	Initializes the RA2000 setting.
Input Format	[DC4](14h)
Output Format	None
Description	This command has the same meaning as the ESI command that initializes the RA2000. Execution is possible while the RA2000 is stopped. Execution error occurs while the RA2000 is operating. Initialization + application restart is performed. Communication settings are not initialized.

2.4. Escape Sequence

► The [ESC]+1 character is used as a command. By using this command the RA2000 operation/error information can be obtained. This command cannot control settings and operation of the RA2000.

- **Character code of [ESC] is 1Bh.**
- **Example of basic program**
  PRINT#MAD,CHR$(&H1B)+"Z"; (MAD= Line number)

In the Escape Sequence Command, a parameter or delimiter is not used.

[ESC]+'Z' Go to Local

Function	Returns to the local state. The key control on the panel becomes valid.
Input Format	[ESC]+'Z' <1Bh> <5Ah>
Output Format	None
Description	Note that, if a delimiter is added (CR, LF, or others), the mode returns to the remote again after going back to the local because of the delimiter detection.

[ESC]+'R' Communication buffer clear

Function	Clears buffer for interface transmission/reception
Input Format	[ESC]+'R'
Output Format	None
Description	When command transmission/reception becomes abnormal during communication, or unnecessary data accumulates in the transmit/receive buffer, it is possible to recover normal communication by initializing the interface.

[ESC]+'C' Status output

Function	Outputs status (present status of the RA2000)
Input Format	[ESC]+'C'
Output Format	A1 (Delimiter)

A1	Outputs status (present status of the RA1000)
0	The RA1000 is not operating.
1	Recording or measurement is in progress. (includes real-time filing)
2	Memory copy is in progress. (includes file save and load)
3	Paper feed is in progress.
4	List print is in progress.
5	Test print is in progress.
6	Other operation is in progress. (includes amp auto balance, etc.)

Description	

[ESC]+'E' Outputting error information

<table>
<tr><td>Function</td><td>Outputs error information of the RA2000.</td></tr>
<tr><td>Input Format</td><td>[ESC]+'E'</td></tr>
<tr><td>Output Format</td><td>A1,A2 (Delimiter)
A1: RA2000 hardware error
<table>
<tr><th>A1</th><th>RA2000 hardware information</th></tr>
<tr><td>0</td><td>Normal</td></tr>
<tr><td>2</td><td>When clamping of thermal head is released</td></tr>
<tr><td>4</td><td>No chart</td></tr>
<tr><td>8</td><td>Abnormal increase of thermal head temperature</td></tr>
</table>
If an error in two or more items is generated, the logical OR of each error number is output. The error information of answer A1 is not cleared until the error status is canceled.
A2: Command processing error
<table>
<tr><th>A2</th><th colspan="2">Command processing error information</th></tr>
<tr><td>0</td><td colspan="2">Normal</td></tr>
<tr><td>1</td><td>Command grammar error</td><td>(Syntax error upon command reception)</td></tr>
<tr><td>2</td><td>Parameter error</td><td>(Parameter exceeding the specifications)</td></tr>
<tr><td>3</td><td>Mode error</td><td>(Impossible to operate in this mode)</td></tr>
<tr><td>4</td><td>Execution error</td><td>(Restricted because of the status of RA2000)</td></tr>
</table></td></tr>
<tr><td>Description</td><td>Error information of answer A1 is not cleared until the error state is cleared. If an error is generated in answer A2, command generating an error with "IES Error Status readout" can be read out. After the details are checked with the IES command, the answer A2 is cleared.</td></tr>
</table>

[ESC]+'S' Status output

<table>
<tr><td>Function</td><td>Outputs status (present status of the RA2000)</td></tr>
<tr><td>Input Format</td><td>[ESC]+'C'</td></tr>
<tr><td>Output Format</td><td>A1 (Delimiter)
<table>
<tr><th>A1</th><th>Outputs status (present status of the RA1000)</th></tr>
<tr><td>0</td><td>The RA1000 is not operating</td></tr>
<tr><td>1</td><td>Recording or measurement is in progress (includes real-time filing)</td></tr>
<tr><td>2</td><td>Memory copy is in progress (includes file save and load)</td></tr>
<tr><td>3</td><td>Paper feed is in progress</td></tr>
<tr><td>4</td><td>List print is in progress</td></tr>
<tr><td>5</td><td>Test print is in progress</td></tr>
<tr><td>6</td><td>Other operation is in progress (includes amp auto balance, etc.)</td></tr>
</table></td></tr>
<tr><td>Description</td><td></td></tr>
</table>

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2.1.2. Remote Control Mode 2-2
2.1.3. Returning to Local Mode 2-2

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2.3. 1-Byte Control Command.....2-4
[ENQ] Outputting the status of RA2000 2-4
[CAN] Command cancel 2-4
[DC4] Initialize of RA2000 2-4

2.4. Escape Sequence 2-5
[ESC]+'Z' Go to Local 2-5
[ESC]+'R' Communication buffer clear 2-5
[ESC]+'C' Status output 2-5
[ESC]+'E' Outputs error information 2-6
[ESC]+'S' Status output 2-6

*3. Setting Command – s***

3.1. Measurement Mode

SMM (Set Measure Mode)　Setting measurement mode

Function	Sets measurement mode.
Input Format	SRM P1 (Delimiter)
	P1: Measurement Mode

P1	Measurement Mode
1	Pen Recorder
2	Memory Recorder
3	HD Recorder
4	Multi Recorder
5	X-Y Recorder
6	Data Chart Recorder (Maintenance Function)

Output Format	None
Description	These settings are recording basics. For details of each recording type, see the RA2300MKⅡ User's Manual. While the RA2300MKⅡ is operating, an execution error occurs.

3.2. Recording in General

SSS (Set filing Save Setting)　Setting place where to save files

Function	Sets place where to save files.
Input Format	SSS P1, P2, P3, P4, P5 (Delimiter)
	P1: Drive selection ([A-I] Excludes OS drives are excluded and external drives are available.) P2: Using user folder (0=OFF, 1=ON) P3: Using Day folder (0=OFF, 1=ON) P4: User folder name (String available for folder name) (Can be omitted.) P5: File name (first 4 characters) (Maximum 4 alphanumeric letters) (Can be omitted.)
Output Format	None
Description	An execution error is generated while the recorder is operating. The restriction for P4 user folder name is applied by PC restrictions only. Setup target will differ depending on the recorder mode. The description above applies to the Memory Recorder. Refer to the dedicated storage values of memory filing storage location. For the HD Recorder, refer to SSS Settings for Storage Location of HD Recorder. For Multi-Recorder, SSS Settings for Storage Location of Multi-Recorder. P1 through P5 may be deleted. If values are deleted, current value is maintained. If all values are omitted, a parameter error is generated.

3.3. Waveform Chart Recording

SCS (Set Chart Speed) Setting paper feed speed of waveform chart printing

<table>
<tr><td>Function</td><td>Sets paper feeding speed of waveform chart recording.</td></tr>
<tr><td>Input Format</td><td>SCS P1, P2 (Delimiter)
P1: Setting speed
<table>
<tr><th>P1</th><th>Speed value</th></tr>
<tr><td>1-100</td><td>Speed numerical value Resolution 1, Recording unit is set by P2.</td></tr>
<tr><td>E</td><td>External synchronization recording External synchronization pulse is set by P2.</td></tr>
</table>
P2: Speed unit (When P1=1 to 100) (Can be omitted.)
<table>
<tr><th>P2</th><th>Speed unit</th></tr>
<tr><td>1</td><td>[mm/s]</td></tr>
<tr><td>2</td><td>[mm/min]</td></tr>
<tr><td>Omitted</td><td>[mm/s]</td></tr>
</table>
P2: External synchronization pulse ratio (When P1=E) (Can be omitted.)
<table>
<tr><th>P2</th><th>Sets speed value</th></tr>
<tr><td>1</td><td>0.1mm/pulse</td></tr>
<tr><td>2</td><td>0.025mm/pulse (Not available in RA2800)</td></tr>
<tr><td>Omitted</td><td>0.1mm/pulse</td></tr>
</table></td></tr>
<tr><td>Output Format</td><td>None</td></tr>
<tr><td>Description</td><td>The operations above are applicable when the mode is other than in X-Y or Data Chart.
For X-Y, refer to SCS X-Y Data Sampling Speed Settings.
For Data Chart, refer to SCS Data Chart Recording Speed Settings.
The speed value settings can be set to User2.</td></tr>
</table>

3.4. Memory Recording

NOTE If a setting command related to memory recording is set while the RA2300MKⅡ is operating, an execution error occurs.

SSC (Set Sampling Clock) Setting memory sampling speed

Function	Sets memory sampling speed.
Input Format	SSC P1, P2 (Delimiter)
	P1: Setting speed

P1	Speed value
1-999	Speed numerical value Recordable by 1 step, Recording unit is set by P2.
E	External synchronization printing

P2: Speed unit (When P1=n)

P2	Speed unit
1	[μs]
2	[ms]
3	[s]

* When P1=E, P2 is invalid.

Output Format	None
Description	The highest speed for P1 for RA2300MKⅡ is 1 μs and RA2800A, 2 μs. While the recorder is operating, an execution error occurs. Speed value is set for User2.

SBS (Set Block Size) Setting block size

Function	Sets block size.
Input Format	SBS P1 (Delimiter)
	P1: Block Size

P1	Block size	Setting condition
1	32MW *	Recording channel is just 1.
2	16MW *	Recording channels are 2 or less.
3	8MW *	Recording channels are 4 or less.
4	4MW *	Recording channels are 8 or less.
5	2MW	Recording channels are 16 or less.
6	1MW	Recording channels are 32 or less.
7	512KW	No limitation
8	256KW	No limitation
9	128KW	No limitation
10	64KW	No limitation
11	32KW	No limitation
12	16KW	No limitation
13	8KW	No limitation
14	4KW	No limitation
15	2KW	No limitation

* Be limited by recording channel number of “SRC Recording Channel” to become applicable block size.

Output Format	None
Description	While the RA2000 is operating, an execution error occurs.

SML (Set Memory Length)　Setting memory block size

Function	Sets the memory block size using arbitrary values.
Input Format	SML P1 (Delimiter)
	P1: Data count stored in memory (1000 to 61865984) * The effective size (upper limit value) is a value determined by dividing memory capacity by channel count. * The upper limit value of P1 above is a value when the number of data recording channel is one. In actual cases, the upper limit value will be the value divided by the number of recording channel (set by SRC Recording Channel).
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs. When the memory block size is changed, the memory data is deleted. Memory segmentation up to 128 is made, which is larger segmentation than specified size.

SMB (Set Memory Block)　Setting block No.

Function	Setting block No..
Input Format	SMB P1 (Delimiter)
	P1: Block No.　　([1 - 128])
Output Format	None
Description	While the RA2000 is operating, an execution error occurs. The range varies depending on the segmentation number. (Example: 8 segmentation, [1-8])

STD (Set Trigger Delay)　Setting pre-trigger

Function	Sets pre-trigger.
Input Format	STD P1 (Delimiter)
	P1: Pre-trigger　　([0-100]%)
Output Format	None
Description	While the RA2000 is operating, an execution error occurs. Becomes valid when recording in a memory block.

STE (Set Trigger Execution)　Setting trigger execution

Function	Sets trigger execution.
Input Format	STE P1 (Delimiter)
	P1: Trigger execution　　(1=Once, 2=Repeat, 3=Endless)
Output Format	None
Description	While the RA2000 is operating, an execution error occurs. Be reflected only in memory recording.

SMC(Set Memory Copy) Sets the readout amount

Function	Sets the readout amount of the internal memory when copying
Input Format	SMC P1(Delimiter)
	P1: readout amount(1-100 %)
Output Format	None
Description	While the RA2000 is operating, an execution error occurs.

For the other settings, see commands in the following table.

Setting contents	Command to see
Path to save files	SSS (Set filing Save Setting)　Setting place where to save files
Setting for CSV savings	SMF (Set Memory Filing)　Setting Filing

3.5. HD Recording

SRF (Set Real-time Filing) Setting HD recorder basics

Function	Sets recording speed, recording length, and recording method.
Input Format	SRF P1, P2, P3, P4, P5 (Delimiter)
	P1: Recording speed numeric value ([1-1000, E] E=external synchronization) P2: Recording speed Unit (1=[μs], 2=[ms], 3=[s]) Invalid when P1=E. P3: Data format (1=Peak, 2=Sampling) P4: Recording method (1=Normal, 2=Ringing) P5: Recording data number (Selecting 0 enables the whole "Free Disk Space")
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs. The recording speed settings with P2 are: 1μs – 100s for RA2300MKⅡ, and 1μs – 100s for RA2800A. The recording speed settings with P1 and P2 are limited from 1us to 10s.

SFT (Set Filing Time) Setting recording time

Function	Sets recording time.
Input Format	SFT P1, P2, P3, P4 (Delimiter)
	P1: Day number (0 or higher numeric value) (To be omitted, select 0) P2: Hour number (0 or higher numeric value) (To be omitted, select 0) P3: Minute number (0 or higher numeric value) (To be omitted, select 0) P4: Second number (0 or higher numeric value) (To be omitted, select 0)
Output Format	None
Description	While the recorder is operating, an execution error occurs. P1 through P4 can be omitted. When the value is omitted, 0 is set. However, if all the values are omitted, a parameter error occurs.

SRT (Set Real-time Trigger) Setting real-time recording operation

Function	Sets real-time recording operation.
Input Format	SRT P1, P2 (Delimiter)
	P1: Starting execution of recording with detecting trigger.

P1	Starting execution of recording with detecting trigger
0	Pressing "START" key initiates recording soon.
1	Detecting trigger initiates recording.
2	Detecting trigger initiates and repeats recording.

	P2: Mark printing with trigger (0=OFF, 1=ON)
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs. The repeat execution with P1=2 is valid only when a recording length is limited.

For the other settings, see commands in the following table.

Setting contents	Command to see
Paper feeding speed of a wavelength chart recording	SCS (Set Chart Speed) Setting paper feed speed of waveform chart
Path to save files	SSS (Set filing Save Setting) Setting place where to save files

3.6. X-Y Recording

SCS (Set Chart Speed) HD recording speed of X-Y recorder

Function	Sets HD recording speed of X-Y recorder
Input Format	SCS P1,P2 (Delimiter)
	P1: Speed numerical value [1-1000] ms P2: Speed unit Sets sample unit “2=ms”(Fixed) (Can be omitted.)
Output Format	None
Description	This function is valid in X-Y recorder mode Please refer to "SCS: Waveform Chart Feed Speed Settings” at other recorder modes.

SXA (Set X-Axis) Sets X axis channel

Function	Sets X axis channel in X-Y recording
Input Format	SXA P1(Delimiter)
	P1: Sets channel ([1-16] for RA2300MKⅡ and [1-32] for RA2800A)
Output Format	None
Description	Registering is possible even if the specified channel is invalid. In this case, it doesn't draw in X-Y form.

SYC (Set Y-Ch) Sets Y axis channels

Function	Sets Y axis channels in X-Y recording
Input Format	SYC P1,P2 (Delimiter)
	P1: Y axis No. ([1-3]) P2: Sets channel.([1-16] for RA2300MKⅡ and [1-32] for RA2800A)
Output Format	None
Description	Registering is possible even if the specified channel is invalid. In this case, it doesn't draw in X-Y form.

3.7. Trigger

STM (Set Trigger Mode) Setting trigger mode

Function	Sets trigger mode.
Input Format	STM P1, P2 (Delimiter)
	P1: Trigger mode 0=OFF, 1=OR, 2=AND, 4=WINDOW

P1	Trigger mode
0	OFF (memory block=1 block)
1	OR
2	AND
3	<Reserved> A parameter error occurs.
4	WINDOW

	P2: <Reserved>
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs. The recorder does not support P1=3(A*B); therefore, a parameter error occurs when it is selected.

STC (Set Trigger mode OR, AND Channel) Setting OR, AND trigger condition

Function	Sets OR, AND trigger condition.
Input Format	STC P1, P2, P3, P4 (Delimiter)
	P1: Channel number [1-16] for RA2300MKⅡ and [1-32] for RA2800 P2: Detecting ON/OFF 0=OFF, 1=ON P3: Varies depending on amp type (see below). (Can be omitted.) P4: Varies depending on amp type (see below). (Can be omitted.)
	----- For analog type of amp ----- P3: Trigger level Selecting with measured value (within the dynamic range). P4: Slope 1=Rising edge, 2=Falling edge)
	----- For event amp ----- P3: Detecting logic 1=AND, 2=OR P4: Detecting pattern 0=X, 1=H, 2=L Example: For HHLL XXHL, “11220012”.
Output Format	None
Description	P1=E1 is a setting for an extra event or the recorder event (E1). While the RA2300MKⅡ is operating, an execution error occurs. When the selected channel is an invalid amp, a parameter error occurs.

STW (Set Trigger Window) Setting WINDOW trigger condition

Function	Sets WINDOW trigger condition.
Input Format	STW P1, P2, P3, P4, P5, P6 (Delimiter)
	P1: Channel number [1-16] for RA2300MKⅡ and [1-32] for RA2800A P2: Detecting ON/OFF 0=OFF, 1=ON P3: <Reserved> P4: Maximum trigger level Selecting with measured value (within the dynamic range). P5: Minimum trigger level Selecting with measured value (within the dynamic range). P6: Trigger occurrence direction 1=IN, 2=OUT
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs. When the selected channel is the amp other than an analog type of amp, a parameter error occurs.

STF (Set Trigger Filter) Sets trigger filter

Function	Sets trigger filter
Input Format	STF P1(Delimiter)
	P1: Trigger Filter [0-65534] 0=OFF
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs.

3.8. Amp Unit

Names of input units are represented by the following symbols.

Name of Amp Unit	Symbol	Name of Amp Unit	Symbol
2-CH high resolution DC amp unit	***HRDC***	TC/DC amp unit	***TDC***
2-CH FFT amp unit	***FFT***	F/V converter unit	***FV***
2-CH high speed DC amp unit	***HSDC***	2-CH vibration/RMS amp unit	***RMS***
2-CH AC strain amp unit	***ACST***	2-CH DC strain amp unit	***DCST***
Event amp unit	***EV***	2-CH zero suppression amp unit	***HRZS***
2-CH TC/DC amp unit	***TCDC***		

SCH (Set CHannel)　Setting HRDC amp

Function	Sets HRDC amp.
Input Format	SCH P1, P2, P3, P4, P5, P6, P7 (Delimiter)
	P1:Selecting channel　[1-16, A] for RA2300MKⅡ and [1-32, A] for RA2800A　A means a batch setting. P2: Amp type　1 fixed P3: Input　0=OFF, 1=ON, 2=GND P4: Setting range　1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V, 7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV P5: Filter　0=OFF, 1=30Hz, 2=300Hz, 3=3kHz P6: Position　[-100.00 to 200.00] Step 0.05 P7:Input combination　1=AC, 2=DC
Output Format	None
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs.

SCH (Set CHannel) Setting FFT amp

Function	Setting FFT amp.
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, to P13 (Delimiter) P1: Specifying channel [1-16, A] for RA2300MK Ⅱ and [1-32, A] for RA2800A A means a batch setting. P2: amp type 2 fixed P3: Input 0=OFF, 1=ON, 2=GND P4: Setting range 1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V, 7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV P5: Filter 0=OFF, 1=30Hz, 2=300Hz, 3=3kHz, 4=Anti-aliasing P6: Position [-100.00 to 200.00] Step 0.05 P7: Input combination 1=AC, 2=DC P8: Measurement mode 0=Voltage, 1=Vibration P9: Setting sensor 1=Hybrid type, 2=Standalone type P10: Vibration unit 1=[m/s^2], 2=[G] P11: Hybrid-type sensor sensitivity [0.001 to 120.000]mV/m/s^2 or [0.010 to 1200.00]mV/G P12: Charge converter sensitivity [0.01 to 10.0]mV/pC P13: Acceleration Sensor sensitivity [0.001 to 120.000]pC/m/s^2 or [0.010 to 1200.00]pC/G The sensitivity ranges of P11 and P13 vary depending on a vibration unit.
Output Format	None
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs. When a measurement mode is vibration (P8=1), the setting range of P4 is 5V-100mV (7-12).

SCH (Set CHannel) Setting HSDC amp

Function	Sets HSDC amp.
Input Format	SCH P1, P2, P3, P4, P5, P6, P7 (Delimiter) P1: Selecting channel [1-16, A] for RA2300MK Ⅱ and [1-32, A] for RA2800A A means a batch setting. P2: Amp type 3 fixed P3: Input 0=OFF, 1=ON, 2=GND P4: Setting range 1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V, 7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV P5: Filter 0=OFF, 1=5Hz, 2=50Hz, 3=500kHz, 4=5kHz, 5=50kHz P6: Position [-100.00 to 200.00] Step 0.05 P7: Input combination 1=AC, 2=DC
Output Format	None
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs.

SCH (Set CHannel) Setting ACST amp

Function	Sets ACST amp.	
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, P8, P9 (Delimiter)	
	P1: Selecting channel	[1-16, A] for RA2300MKⅡ and [1-32, A] for RA2800A A means a batch setting.
	P2: Amp type	4 fixed
	P3: Input	0=OFF, 1=ON, 2=GND
	P4: Setting range	2=20kμε, 3=10kμε, 4=5kμε, 5=2kμε, 6=1kμε
	P5: Filter	0=OFF, 1=10Hz, 2=30Hz, 3=100Hz, 4=300Hz
	P6: Position	[-100.00 to 200.00] Step 0.05
	P7: Gage rate	[1.50 to 2.50] Step 0.01 Select 2.00 for out of range.
	P8: CAL polarity	0=OFF, 1=[+], 2=[-]
	P9: CAL level	2=5000με, 3=3000με, 4=2000με, 5=1000με, 6=500με
Output Format	None	
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs.	

SAR (Set Ac strain amp R-fine) Setting R-balance

Function	Sets R-fine (fine adjustment of resistance balance) of ACST amp	
Input Format	SAR P1,P2 (Delimiter)	
	P1: Selecting channel	[1-16] for RA2300MKⅡ and [1-32] for RA2800A
	P2: Adjustment value	[-100 to 100] can not be specified
Output Format	None	
Description	After execution of the EAS command (auto balance execution), this command adjusts the unbalanced portion. The auto balance of ACST amp and DCST amp can be executed with the EAS command and the EAB command respectively. While any action other than a chart recording is executing, an execution error occurs.	

SCH (Set CHannel) Setting EV amp

Function	Sets EV amp.
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, P8, P9 (Delimiter)
	P1: Selecting channel [1-16, A] for RA2300MKⅡ and [1-32, A] for RA2800A A means a batch setting. P2: Amp type 5 fixed P3: Input 0=OFF, 1=ON P4: Signal type 1=V, 2=C The order of all 8 signals is sig1, 2, 3, to 8 from left . P5: Signal ON/OFF 0=OFF, 1=ON The order of all 8 signals is sig1, 2, 3, to 8 from left. P6: Signal number [1-8] P7: Wavelength position 0.0 to 215.0 [mm] P8: Vibration 2.0 to 25.0 [mm] P9: Width of base line 0.5 to 2.0 [mm]
Output Format	None
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs.

SCH (Set CHannel) Setting TCDC amp

Function	Sets TCDC amp.
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, P8 (Delimiter)
	P1: Selecting channel [1-16, A] for RA2300MKⅡ and [1-32, A] for RA2800A A means a batch setting. P2: Amp type 6 Fixed P3: Input 0=OFF, 1=ON, 2=GND P4: Setting range The content varies depending on the P7 measurement mode. P7=1 Temperature measurement mode with thermocouple 1=R1800 C, 2=T400C, 3=J1200C, 4=K1400C, 5=K500C, 6=W2400C, 7=R3200F, 8=T800F, 9=J2000F, 10=K2500F, 11=K1000F, 12=W4200F P7=2 Voltage measurement mode 1=50V, 2=20V, 3=10V, 4=5V, 5=2V, 6=1V, 7=500mV, 8=200mV, 9=100mV P5: Filter 0=OFF, 1=10Hz, 2=30Hz, 3=500Hz, 4=5Hz P6: Position [-100.00 to 200.00] Step 0.05 P7: Measurement mode 1= Thermocouple, 2=Voltage measurement P8: Reference junction temperature compensation 1=EXT, 2=INT
Output Format	None
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs.

SCH (Set CHannel) Setting TDC amp

Function	Sets TDC amp.	
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, P8 (Delimiter)	
	P1: Selecting channel	[1-16, A] for RA2300MKⅡ and [1-32, A] for RA2800A A means a batch setting.
	P2: amp type	7 fixed
	P3: Input	0=OFF, 1=ON, 2=GND
	P4: Setting range	The contents vary depending on the P7 measurement mode.
		P7=1 Temperature measurement mode with thermocouple
		1=R1600C, 2=R800C, 3=T400C, 4=T200C, 5=J1000C, 6=TJ200C, 7=K1200C, 8=K200C, 9=R3000F, 10=R1500F, 11=T800F, 12=T400F, 13=J2000F, 14=J400F 15=K2500F, 16=K400F
		P7=2 Voltage measurement mode
		1=50V, 2=20V, 3=10V, 4=5V, 5=2V, 6=1V, 7=500mV, 8=200mV, 9=100mV, 10=50mV, 11=20mV, 12=10mV
	P5: Filter	0=OFF, 1=10Hz, 2=30Hz, 3=500Hz, 4=5Hz
	P6: Position	[-100.00 to 200.00] Step 0.05
	P7: Measurement Mode	1= Thermocouple, 2=Voltage measurement
	P8: Reference junction temperature compensation	1=EXT, 2=INT
Output Format	None	
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs.	

SCH (Set CHannel) Setting FV amp

Function	Sets FV amp.	
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, P8 (Delimiter)	
	P1: Selecting channel	[1-16, A] for RA2300MKⅡ and [1-32, A] for RA2800A A means a batch setting.
	P2: Amp type	8 fixed
	P3: Input	0=OFF, 1=ON
	P4: Setting range	1=10kHZ, 2=5kHz, 3=2kHz, 4=1kHz, 5=500Hz, 6=200Hz, 7=100Hz
	P5: Position	[-100.00 to 200.00] Step 0.05
	P6: Input combination	1=AC, 2=DC
	P7: Filter	1=Ripple priority, 2=Answer priority
	P8: Detecting Level	1=0V, 2=2.5V
Output Format	None	
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs.	

SCH (Set CHannel) Setting RMS amp

Function	Sets RMS amp.
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, to P15 (Delimiter)
	P1: Selecting channel — [1-16, A] for RA2300MK Ⅱ and [1-32, A] for RA2800A A means a batch setting. P2: Amp type — 9 fixed P3: Input — 0=OFF, 1=ON, 2=GND P4: Setting range — The content varies depending on the P10 measurement mode. **P8=1 RMS input mode** 1=350Vrms, 2=200Vrms, 3=100Vrms, 4=50Vrms, 5=20Vrms, 6=10Vrms, 7=5Vrms, 8=2Vrms, 9=1Vrms, 10=500mVrms, 11=200mVrms, 12=100mVrms **P8=2 DC input mode** 1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V, 7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV P5: Low pass filter — 0=OFF, 1=30Hz, 2=100Hz, 3=300Hz, 4=1kHz P6: High pass filter — 0=OFF, 1=10Hz, 2=30Hz, 3=100Hz P7: Position — [-100.00 to 200.00] Step 0.05 P8: Input mode — 1=RMS, 2=DC P9: Input combination — 1=AC, 2=DC P10: Measurement mode — 0=Voltage, 1=Vibration P11: Setting sensor — 1=Hybrid type, 2=Standalone type P12: Vibration unit — 1=[m/s^2],2=[G] P13: Hybrid-type sensor sensitivity — [0.001 to 120.000]mV/m/s^2 or [0.010 to 1200.00]mV/G P14: Charge converter sensitivity — [0.01 to 10.0]mV/pC P15: Acceleration sensor sensitivity — [0.001 to 120.000]pC/m/s^2 or [0.010 to 1200.00]pC/G The sensitivity ranges of P11 and P13 vary depending on vibration a unit.
Output Format	None
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs.

SCH (Set CHannel) Setting DCST amp

Function	Sets DCST amp.	
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, P8 (Delimiter)	
	P1: Selecting channel	[1-16, A] for RA2300MK Ⅱ and [1-32, A] for RA2800A A means a batch setting.
	P2: Amp type	10 fixed
	P3: Input	0=OFF, 1=ON, 2=GND
	P4: Setting range	The content varies depending on the P8 Input mode. P8=1 ST BV=2V 1=50kμε, 2=20kμε, 3=10kμε, 4=5kμε, 5=2kμε P8=2 ST BV=5V 1=20kμε, 2= 8kμε, 3= 4kμε, 4=2kμε, 5=800με P8=3 DC 1=50mV, 2=20mV, 3=10mV, 4=5mV, 5=2mV
	P5: Filter	0=OFF, 1=10Hz, 2=30Hz, 3=300Hz, 4=1kHz
	P6: Position	[-100.00 to 200.00] Step 0.05
	P7: Gage rate	[1.50 to 2.50] Step 0.01 Select at 2.00 for out of range
	P8: Input mode and BV	1=ST(BV=2V), 2=ST(BV=5V), 3=DC
Output Format	None	
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs. “BV” means a bridge voltage.	

SCH (Set CHannel) Setting HRZS amp

Function	Sets HRZS amp.	
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, P8, P9 (Delimiter)	
	P1: Selecting channel	[1-16, A] for RA2300MK Ⅱ and [1-32, A] for RA2800A A means a batch setting.
	P2: Amp type	11 fixed
	P3: Input	0=OFF, 1=ON, 2=GND
	P4: Setting range	1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V, 7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV
	P5: Filter	0=OFF, 1=30Hz, 2=300Hz, 3=3kHz
	P6: Position	[-100.00 to 200.00] Step 0.05
	P7: Input combination	1=AC, 2=DC
	P8: ZSV ON/OFF	0=OFF, 1=ON
	P9: ZSV level	The range varies depending on a P4 range setting. 500V-5V:[-130.000 to 130.000]V 2V-100mV:[-13.0000 to 13.0000]V
	ZSV means a zero suppression voltage.	
Output Format	None	
Description	When P1 = A, the other selections apply to all the channels corresponding to the selected type with P2. When the amp type of selected channel does not correspond to P2, a parameter error occurs. While any action other than a chart recording is executing, an execution error occurs.	

SCH (Set CHannel) Setting Extra Event or the Recorder Event (E1)

Function	Sets extra event (E1).
Input Format	SCH P1, P2, P3, P4, P5, P6, P7, P8, P9 (Delimiter)
	P1: Selecting channel E1 fixed P2: Amp type -1 fixed P3: Input 0=OFF, 1=ON P4: <Reserved> P5: Signal ON/OFF 0=OFF, 1=ON The order of all 16 signals is sig1, 2, 3, to 16 from left. P6: Signal number [1-16] P7: EV wavelength position 0.0 to 215.0 [mm] P8: Vibration 2.0 to 25.0 [mm] P9: Width of base line 0.5 to 2.0 [mm]
Output Format	None
Description	P1 and P2 are fixed. When the event unit of the recorder is not installed, a mode error occurs. The vibration (P8) and the width of base line (P9) must be set against all the signals, regardless of the signal number (P6) designation. A setting for the wavelength position (P7) becomes the following action, depending on the signal number (P6) designation.

P6	Action
Signal 8	Used for setting the event wavelength position
Signal 7	Used for calculating the signal-interval pitch based on a gap of the signal 8 position.
Others	Rejected

SUS (Set User Scale) Sets user-scale

Function	Sets user-scale
Input Format	SUS P1, P2, P3, P4, P5, P6, P7, P8, P9,P10(Delimiter)
	P1: Selecting channel [1-16] for RA2300 and [1-32] for RA2800 P2: ON,OFF for physical conversion(0=OFF, 1=ON) P3: maximum input value(Can be omitted) P4:minimum input value (Can be omitted) P5:maximum output value (Can be omitted) P6:minimum output value (Can be omitted) P7:upper limit of recording full scale. (Can be omitted) P8:lower limit of recording full scale. (Can be omitted) P9:Unit setting(Can be omitted) 0= Standard, 2=N, 3=Pa, 4=mm, 5=με, 6= m/s^2, 7=°C, 8=Ω, 9= kg, 10= kgf, 11= kgf/cm^2, 12= g P10: User-specified unit (character string of a maximum of 9 characters) (Can be omitted)
Output Format	None
Description	When the selected channel is the amp other than an analog type of amp, a parameter error occurs.

3.9.Setting for Display and Printing

SWD (Set Scale Wave Division) Setting Waveform Division

Function	Sets Waveform Division
Input Format	SWD P1 (Delimiter)
	P1: Division [1-16]
Output Format	None
Description	While the recorder is operating, an execution error occurs. Each setting for frame width and channel will be operated by SWF commands.

SWF (Set Scale Wave flame) Setting Waveform Frame size

Function	Sets Waveform Frame size
Input Format	SWF P1, P2, P3 (Delimiter)
	P1: Frame [1-16] P2: Size [10-200]mm 5mm step P3: Display channel [0-FFFF]ASCII-HEX format for RA2300MKⅡ [0-FFFFFFFF]ASCII-HEX format for RA2800A
Output Format	None
Description	While the recorder is operating, an execution error occurs. The frame becomes the order from 1 to 16 from the uppermost part to the lower side for RA2300MKⅡ and the order from 1 to 32 for RA2800A. The range of the frame specification (P1) changes according to the waveform record number of segmentations. (ex. in case where waveforms divide into five, range from 1 to 5) When the sum total of the size of the frame exceeds 200mm, this case becomes a parameter error ASCII HEX format of the channel pattern shows LSB=1 channel and MSB=16 or 32 channels in a bit format.

* ON/OFF of the scale display and the digital display, etc. cannot be set by the communication command.

3.10. Output to File and Recording Paper (including Backup Filing)

SMF (Set Memory Filing) Setting Filing

Function	Sets memory backup filing and file output of playback data.
Input Format	SMF P1, P2 (Delimiter)
	P1: Date format (1=Binary, 2=CSV) P2: Date interval between CSV savings

P2	0	1	2	3	4	5	6	7	8	9
Date Interval	1	2	5	10	20	50	100	200	500	1000

Output Format	None
Description	While the recorder is operating, an execution error occurs.

SPS (Set Print Size) Sets copy scaling

Function	Sets copy scaling of memory recorder or HD recorder in memory copy
Input Format	SPS P1(Delimiter)
	P1: Sets copy scaling

P1	Sets copy scaling	P1	Sets copy scaling
1	x5	9	1/100
2	x2	10	1/200
3	1/1	11	1/500
4	1/2	12	1/1000
5	1/5	13	1/2000
6	1/10	14	1/5000
7	1/20	15	1/10000
8	1/50		

Output Format	None
Description	X100, x50, x20, and x10 cannot be set by the communication command.

3.11. System – Recording Setting

SRC (Set Record Ch) Setting record channel

Function	Sets record channel.
Input Format	SRC P1 (Delimiter)
	P1: Record channel Select a valid channel in ASCII HEX format. (1=valid/0=invalid)

Examples	RA2300MKⅡ	RA2800A
Only CH1 is valid	00001	000000001
Only CH8 is valid	00080	000000080
All the channels are valid	0FFFF	0FFFFFFFF
E1 is valid	1FFFF	1FFFFFFFF
E2 is also valid	3FFFF	3FFFFFFFF

Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs. If the memory block size becomes invalid due to the setting, it is automatically corrected to the normal value. Example: After the recording channel is set to only 1 channel and the block size is set to 32MW, if all the channels are designated as the recording channel, the block size is automatically corrected to 2MW, because 32MM is too large and cannot be assigned to the block size.

SDN (Set Data No.) Setting Data No.

Function	Sets data No..
Input Format	SDN P1 (Delimiter)
	P1: Data No. ([1 - 9999])
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs. Recording automatically increments data No. (Next number of 9999 is 1.)

SAN (Set Annotation ON/OFF) Setting annotation print

Function	Sets annotation print.
Input Format	SAN P1, P2, P3, P4, P5, P6 (Delimiter)
	P1: System annotation print (0=OFF, 1=ON) P2: System channel annotation print (0=OFF, 1=ON) P3: <Reserved> P4: User page annotation print (0=OFF, 1=ON) P5: <Reserved> P6: Annotation print interval (0=The first time only, 30-1000[cm])
Output Format	None
Description	**P3 and P5 are parameters for compatibility with the RA1000 series so that they are invalid for the RA2300MKⅡ.**

* “TIP”, “TOP”, or “TCP” command supports the string of a user annotation page.

SPA (Set Print Auxiliary) Setting measurement information and signal name print

Function	Sets measurement information and signal name print (ON/OFF).
Input Format	SPA P1, P2, P3, P4, P5, P6, P7, P8, P9 (Delimiter)
	P1:Print measurement information (0=OFF, 1=ON) P2: <Reserved> Invalid P1: Print signal name (0=OFF, 1=ON) P4 to 9: <Reserved> Invalid
Output Format	None
Description	**<Reserved> is a parameter for compatibility with the RA1000 series so that it is invalid for the RA2300MKⅡ.**

* “THD”, “TOH”, or “TCD” command supports the string of measurement information.
* “TSN”, “TOS”, or “TCS” command supports the string of a signal name.

SGP (Set Grid Pattern) Sets grid pattern

Function	Sets grid pattern
Input Format	SGP P1 (Delimiter)
	P1: Grid(0=OFF,1=10mmSTD,2=10mm,3=5mmSTD,4=5mm)
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs.

SAS (Set Auto Scaling) Sets auto scaling (ON/OFF)

Function	Sets auto scaling for print
Input Format	SAS P1 (Delimiter)
	P1: scale after recording (0=OFF,1=ON)
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs.

SSM (Set Scale Mode) Sets auto scaling mode

Function	Sets auto scaling mode
Input Format	SSM P1 (Delimiter)
	P1: print scaling mode (0=ALL,1=channel independence)
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs.

3.12.System - Maintenance

SDT (Set DaTe) Setting clock

Function	Sets the internal clock.
Input Format	SDT P1, P2, P3, P4, P5, P6 (Delimiter)
	P1: Year (A.D.) (0 – 99) Last two digits P2: Month (1-12) P3: Date (1-31) P4: Hour (0-23) P5: Minute (0-59) P6: Second (0-59)
Output Format	None
Description	The setting of display format of a clock is not supported. When an invalid date (such as Feb.31) is selected, a parameter error occurs.

3.13. Other Settings

STR (Set TRans CH.) Setting real-time transfer channel

Function	Sets real-time transfer channel.
Input Format	STR P1, P2 (Delimiter)
	P1: Specifying channel [1-16, E1, E2, A] for RA2300MKⅡ [1-32, E1, E2, A] for RA2800A A means a batch setting. P2: ON/OFF (0=OFF, 1=ON)
Output Format	None
Description	Real-time transfer is executed with the “ETS Execute Real-time data trans”

SIM (Set Input Monitor) Setting display speed of input monitor

Function	Sets display speed of input monitor.
Input Format	SIM P1, P2, P3 (Delimiter)
	P1: Speed numeric value ([0-1000] step 1 0=External synchronization (Can be omitted) P2: Speed unit (0=[us/div], 1=[ms/div], 2=[s/div], 3=[min/div]) (Can be omitted) P3: Switch (0=input monitor, 1=chart, 2=memory recording, 3=HD recording) (Can be omitted)
Output Format	None
Description	When all parameters are omitted, a parameter error occurs. The current recorder mode limits the switch selected with P3. The cases in which a switch is allowed are below. (When it is disallowed, a mode error occurs.)

Recorder mode	Input monitor	Chart	Memory recording	HD recording
Pen recorder	Enabled	Enabled	Disabled	Disabled
Memory recorder	Enabled	Disabled	Enabled	Disabled
HD recorder	Enabled	Enabled	Disabled	Enabled
Multi recorder	Enabled	Enabled	Enabled	Enabled
X-Y recorder	Enabled	Disabled	Disabled	Disabled
Data recorder	Enabled	Disabled	Disabled	Disabled

SAT (Set Auto Transmit) Setting transmit function

Function	Sets transmit function.
Input Format	SAT P1, P2 (Delimiter)
	P1: Record error occurrence 0=No transmit 1=Transmit P2: Transmit during recording 0=No transmit, 1=Transmit after recording is finished, 2=Transmit when trigger is detected.
Output Format	None
Description	When the specified cause occurs, “!” is output from the RA2300MKⅡ. The detailed cause can be confirmed with the “ICA Inquire auto transmit CAtion”

SIF Setup for pause of Input monitor

Function	Sets pause of input monitor
Input Format	SIF P1 (Delimiter)
	P1: Pause (0 = Cancellation, 1 = Pause)
Output Format	None
Description	P1: When the setting of pause is omitted, operation proceeds under the manner in which the pause has been cancelled. If the Pen Recorder mode is set, the setting of pause is rejected.
	While the replay monitor screen is displayed, the monitor changes to the input monitor screen when this command is entered.

SIS Setting sync trigger

Function	Sets sync trigger
Input Format	SIS P1 (Delimiter)
	P1:Sync Trigger (0 = OFF, 1 = ON)
Output Format	None
Description	P1: If the setting of trigger synchronization is omitted, the current setting is held. While the Pen Recorder mode or X-Y Recorder mode is set, the setting of Trigger synchronization = 0 is rejected.
	While the replay monitor screen is displayed, the monitor changes to the input monitor screen when this command in entered.

SRI Setting data acquisition and printing

Function	Sets data acquisition and printing
Input Format	SRI P1, P2, P3, P4, P5, P6 (Delimiter)
	P1:Waveform chart Printing (0 = OFF, 1 = ON) (Can be omitted) P2:Memory Recording (0 = OFF, 1 = ON) (Can be omitted) P3:Memory recording -auto copy (0 = OFF, 1 = ON) (Can be omitted) P4:Memory recording -binary save (0 = OFF, 1 = ON) (Can be omitted) P5:HD Recording (0 = OFF, 1 = ON) (Can be omitted)
Output Format	None
Description	P1-P5 can be arbitrarily omitted. In that case, a present setting is maintained. When all parameters are omitted, a parameter error occurs. The setting specified by the recording mode might be disregarded. The condition of on or off for data acquisition for each recorder mode.

Recording Mode	Waveform chart printing	Memory Recording	Memory recording auto copy	Memory recording binary save	HD Recording
Pen	ON	OFF	OFF	OFF	OFF
Memory	OFF	ON	*	*	OFF
HD	*	OFF	OFF	OFF	ON
Multi	*	ON	OFF	ON	ON
X-Y	*	OFF	OFF	OFF	*

ON = ON fixed, OFF = OFF fixed, * = ON/OFF through setting

⚠ CAUTION

The items that can be set differ depending on the recorder mode. The settings for the invalid items are rejected.

Example: In the HD Recorder mode, on or off for chart printing is possible, but HD acquisition cannot be set up because it is fixed to on. Settings for the HD Recorder are rejected.

SBR Setting basic Recording setting

Function	Settings time axis display
Input Format	SBR P1, P2, P3, P4 (Delimiter)
	P1: <Reserved> Invalid P2: Time axis display setting （1=Value, 2=Time, 3=Period） P3: <Reserved> Invalid P4: <Reserved> Invalid
Output Format	None
Description	While the RA2300 is operating, an execution error occurs.

3.14. Compatibility with Older Series

This section describes commands for compatibility with the old series RA1000.
Although these commands cannot achieve the same executions as the old series due to the function differences, they take the similar setting process.
The compatible commands are described below. For controlling RA2300MKⅡ, we recommend to use the command mentioned in each description field.

SRM (Set Recording Mode) Setting measurement mode

Function	Sets measurement mode.
Input Format	SRM P1 (Delimiter)
	P1

P1	RA1000 measurement mode setting	RA2300MKⅡ measurement mode setting
1	Memory recorder	Memory recorder
2	Real-time	Pen recorder
3	Transient	To multi recorder
4	Filing	HD recorder
5	FFT	An error occurs due to no support.

Output Format	None
Description	The recommended command is “SMM (Set Measure Mode) Setting measurement mode”.

SAC (Set Auto Copy) Set auto copy

Function	Sets ON/OFF the auto copy of the memory mode.
Input Format	SAC P1: (Delimiter)
	P1: Sets auto copy (0=OFF,1=ON)
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs.

SMI (Set Memory autocopy Icon) Sets auto copy

Function	Sets ON/OFF auto copy
Input Format	SMI P1 (Delimiter)
	P1: Sets auto copy (0=OFF,1=ON)
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs.

SFI (Set Filing Icon) Sets ON/OFF the filing icon.

Function	Sets ON/OFF of HD recording of XY recorder mode
Input Format	SFI P1 (Delimiter)
	P1:HD recording (0=OFF,1=ON)
Output Format	None
Description	While the RA2300MKⅡ is operating, an execution error occurs.

SYA (Set Y-Axis) Sets Y-axis channels

Function	Sets Y-axis channels in X-Y recording
Input Format	SYA P1 (Delimiter)
	P1:Y-Axis(16 characters) The ON/OFF settings of CH1 through CH16 for RA2300MKⅡ and CH1 through CH32 for RA2800A are represented with the character 01. Ex. Sets CH2,3,4 P1:“0111000000000000”
Output Format	None
Description	The recommended command is ”SYC (Set Y-Ch) Sets Y axis channels”. Registering is possible even if the specified channel is invalid. In this case, it doesn't draw in X-Y form. The channel specified for X axis is excluded. The channel from the head to 3 is effective.

SMD (Set Memory Division) Setting channel combination

Function	Sets channel combination.
Input Format	SMD P1 (Delimiter)
	P1: Selecting recording channel (Compatible mode)

P1	Recording channel in compatible mode
1	All Channels :1, 2, 3, 4, 5, 6, 7, 8, 9, 10 ,11, 12 ,13, 14, 15, 16
2	8ch :1, 3, 5, 7, 9, 11, 13, 15
3	4ch :1, 5, 9, 13
4	2ch :1, 9

Output Format	None
Description	The recommended command is “SRC (Set Record Ch) Setting record channel”.

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*4. Information Readout Command - I***

4.1. Measurement Mode

IMM (Inquire Measure Mode) Reading measurement mode

Function	Outputs measurement mode setting.
Input Format	IMM (Delimiter)
Output Format	A1 (Delimiter)
	A1: Measurement mode

A1	Measurement mode
1	Pen recorder
2	Memory recorder
3	HD recorder
4	Multi recorder
5	X-Y recorder
6	Data chart recorder (Maintenance function)

Description	When an error occurs, "?" is returned.

4.2. Recording in General

ISS (Inquire filing Save Setting) Reading where to save files

Function	Outputs where to save files.	
Input Format	ISS (Delimiter)	
Output Format	A1, A2, A3, A4, A5 (Delimiter)	
	A1: Selecting drive	([A-I] Excludes OS drives are excluded and external drives are available.)
	A2: Using user folder	(0=OFF, 1=ON)
	A3: Using Day folder	(0=OFF, 1=ON)
	A4: Using folder name	(String available for folder name)
	A5: File name (first 4 letters)	(Maximum 4 letters and alphanumeric)
Description	Reads where to save files of a HD recorder, a multi recorder, and a memory recorder (backup filing).	

ISP (Inquire filing Save Pss) Reading path to save files

Function	Outputs the setting of a path to save files.
Input Format	ISP (Delimiter)
Output Format	A1 (Delimiter)
	A1: The string of a path to save files
Description	

Recorder mode	What to be output
Pen recorder	Outputs “” because no file is saved.
Memory recorder	Output the path for a backup filing.
HD Recorder	Outputs the file path for HD recording.
Multi Recorder	Outputs the file path for memory and HD recordings.
X-Y recorder	Outputs the file path for HD recording for X-Y.
Data chart	Outputs “” because no file is saved.

4.3. Waveform Chart Recording

ICS (Inquire Chart Speed) Reading paper feeding speed of wavelength chart recording

Function	Outputs the setting of paper feeding speed of the waveform chart recording.
Input Format	ICS (Delimiter)
Output Format	A1, A2 (Delimiter)

A1: Selecting speed

A1	Speed value
1-100	Speed numeric value
E	External synchronization recording

A2: Speed unit (When A1=1 to 10)

A2	Speed unit
1	[mm/s]
2	[mm/min]

A2: External synchronization pulse ratio (When A1=E)

A2	Sets speed value
1	0.1mm/pulse
2	0.025mm/pulse (Not provided in RA2800A)

Description	When a recorder mode is not “X-Y”, an above execution works.

4.4. Memory Recording

NOTE If the setting command related to a memory recording is set while the RA2300MKⅡ is operating, an execution error occurs.

ISC (Inquire Sampling Clock) Reading memory sampling speed

Function	Outputs the setting of memory sampling speed.
Input Format	ISC (Delimiter)
Output Format	A1, A2 (Delimiter)
	A1: Selecting speed value

A1	Speed value
1-999	Speed numeric value
E	External synchronization recording

A2: Speed unit (When A1=n)

A2	Speed unit
1	[μs]
2	[ms]
3	[s]

* When A1=E, A2=*.

Description	

IBS (Inquire Block Size) Reading block size

Function	Outputs block size setting.
Input Format	IBS (Delimiter)
Output Format	A1 (Delimiter)
	A1: Block size

A1	Block size	A1	Block size
1	32MW	9	128KW
2	16MW	10	64KW
3	8MW	11	32KW
4	4MW	12	16KW
5	2MW	13	8KW
6	1MW	14	4KW
7	512KW	15	2KW
8	256KW		

Description	

IML (Inquire Memory Length) Reading memory block size

Function	Outputs the memory block size
Input Format	IML (Delimiter)
Output Format	A1 (Delimiter)
	A1:memory block size
Description	

IMB (Inquire Memory Block) Reading block No.

Function	Outputs block No. setting.
Input Format	IMB (Delimiter)
Output Format	A1 (Delimiter)
	A1: Block No. ([1 - 128])
Description	

ITD (Inquire Trigger Delay) Reading pre-trigger

Function	Outputs pre-trigger setting.
Input Format	ITD (Delimiter)
Output Format	A1 (Delimiter)
	A1: Pre-trigger ([0-100]%)
Description	

ITE (Inquire Trigger Execution) Reading trigger execution

Function	Outputs trigger execution setting.
Input Format	ITE (Delimiter)
Output Format	A1 (Delimiter)
	A1: Trigger execution (1=Once, 2=Repeat, 3=Endless)
Description	

IMC (Inquire Memory Copy) Reading amount of copying the memory

Function	Outputs the readout amount setting in copying the memory
Input Format	IMC (Delimiter)
Output Format	A1 (Delimiter)
	A1: Readout amount setting ([1 – 100]%)
Description	

IMS (Inquire Memory Status) Read-out of memory status

<table>
<tr><td>Function</td><td>Outputs the status of memory.
Depending on the parameter, output format will vary.
The information of a memory block, which was set by a monitor or a SMB command at present, will output.</td></tr>
<tr><td>Input Format</td><td>IM S P1 (Delimiter)
P1: Point out an information category.
(Omit able P1 is as same as response 0)
<table>
<tr><th>P1</th><th>Information category</th></tr>
<tr><td>0</td><td>Output existence of data ※ 1</td></tr>
<tr><td>1</td><td>Output of the Start, Trigger, and End time ※ 2</td></tr>
<tr><td>2</td><td>Output existences of all data among 128 blocks ※ 1</td></tr>
<tr><td>3</td><td>Output of Data existence, start, trigger, end time ※ 2</td></tr>
<tr><td>4</td><td>Output of Trigger, end address ※ 2</td></tr>
<tr><td>5</td><td>Output of maximum block No in which all the data are effective. ※1</td></tr>
</table></td></tr>
<tr><td rowspan="6">Output Format</td><td>P1 =0: A1 (Delimiter) (Same at the time of P1 omission):
0= no data, 1= data exists</td></tr>
<tr><td>In case of P1 =1: A1, A2, A3 (Delimiter)
A1 = Starting time of recording, A2 = Trigger detection time, A3 = Ending time of recording
Fromat of time indication: YY/MM/DD HH:MM:SS
No trigger case: A2="**/**/** **:**:**"
No data case A1=A2=A3="**/**/** **:**:**"</td></tr>
<tr><td>In case of P1 =2: A1, A2, A3, ..., A128 (Delimiter)
<table>
<tr><th>An</th><th>Block</th><th>Data</th></tr>
<tr><td>0</td><td>Exist</td><td>None</td></tr>
<tr><td>1</td><td>Exist</td><td>Exist</td></tr>
<tr><td>*</td><td>None</td><td>None</td></tr>
</table>
Example: If the case of four even splits, only data exist in block 1
A1="1",A2=A3=A4="0", A5 ~A128="*"</td></tr>
<tr><td>In case of P1 =3: A1, A2, A3, A4 (Delimiter)
A1 is the same as A1 in case of (P1 =0)
A2, A3, A4 are the same as A1, A2, A3 in case of (P1 =1)</td></tr>
<tr><td>In case of P1 =4: A1, A2 (Delimiter)
A1 outputs a trigger address(numerical value). If there is no detection, A1 outputs "*".
A2 outputs a last address(numerical value). If there is no data, A1 outputs "*".</td></tr>
<tr><td>In case of P1 =5: A1(Delimiter)
Data output the greatest number of an effective block.
If there is no data which is effective for a block, it outputs "*".</td></tr>
<tr><td>Description</td><td>The reference of memory block out of case of P1-2 or 5 will be present active block. (Point the setting of “SMB block No”)
If the case P1 is not correct, it becomes a parameter error. This case of answer output is “?”.</td></tr>
</table>

4.5. HD Recording

IRF (Inquire Real-time Filing) Reading basics of HD recorder

Function	Outputs the settings of recording speed, recording length, and recording method.
Input Format	IRF (Delimiter)
Output Format	A1, A2, A3, A4, A5 (Delimiter)
	A1: Recording speed value ([1-1000, E] E=external synchronization A2: Recording speed unit (1=[µs], 2=[ms], 3=[s]) A2=0 when A1=E. A3: Data format (1=Peak, 2=Sampling) A4: Recording method (1=Normal, 2=Ringing) A5: Recording data number (Selecting 0 enables continuing execution until the "STOP" key is pressed.)
Description	

IFT (Inquire Filing Time) Reading recording time

Function	Outputs recording time setting.
Input Format	IFT (Delimiter)
Output Format	A1, A2, A3, A4 (Delimiter)
	A1=Day number, A2=Time number, A3=Minute number, A4=Second number
Description	

IRT (Inquire Real-time Trigger) Reading real-time recording operation

Function	Outputs real-time recording operation setting.
Input Format	IRT (Delimiter)
Output Format	A1, A2 (Delimiter)
	<table><tr><th>A1</th><th>Starting execution of recording by detecting trigger</th></tr><tr><td>0</td><td>Pressing "START" key initiates recording soon.</td></tr><tr><td>1</td><td>Detecting trigger initiates recording.</td></tr><tr><td>2</td><td>Detecting trigger initiate and repeat recording.</td></tr></table> A1: Starting execution of recording by detecting trigger. A2: Mark print with trigger (0=OFF, 1=ON)
Description	

4.6.X-Y

ICS (Inquire Chart Speed) Reading HD recording speed of X-Y recorder

Function	Outputs HD recording speed of X-Y recorder
Input Format	ICS (Delimiter)
Output Format	A1, A2 (Delimiter)
	A1: Speed numerical value [1-1000] ms A2: Speed unit Sets sample unit “2=ms”(Fixed)
Description	This function is valid in X-Y recorder mode, In other mode, it becomes the paper feed speed.

IXA (Inquire X-Axis) Reading X axis channel

Function	Outputs X axis channel in X-Y recording
Input Format	IXA (Delimiter)
Output Format	A1: (Delimiter)
	A1: X axis channel ([1-16]) (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Description	

IYC (Inquire Y-Ch) Reading Y axis channels

Function	Outputs Y axis channels in X-Y recording
Input Format	IYC P1 (Delimiter)
	P1: Y axis No. ([1-3])
Output Format	A1: (Delimiter)
	A1: Y axis channel ([1-16]) (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Description	When an error occurs, "?" is returned.

4.7. Trigger

ITM (Inquire Trigger Mode) Reading trigger mode

Function	Outputs trigger mode setting.
Input Format	ITM (Delimiter)
Output Format	A1 (Delimiter)
	A1: Trigger Mode 0=OFF, 1=OR, 2=AND, 4=WINDOW
Description	The recorder does not support A1=3(A*B).

ITC (Inquire Trigger mode OR,AND Channel) Reading OR, AND trigger condition

Function	Outputs the setting of OR, AND trigger condition.
Input Format	ITC P1 (Delimiter)
	P1: Channel number (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1, A2, A3 (Delimiter)
	A1: Detecting ON/OFF 0=OFF, 1=ON A2: Varies depending on amp type (see below). A3: Varies depending on amp type (see below).
	----- For analog type of amp ----- A2: Trigger level Represents with the measurement value. A3: Slope 1=Rising edge, 2=Falling edge
	----- For event amp ----- A2: Detecting logic 1=AND, 2=OR A3: Detecting pattern 0=X, 1=H, 2=L Outputs Sig1, Sig2, to Sig8 in the order from left. Example: For HHLL XXHL, “11220012”.
Description	When the selected channel is an invalid amp, a parameter error occurs. When an error occurs, "?,?,?" is returned.

ITW (Inquire Trigger Window) Reading WINDOW trigger condition

Function	Outputs the setting of WINDOW trigger condition.
Input Format	ITW P1 (Delimiter)
	P1: Channel number (For RA2300MKⅡ, 1 through 16 and E1, for RA2800A, 1 through 32, and E1)
Output Format	A1, A2, A3, A4, A5 (Delimiter)
	A1: Detecting ON/OFF 0=OFF, 1=ON A2: <Reserved> A3: Maximum trigger level Represents with the measurement value. A3: Minimum trigger level Represents with the measurement value. A5: Trigger occurrence direction 1=IN, 2=OUT
Description	When the selected channel is an invalid amp, a parameter error occurs.

ITF (Inquire Trigger Filter) Reading trigger filter

Function	Outputs trigger filter setting.
Input Format	ITM (Delimiter)
Output Format	A1 (Delimiter)
	A1: Trigger Filter [0-65534] 0=OFF
Description	

4.8. Amp Unit

Names of input units are represented by the following symbols.

Name of Amp Unit	Symbol	Name of Amp Unit	Symbol
2-CH high resolution DC amp unit	***HRDC***	TC/DC amp unit	***TDC***
2-CH FFT amp unit	***FFT***	F/V converter unit	***FV***
2-CH high speed DC amp unit	***HSDC***	2-CH oscillation･RMS amp unit	***RMS***
2-CH AC strain amp unit	***ACST***	2-CH DC strain amp unit	***DCST***
Event amp unit	***EV***	2-CH zero suppression amp unit	***HRZS***
2-CH TC/DC amp unit	***TCDC***		

The decimal of the answer from the CH command is as follows.

Item	Decimal digit	Item	Decimal digit
Position	2	Gauge factor	2
Sensitivity of incorporated sensor	3	Event waveform	1
Charge converter sensitivity	2	ZS V (500 V-5 V)	3
Acceleration sensor sensitivity	3	ZS V (2 V-100m V)	4

ICH (Inquire CHannel)　Reading HRDC amp Setting

Function	Outputs HRDC amp setting.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1, A2, A3, A4, A5, A6 (Delimiter)
	A1: Amp type　1 fixed A2: Input　0=OFF, 1=ON, 2=GND A3: Setting range　1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V, 7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV A4: Filter　0=OFF, 1=30Hz, 2=300Hz, 3=3kHz A5: Position　[-100.00 to 200.00] Step 0.05 A6: Input combination　1=AC, 2=DC
Description	

ICH (Inquire CHannel)　Reading FFT amp setting

Function	Outputs FFT amp setting.	
Input Format	ICH P1 (Delimiter)	
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)	
Output Format	A1, A2, A3, A4, A5, A6 to A12 (Delimiter)	
	A1: Amp type	2 fixed
	A2: Input	0=OFF, 1=ON, 2=GND
	A3: Setting range	1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV
	A4: Filter	0=OFF, 1=30Hz, 2=300Hz, 3=3kHz, 4=Anti-aliasing
	A5: Position	[-100.00 to 200.00] Step 0.05
	A6: Input combination	1=AC, 2=DC
	A7: Measurement mode	0=Voltage, 1=Oscillation
	A8: Setting sensor	1=Hybrid type, 2=Standalone type
	A9: Vibration unit	1=[m/s^2],2=[G]
	A10: Hybrid-type sensor sensitivity	[0.001 to 120.000]mV/m/s^2 or [0.010 to 1200.00]mV/G
	A11: Charge converter sensitivity	[0.01 to 10.0]mV/pC
	A12: Acceleration sensor sensitivity	[0.001 to 120.000]pC/m/s^2 or [0.010 to 1200.00]pC/G
	The sensitivity ranges of P11 and P13 vary depending on a vibration unit.	
Description		

ICH (Inquire CHannel)　Reading HSDC amp setting

Function	Outputs HSDC amp setting.	
Input Format	ICH P1 (Delimiter)	
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)	
Output Format	A1, A2, A3, A4, A5, A6 (Delimiter)	
	A1: Amp type	3 fixed
	A2: Input	0=OFF, 1=ON, 2=GND
	A3: Setting range	1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V, 7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV
	A4: Filter	0=OFF, 1=5Hz, 2=50Hz, 3=500kHz, 4=5kHz, 5=50kHz
	A5: Position	[-100.00 to 200.00] Step 0.05
	A6: Input combination	1=AC, 2=DC
Description		

ICH (Inquire CHannel) Reading ACST amp setting

Function	Outputs ACST amp setting.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1, A2, A3, A4, A5, A6, A7, A8 (Delimiter)
	A1: Amp type 4 fixed A2: Input 0=OFF, 1=ON, 2=GND) A3: Setting range 2=20kμε, 3=10kμε, 4=5kμε, 5=2kμε, 6=1kμε A4: Filter 0=OFF, 1=10Hz, 2=30Hz, 3=100Hz, 4=300Hz A5: Position [-100.00 to 200.00] Step 0.05 A6: Gage rate [1.50 to 2.50] Step 0.01 A7: CAL polarity 0=OFF, 1=[+], 2=[-] A8: CAL polarity 2=5000με,3=3000με,4=2000με,5=1000με,6=500με
Description	

ICH (Inquire CHannel) Reading EV amp setting

Function	Outputs EV amp setting.
Input Format	ICH P1, P2 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32) P2: Signal number [1-8] (To be omitted, select 8)
Output Format	A1, A2, A3, A4, A5, A6, A7, A8 (Delimiter)
	A1: Amp type 5 fixed A2: Input 0=OFF, 1=ON A3: Signal type 1=V, 2=C The order of all 8 signals is sig1, 2, 3, to 8 from left . A4: Signal ON/OFF 0=OFF, 1=ON The order of all 8 signals is sig1, 2, 3, to 8 from left. A5: EV Wavelength position 0.0 to 215.0 [mm] A6: Vibration 2.0 to 25.0 [mm] A7: Width of base line 0.5 to 2.0 [mm]
Description	

ICH (Inquire CHannel) Reading TCDC amp setting

Function	Outputs TCDC amp setting.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1, A2, A3, A4, A5, A6, A7 (Delimiter)
	A1: Amp type — 6 fixed A2: Input — 0=OFF, 1=ON, 2=GND A3: Setting range — The content varies depending on an A6 measurement mode. A6=1 Temperature measurement mode with thermocouple 1=R1800C, 2=T400C, 3=J1200C, 4=K1400C, 5=K500C, 6=W2400C, 7=R3200F, 8=T800F, 9=J2000F, 10=K2500F, 11=K1000F, 12= W 4200F A6=2 Voltage measurement mode 1=50V, 2=20V, 3=10V, 4=5V, 5=2V, 6=1V, 7=500mV, 8=200mV, 9=100mV A4: Filter — 0=OFF, 1=10Hz, 2=30Hz, 3=500Hz, 4=5Hz A5: Position — [-100.00 to 200.00] Step 0.05 A6: Measurement mode — 1= Thermocouple, 2=Voltage measurement A7: Reference junction temperature compensation — 1=EXT, 2=INT
Description	

ICH (Inquire CHannel) Reading TDC amp setting

Function	Outputs TDC amp setting.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1, A2, A3, A4, A5, A6, A7 (Delimiter)
	A1: Amp type — 7 fixed A2: Input — 0=OFF, 1=ON, 2=GND) A3: Setting range — The content varies depending on an A6 measurement mode. A6=1 Temperature measurement mode with thermocouple 1=R1600C, 2=R800C, 3=T400C, 4=T200C, 5=J1000C, 6=J200C, 7=K1200C, 8=K200C, 9=R3000F, 10=R1500F, 11=T800F, 12=T400F, 13=J2000F, 14=J400F, 15=K2500F, 16=K400F A6=2 Voltage measurement mode 1=50V, 2=20V, 3=10V, 4=5V, 5=2V, 6=1V, 7=500mV, 8=200mV, 9=100mV, 10=50mV, 11=20mV, 12=10mV A4: Filter — 0=OFF, 1=10Hz, 2=30Hz, 3=500Hz, 4=5Hz A5: Position — [-100.00 to 200.00] Step 0.05 A6: Measurement mode — 1= Thermocouple, 2=voltage Measurement A7: Reference junction temperature compensation — 1=EXT, 2=INT
Description	

ICH (Inquire CHannel)　Reading FV amp setting

Function	Outputs FV amp setting.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1, A2, A3, A4, A5, A6, A7 (Delimiter)
	A1: Amp type　2 fixed A2: Input　0=OFF, 1=ON A3: Setting range　1=10kHZ, 2=5kHz, 3=2kHz, 4=1kHz, 5=500Hz, 6=200Hz, 7=100Hz A4: Position　[-100.00 to 200.00] Step 0.05 A5: Input combination　1=AC, 2=DC A6: Filter　1=Prioritizes ripple, 2=Prioritizes answer A7: Detecting level　1=0V, 2=2.5V
Description	

ICH (Inquire CHannel)　Reading RMS amp setting

Function	Outputs RMS amp setting.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1, A2, A3, A4, A5, A6 to A14 (Delimiter)
	A1: Amp type　9 fixed A2: Input　0=OFF, 1=ON, 2=GND A3: Setting range A7=1 RMS input mode 1=350Vrms, 2=200Vrms, 3=100Vrms, 4=50Vrms, 5=20Vrms, 6=10Vrms, 7=5Vrms, 8=2Vrms, 9=1Vrms, 10=500mVrms, 11=200mVrms, 12=100mVrms A7=2 DC input mode 1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V, 7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV A4: Low pass filter　0=OFF, 1=30Hz, 2=100Hz, 3=300Hz, 4=1kHz A5: High pass filter　0=OFF, 1=10Hz, 2=30Hz, 3=100Hz A6: Position　[-100.00 to 200.00] Step 0.05 A7: Input mode　1=RMS, 2=DC A8: Input combination　1=AC, 2=DC A9: Measurement mode　0=Voltage, 1=Oscillation A10: Setting sensor　1=Hybrid type, 2=Standalone type A11: Vibration unit　1=[m/s^2],2=[G] A12: Hybrid-type sensor sensitivity　[0.001 to 120.000]mV/m/s^2 or [0.010 to 1200.00]mV/G A13: Charge converter sensitivity　[0.01 to 10.0]mV/pC A14: Acceleration sensor sensitivity　[0.001 to 120.000]pC/m/s^2 or [0.010 to 1200.00]pC/G The sensitivity ranges of P11 and P13 vary depending on a vibration unit.
Description	

ICH (Inquire CHannel)　Reading DCST amp setting

Function	Outputs DCST amp setting.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1, A2, A3, A4, A5, A6, A7 (Delimiter)
	A1: Amp type　10 fixed A2: Input　0=OFF, 1=ON, 2=GND A3: Setting range　Varies depending on A7 contents.

A7	Measurement mode	A3 contents
1	ST BV=2V	1=50kμε,2=20kμε, 3=10kμε, 4=5kμε, 5=2kμε
2	ST BV=5V	1=20kμε,2=8kμε, 3=4kμε ,4=2kμε, 5=800με
3	DC	1=50mV,2=20mV, 3=10mV,4=5mV, 5=2mV

	A4: Filter　0=OFF, 1=10Hz, 2=30Hz, 3=300Hz, 4=1kHz A5: Position　[-100.00 to 200.00] Step 0.05 A6: Gage rate　[1.50 to 2.50] Step 0.01 A7: Input mode and BV　1=ST(BV=2V), 2=ST(BV=5V), 3=DC
Description	“BV” means a bridge voltage.

ICH (Inquire CHannel)　Reading HRZS amp setting

Function	Outputs HRZS amp setting.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1, A2, A3, A4, A5, A6, A7, A8 (Delimiter)
	A1: Amp type　11 fixed A2: Input　0=OFF, 1=ON, 2=GND A3: Setting range　1=500V, 2=200V, 3=100V, 4=50V, 5=20V, 6=10V, 7=5V, 8=2V, 9=1V, 10=500mV, 11=200mV, 12=100mV A4: Filter　0=OFF, 1=30Hz, 2=300Hz, 3=3kHz A5: Position　[-100.00 to 200.00] Step 0.05 A6: Input combination　1=AC, 2=DC A7: ZSV ON/OFF　0=OFF, 1=ON A8: ZSV level　The range varies depending on a P4 range setting. 500V-5V: [-130,000 to 130,000]V 2V-100mV: [-13.0000 to 13.0000]V
Description	

ICH (Inquire CHannel) Reading extra event (E1) setting

Function	Outputs extra event (E1) setting.
Input Format	ICH E1, P2 (Delimiter)
	P1: E1 fixed P2: Signal number [1-16]
Output Format	A1, A2, A3, A4, A5, A6, A7, A8 (Delimiter)
	A1: Amp type -1 fixed A2: Input (0=OFF, 1=ON) A3: <Reserved> A4: Signal ON/OFF (0=OFF, 1=ON) The order of all 16 signals is sig1, 2, 3, to 16 from left. A5: EV wavelength position [0.0 to 215.0 [mm] A6: Vibration 2.0 to 25.0 [mm] A7: Width of base line 0.5 to 2.0 [mm]
Description	When an event unit is not installed, the output becomes the same as an invalid amp so that “0,0,0,0”, is output.

ICH (Inquire CHannel) Reading invalid amp setting

Function	Outputs the value meaning that the selected channel is an invalid amp.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel [1-16]
Output Format	Outputs “0,0,0,0”.
Description	

IUS (Inquire User Scale) Reading user-scale

Function	Outputs user-scale
Input Format	IUS P1 (Delimiter)
	P1: Selecting channel (For RA2300MKⅡ, 1 through 16, for RA2800A, 1 through 32)
Output Format	A1: ON,OFF for physical conversion(0=OFF, 1=ON) A2: maximum input value(Can be omitted) A3:minimum input value (Can be omitted) A4:maximum output value (Can be omitted) A5:minimum output value (Can be omitted) A6:upper limit of recording full scale. (Can be omitted) A7:lower limit of recording full scale. (Can be omitted) A8:Unit setting(Can be omitted) 0= Standard, 2=N, 3=Pa, 4=mm, 5=με, 6= m/s^2, 7=°C, 8=Ω, 9= kg, 10= kgf, 11= kgf/cm^2, 12= g A9: User-specified unit (character string of a maximum of 9 characters) (Can be omitted)
Description	When the selected channel is the amp other than an analog type of amp, a parameter error occurs. When an error occurs, "?,?,?,?,?,?,?,?,?" is returned.

4.9. Output to File and Recording Paper (including Backup Filing)

IMF (Inquire Memory Filing) Reading memory filing setting

Function	Outputs memory filing setting.
Input Format	IMF (Delimiter)
Output Format	A1, A2 (Delimiter) A1: Date format (1=Binary, 2=CSV) A2: Date interval between CSV Savings

A2	0	1	2	3	4	5	6	7	8	9
Date interval	1	2	5	10	20	50	100	200	500	1000

Description	

IWD (Inquire Scale Wave Division) Reading Waveform Division

Function	Outputs Waveform Division
Input Format	IWD (Delimiter)
	P1: Division [1-16]
Output Format	
Description	

IWF (Inquire Scale Wave flame) Reading Waveform Frame size

Function	Outputs Waveform Frame size
Input Format	IWF P1 (Delimiter)
	P1: Frame [1-16]
Output Format	A1: Size [10-200]mm 5mm step A2: Display channel [0-FFFF]ASCII-HEX format LSB=CH1
Description	The frame for RA2300MKⅡ is 1, 2, 3 – 16 from the top and for RA2800A, 1, 2, 3, - 32 from the top. The ASCII HEX format of the channel pattern shows LSB = 1 channel and MSB = 16 channels in bits.

4.10. System – Recording Setting

IRC (Inquire Record Ch) Reading recording channel

Function	Outputs recording channel setting.
Input Format	IRC (Delimiter)
Output Format	A1 (Delimiter)
	A1: Record channel Select a valid channel in ASCII HEX format. (1=Valid/0=Invalid)

Example	RA2300	RA2800
Example: Only CH1 is valid.	00001	000000001
Only CH8 is valid.	00080	000000080
All 16 channels are valid.	0FFFF	0FFFFFFFF
E1 is valid.	1FFFF	1FFFFFFFF
E2 is also valid.	3FFFF	3FFFFFFFF

Description	

IDN (Inquire Data No.) Reading data No.

Function	Outputs data No. setting.
Input Format	IDN (Delimiter)
Output Format	A1 (Delimiter)
	A1: Data No. ([1 - 9999])
Description	

IAN (Inquire ANnotation) Reading annotation print setting

Function	Outputs annotation print setting.
Input Format	IAN (Delimiter)
Output Format	A1, A2, A3, A4, A5, A6 (Delimiter)
	A1: System annotation print (0=OFF, 1=ON) A2: System annotation print (0=OFF, 1=ON) A3: User channel annotation print (0=OFF fixed) A4: User page annotation print (0=OFF, 1=ON) A5: Printing device ID (1=ON fixed) A6: Annotation print interval (0=The first time only, 30-1000[cm])
Description	**A3 and A5 are answers for compatibility with the RA1000 series so that they output the fixed value in the RA2300MKⅡ.**

IPA (Inquire Print Auxiliary) Reading settings of measurement information and signal name printing.

Function	Outputs the settings of measurement information and signal name (ON/OFF).
Input Format	IPA (Delimiter)
Output Format	A1, A2, A3, A4, A5, A6, A7, A8, A9 (Delimiter)
	A1: Print measurement information (0=OFF, 1=ON) A2: 31 fixed A3: Printing signal name (0=OFF, 1=ON) A4: 31 fixed A5-9: 0 fixed
Description	A2 and from A4 to A9 are parameters for compatibility with the RA1000 series.

IGP (Inquire Grid Pattern) Reading grid pattern

Function	Outputs grid pattern
Input Format	IGP (Delimiter)
Output Format	A1 (Delimiter) A1: Grid(0=OFF,1=10mmSTD,2=10mm,3=5mmSTD,4=5mm)
Description	

IAS (Inquire Auto Scaling) Reading auto scaling (ON/OFF)

Function	Outputs auto scaling for print
Input Format	IAS (Delimiter)
Output Format	A1 (Delimiter) A1: scale after recording (0=OFF,1=ON)
Description	

ISM (Inquire Scale Mode) Reading auto scaling mode

Function	Outputs auto scaling mode
Input Format	ISM (Delimiter)
Output Format	A1 (Delimiter) A1: print scaling mode (0=ALL,1=channel independence)
Description	

4.11. System - Maintenance

IWH (Inquire WHo) Reading version information

Function	Outputs version information.
Input Format	IWH P1 (Delimiter)
	P1: Selecting item (0-2) Refer to the description. (Can be omitted, the same when P1=0)
Output Format	A1 (Delimiter)
Description	Relation between P1 and A1

P1	Output item	A1
0	Device type	“RA2300” or “RA2800” fixed
1	Version of the RA2300	“V1.0a”
2	Device No.	“6020001”

IDT (Inquire DaTe) Reading clock

Function	Outputs the internal clock setting.
Input Format	IDT (Delimiter)
Output Format	A1, A2, A3, A4, A5, A6 (Delimiter)
	A1: Year (A.D.) (0-99) Last two digits A2: Month (1-12) A3: Date (1-31) A4: Hour (0-23) A5: Minute (0-59) A6: Second (0-59)
Description	The setting of display format of a clock is not supported.

4.12. Other Settings

IES (Inquire Error Status) Reading error status

<table>
<tr><td>Function</td><td>Outputs characters corresponding to the command type detecting an error.</td></tr>
<tr><td>Input Format</td><td>IES (Delimiter)</td></tr>
<tr><td rowspan="4">Output Format</td><td>A1 (Delimiter):</td></tr>
<tr><td>For one byte control command
<table>
<tr><th>Command</th><th>HEX</th><th>Content of process</th><th>A1</th></tr>
<tr><td>[ENQ]</td><td>05</td><td>Outputs the status of the RA2300.</td><td>^E</td></tr>
<tr><td>[CAN]</td><td>18</td><td>Suspends command execution.</td><td>^X</td></tr>
<tr><td>[DC4]</td><td>14</td><td>Initializes the RA2300MKⅡ.</td><td>^T</td></tr>
</table>
A code where 40h is added to “^” is output.
For details of one byte command, see “1-Byte Control Command”.</td></tr>
<tr><td>For escape sequence
<table>
<tr><th>Command</th><th>Content of Process</th><th>A1</th></tr>
<tr><td>[ESC]+Z</td><td>Returns to a local status.</td><td>eZ</td></tr>
<tr><td>[ESC]+R</td><td>Clears a send buffer.</td><td>eR</td></tr>
<tr><td>[ESC]+C</td><td>Outputs a status.</td><td>eC</td></tr>
<tr><td>[ESC]+E</td><td>Outputs error information.</td><td>eE</td></tr>
</table>
A code where [ESC] and an additional character are added to “e” is output.
For details of escape sequence, see “Escape Sequence”.</td></tr>
<tr><td>For string command
A string received as a command string is output.
For details of string command, see “String Command”.</td></tr>
<tr><td>When no error occurs, “*” is output.</td></tr>
<tr><td>Description</td><td>After the answer A1 is output, the detected error is cleared.</td></tr>
</table>

IIM (Inquire Input Monitor) Reading display speed of input monitor

<table>
<tr><td>Function</td><td>Outputs display speed setting of input monitor.</td></tr>
<tr><td>Input Format</td><td>IIM (Delimiter)</td></tr>
<tr><td>Output Format</td><td>A1, A2, A3 (Delimiter)</td></tr>
<tr><td></td><td>A1: Speed numeric value ([0-1000] step 1 0=External synchronization)
A2: Speed unit (0=[us/div],1=[ms/div],2=[s/div],3=[min/div])
A3: Switch (0=Input monitor, 1=Chart, 2=Memory recording, 3=HD recording)</td></tr>
<tr><td>Description</td><td></td></tr>
</table>

IDA (Inquire Input monitor DAta) Reading measurement value of input signal

<table>
<tr><td>Function</td><td>Outputs the current settings of measurement value of input signal.</td></tr>
<tr><td>Input Format</td><td>IDA P1 (Delimiter)
P1: Selecting output
<table>
<tr><th>P1</th><th>Content of output</th></tr>
<tr><td>[1-16] for RA2300MKⅡ, [1-32] for RA2800A</td><td>Outputs a channel of measurement value.</td></tr>
<tr><td>A</td><td>Outputs all channels of measurement values.</td></tr>
<tr><td>E1</td><td>Outputs an extra event 1 of measurement value.</td></tr>
<tr><td>[U1-U16] for RA2300MKⅡ, [U1-U32] for RA2800A</td><td>Outputs amp information.</td></tr>
</table></td></tr>
<tr><td>Output Format</td><td>When P1=[1-16, E1] A1 (Delimiter)
Outputs a channel of measurement value (ASCII string).</td></tr>
<tr><td></td><td>When P1=A A1, A2 to A18 (Delimiter)
Outputs all channels of measurement values including E1 (ASCII string).</td></tr>
<tr><td></td><td>When P1=[U1-U16] A1, A2 (Delimiter)
A1: Amp type
<table>
<tr><th>A1</th><th>Content of output</th><th>A1</th><th>Content of output</th></tr>
<tr><td>0</td><td>None</td><td>7</td><td>TDC</td></tr>
<tr><td>1</td><td>HRDC</td><td>8</td><td>FV</td></tr>
<tr><td>2</td><td>FFT</td><td>9</td><td>RMS</td></tr>
<tr><td>3</td><td>HSDC</td><td>10</td><td>DCST</td></tr>
<tr><td>4</td><td>ACST</td><td>11</td><td>HRZS</td></tr>
<tr><td>5</td><td>EV</td><td>-1</td><td>Extra event (E2)</td></tr>
<tr><td>6</td><td>TCDC</td><td></td><td></td></tr>
</table>
A2: Unit string Example: “mV” etc. (A null character is output for EV amp.)</td></tr>
<tr><td>Description</td><td>The selected channel of the current measurement value is output in string.</td></tr>
</table>

IAT (Inquire Auto Transmit) Reading transmit function

<table>
<tr><td>Function</td><td>Outputs the transmit function setting.</td></tr>
<tr><td>Input Format</td><td>IAT (Delimiter)</td></tr>
<tr><td>Output Format</td><td>A1, A2 (Delimiter)</td></tr>
<tr><td></td><td>A1: Record error occurrence 0=No transmit 1=Transmit
A2: transmit during recording 0=No transmit, 1=Transmit after recording is finished, 2=Transmit when trigger is detected.</td></tr>
<tr><td>Description</td><td></td></tr>
</table>

ICA (Inquire Auto Transmit CAution)　Reading transmit factor

Function	Outputs the setting of the factor of transmit from the RA2300MKⅡ.
Input Format	ICA (Delimiter)
Output Format	A1 (Delimiter)
	A1: Transmit factor ΣA1 / Factor 1 / Printer error 2 / File error 4 / Measurement completed 8 / Trigger detection The logical OR of the number of factors is output for multiple factors. (in a decimal number) Example: When a printer error and a file error occur, A1=3.
Description	

IIF　Reading pause of Input monitor

Function	Outputs pause of Input monitor
Input Format	IIF (Delimiter)
Output Format	A1 (Delimiter)
	P1: Pause　(0 = Cancellation, 1 = Pause)
Description	

IIS　Reading sync trigger condition

Function	Outputs sync trigger condition.
Input Format	IIS (Delimiter)
Output Format	A1 (Delimiter)
	A4: Sync Trigger　(0 = OFF, 1 = ON)
Description	

IRI　Reading data acquisition and printing condition

Function	Outputs data acquisition and printing condition
Input Format	IRI (Delimiter)
Output Format	A1, A2, A3, A4, A5 (Delimiter)
	A1: Waveform chart printing　(0 = OFF, 1 = ON) A2: Memory Recording　(0 = OFF, 1 = ON) A3: Memory recording -auto copy　(0 = OFF, 1 = ON) A4: Memory recording -binary save　(0 = OFF, 1 = ON) A5: HD Recording　(0 = OFF, 1 = ON)
Description	The mask might set it by the recorder mode. About the state of the ON/OFF setting of data acquisition in each recording mode, It is the same as the content of “10.7 SRI”.

IBR　Reading time axis display

Function	Outputs time axis display
Input Format	IBR (Delimiter)
Output Format	A1, A2, A3, A4 (Delimiter)
	A1: 0 fixed A2: Time axis display setting （1=Value, 2=Time, 3=Period） A3: 1 fixed A4: 0 fixed
Description	

4.13. Compatibility with Older Series

This section describes commands for compatibility with the old series RA1000.
Although these commands cannot achieve the same executions as the old series due to the function differences, they take the similar setting process.
The compatible commands are described below. For controlling RA2300MKⅡ, we recommend to use the command mentioned in each description field.

IRM (Inquire Recording Mode) Reading measurement mode

Function	Outputs measurement mode setting.
Input Format	IRM (Delimiter)
Output Format	A1 (Delimiter)
	A1 A1: RA1000 measurement mode setting / RA2300MK Ⅱ measurement mode setting 1: Memory recorder 2: Real-time / Pen recorder 3: Transient / Multi recorder 4: Filing / HD recorder 5: FFT / An error occurs due to no support.
Description	The recommended command is “IMM (Inquire Measure Mode) Reading measurement mode”. When an error occurs, "?" is returned.

IAC (Inquire Auto Copy) Reading auto copy

Function	Outputs ON/OFF the auto copy of the memory mode.
Input Format	IAC (Delimiter)
Output Format	A1 (Delimiter) A1: Auto copy (0=OFF,1=ON)
Description	

IRS (Inquire Rec icon information) Reading recording icon conditions

Function	Outputs Recording conditions.
Input Format	IRS (Delimiter)
Output Format	A1, A2,A3 (Delimiter)
	A1: waveform chart recording. (0=OFF,1=ON) A2: Memory auto copy (0=OFF,1=ON) A3: HD recording (0=OFF,1=ON)
Description	

IMP (Inquire Memory block Point) Reading block No.

Function	Outputs block No. setting.
Input Format	IMP (Delimiter)
Output Format	A1, A2 (Delimiter)
	A1: Recording block No. ([1 - 128]) A2: Output block No. ([1 - 128])
Description	The recommended command is “IMB (Inquire Memory Block) Reading block No.”. The output is A1=A2.

IYA (Inquire Y-Axis) Reading Y-axis channels

Function	Outputs Y-axis channels in X-Y recording
Input Format	IYA (Delimiter)
Output Format	A1:Y-Axis ON/OFF The RA2300MKⅡ outputs ON or OFF for CH1 to CH16 in the form of 0 or 1. The RA2300MKⅡ outputs ON or OFF for CH1 to CH16 in the form of 0 or 1. Example: When CH2, CH3 and CH4 are ON, the value is "0111000000000000".
Description	The recommended command is "IYC (Inquire Y-Ch) Output Y axis channels".

IMD (Inquire Memory Division) Reading channel combination

Function	Outputs channel combination setting.
Input Format	IMD (Delimiter)
Output Format	A1 (Delimiter)
	A1: Channel combination in the RA1000 series As a result of referring to a recording channel setting, If the setting is equal the amp configuration with the channel combination in the RA1000 series, the coincident information is output. Otherwise, "0" is output.

A1	Recording Channel Configuration
1	All Channels :1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
2	8ch : 1, 3, 5, 7, 9, 11, 13, 15
3	4ch : 1, 5, 9, 13
4	2ch : 1, 9
0	The others

Description	The recommended command is "IRC (Inquire Record Ch) Reading recording channel".

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*5. Execution Command – E***

5.1. Storing and Printing Operations

EST (Execute StarT) Starting printing

Function	Starts printing and storing,
Input Format	EST P1 (Delimiter) P1: <Reserved> No selection is valid. (Can be omitted)
Output Format	None
Description	As in the case with pressing the “START” key on the operation panel, Storing and Printing are started according to the current setting of a recorder mode.

ESP (Execute StoP) Stopping the RA2300 execution

Function	Stop the RA2300MKⅡ execution.
Input Format	ESP (Delimiter)
Output Format	None
Description	As in the case with pressing the “STOP” key on the operation panel, the process of an execution such as recording can be stopped.

ECP (Execute CoPy) Executing memory copy

Function	Executing memory copy.
Input Format	ECP P1, P2 (Delimiter) P1:Start address 0 to (N – 1) (Can be omitted.) P2:Data count 1 to N (Can be omitted.)
Output Format	None
Description	As in the case with pressing the “Copy” key on the operation panel, the copy output is executed. When P1 and P2 are omitted, all data is copied. When only either is omitted, it becomes an error.

EMT (Execute Manual Trigger) Executing manual trigger

Function	Executes manual trigger.
Input Format	EMT (Delimiter)
Output Format	None
Description	As in the case with pressing the “M.TRIG/EVENT” key on the operation panel, a trigger is generated.

EMK (Execute MarK) Executing printing

Function	Executes manual trigger.
Input Format	EMK (Delimiter)
Output Format	None
Description	As in the case with pressing the “M.TRIG/EVENT” key on the operation panel, an event mark is printed.

5.2. Clearing of Configuration

EMC (Execute Memory block data Clear) Clearing memory block data

<table>
<tr><td>Function</td><td>Clears the contents of a memory.</td></tr>
<tr><td>Input Format</td><td>EMC P1 (Delimiter)</td></tr>
<tr><td>Output Format</td><td>P1 (Delimiter)</td></tr>
<tr><td></td><td>P1: Selecting the memory block number to be cleared. (Can be omitted.)
<table>
<tr><th>P1</th><th>Contents of Initializing</th></tr>
<tr><td>[1-128]</td><td>Clears the selected memory block.
When the selected number is more than the current number of block divisions, a parameter error occurs.</td></tr>
<tr><td>A</td><td>Clears all blocks.</td></tr>
<tr><td>Omitted</td><td>Clears the current block.</td></tr>
</table></td></tr>
<tr><td>Description</td><td>Valid only when the RA2300MKⅡ is stopped. Otherwise, an execution error occurs.</td></tr>
</table>

5.3.Auto

EAS (Execute Ac Strain amp balance) Executing auto balance

Function	Executing auto balance of ACST amp.
Input Format	EAS P1 (Delimiter) P1: Channel specification [1-16, A] for RA2300MKⅡ, [1-32, A], A means a batch setting.
Output Format	None
Description	Executes auto balance of ACST amp. To execute the auto balance, about 1 second is necessary per channel. During this command execution, other commands (including [ESC]+C) are not accepted. When a channel other than ACST is specified, a parameter error occurs.

EAB (Execute Auto Balance) Executing auto balance

Function	Executing auto balance of DCST amp.
Input Format	EAB P1 (Delimiter) P1: Channel specification [1-16, A] for RA2300MKⅡ, [1-32, A], A means a batch setting.
Output Format	None
Description	Executes auto balance of DCST amp. To execute the auto balance, about 1 second is necessary per channel. During this command execution, other commands (including [ESC]+C) are not accepted. When a channel other than DCST is specified, a parameter error occurs.

EZS (Execute auto Zero Suppression) Executing auto zero suppression

Function	Executing auto zero suppression voltage for the HRZS amp.
Input Format	EZS P1 (Delimiter) P1: Channel specification [1-16, A] for RA2300MKⅡ, [1-32, A], A means a batch setting.
Output Format	None
Description	Executes auto zero suppression voltage for the HRZS amp The execution requires 0.5 second per channel. During this command execution, other commands (including [ESC]+C) are not accepted. When a channel other than HRZSis specified, a parameter error occurs. When the zero suppression voltage has not been turned on, this command is invalid.

5.4.Data Transfer

EIM (Execute Input Monitor data trans)　Executing monitor transfer

Function	Transfers a screenful of data in the input wavelength monitor.
Input Format	EIM (Delimiter)
Output Format	A1 (Delimiter) <Binary data>
	A1: Outputs the number of transferred bytes of a line. “0” means no transmit channel. “?” means that transmit is disallowed during HD recording. “*” means that the selected transmit speed beyond the spec disallows transmission. When the other values are output, no binary data is output anymore. <Binary data>: Raw data of the current input signal (A/D value) Sample: RA2300MKⅡは[STX](D1.DAT)(D2.DAT)(D3.DAT)……(D16.DAT)[SUM] RA2800Aは[STX](D1.DAT)(D2.DAT)(D3.DAT)……(D32.DAT)[SUM] Peak:: RA2300MKⅡは[STX](D1.MAX)(D1.MIN)(D2.MAX) ……(D16.MIN)[SUM] RA2800Aは[STX](D1.MAX)(D1.MIN)(D2.MAX) ……(D32.MIN)[SUM] [ ]: one byte, ( ):two bytes
Description	A screenful of data on the input monitor without any restrictions is transferred from the RA2300MKⅡ status. Monitoring signals at remote site with the communication during recording is enabled. For monitor speed setting, see “SIM　Setting display speed of input monitor”. The setting of a transfer channel complies with the current amp setting. (The same as a recording condition)

ETS (Execute Real-time data trans)　Executing real-time transition

Function	Executes real-time transition
Input Format	ETS P1, P2, P3 (Delimiter)
	P1: Date format　(0=Sample, 1=Peak) P2: Transmit speed unit　(0=ms, 1=s) P3: Transmit speed numeric value　([1-1000])
Output Format	A1 (Delimiter) <Binary data>
	A1: Outputs the number of transferred bytes of a line. “0” means no transmit channel. “?” means that transmit is disallowed during HD recording. “*” means that the selected transmit speed beyond the spec disallows transmission. When the other values are output, no binary data is output anymore. <Binary data>: Raw data of the current input signal (A/D value) Sample: RA2300MK2　[STX](D1.DAT)(D2.DAT)(D3.DAT)……(D16.DAT)[SUM] RA2800A　[STX](D1.DAT)(D2.DAT)(D3.DAT)……(D32.DAT)[SUM] Peak: RA2300MKⅡ　[STX](D1.MAX)(D1.MIN)(D2.MAX) ……(D16.MIN)[SUM] RA2800A　[STX](D1.MAX)(D1.MIN)(D2.MAX) ……(D32.MIN)[SUM] [ ]:one byte, ( ):two bytes
Description	A transmit channel is selected in “STR　Setting real-time transmit channel “. Exceptional process When something abnormal occurs during execution, the following error code is output instead of start code [STX] indicating the beginning of data. [EOT] (04ch) …The RA2300MKⅡ received a command and then transmission was terminated. [CAN] (18ch) Since reception process on the host side was not done in time, it is judged that transmission is disallowed and then transmission was terminated. Terminating transmission To terminate transmission, execute the ESP command. When ESP is executed, the RA2300AMKⅡ outputs [EOT] to terminate transmission, and the normal state of receiving commands is entered

5.5.Others

EPA (Execute Page Annotation)　Executing page annotation print

Function	Execute page annotation print.
Input Format	EPA (Delimiter)
Output Format	None
Description	When the RA2300MKⅡ is not operating, a page annotation is printed. When waveforms are being recorded, a page annotation is printed over the waveforms.

EFD (Execute paper FeeD)　Executing paper feed

Function	Execute page annotation print.
Input Format	EFD P1 (Delimiter) P1: Sets recording paper feeding amount　([1-100]) mm　(Can be omitted.)
Output Format	None
Description	When P1 is set, paper is fed according to the set amount. When P1 is omitted, feeding continues until another command is received. The ESP command is used to stop feeding.

ESI (Execute System Initialize)　System Initialize Command

Function	System initialization
Input Format	ESI P1 (Delimiter)
	P1: Initialized settings

P1	Initialized settings
1	Initializes setup data for RA2300MKⅡ main unit only
2	Initializes setup data for RA2300MKⅡ main unit and all memory block
Omitted	The same as the case of P=2

Input Format	ESI (Delimiter)
Output Format	None
Description	Communication settings are not initialized. While the RA2300MKⅡ is operating, an execution error occurs. Initialization and application restart are made.

⚠ CAUTION

Initialization through the ESI command necessitates the restart of the main program, which forcibly disconnects the communication connection. Accordingly, reconnection is needed after the initialization. To completely finish the initialization, it needs at least 5 seconds. Allow sufficient time, and then execute reconnection after performing this command.

⚠ CAUTION

In the case of P1 = 1 Not clearing memory block, memory data will be lost if the block size changes through initialization.

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*6. File/Data Operation Command – F***

FDS (File Data file Save)　Saving memory recording data as file

<table>
<tr><td>Function</td><td>Saves memory recording data as a file.</td></tr>
<tr><td rowspan="2">Input Format</td><td>FDS P1 (Delimiter)</td></tr>
<tr><td>P1: Saved file name (without extension)</td></tr>
<tr><td>Output Format</td><td>A1, A2 (Delimiter)
A1: Current folder information
<table>
<tr><th>A1</th><th>Drive (folder) Information</th></tr>
<tr><td>0</td><td>All access possible</td></tr>
<tr><td>1</td><td>Read only</td></tr>
<tr><td>2</td><td>Change disk</td></tr>
<tr><td>3</td><td>Unidentified format</td></tr>
<tr><td>4</td><td>No media</td></tr>
<tr><td>5</td><td>No drive</td></tr>
<tr><td>6</td><td>Other error</td></tr>
</table>
A2: Execution information of file saving
<table>
<tr><th>A2</th><th>Execution Information of File Operation</th></tr>
<tr><td>0</td><td>Successful</td></tr>
<tr><td>1</td><td>Lack of capacity</td></tr>
<tr><td>2</td><td>Write error</td></tr>
<tr><td>3</td><td>Read error</td></tr>
<tr><td>4</td><td>Illegal characters detected</td></tr>
<tr><td>5</td><td>Reserved file name</td></tr>
<tr><td>6</td><td>Same file name</td></tr>
<tr><td>7</td><td>Other error</td></tr>
</table></td></tr>
<tr><td>Description</td><td>According to the current setting (block number and copy range), memory data is saved in a file.
The file is saved in the current folder with the file name selected with P1.
The extension is “FSD”. (Automatically added)
When a file name is selected with an extension:　A1=6, A2=7 A parameter error occurs.
When the block has no data:　A1=6, A2=7 An execution error occurs.
When the RA2300MKⅡ is operating:　A1=6, A2=7 An execution error occurs.</td></tr>
</table>

6. File/Data Operation Command – F.....6-1**

FDS (File Data file Save) Saving memory recording data as file..... 6-2

*7. Text Operation Command – T***

7.1. Page Annotation String

TIP (Text Input Page) Inputting page annotation string

Function	Inputs page annotation string.
Input Format	TIP (Delimiter) P: <Line number>:<String> (Delimiter) : E: (Delimiter)
	<Line number> The line number from 1 to 108 can be selected. <String> S-SJIS code Maximum 64 characters can be input. * A one-byte character can be input but is converted into S-JIS code to be registered.
Output Format	None
Description	Once the TIP command is received, an input mode becomes the mode where texts are input by line. From then on, it is possible to select a line to input string. Exit from the input mode with the reception of “E”.

TOP (Text Output Page) Outputting page annotation string

Function	Outputs page annotation string.
Input Format	TOP P1 (Delimiter)
	P1: Selecting line [1-108] or A When any number is selected: Only a single line is output. When “A” is selected: All lines are output.
Output Format	When P1=[1-108], only a single line of string is output. <String> (Delimiter) When P1=A, the output is given in the following format, which is the same as the input of TIP. P: <Line number>:<String> (Delimiter) : E: (Delimiter)
Description	When P1=A (all lines are selected), the output of lines including no string are omitted.

TCP (Text Clear Page) Clearing page annotation string

Function	Clears page annotation string.
Input Format	P1: Selecting line [1-108] or A
	When any number is selected: Only string in a single line is cleared. When “A” is selected: All lines are cleared.
Output Format	E: (Delimiter)
Description	The selected line is cleared and then “E” is output as an ending code. When the selection of P1 has an error, “?” is output as a parameter error.

7.2. Signal Name String

TSN (Text input SigNal) Inputting signal name string

Function	Inputs signal name string.
Input Format	TSN (Delimiter) S: <Channel number>:<Signal number>:<String> (Delimiter)
	<Channel number> The RA2300MKⅡ specifies channel numbers 1 through 16. The RA2800A specifies channel numbers 1 through 32. <Signal number> For an analog amp, "1" fixed. For an EV amp, select a signal number [1-8]. When <Channel number>=E1, select a signal number [1-16]. <String> Maximum 31 characters in JIS code * A one-byte character can be input. It is converted into S-JIS code to be registered. Example: For analog channel TSN (Delimiter) S:1:Vertical oscillation (Delimiter) Example: For an event channel (and E1) TSN (Delimiter) S:15:1:Water gate 1 (Delimiter) TSN (Delimiter) S:15:2:Water gate 2 (Delimiter)
Output Format	None
Description	In contrast to the TIP command, this command is input in just a single line.

TOS (Text Output Signal) Outputting signal name string

Function	Outputs signal name string.
Input Format	TOS P1, P2 (Delimiter)
	P1: Channel number [1-16, A] for RA2300MKⅡ, [1-32, A] for RA2800A When a number is selected: Only a single line is output. When "A" is selected: All lines are output. When "E1" is selected: An extra event is output. P2: Selecting the signal number in an event. (To be omitted, select 1)
Output Format	For TOS 1 (Delimiter), the signal name of CH1 is output. S:1:<String> (Delimiter) For TOS 15.2 (Delimiter), the signal names of CH15 and the signal number 2 are output. S:15:2: <String> (Delimiter) For TOS A (Delimiter), the signal names of all channels are output. S:1:<String> (Delimiter) S:2:<String> (Delimiter) -- <For Event Amp> -- S:15:1: <String> (Delimiter) Signal 1 S:15:2: <String> (Delimiter) Signal 2 -- <omitted> -- S:15:8: <String> (Delimiter) Signal 8 S16: <String> (Delimiter) E: (Delimiter)
Description	

TCS (Text Clear Signal)　Clearing signal name string

Function	Clears signal name string.
Input Format	TCS P1 (Delimiter)
	P1: Selecting channel [1-16, A] for RA2300MKⅡ, [1-32, A] for RA2800A When a number is selected: Only the signal name string in the selected channel is cleared. When [A] is selected: The signal name strings of all channels are cleared. When “E1” is selected: The signal name string of an extra event is cleared.
Output Format	E: (Delimiter)
Description	The selected channel is cleared and then “E” is output as an ending code. When the selection of P1 has an error, “?” is output as a parameter error.

7.3. Measurement Information String

THD (Text input information) Inputting measurement information string

Function	Inputs measurement information string.
Input Format	THD (Delimiter) H: <Line number>:<String> (Delimiter)
	<Line number> The line number from 1 to 108 can be selected. <String> S-SJIS code Maximum 31 characters can be input. * One-byte character can be input but is converted into S-JIS code to be registered.
Output Format	None
Description	In contrast to the TIP command, this command is input in just a single line.

TOH (Text Output Information) Outputting measurement information string

Function	Outputs measurement information string.
Input Format	TOH P1 (Delimiter)
	P1: Selecting line [1-108] or A When a number is selected: Only a single line is output. When “A” is selected: All lines are output.
Output Format	When P1=[1-108], only a single line of string is output. H: <Line number>:<String> (Delimiter) When P1=A, the output is given in the following format, which is the same as the input of TIP. H:<Line number>:<String> (Delimiter) All 108 lines are output. E: (Delimiter)
Description	When P1=A (all lines are selected), the output of lines including no string are omitted.

TCD (Text Clear information Data) Clearing measurement information string

Function	Clears measurement information string.
Input Format	TCD P1 (Delimiter)
	P1: Selecting line [1-108] or A When number is selected: Only string in a single line is cleared. When “A” is selected: All lines are cleared.
Output Format	E: (Delimiter)
Description	The selected line is cleared and then “E” is output as an ending code. When the selection of P1 has an error, “?” is output as a parameter error.

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8. Reference

8.1. Character Code List

8 bits

Low-order 4 bits -- Hexadecimal representation	High-order 4 bits・・・Hexadecimal representation											
	0	1	2	3	4	5	6	7	A	B	C	D
0	NUL		SP	0	@	P	`	p		ー	タ	ミ
1	SOH	Xon	!	1	A	Q	a	q	。	ア	チ	ム
2	STX		“	2	B	R	b	r	「	イ	ツ	メ
3	ETX	Xoff	#	3	C	S	c	s	」	ウ	テ	モ
4	EOT	DC4	$	4	D	T	d	t	、	エ	ト	ヤ
5	ENQ	NAK	%	5	E	U	e	u	・	オ	ナ	ユ
6	ACK		&	6	F	V	f	v	ヲ	カ	ニ	ヨ
7	BEL		‘	7	G	W	g	e	ァ	キ	ヌ	ラ
8	BS	CAN	(	8	H	X	h	x	ィ	ク	ネ	リ
9	HT		)	9	I	Y	i	y	ゥ	ケ	ノ	ル
A	LF	EOF	*	:	J	Z	j	z	ェ	コ	ハ	レ
B	VT	ESC	+	;	K	[	k	{	ォ	サ	ヒ	ロ
C	FF		,	<	L	¥	l	|	ャ	シ	フ	ワ
D	CR		-	=	M	]	m	}	ュ	ス	ヘ	ン
E	SO		.	>	N	^	n	~	ョ	セ	ホ	゛
F	SI		/	?	O	_	o	DEL	ッ	ソ	マ	°

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Communication Command
RA2000 series INSUTRUCTION Manual (1WMPD4003507)

1st Edition : August,2017

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