Communication Command

RA2300A

INSTRUCTION MANUAL

1WMPD4003181

A&D Company, Limited

Communication Command
RA2300A

INSTRUCTION MANUAL

A&D Company, Limited

Introduction

We thank you for your purchase of our product OMNIACE III RA2300A. Please read this manual before operating this instrument. Refer to this manual to operate the LAN interface which is provided as standard in the RA2300A and the RS-232C interface included in the optional RS-232C unit (RA23-142). This manual provides the information necessary to operate the RA2300A recorder safely. Place this manual within reach of the RA2300A.

For basic operations, please refer to the RA2300A Recorder Manual. Please read the user's manual of the PC or modem before connecting the RA2300A 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 RA2300A communication interface. For operation of basic functions, please refer to the separate-volume manuals listed below.

<Separate-volume manuals>

Manual	Contents
Instruction Manual MAINFRAME for RA2300A	This manual explains functions and how to operate the RA2300A.
Instruction Manual Amplifier Units for RA2000A/ DL2800A/DF1000A	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 are.
- 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 RA2300A 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.

⚠ WARNING

► Refer to 17 How to Use Optional Units in the RA2300A User's M anual 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 RA2300A and another instrument, make sure that there is no potential difference between the RA2300A 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	RA2300A recorder
Memory	Internal memory of RA2300A 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

CONTENTS

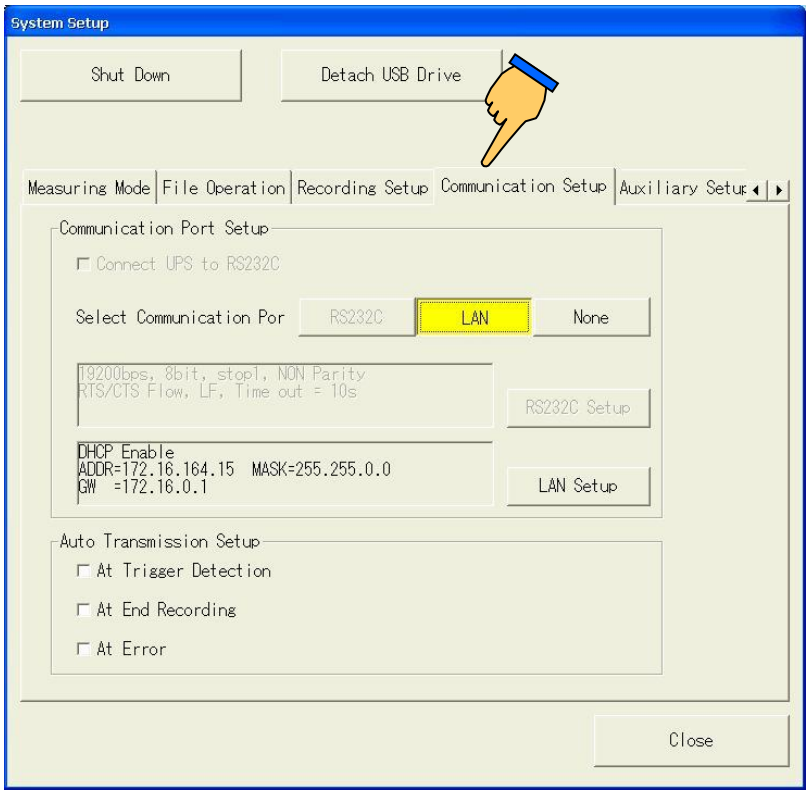
1. Selection of Communication Interface

1.1. RA2300A Communication Interface Setup

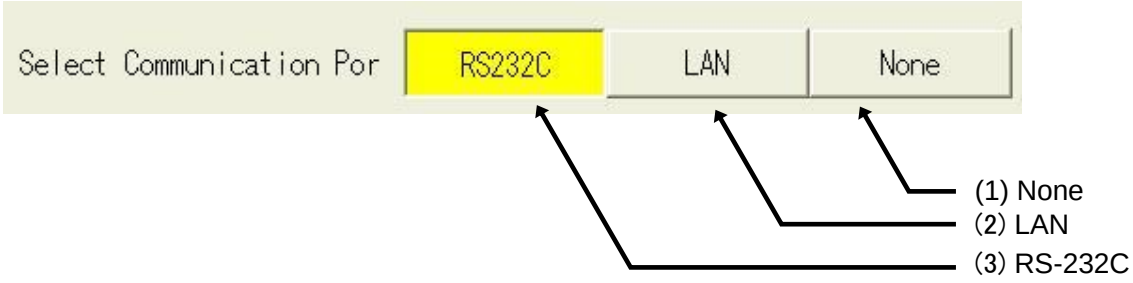
► To control the RA2300A using an instrument such as a personal computer via a communication interface, you must allow RA2300A to conform to the specifications of the communication interface to be used in advance.

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.

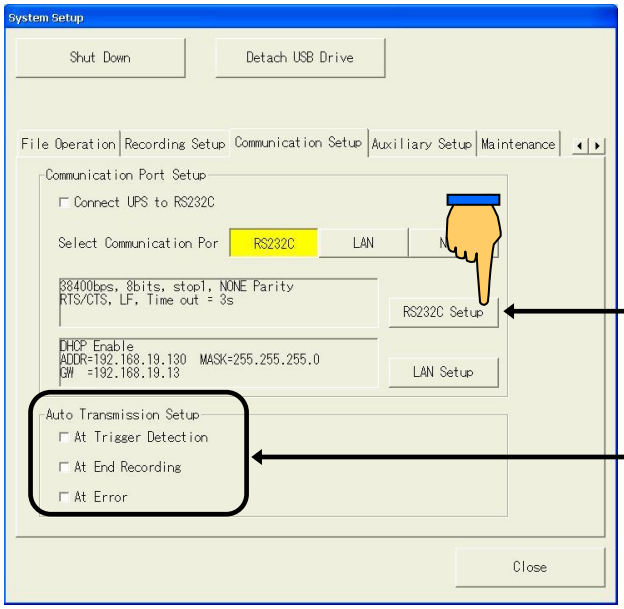
(3) RS-232C

The RS-232C interface is used.

1.2. How to Control RA2300A Using RS-232C

► By using the RS-232C interface, it is possible for the host computer to directly control the RA2300A.

Select RS-232C and then RS-232C Setup Change, make settings for RS-232C.

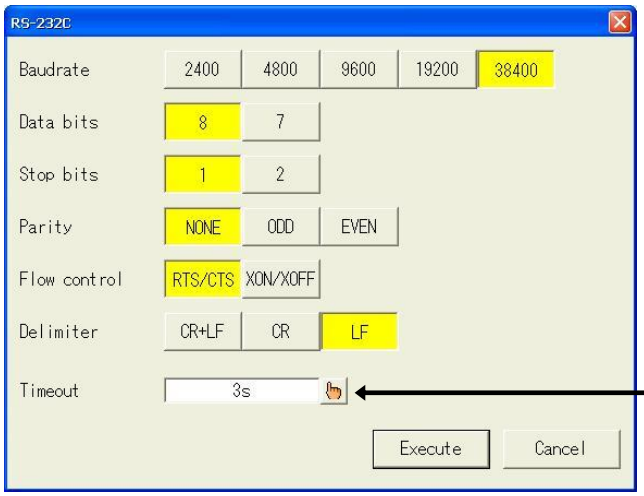


(1) RS-232C Setup Change

(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.

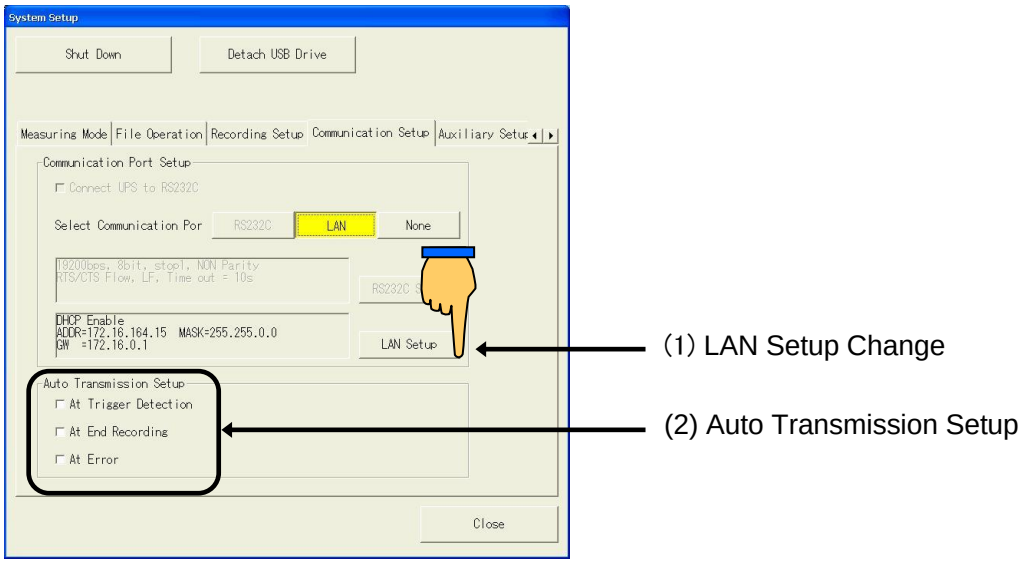
(2) Auto-transmission function

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 RA2300A by Remote Control Using LAN

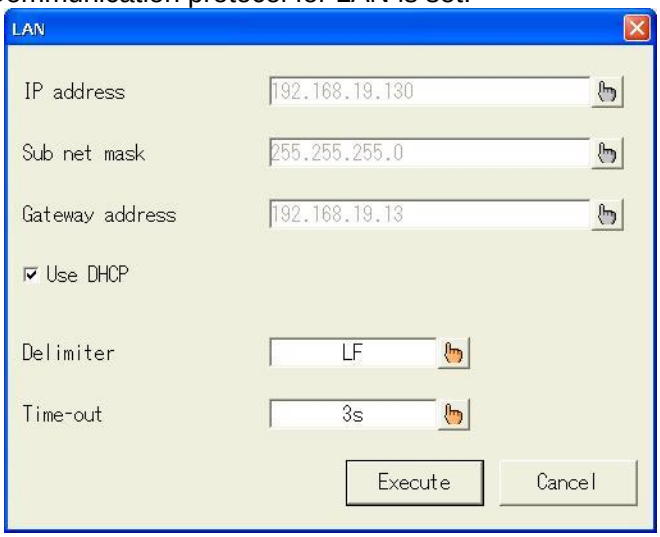
► The RA2300A can be controlled by the host computer directly through the LAN interface.

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



(1) LAN settings

Communication protocol for LAN is set.

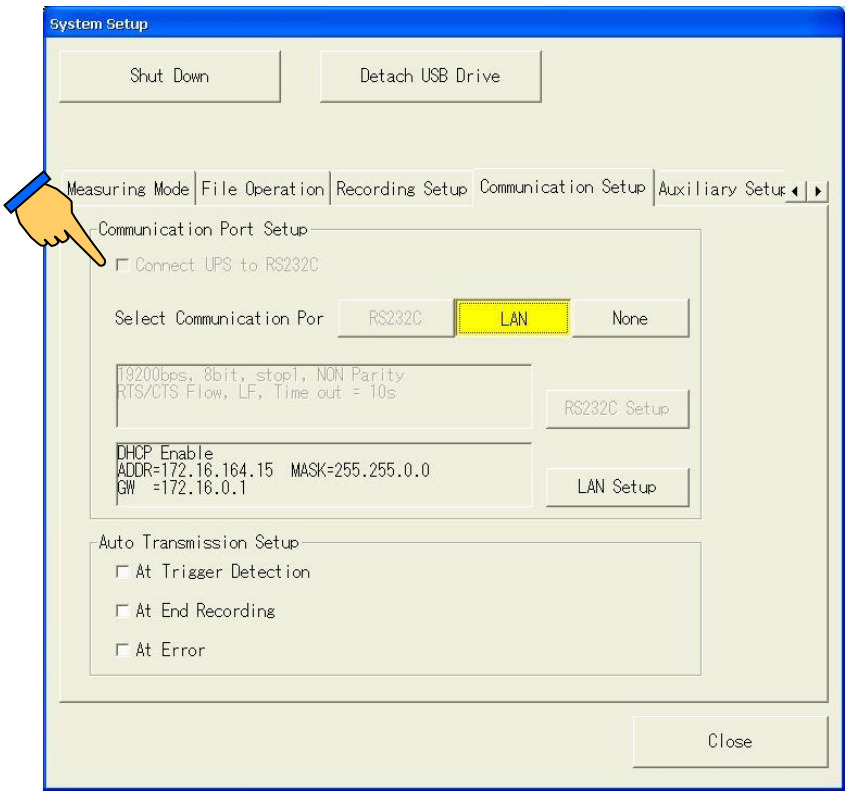


IP address, subnet mask, gateway address, delimiter, and timeout are set. Pressing a key opens the window for settings.

(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 RA2300A is connected to UPS and a tick mark is added to the checkbox for “Connecting UPS to RS-232C”, safety shutdown of the RA2300A 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.

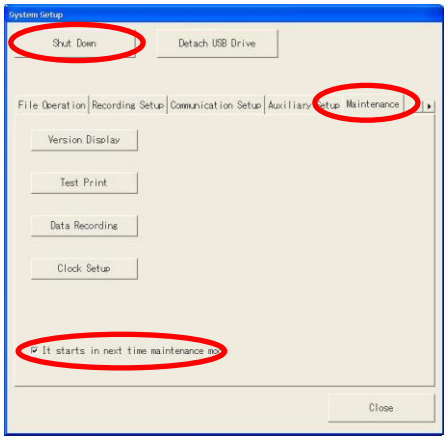
TIPS A special UPS connection cable is necessary when connecting the RA2300A with UPS. The RS232C cable of the commercial item cannot be used. Please inquire of our business about UPS and the cable that can be used.

1.5.Set Up File Sharing

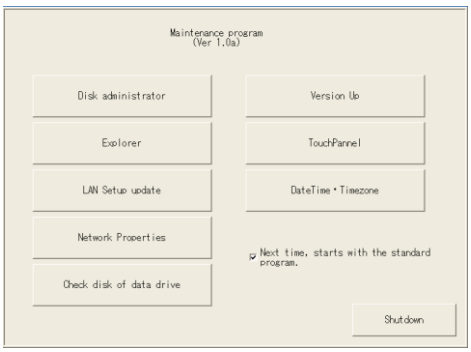
The file sharing allows you to check offline data via LAN connection. You can copy these data on PC and control without external media. To enable the file sharing, do following setting on RA2300A.

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 RA2300A. The maintenance program window opens as below.



Maintenance program window



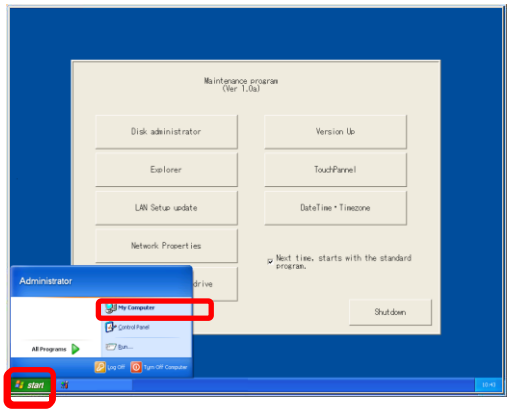
Keep the maintenance program window open and do following settings.

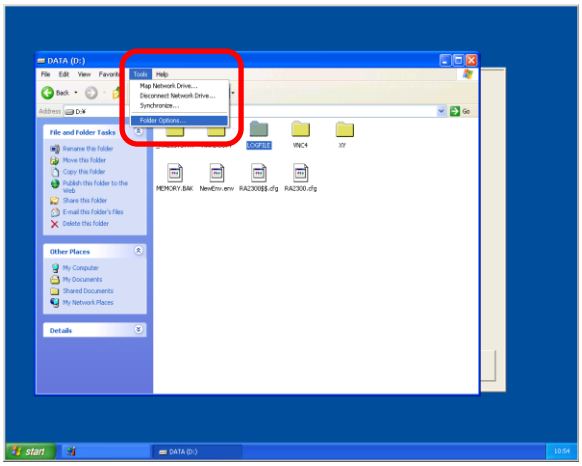
1.5.2. Set up folder options

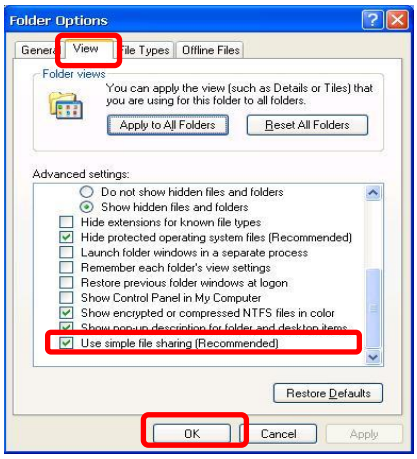
Click “Start” on the lower left corner and open “My Computer.”)

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.



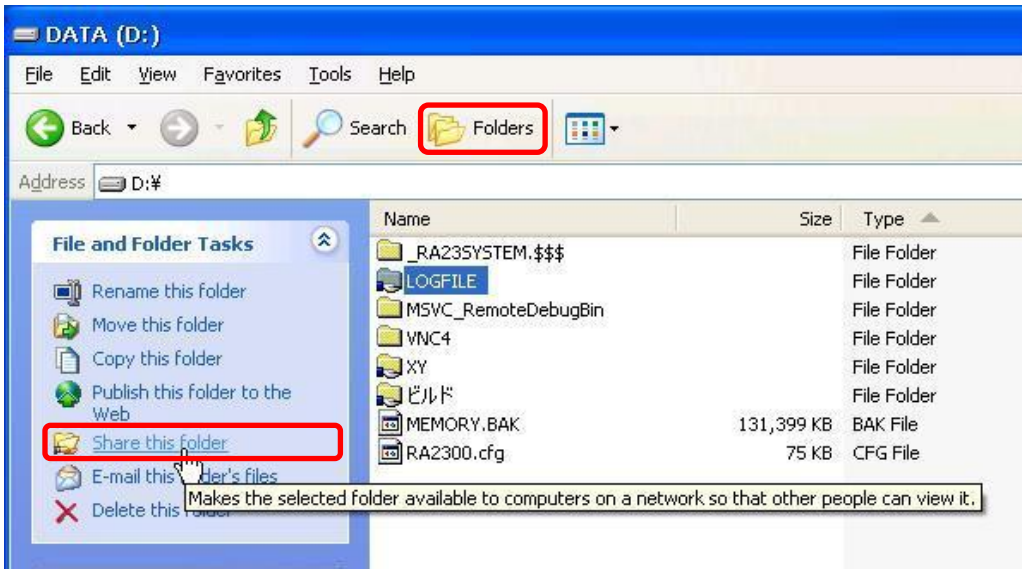




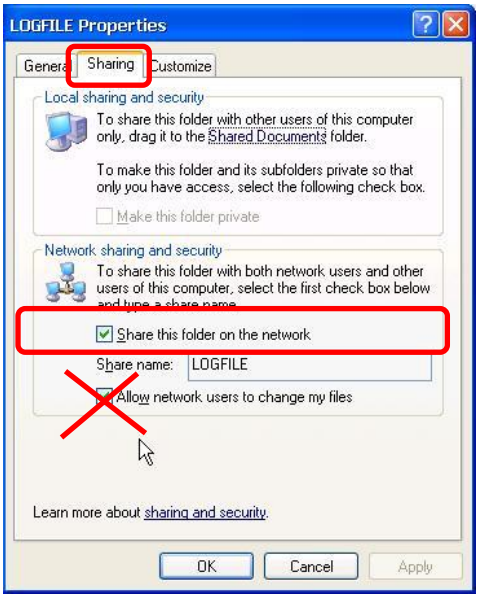
1.5.3.Set Up Files to Share

RA2300A 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.



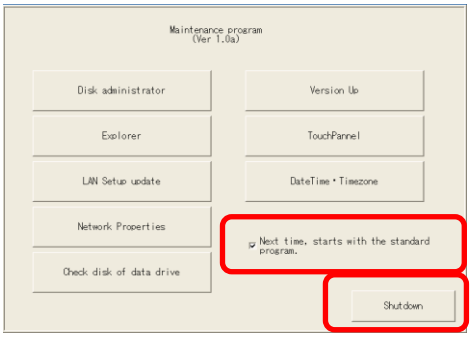
- Open “Sharing” tab on the Properties window.
- Check “Share this folder on the network” on Network sharing and security box.
- Click OK and finish setting.



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 RA2300A when it is safe.

Turning RA2300A on again will start the normal RA2300A program.

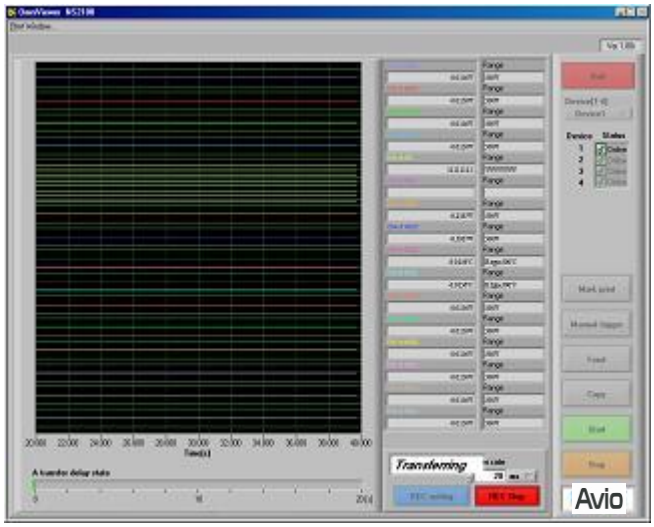


1.6.Available Functions of NS2100

NS2100 is designed and developed for RA1000 series, but the following functions are available for RA2300A.

1.6.1. Reading offline data

NS2100 can read data files recorded by RA2300A and display waveform and cursor information. However, following restrictions apply.



- **Displaying data from Event Unit (E1/E2)**
  Since RA23-145 Event Unit (E1) and Mark Recording Channel (E2) are new functions on RA2300A, their data cannot be displayed on NS2100.

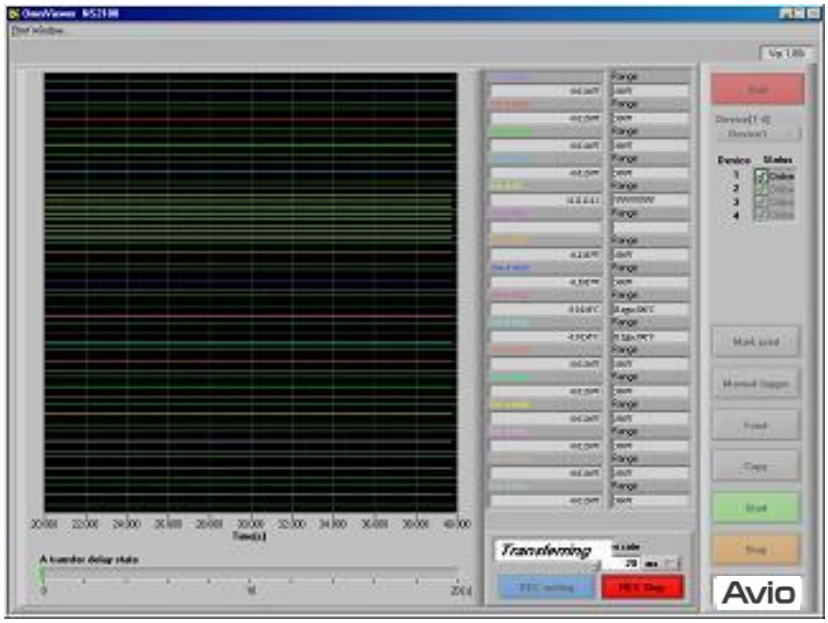
- **Displaying event data recorded as peak data**
  RA2300A uses different event data configuration at peak format recording (because different hardware is used). Therefore, event data recorded at peak format is not displayed correctly (waveform at high level not shown). Event data from memory recording or other sampling format will be displayed correctly.

NOTE When data file is loaded on NS2100, the data is always needed to be rewritable. A shared file is not directly loaded on NS2100, since it is non-rewritable to safeguard the data. the shared file When data file is retrieved on NS2100, please make a copy of the data file by using explorer, and then retrieve the copy.

1.6.2.Real-time data transfer

With NS2100, you can transfer real-time A/D data from RA2300A using RA-232C or LAN (same function as RA1000). Transferred data can be saved as data files for later use. Waveforms and numeric values can also be displayed.
Please refer to section 2 “Communication Setup” for RS-232C or LAN communications.

As for details of operation procedure for the real-time data transfer, please refer to the Instruction Manual for NS2100.



NOTE Currently, at real-time data transfer, position of event waveform on RA2300A screen will not be copied exactly on remote PC screen. Also, Neither RA23-145 Event Unit (E1) nor signal for trigger mark (E2) will be read out.

1.6.3.Online control (limited functions)

Basically, NS2100 is used for offline and real-time data transfer, but some online control functions are available as followings.

Action	Availability and Screen for Control
Start	Controllable
Stop	Controllable
Copy	Not controllable
Chart Feed	Controllable
Manual Trigger	Controllable
Mark Printing	Controllable
Pen Recorder	Controllable if recorder type is real-time.
Chart Speed	Can be set at speed/measuring condition setup
Memory Recorder	Controllable if recorder type is memory.
Sampling Speed	Can be set at recording screen.
Dividing Memory Block	Not controllable
Pre-trigger	Can be set at trigger setup screen.
Memory Recording Mode	Can be set at trigger setup screen.
Auto Copy (including files)	Not controllable
Copy CSV Files	Not controllable
Destination to Save Files	Not controllable (No retrieve but setting is done)
HD Recorder	Controllable if recorder type is filing.
Recording Speed	Can be set at speed/recording screens.
No of Recording Data	Can be set at speed/recording screens.
Recording Time	Not controllable
Disk Capacity	Not shown
Recording Operation	Not controllable
Data Format	Can be set at speed/recording screens.
Filing Format (Ring)	Can be set at speed/recording screens.
Real-time Recording	Not controllable
Destination to Save Files	Not controllable
Multi Recorder	Controllable if recorder type is transient.
Destination to Save Files	Not controllable (No retrieve but setting is done)
Sampling Speed	Can be set at speed/recording screens
Dividing Memory Blocks	Not controllable
Pre-trigger	Can be set at trigger setup screen.
Memory Recording Mode	Can be set at trigger setup screen.
Auto Copy (including files)	Not controllable
Copy CSV Files	Not controllable
Recording Speed	Not controllable
No of Recording Data	Not controllable
Recording Time	Not controllable
Real-time Recording	Not controllable
X-Y Recorder	Controllable if recording type is X-Y.
All Operations	Not controllable
Amplifier Setup	
Analog Amp	Controllable at amp setup screen.
Physical Qty Conversion	Cannot be set but retrieve is available.
Event Amp	Input ON/OFF or signal type can be set. Some problems in adjusting waveforms (currently being corrected).
Main Unit Event	Not controllable
Trigger Setup	
Trigger Mode	Controllable at trigger setup screen.
Conditions for OR Mode	Controllable at trigger setup screen.
Conditions for AND Mode	Controllable at trigger setup screen.
Conditions for WINDOW Mode	Setup is available but not retrievable.
Trigger Filter	Not controllable
Display	
Scale Display	Not controllable
Grid Display	
Digital Voltage Value Display	
Signal Name Display	
Waveform Division Display	
System—Measuring Mode	
Changing Measuring Mode	Controllable
Custom Setup	Not controllable
Initialization	Not controllable
Display this screen when power is ON.	Not controllable

System—File Control	
Online File Data Readout	Not controllable
System—Measuring Setup	
Memory Size	Controllable at System Setup then Memory Size screen.
Data No	Controllable at System Setup then Ext Sync screen (Set chart speed at Ext Sync)
Time Axis Display	Not controllable
Pulse Ratio of Ext Sync	Controllable at System Setup then Data No
Timer	Not controllable
Speed Table	Not controllable
Channel Mark ON/OFF	Not controllable
System Annotation ON/OFF	Controllable: set recorder mode, press Disp. Form then Annotation Tab
Channel Annotation ON/OFF	Controllable: set recorder mode, press Disp. Form then Annotation Tab
Print Time Axis	Not controllable
Print Signal Name ON/OFF	Controllable: set recorder mode, press Disp. Form then Report Tab Check “Before Print” to set it ON.
Signal Name Text	Not controllable
Page Annotation Print ON/OFF	Controllable: set recorder mode, press Disp. Form then Annotation Tab
Page Annotation Text	Not controllable
Print Measuring Info ON/OFF	Controllable: set recorder mode, press Disp. Form then Report Tab Check “Before Print” to set it ON.
Measuring Information Text	Controllable: set recorder mode, press Disp. Form then Report Tab
Grid Pattern	Not controllable
Amplitude Axis Text	Not controllable
System—Communication Setup	
	Not Controllable
System—Auxiliary Setup	
Click Sound	Not controllable
Display Auto Shutoff	Not controllable
Screen Copy	Not controllable
Key Lock	Not controllable
Feed Length	Not controllable
System—Maintenance	
Version Display	Controllable at System Setup then Version Display
Test Printing	Not controllable
Data Saving	Not controllable
Clock Calibration	Not controllable
Start up from Maintenance mode next time	Not controllable

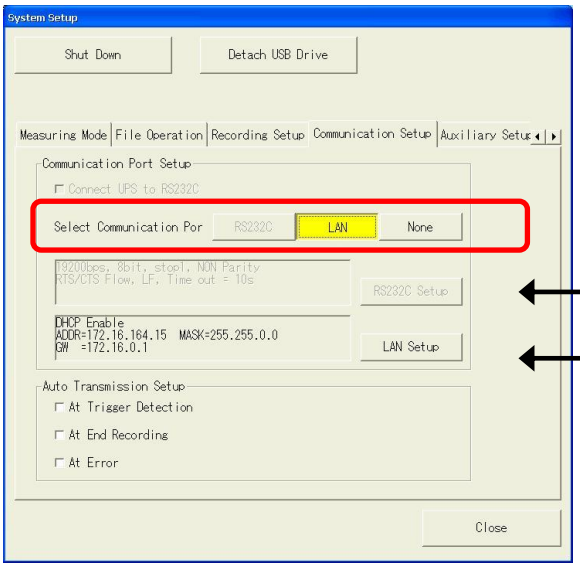
**When executing setup, a message appears as “There was errors on some setups.” Please ignore the
message.

1.6.4.Communication Setup

NS2100 can be connected with RA2300A via LAN or RS-232C (optional). No GP-IP connection is available.

Select communication method

Go to SYSTEM then COMMUNICATION SETUP on RA2300A. And select communication device.

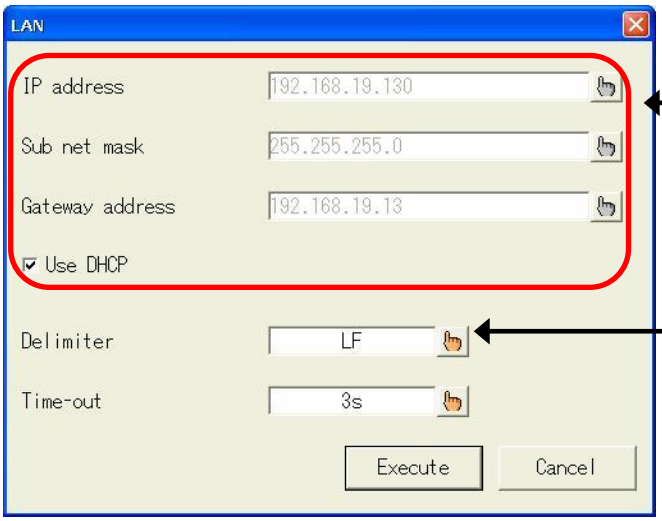


Set up RA-232C protocol

Set up LAN protocol

Communication via LAN

Check IP address of RA2300A. Go to SYSTEM then COMMUNICATION SETUP and press CHANGE LAN SETUP.



This IP address needs to be entered at NS2100 startup window on other PC.

To use NS2100, set delimiter to LF.

NOTE When DHCP is used, IP address is modified and as a consequence, the communication may be difficult to hold. In addition, DHCP is unusable in the case of peer-to-peer LAN connection. To solve the above problems, please input IP address without checking the box of “Use DHCP”.

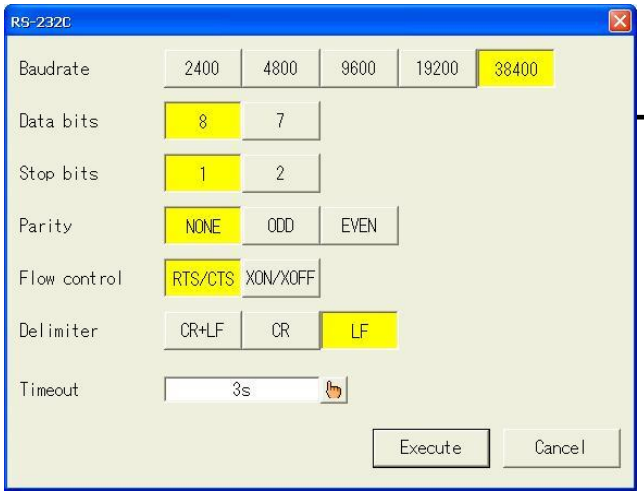
Enter IP address at setup window of NS2100 on PC.

Check IP address at COMM SETUP window of RA2300A.

Port No of RA2300A is: 2300
Port No of RA1000 is: 1404

Communication via RS-232C

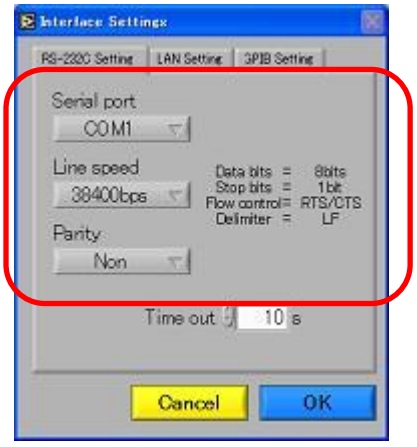
Check communication protocol of RA2300A. Go to SYSTEM then COMMUNICATION SETUP and press CHANGE RS-232C SETUP.



Use same protocol as NS2100.
NS2100 is fixed as the following setup:

Data bit	**8 bits**
Stop bit	**1 bit**
Flow Control	**RTS/CTS**
Delimiter	**LF**

Set up at the startup window of NS2100.



Same setting as RA2300A.
Check serial port of PC that is to be connected.

NOTE If setting was changed frequently, there may be a case that data such as amp information cannot be retrieved. If it happens, restart RA2300A.

If an error still happens at communication setup after restart, invalid information from the previous connection may be remaining. Please try to delete “RA1000_1.ini” file in the NS2100 install folder. The folder is located on “C:¥Program Files¥Ns2100¥Config” if not changed at initial installation.

2. Overview of Communication Control

2.1. Local/Remote Control

► The RA23000A 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 RA2300A 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 RA2300A from the communication interface.

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

When the RA2300A 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 **remote control mode**

or


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 icon of “Keylock” to return manually to local mode.

2.2. Overview of the Communication Commands

► Communication commands to control the RA2300A remotely are categorized into three types.

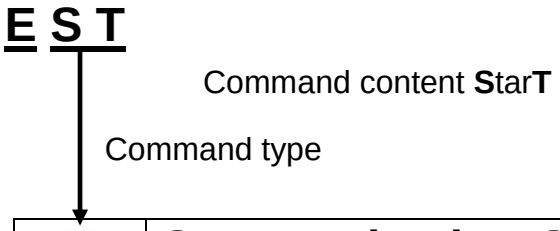
- **Character string command**
  Controls such as settings and recordings are basically performed by string commands. The string commands consist of a 3-character command and parameter string following the command.

- **Escape Sequence Commands**
  The [ESC]+1 character is used as a command. By using these commands, operation/error information of the RA1000 can be obtained. This command cannot control settings and operation of the RA2300A.

- **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], [EOI]** (for GP-IB only), etc., and it is necessary to use the same delimiter as that set in the RA2300A.

Format Examples of SFT Command (Set Filing Time)

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

- **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 RA2300A

Function	Outputs the status of the RA2300A.
Input Format	[ENQ](05h)
Output Format	[NAK](15h): The RA2300A is operating. [ACK](06h): The RA2300A stops and is waiting command.
Description	When the RA2300A is operating, [NAK](15h) is returned. When the RA2300A is stopped and waiting for a command, [ACK](06) is returned. To see the status of the RA2300A 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.

2.4. Escape Sequence

► The [ESC]+1 character is used as a command. By using this command the RA2300A's operation/error information can be obtained. This command cannot control settings and operation of the RA2300A.

- **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 RA2300A)
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' Outputs error information

<table>
<tr><td>Function</td><td>Outputs error information of the RA2300A.</td></tr>
<tr><td>Input Format</td><td>[ESC]+'E'</td></tr>
<tr><td>Output Format</td><td>A1,A2 (Delimiter)
A1: RA2300A hardware error
<table>
<tr><th>A1</th><th>RA2300A 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>Command processing error information</th></tr>
<tr><td>0</td><td>Normal</td></tr>
<tr><td>1</td><td>Command grammar error (Syntax error upon command reception)</td></tr>
<tr><td>2</td><td>Parameter error (Parameter exceeding the specifications)</td></tr>
<tr><td>3</td><td>Mode error (Impossible to operate in this mode)</td></tr>
<tr><td>4</td><td>Execution error (Restricted because of the status of RA2300A)</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>

*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 RA2300A User's Manual. While the RA2300A 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	Sets where to save files of a HD recorder, a multi recorder, or a memory recorder (backup filing). While the RA2300A is operating, an execution error occurs.

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</td></tr>
<tr><td>Omitted</td><td>0.1mm/pulse</td></tr>
<tr><td>2</td><td>[min]</td></tr>
</table></td></tr>
<tr><td>Output Format</td><td>None</td></tr>
<tr><td>Description</td><td>While any action other than a chart printing is operating, an execution error occurs</td></tr>
</table>

3.4. Memory Recording

NOTE If a setting command related to memory recording is set while the RA2300A 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	While the RA2300A 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	No limitation
6	1MW	No limitation
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 RA2300A is operating, an execution error occurs.

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 RA2300A 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 RA2300A 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 RA2300A 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 RA2300A 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 Realtime 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 RA2300A is operating, an execution error occurs. 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 RA2300A is operating, an execution error occurs. If the time is set at 0 hour, 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 RA2300A 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 paper feed speed setting of "SCS: wavy chart record” 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])
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])
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 RA2300A is operating, an execution error occurs. The RA2300A does not support P1=3(A*B); therefore, a parameter error occurs when selecting it.

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 [1-17] 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	CH17 is for an extra event (E1). While the RA2300A 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] 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 RA2300A 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 RA2300A 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] 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] 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] 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] 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] 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. 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] 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] 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] 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] 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 P9: 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] 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] 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] 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 (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. While any action other than a chart recording is executing, an execution error occurs. When the event unit of the RA2300A is not installed, a mode error occurs.

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] 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

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 LSB=CH1
Output Format	None
Description	While any action is executing, an execution error occurs. The frame becomes the order from 1 to 16 from the uppermost part to the lower side. The range of the frame specification (P1) changes according to the wavy record number of partitions. (ex. in case of divide into five, range from 1 to 5) When the sum total of the size of the frame exceeds 200mm, it becomes a parameter error

* 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 RA2300A 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) Example: Only CH1 is valid. 00001 Only CH8 is valid. 00080 All 16 channels are valid. 0FFFF E1 is valid. 1FFFF E2 is also valid. 3FFFF
Output Format	None
Description	While the RA2300A is operating, an execution error occurs.

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 RA2300A 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 RA2300A.**

* “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 RA2300A.**

* “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 RA2300A 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 RA2300A 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 RA2300A 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] A=Batch) 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 RA2300A. The detailed cause can be confirmed with the “ICA Inquire auto transmit CAtion”

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 RA2300A, 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	RA2300A 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 RA2300A 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 RA2300A 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 RA2300A 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) n1n2n.....n16 =CH1,CH2.....CH16 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".

*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	P1, P2, P3, P4, P5 (Delimiter)
	P1: Selecting drive ([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: Using folder name (String available for folder name) P5: 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

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 RA2300A 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	

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	

4.5. HD Recording

IRF (Inquire Realtime 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=Rnging) 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)
	A1: Starting execution of recording by detecting trigger.

A1	Starting execution of recording by detecting trigger
0	Pressing “START” key initiates recording soon.
1	Detecting trigger initiates recording.
2	Detecting trigger initiate and repeat recording.

	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])
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])
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 RA2300A does not support A1=3(a*B) because it has no appropriate function.

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 [1-17]
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 [1-16]
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***		

ICH (Inquire CHannel) Reading HRDC amp Setting

Function	Outputs HRDC amp setting.
Input Format	ICH P1 (Delimiter)
	P1: Selecting channel [1-16]
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 [1-16]
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 [1-16]
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 [1-16]
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 [1-16] 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: Signal number [1-8] The same as the setting with P2. A6: EV Wavelength position 0.0 to 215.0 [mm] A7: Vibration 2.0 to 25.0 [mm] A8: 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 [1-16]
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 [1-16]
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 [1-16]
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 [1-16]
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 [1-16]
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 a A8 contents.

A8	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 [1-16]
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: Signal number [1-16] The value set with P2. A6: EV wavelength position 0.0 to 215.0 [mm] A7: Vibration 2.0 to 25.0 [mm] A8: 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 [1-16]
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	

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 becomes the order from 1 to 16 from the uppermost part to the lower side.

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: Only CH1 is valid 00001 Only CH8 is valid 00080 All 16 channels are valid. 0FFFF E1 is valid. 1FFFF E2 is also valid. 3FFFF
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 RA2300A.**

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” fixed
1	Version of the RA2300	“V1.0a”
2	Device No.	“1234567”

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

Function	Outputs characters corresponding to the command type detecting an error.
Input Format	IES (Delimiter)
Output Format	A1 (Delimiter):
	For one bite control command Command / HEX / Content of process / A1 [ENQ] / 05 / Outputs the status of the RA2300A. / ^E [CAN] / 18 / Suspends command execution. / ^X [DC4] / 14 / Initializes the RA2300A. / ^T A code where 40h is added to "^" is output. For details of one bite command, see "One Bite Control Command".
	For escape sequence Command / Content of Process / A1 [ESC]+Z / Returns to a local status. / eZ [ESC]+R / Clears a send buffer. / eR [ESC]+C / Outputs a status. / eC [ESC]+E / Outputs error information. / eE A code where [ESC] and an additional character are added to "e" is output. For details of escape sequence, see "Escape Sequence".
	For string command A string received as a command string is output. For details of string command, see "String Command".
	When no error occurs, "*" is output.
Description	After the answer A1 is output, the detected error is cleared.

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

Function	Outputs display speed setting of input monitor.
Input Format	IIM (Delimiter)
Output Format	A1, A2, A3 (Delimiter)
	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)
Description	

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

Function	Outputs the current settings of measurement value of input signal.
Input Format	IDA P1 (Delimiter)
	P1: Selecting output

P1	Content of output
[1-16]	Outputs a channel of measurement value.
A	Outputs all channels of measurement values.
E1	Outputs an extra event 1 of measurement value.
[U1-U16]	Outputs amp information.

Output Format	When P1=[1-16, E1] A1 (Delimiter) Outputs a channel of measurement value (ASCII string).
	When P1=A A1, A2 to A18 (Delimiter) Outputs all channels of measurement values including E1 (ASCII string).
	When P1=[U1-U16] A1, A2 (Delimiter) A1: Amp type

A1	Content of output	A1	Content of output
0	***None***	7	***TDC***
1	***HRDC***	8	***FV***
2	***FFT***	9	***RMS***
3	***HSDC***	10	***DCST***
4	***ACST***	11	***HRZS***
5	***EV***	-1	Extra event (E2)
6	***TCDC***		

A2: Unit string Example: “mV” etc. (A null character is output for EV amp.)

Description	The selected channel of the current measurement value is output in string.

IAT (Inquire Auto Transmit) Reading transmit function

Function	Outputs the transmit function setting.
Input Format	IAT (Delimiter)
Output Format	A1, A2 (Delimiter)
	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.
Description	

ICA (Inquire Auto Transmit CAtion) Reading transmit factor

Function	Outputs the setting of the factor of transmit from the RA2300A.
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	

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 RA2300A, 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	RA2300A 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 (Delimiter) A1:Y-Axis(16 characters) n1n2n.....n16 =CH1,CH2.....CH16 Ex. Sets CH2,3,4 A1:"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".

*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 RA2300A execution

Function	Stop the RA2300A 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	The copy output is executed as well as the case to push "Copy" key on the replay screen 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 prin

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, prints an event mark.

5.2. Clearing of Configuration

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

Function	Clears the contents of a memory.
Input Format	EMC P1 (Delimiter)
Output Format	P1 (Delimiter)
	P1: Selecting the memory block number to be cleared. (Can be omitted.)

P1	Contents of Initializing
[1-128]	Clears the selected memory block. When the selected number is more than the current number of block divisions, a parameter error occurs.
A	Clears all blocks.
Omitted	Clears the current block.

Description	Valid only when the RA2300A is stopped. Otherwise, an execution error occurs.

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: Execution channel [1-16, 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: Execution channel [1-16, 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: Execution channel [1-16, A] A means a batch setting.
Output Format	None
Description	Executes auto zero suppression voltage for the HRZS amp The execution requires 0.5 s 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: [STX](D1.DAT)(D2.DAT)(D3.DAT)……(D16.DAT)[SUM] Peak: [STX](D1.MAX)(D1.MIN)(D2.MAX) ……(D16.MIN)[SUM] []: one byte, ():two bites
Description	A screenful of data on the input monitor without any restrictions is transferred from the RA2300A 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: [STX](D1.DAT)(D2.DAT)(D3.DAT)……(D16.DAT)[SUM] Peak: [STX](D1.MAX)(D1.MIN)(D2.MAX) ……(D16.MIN)[SUM] []:one byte, ():two bites
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 RA2300A 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 RA2300A 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 RA2300A 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 ([1-999])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.

*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 RA2300A is operating: A1=6 A2=7 An execution error occurs.</td></tr>
</table>

*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. * An 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> Selecting a channel number [1-16, E1]. (E1 means an Extra event is selected.) <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 * An 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, E1] 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) -- <omitted> -- S:15:1: <String> (Delimiter) S:15:2: <String> (Delimiter) -- <omitted> -- S:15:8: <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, E1, A] 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.

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	°

To Ensure Prolonged Use

A&D Company,Limited.

Thank you for purchasing an A&D Company,Limited. product.

To ensure prolonged use of the product that you have purchased, we offer the following lineup of maintenance services.

1. Warranty Period

The warranty period for this product is one year from the date of purchase. In case of a failure, the product will be repaired free of charge (only if the failure is ascribable to the responsibility of A&D).

2. Disclaimers

We take no responsibility for any damages caused by the following reasons;

(1) Consequential damages and production compensation caused by any accidents of our product;
(2) Damages of our product generated by other companies' equipments and their construction;
(3) When operation, proper maintenance, and regular inspection are not done;
(4) Troubles which are apparently not attributable to our company or those that cannot be decided clearly whether our company is responsible for those troubles;
(5) Exhaustion of consumptions and repair parts;
(6) Troubles attributed to third party's conflicts;
(7) Troubles caused by a force majeure such as natural disasters

Address inquiries to:

Communication Command
RA2300A INSUTRUCTION Manual (7006559R01A)

1st Edition : July,2015

A&D Company, Limited