SERIAL INTERFACE MANUAL

1/3 Octave Band Real-Time Analyzer

SA-29/SA-30

RION CO., LTD.

Contents

Outline

The 1/3 octave real-time analyzer SA-29/SA-30 incorporates two serial interfaces, one using a RS-232-C connector and one using an optical link. When a computer is connected via one of these interfaces, it can be used to control settings and measurement operation and to receive measurement data for storage or further processing. High transfer rates and protocols for block transfer allow speedy communication.

This manual is divided into three sections covering the following topics.

- Connection to a computer
  Here you will find information about connecting the SA- 29/SA-30 to the computer and how to set transfer parameters.

- Transfer principle and transfer procedure
  This section describes the transfer principle and the procedure for sending commands and data.

- Commands and Response Data
  This section describes the commands that can be sent from a computer to the SA-29/SA-30, and the data that are sent to the computer in response.

Optical communication

The optical communication port of the SA-29/SA-30 uses a proprietary protocol that is based on the RS-232-C standard. The SA-29/SA-30 does not support the IrDA standard, but it is capable of communicating with infrared ports on computers that comply to IrDA specifications. However, if an IrDA driver is installed for the infrared port on the computer, data transfer with the SA-29/SA-30 will not function properly. Verify that a driver that sets up the infrared port for serial communication is installed on the computer.

Connection to a Computer

Using the RS-232-C interface

1-to-1 connection

Using a commercially available RS-232-C cable, make the connection as shown below. The cable should have a 9-pin D-sub connector on the end that connects to the SA-29/SA- 30 and a connector that fits the RS-232-C interface on the computer at the other end.

SERIAL I/O connector

SA-29
SA-30

To COM port (RS-232-C interface) on computer

RS-232-C cable

Use comonly available interface cable
(a female 9-pin D-sub connector)
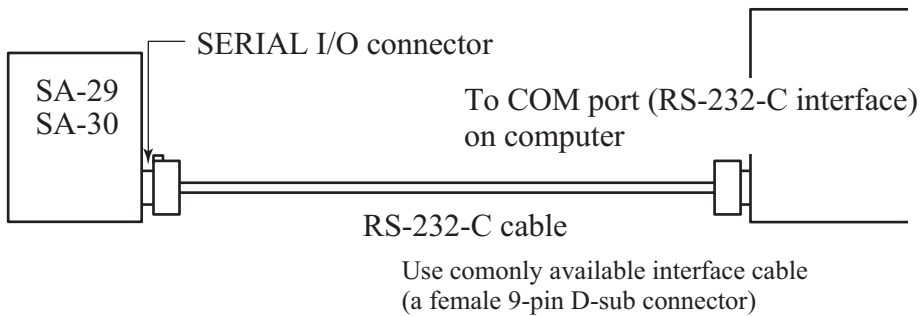
1-to-N connection

When connecting several SA-29/SA-30 units to a single computer, use the dedicated multi-channel interface adapter and connection cables, and make the connection as shown below.

SA-29 SA-30	SA-29 SA-30	SA-29 SA-30

SC-31	SC-31	SC-31	Host computer
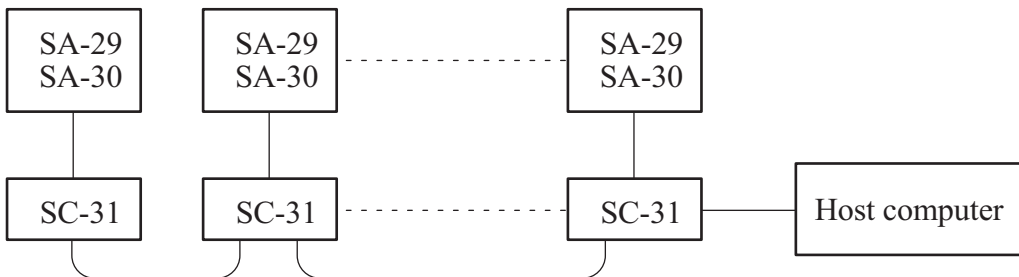
SC-31: Multi-Channel Interface Adapter (available separately)

Using the optical port

1-to-1 connection

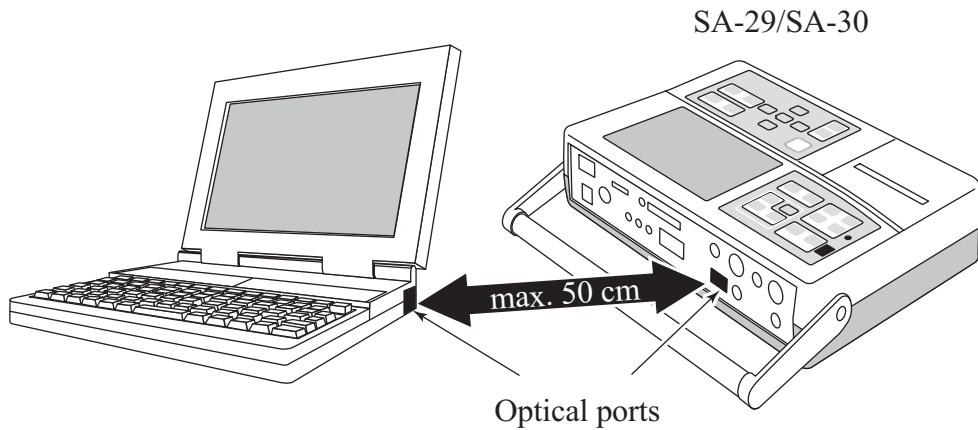Position the SA-29/SA-30 and the computer so that the optical ports face each other, as shown below. The two ports should not be further than 50 centimeters apart.

SA-29/SA-30

max. 50 cm

Optical ports

Note
1-to-N connection is not possible.

Settings at the SA-29/SA-30

To enable communication, the communication port, transfer rate, and unit index must be set properly, as described below.

Setting procedure

(1) Press the SETUP key on the SA-29/SA-30 to call up the top menu.

(2) Press the [I/O] touch-panel key to call up the input/output settings main menu.

(3) Press the [COMM.] touch-panel key to call up the communication parameters setting menu.

(4) Select the communication port.
   [SERIAL]: RS-232-C   [OPTICAL]: optical port

(5) Select the transfer rate to match the setting made at the computer.

(6) Press the [CLOSE] touch-panel key to return to the input/output settings main menu.

(7) Press the [INDEX] touch-panel key to call up the index number setting menu.

(8) Use the numeric keys to enter the index number, and then press the [OK] key. In a 1-to-N configuration, specify a unique number that is not in use by any other unit in the system.

(9) Press the SETUP key once more to return to the measurement screen.

Transfer Principle and Transfer Procedure

Transfer Principle

Communication port	RS-232C	Infrared port
Transfer rate	9600/19200/38400/115200 bps	
Data word length	8 bits	
Stop bits	1	
Parity	None	
Flow control	RTS/CTS control	None
Format	1-to-N ($1 \leq N \leq 16$)	1-to-1
Receive timeout	5 seconds	
Error correction method	Packet resend (max. 3 times)	
Max. packet size	1024 bytes	
Transmission	Half-duplex	
Protocol	Rion-specific packet transfer	

Remote Mode/Local Mode

● Local mode
In this mode, the SA-29/SA-30 can be operated by its own command keys or the supplied infrared remote control. Communication is possible also in local mode.

● Remote mode
In this mode, the SA-29/SA-30 is operated by commands received from the computer. The command keys or the supplied infrared remote control are inactive.

● Switching between local mode and remote mode
To switch from local mode to remote mode, the RMT command can be used.
To switch from remote mode to local mode, the RMT command can be used, or the ENTER key on the SA-29/SA-30 can be pressed.

Transfer Data Format

Between the host computer and the SA-29/SA-30, the following codes and messages are exchanged.

- Data link message
- Information message
- Positive acknowledge code
- Negative acknowledge code
- Link cut code

Data link message

This message packet serves to specify the communication partner. It has a fixed length of 6 bytes.

DLE (10 h)	EOT (04 h)	INDEX	DLE (10 h)	ENQ (05 h)
1 byte	1 byte	2 byte	1 byte	1 byte

INDEX

This is the index number assigned to the SA-29/SA-30 unit. It is specified in hexadecimal notation with two digits. "00" means the host and "FF" means all stations.

Actual index number	INDEX notation
Host	"00"
1	"01"
2	"02"
3	"03"
4	"04"
5	"05"
6	"06"
7	"07"
8	"08"
9	"09"
10	"0A"
11	"0B"
12	"0C"
13	"0D"
14	"0E"
15	"0F"
16	"10"
All stations	"FF"

Information message

This message packet contains commands from the host and response data from the SA-29/SA-30. Its length is variable, with a maximum of 1030 bytes (the DATA part varies in length). In a packet followed by other packets, BCC is preceded by ETB. In the last packet, BCC is preceded by ETX.

Packet followed by other packets

DLE (10 h)	STX (02 h)	DATA	DLE (10 h)	ETB (17 h)	BCC
1 byte	1 byte	Max. 1024 bytes	1 byte	1 byte	2 byte

Last packet

DLE (10 h)	STX (02 h)	DATA	DLE (10 h)	ETX (03 h)	BCC
1 byte	1 byte	Max. 1024 bytes	1 byte	1 byte	2 byte

DATA

> The body of the information message. Length is variable, with a maximum of 1024 bytes. The packet can contain either ASCII or binary codes. DLE in binary data is converted to DLE+DLE.

BCC

> Block check code used for checksum processing. The checksum code contains the lower 16-bit of adding an ASCII code to each byte. The data from the start of the DATA part to ETB or ETX are covered by checksum processing. The processed 16-bit (2-byte) checksum code is output in order of lower byte and upper byte. Commands from the host can be any 2-byte character (because the SA-29/SA-30 does not implement this check).

Positive acknowledge code

When a data link has been successfully established and when a received infor-

DLE (10 h)	ACK (06 h)
1 byte	1 byte

mation message is correct, the receiver returns this 2-byte code to the sender.

Negative acknowledge code

When a received information message is incorrect (block check code error, data

DLE (10 h)	NAK (15 h)
1 byte	1 byte

size exceeded), the receiver returns this 2-byte code to the sender.

Link cut code

When the host switches to a different station or terminates communication, or when the SA-29/SA-30 abandons communication due to timeout or maximum retry count, this 2-byte code is sent.

DLE (10 h)	EOT (04 h)
1 byte	1 byte

Transfer Procedure

This section describes the operation sequence that is used to transfer the data described in the "Transfer Data Format" section.

(1) Establish link

This is the stage where the host specifies the SA-29/SA-30 units with which to communicate. The step is necessary also for 1-to-1 communication with a single SA-29/SA-30 unit. The index number of the SA-29/SA-30 (set with the menu on the unit itself) is specified. After establishing the link, any communication with other SA-29/SA-30 units that were not specified is disregarded until the link is terminated. Once a link with a SA-29/SA-30 unit has been established, the steps for cutting and reestablishing the link can be omitted, allowing consecutive command transmission and data reception (section framed by a dotted line in the illustration).

(2) Command send and acknowledge

The host sends one or several command messages. If the command is a command that requests data, the SA-29/SA-30 returns an acknowledge message and waits for a response from the host. If this response is not received within 5 seconds, the SA-29/SA-30 times out and cuts the link.

(3) Cut link

The cut link command (DLE+EOT) terminates the communication link with a SA-29/SA-30 unit. It is used by the host after data transfer is completed, and it can be used by either side in case of a block error or timeout.

Note
When the link is established by specifying "FF" (all SA- 29/SA-30 units), there will be no response whatsoever from the individual SA-29/SA-30 units. There will be no DLE+ACK response to data confirm messages and command messages. (This is because the host would not be able to identify the SA-29/SA-30 unit from which the response was sent.) The host cannot send a request command to all stations. If such a command is sent, it will be disregarded.

Note
A correct BCC (block check code) is appended to all messages sent from a SA-29/SA-30 unit. The host can use these to test the validity of received messages. The SA- 29/SA-30 disregards the BCC contents of any message it receives. The BCC from the host therefore need not be correct. It should contain of an arbitrarily decided 2- byte code (for example "00"). However, the BCC may not be omitted.
Note
The DLE code in the DATA section of response messages from the SA-29/SA-30 is converted to DLE+DLE for sending. Therefore the length of the DATA section may reach 1025 bytes. At the host side, any occurrence of DLE+DLE in the received DATA section should be decoded to a 1-byte DLE.

● Normal sequence

The area within the dotted line allows for consecutive simplified communication between SA-29/SA-30 and host while the link is maintained.
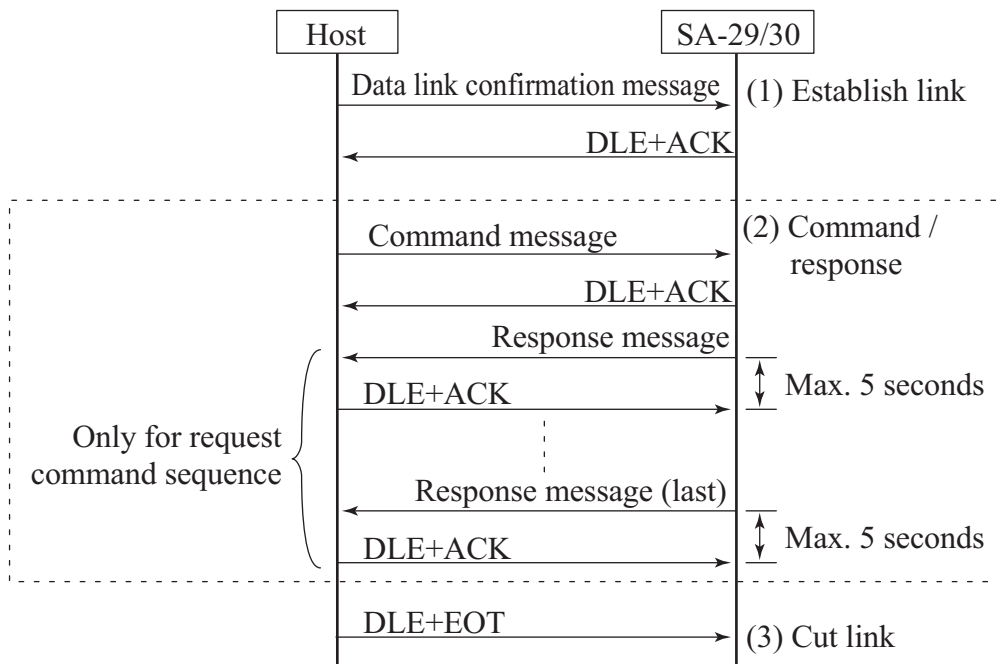
● Error sequence (block receive error)

When a message received by the SA-29/SA-30 from the host is incorrect (block check code error, block length exceeded), a negative acknowledge message is returned up to 3 times. At the 4th time, the link is cut.

```
          ┌──────┐                    ┌──────────┐
          │ Host │                    │ SA-29/30 │
          └──────┘                    └──────────┘
             │                             │
             │           Message           │
             │────────────────────────────▶│  Error block
             │            DLE+NAK           │
             │◀────────────────────────────│
             │      Message (resend 1)      │
             │────────────────────────────▶│  Error block
             │            DLE+NAK           │
             │◀────────────────────────────│
             │      Message (resend 2)      │
             │────────────────────────────▶│  Error block
             │            DLE+NAK           │
             │◀────────────────────────────│
             │      Message (resend 3)      │
             │────────────────────────────▶│  Error block
             │            DLE+EOT           │  Cut link
             │◀────────────────────────────│
             │                             │
```
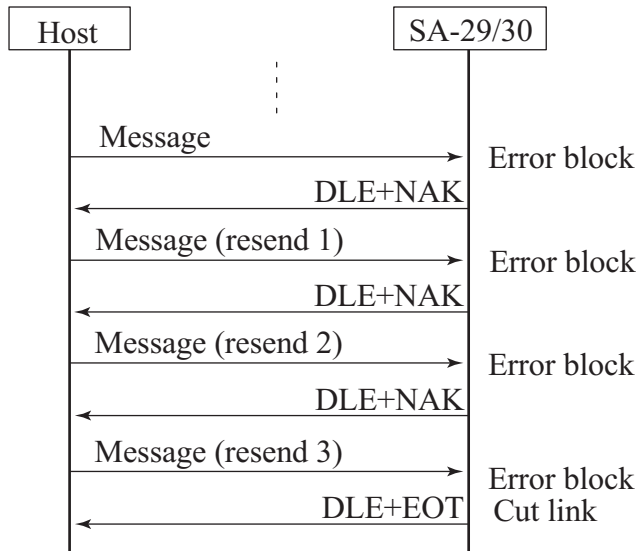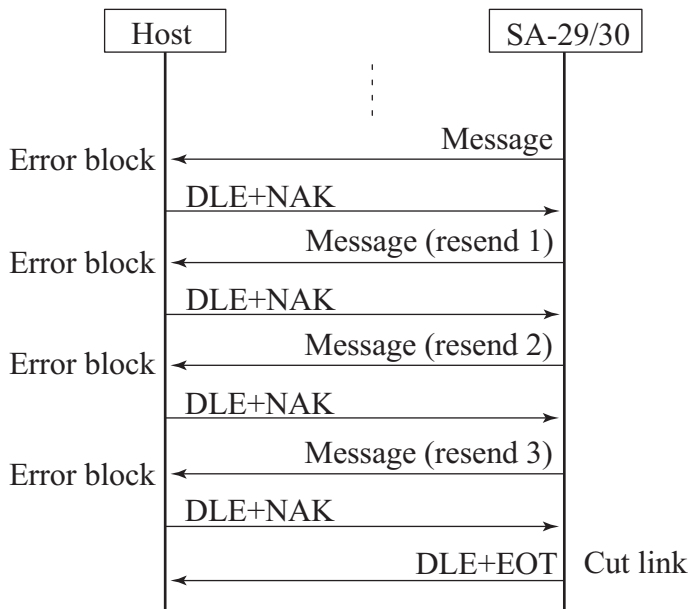
● Error sequence (resend request exceeded)

When the SA-29/SA-30 receives a negative acknowledge response from the host, it resends the same data up to 3 times. At the 4th time, the link is cut.

```
              ┌──────┐                    ┌──────────┐
              │ Host │                    │ SA-29/30 │
              └──────┘                    └──────────┘
                 │                             │
                 │           Message           │
  Error block    │◀────────────────────────────│
                 │            DLE+NAK           │
                 │────────────────────────────▶│
                 │      Message (resend 1)      │
  Error block    │◀────────────────────────────│
                 │            DLE+NAK           │
                 │────────────────────────────▶│
                 │      Message (resend 2)      │
  Error block    │◀────────────────────────────│
                 │            DLE+NAK           │
                 │────────────────────────────▶│
                 │      Message (resend 3)      │
  Error block    │◀────────────────────────────│
                 │            DLE+NAK           │
                 │────────────────────────────▶│
                 │            DLE+EOT           │  Cut link
                 │◀────────────────────────────│
                 │                             │
```

● Error sequence (timeout)

When the SA-29/SA-30 has sent a response message and receives nothing from the host for 5 seconds, it times out and cuts the link.
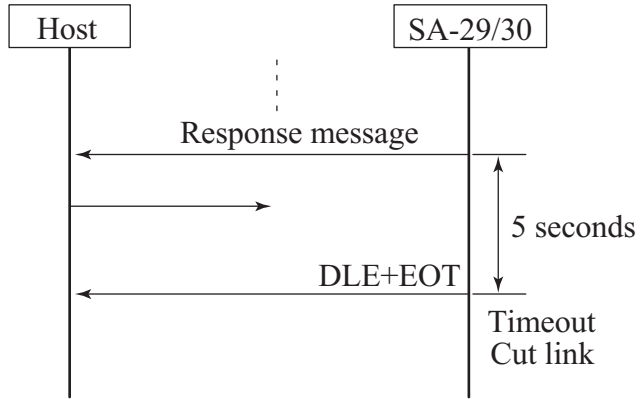
Commands and Response Data

This section lists the actual contents of the DATA section of information messages mentioned in the section "Transfer Data Format".

Command: Information message sent from host to SA-29/SA- 30
Response data: Information message sent from SA-29/SA-30 to host in response to a command

Command Types

● Setting command

This type of command is used by the host to change settings and to control operation of the SA-29/SA-30.

● Request command

This type of command is sent to the SA-29/SA-30 to obtain setting and status information or measurement data. The command is terminated by a "?".

Command Format

Commands used by the SA-29/SA-30 consist of the 3-byte command name (using letters A through Z) followed by one or several parameters. A parameter can consist of numerals "0" - "9", "?", "#", or "." (decimal point).

The command name and the parameter should be separated by a space (20h).

OK: SRT 1

OK: SRT ?

NG: SRT1 (no space)

NG: SRT? (no space)

When there are several parameters, a space (20h) should be used as separator.

OK: MST 1 0

NG: MST 10 (no space)

NG: MST 1,0 (comma used as separator)

Using a "#" as parameter specifies that the current value of the parameter should be maintained.

<Example>

MST 10 #

Processing time for time measurement mode is set to 10 and the current unit is maintained.

Response Data and Format

Response data are setup information data or measurement data sent from the SA-29/SA-30 in response to a command. The first item in response data is the command error code (see next page). When this is other than "0" (normal), no further response data are sent. When there are multiple response data, a comma is used as separator.

<Example>

Response to the command "SRT ?" (processing status request):   0,4

Initial "0" indicates that command was processed normally. "4" indicates current processing status (processing completion standby)

Note
Regarding the format of binary response data, see the section "Response to Measurement Data Request Commands".

Command Error Handling

When the SA-29/SA-30 receives a command from the host, it sets the command error code. The host can check the command error code as follows.

Result of a setting command

Use the "EST ?" command. This command will return the command error code of the immediately preceding command.

Result of a request command

The SA-29/SA-30 appends the command error code to the beginning of the response data. When this is other than "0" (normal), no further response data are sent.

Note
When the link is established for all stations (index number FFh), the SA-29/SA-30 will not return anything to the host. The above described methods for checking the command error code therefore do not work. You must link to individual units to check for command errors.

Command error codes

    0: Command was executed normally.

2 - 4: Invalid command name

    5: Setting command parameter is out of range.

    6: Command cannot be executed. Parameter is out of range, or current operation status does not allow execution.

    7: Request command parameter is out of range.

   11: Command cannot be executed because unit is in current mode.

   12: Command cannot be executed because unit is in recall mode.

   13: Command cannot be executed because processing is in progress.

   14: Command cannot be executed because printing is in progress.

Command Description Conventions

Command parameters are denoted as "p1", "p2" etc., with the numeral indicating the number of the parameter. The parameter of request commands ("?") is shown as is.

Note
Indications such as "May not be used if ..." or "May not be used if p1 value is ..." should be followed (do not send the command in such cases). The same applies to instructions such as "Specify ... for p1 when using SA-29" (do not make other settings in such cases). Otherwise a command error will occur, or an unexpected setting will be established without warning. Specified parameters may not be omitted. Always add the specified number of parameters.

List of Commands

Memory commands

System setting commands

Sync data commands

Measurement data request commands

Command Description

Measurement progress control commands

SRT p1   Start/stop processing

p1:   Processing status

   0: Start processing

   1: Stop processing

- In current mode, "1" starts current processing. In recall mode, "1" starts recall processing.
- In recall mode, "0" may not be specified.
- If "0" is specified during store, the store operation will be stopped.

SRT ?   Get processing status

Response: err,p1

p1:   Processing status

   0: Processing stopped, trigger disabled

   1: Processing stopped, trigger enabled

   2: Trigger standby

   3: Delay time elapse standby

   4: Processing in progress

- May not be used in recall mode.

PSE p1   Enable/disable pause

p1:   Pause status

   0: Disable pause

   1: Enable pause

- May not be used in recall mode.

PSE ?   Get pause status

Response: err,p1

p1:   Pause status

   0: Pause disabled

   1: Pause enabled

- May not be used in recall mode.

STO p1 **Start/stop store**

p1: Store status

0: Store is stopped

1: Store in progress

- May not be used in the following cases:

  • In recall mode

  • During differential processing/overlay & differential processing display

  • In level measurement mode when statistical values (L1 - L99) are included as store targets

STO ? **Get store status**

Response: err,p1

p1: Store status

0: Store stopped

1: Store in progress

- May not be used in recall mode.

Measurement parameter commands

INP p1 p2   Make input signal setting

p1:   Channel A input signal

p2:   Channel B input signal

        1: Preamp input

        2: Direct input

        #: Keep current setting

- May not be used in the following cases:

  • During processing/store

  • In recall mode

- For SA-29, specify "#" for p2. "1" or "2" will result in an error.

INP ?   Get input signal setting

Response: err,p1,p2

p1:   Channel A input signal

p2:   Channel B input signal

        1: Preamp input

        2: Direct input

- For SA-29, the p2 value is undefined.

BAI p1 p2   Make microphone bias setting

p1:   Microphone bias

        0: Bias OFF

        1: Bias ON

        #: Keep current setting

p2:   Preamp gain

        0: 0 dB

        1: +20 dB

        #: Keep current setting

- May not be used in the following cases:

  • During processing/store

  • In recall mode

BAI ?   Get microphone bias setting

Response: err,p1,p2

p1:   Microphone bias

0: Bias OFF

1: Bias ON

p2:   Preamp gain

0: 0 dB

1: +20 dB

RNG p1 p2   Make level range setting

p1:   Channel A level range

p2:   Channel B level range

0: -40 dB   1: -30 dB   2: -20 dB

3: -10 dB   4: 0 dB   5: 10 dB

6: 20 dB   #: Keep current setting

- May not be used in the following cases:
  - During processing/store
  - During overlay/differential processing/overlay & differential processing display
  - In recall mode
- For SA-29, specify "#" for p2.

RNG ? Get level range setting

Response: err,p1,p2

p1:   Channel A level range

p2:   Channel B level range

0: -40 dB   1: -30 dB   2: -20 dB

3: -10 dB   4: 0 dB   5: 10 dB

6: 20 dB

- For SA-29, the p2 value is undefined.

TMC p1 p2   Make time constant setting

p1:   Channel A time constant

p2:   Channel B time constant

> 0: 1 ms   1: 10 ms   2: 35 ms
>
> 3: 125 ms   4: 630 ms   5: 1 s
>
> 6: 10 s   #: Keep current setting

- May not be used in the following cases:
  - During processing/store
  - In recall mode
- For SA-29, specify "#" for p2.

TMC ?   Get time constant setting

Response: err,p1,p2

p1:   Channel A time constant

p2:   Channel B time constant

> 0: 1 ms   1: 10 ms   2: 35 ms
>
> 3: 125 ms   4: 630 ms   5: 1 s
>
> 6: 10 s

- For SA-29, the p2 value is undefined.

WGT p1 p2   Make analog frequency weighting setting

p1:   Channel A analog weighting

p2:   Channel B analog weighting

> 0: FLAT   1: A   2: C
>
> 3: Lvz   #: Keep current setting

- May not be used in the following cases:
  - During processing/store
  - In recall mode
- For SA-29, specify "#" for p2.

WGT ?   Get analog frequency weighting setting

Response: err,p1,p2

p1:   Channel A analog weighting

p2:   Channel B analog weighting

       0: FLAT   1: A   2: C

       3: Lvz

- For SA-29, p2 value is undefined.

CWT p1 p2   Make digital weighting setting

p1:   Channel A digital weighting

p2:   Channel B digital weighting

       0: PFF

       1: A (MID)

       2: C (MID)

       3: Lvz (LOW 1)

       4: Lvxy (LOW 1)

       5: Lhnd (LOW 2)

       6: Lcom (LOW 1)

       7: USER (active band when specification is made)

       #: Keep current setting

- Before using this command, use the BND command to select the analysis band denoted in brackets.
- May not be used in the following cases:
  - During processing/store
  - In recall mode
- For SA-29, specify "#" for p2.

CWT?   Get digital weighting setting

Response: err,p1,p2

p1:   Channel A digital weighting

p2:   Channel B digital weighting

       0: PFF   1: A   2: C   3:   Lvz

       4: Lvxy   5: Lhnd   6: Lcom   7:   USER

- In recall mode, the digital weighting used when the data were stored is used.
- For SA-29, p2 value is undefined.

BND p1 p2 Make analysis band setting

p1:   Channel A analysis band

    0: LOW 1   1: LOW 2   2: MID

    3: HIGH   #: Keep current setting

p2:   Channel B analysis band

    0: LOW 1   1: LOW 2

    2: MID   #: Keep current setting

- May not be used in the following cases:
  - During processing/store
  - During overlay/differential processing/overlay & differential processing display
  - In recall mode
- If A & B Ch analysis mode is currently selected, "3" may not be specified for p1.
- For SA-29, specify "#" for p2.

BND ? Get analysis band setting

Response: err,p1,p2

p1:   Channel A analysis band

p2:   Channel B analysis band

    0: LOW 1   1: LOW 2   2: MID

    3: HIGH

- For SA-29, p2 value is undefined.

WID p1 Make analysis bandwidth setting

p1:   Analysis bandwidth

    0: 1/1 octave analysis

    1: 1/3 octave analysis

    2: Top 1/1, bottom 1/3 octave analysis

    3: Top 1/3, bottom 1/1 octave analysis

- May not be used in the following cases:
  - During processing/store
  - During overlay/differential processing/overlay & differential processing display
  - In recall mode

- For SA-29, "3" cannot be specified.
- During channel A or channel B analysis, "3" may not be specified.

WID ?   Get analysis bandwidth setting

Response: err,p1

p1:   Analysis bandwidth

   0: 1/1 octave analysis

   1: 1/3 octave analysis

   2: Top 1/1, bottom 1/3 octave analysis

   3: Top 1/3, bottom 1/1 octave analysis

CHN p1   Make analysis channel mode setting

p1:   Analysis channel mode

   0: Channel A

   1: Channel B

   2: Channels A & B

- May not be used in the following cases:
  • With SA-29
  • During processing/store
  • During overlay/differential processing/overlay & differential processing display
  • In recall mode
- When HIGH is selected for channel A, "2" may not be specified for p1.

CHN ?   Get analysis channel mode setting

Response: err,p1

p1:   Analysis channel mode

   0: Channel A

   1: Channel B

   2: Channels A & B

- May not be used with SA-29.

MAX p1   Make maximum/minimum value hold type setting

p1:   Maximum/minimum value hold type

   0: AP hold

   1: Band hold

-   May not be used in the following cases:

   • During processing/store

   • In recall mode

MAX ?   Get maximum/minimum value hold type setting

Response: err,p1

p1:   Maximum/minimum value hold type

   0: AP hold

   1: Band hold

DLT p1   Get delay time setting

p1   Delay time

   0 (no delay) - 10 (seconds), in 1-second units

-   May not be used in the following cases:

   • During processing/store

   • In recall mode

DLT ?   Get delay time setting

Response: err,p1

   0 (no delay) - 10 (seconds), in 1-second units

MSR p1 Make measurement mode setting

p1   Measurement mode

   0: Time measurement mode

   1: Level measurement mode

-   May not be used in the following cases:

   • During processing/store

   • In recall mode

MSR ? Get measurement mode setting

Response: err,p1

p1   Measurement mode

0: Time measurement mode

1: Level measurement mode

MST p1 p2   Make measurement time setting for time measurement mode

p1:   Measurement time value

0 - 99

#: Keep current setting

p2:   Measurement time unit

0: hours

1: minutes

2: seconds

#: Keep current setting

- May not be used in the following cases:

  • During processing/store

  • In recall mode

- Setting example

  MST 10 1

  Sets measurement time to 10 minutes.

MST ? Get measurement time setting for time measurement mode

Response: err,p1,p2

p1:   Measurement time value

0 - 99

p2:   Measurement time unit

0: hours   1: minutes   2: seconds

- The information returned for this command is the set measurement time. For the actual elapsed processing time, use the LTI command.

- Example

  0,10,1

  Measurement time is set to 10 minutes.

LTI ?   **Get elapsed processing time**

Response: err,p1,p2,p3,p4

p1:   Elapsed processing time, hours

p2:   Elapsed processing time, minutes

p3:   Elapsed processing time, seconds

p4:   Elapsed processing time, milliseconds

- As opposed to the MST command which gets the set processing time, the LTI command gets the actual elapsed processing time. (If the measurement was interrupted halfway, the set processing time and the actual processing time will be different.)
- When current mode is selected and processing is in progress, the elapsed time from the start of processing until the point when the command is received will be obtained.
- When current mode is selected and processing is not in progress, the actual processing time of the previous measurement will be obtained.
- When recall mode is selected and auto store data are being displayed, the actual processing time of the last address data will be obtained.
- When recall mode is selected and manual data are being displayed, the actual processing time of the data will be obtained.

Example

    0,0,12,4,350

    Processing time is 0 hours, 12 minutes, 4 seconds, 350 milliseconds.

MSL p1 p2 p3 Make measurement parameter setting for level measurement mode

p1:	Channel in which level is monitored
	0: Channel A
	1: Channel B
	#: Keep current setting
p2:	Threshold level
	0 - 80 (dB) in 1-dB steps
	#: Keep current setting
	Specified as value below full-scale.
p3:	Duration time
	0 - 10 (seconds) in 1-second steps
	#: Keep current setting

- May not be used in the following cases:
  - During processing/store
  - In recall mode
- For SA-29, specify "0" for p1.

MSL ?   Get measurement parameter setting for level measurement mode

Response:	err,p1,p2,p3
p1:	Channel in which level is monitored
	0: Channel A
	1: Channel B
p2:	Threshold level
	0 - 80 (dB)
	Specified as value below full-scale.
p3:	Duration time
	0 - 10 (seconds)

- For SA-29, p1 value is undefined.

TRG p1 p2   Make trigger type and repeat mode setting

p1:   Trigger type

        0: Trigger OFF

        1: Level trigger

        2: Time trigger

        3: Noise trigger

        4: External trigger

        #: Keep current setting

p2:   Repeat mode

        0: OFF

        1: ON

        #: Keep current setting

- When the setting of p1 is other than 0, the trigger is ON.
- May not be used in the following cases:
  - During processing/store
  - In recall mode

TRG ?   Get trigger type and repeat mode setting

Response: err,p1,p2

p1:   Trigger type

        0: Trigger OFF

        1: Level trigger

        2: Time trigger

        3: Noise trigger

        4: External trigger

p2:   Repeat mode

        0: OFF

        1: ON

TRL p1 p2 p3 Make level trigger setting

p1: Trigger channel

   0: Channel A

   1: Channel B

   #: Keep current setting

p2: Trigger level

   0 - 80 (dB) in 1-dB steps

   #: Keep current setting

   Specified as value below full-scale.

p3: Trigger slope

   0: + (trigger activated when signal level exceeds trigger level)

   1: - (trigger activated when signal level falls below trigger level)

- May not be used in the following cases:

  • During processing/store

  • In recall mode

- For SA-29, specify "#" for p1.

TRL ? Get level trigger setting

Response: err,p1,p2,p3

p1: Trigger channel

   0: Channel A

   1: Channel B

p2: Trigger level

   0 - 80 (dB)

   p3: Trigger slope

   0: + (Activate trigger when signal level exceeds trigger level)

   1: - (Activate trigger when signal level falls below trigger level)

- For SA-29, p1 value is undefined.

TRN p1   Make noise trigger setting

p1:   Noise trigger condition

           0: Activate trigger at ON edge of noise

           1: Activate trigger at OFF edge of noise

- May not be used in the following cases:
  - During processing/store
  - In recall mode

TRN ?   Get noise trigger setting

Response: err,p1

p1:   Noise trigger condition

           0: Activate trigger at ON edge of noise

           1: Activate trigger at OFF edge of noise

TRT p1 p2 p3   Make time trigger setting

p1:   Trigger time setting (hours)

           0 - 23 (24-hour notation, 1-hour steps)

           #: Keep current setting

p2:   Trigger time setting (minutes)

           0 - 59 (1-minute steps)

           #: Keep current setting

p3:   Trigger repeat period value

           0 - 99 (1-value steps)

           #: Keep current setting

p4:   Trigger repeat period unit

           0: hours   1: minutes

           #: Keep current setting

- May not be used in the following cases:
  - During processing/store
  - In recall mode
- To enable repeat period setting, set repeat mode to ON with TRG command.
- Setting example

      TRT 15 0 20 1

      Processing starts at 3 p.m. with a 20-minute period.

TRT ?   Get time trigger setting

Response: err,p1,p2,p3,p4

p1:   Trigger time setting (hours)

         0 - 23 (24-hour notation, 1-hour steps)

p2:   Trigger time setting (minutes)

         0 - 59 (1-minute steps)

p3:   Trigger repeat period value

         0 - 99 (1-value steps)

p4:   Trigger repeat period unit

         0: hours

         1: minutes

STT p1,p2,p3,p4,p5,p6   Make current processing type setting

p1 - p6

0: None	2: Lave	3: Lsum	4: Lmax
5: Lmin	6: L1	7: L5	8: L10
9: L50	10: L90	11: L95	12: L99

- May not be used in the following cases:
    - During processing/store
    - In recall mode
- When selecting fewer than six processing types, set the remaining parameters to "0".
- Parameters may not be set to "1".

     OK: STT 2 3 4 5 8 10 (six processing types are specified)

     OK: STT 2 3 4 5 0 0 (four processing types are specified)

     NG: STT 2 3 4 5 (too few parameters)

- Regardless of the order the parameters were specified, the unit sorts them in ascending order. Therefore the two commands listed below will have the same effect.

     STT 2 3 4 5 6 7

     STT 7 6 5 4 3 2

STT ?   Get current processing type setting

Response: err,p1,p2,p3,p4,p5,p6

0: None	2: Lave	3: Lsum	4: Lmax
5: Lmin	6: L1	7: L5	8: L10
9: L50	10: L90	11: L95	12: L99

- Output is sorted in ascending order, starting from parameter p1. When there are fewer than six processing types, output starts from p1 and remaining empty parameters will be "0".

Display commands

OPE p1   Make display processing mode setting

p1: Display processing mode

0: Lp	1: 1st processing item
2: 2nd processing item	3: 3rd processing item
4: 4th processing item	5: 5th processing item
6: 6th processing item	7: all processing items

- 1 - 6 refer to processing items that are obtained by the STT request command, with "1" corresponding to p1, "2" corresponding to p2, etc.
- "7" specifies the ALL display.
- If the value of a STT command parameter was "0", the corresponding item cannot be specified.
- In the following cases, "7" may not be specified for p1:
  - During overlay/differential processing/overlay & differential processing display
  - During level/time display and bar graph & level/time display

OPE ?　　　　Get display processing mode setting

Response: err,p1

p1:　　　　Display processing mode

      0: Lp　　　　　　　　　　1: 1st processing item

      2: 2nd processing item　　3: 3rd processing item

      4: 4th processing item　　5: 5th processing item

      6: 6th processing item　　7: all processing items

- 1 - 6 refer to processing items that are obtained by the STT request command, with "1" corresponding to p1, "2" corresponding to p2, etc.
- "7" specifies the ALL display.

GRP p1　　　　Make display type setting

p1:　　　　Display type

      0: Bar graph display

      1: Numeric display

      2: Level/time display

      3: Bar graph & numeric display

      4: Bar graph & level/time display

- When the SA-30 is set to A&B ch analysis, the value of p1 may not be "3" or "4".
- In the following cases, "2" and "4" may not be specified:
  • During overlay/differential processing/overlay & differential processing display
  • During "ALL" display
  • During recall of manual store data

GRP ?　　　　Get display type setting

Response: err,p1

p1:　　　　Display type

      0: Bar graph display

      1: Numeric display

      2: Level/time display

      3: Bar graph & numeric display

      4: Bar graph & level/time display

LVT p1 p2 p3   Make level/time display parameter setting

p1:	Display frequency for top screen
p2:	Display frequency for bottom screen
	0 - 11 when 1/1 octave, 0 - 33 when 1/3 octave
	(For information on numbers and frequencies, please refer to the tables on pages 63 and 64.)
	#: Keep current setting
p3:	Time span (in current mode)

1:	25 s	2:	50 s	4:	100 s	8:	200 s
16:	400 s	32:	800 s				

#: Keep current setting

Compression ratio (recall mode)

1:	1/1	2:	1/2	4:	1/4	8:	1/8
16:	1/16	32:	1/32				

#: Keep current setting

- For display frequency, APW cannot be specified.
- In current mode, specify "#" for p1 and p2.

LVT ?   Get level/time display parameter setting

Response:	err,p1,p2,p3
p1:	Display frequency for top screen
p2:	Display frequency for bottom screen
	0 - 11 when 1/1 octave, 0 - 33 when 1/3 octave
	(For information on numbers and frequencies, please refer to the tables on pages 63 and 64.)
p3:	Time span (in current mode)

1:	25 s	2:	50 s	4:	100 s	8:	200 s
16:	400 s	32:	800 s				

Compression ratio (recall mode)

1:	1/1	2:	1/2	4:	1/4	8:	1/8
16:	1/16	32:	1/32				

OLY p1 p2   Make overlay display parameter setting

p1:   Overlay display mode

       0: OFF

       1: Overlay display

       2: Differential processing display

       3: Top screen overlay, bottom screen differential display

       #: Keep current setting

p2:   Overlay data

       1: Back layer buffer data

       2: Bottom screen

       #: Keep current setting

- May not be used in the following cases:
  - During processing/store
  - In recall mode
  - During level/time display and bar graph & level/time display
  - With overlay data using a different analysis band setting
  - During "ALL" display
- If there are no data stored in the back layer buffer, p2 may not be set to "1".
- If the original number of screens is 1, p2 may not be set to "2".

OLY ?   Get overlay display parameter setting

Response: err,p1,p2

p1:   Overlay display mode

       0: OFF

       1: Overlay display

       2: Differential processing display

       3: Top screen overlay, bottom screen differential display

p2:   Overlay data

       1: Back layer buffer data

       2: Bottom screen

REF p1   Make level conversion mode setting

---

p1:   Level conversion mode

       0: OFF

       1: ON

-   May not be used in the following cases:

    • During processing/store

    • In recall mode

    • During overlay/differential processing/overlay & differential processing display

---

REF ?   Get level conversion mode setting

Response: err,p1

p1:   Level conversion mode

       0: OFF

       1: ON

REV p1 p2 p3 p4 p5   Make level conversion value setting

---

p1:   Selected channel

       0: Channel A

       1: Channel B

p2:   Pre-conversion value

       Real number with 4 effective digits

       #: Keep current setting

       When unit is dB: -120.0 to120.0

       When unit is not dB: -999.9 to 999.9

p3:   Pre-conversion unit

       0: dB

       1: Vrms

       2: mVrms

       #: Keep current setting

p4:   Post-conversion value

       Real number with 4 effective digits

       #: Keep current setting

       When unit is dB: -120.0 to 120.0

       When unit is not dB: -999.9 to 999.9

p5:   Post-conversion unit

0: dB	1: Vrms	2: mVrms
3: mm	4: m/s	5: m/s^2
6: G	#: Keep current setting	

- May not be used in the following cases:
  - During processing/store
  - In recall mode
  - During overlay/differential processing/overlay & differential processing display

REV p1 ?   Get level conversion value setting

p1:   Selected channel

       0: Channel A   1: Channel B

Response: err,p2,p3,p4,p5

p2:   Pre-conversion value (to first decimal digit)

p3:   Pre-conversion unit

       0: dB   1: Vrms   2: mVrms

p4: Post-conversion value (to first decimal digit)

p5: Post-conversion unit

0: dB	1: Vrms	2: mVrms
3: mm	4: m/s	5: m/s^2
6: G		

- For SA-29, specify "0" for p1.

LVS p1 p2   Make level shift amount setting

p1:   Channel A level shift amount

p2:   Channel B level shift amount

       -120 to 120 (dB) in 10-dB steps

       #: Keep current setting

- May not be used in the following cases:
  - During processing/store
  - In recall mode
  - During overlay/differential processing/overlay & differential processing display

- For SA-29, specify "0" for p2.

LVS ?   Get level shift amount setting

Response: err,p1,p2

p1:   Channel A level shift amount

p2:   Channel B level shift amount

           -120 to 120 (dB) in 10-dB steps

   -   For SA-29, p2 value is undefined.

BWT p1   Make band frequency digital weighting display mode setting

p1:   Digital weighting value display for each frequency band

           0: Didable

           1: Enable

   -   May not be used in the following cases:

       • During processing/store

       • In recall mode

BWT ?   Get band frequency digital weighting display mode setting

Response: err,p1

p1:   Digital weighting value display for each frequency band

           0: Disable

           1: Enable

Memory commands

RCL p1 Make processing mode setting

    p1:   Processing mode

                0: Current mode

                1: Recall mode

    - May not be used in the following case:

        • During processing/store

RCL ? Get processing mode setting

    Response: err,p1

    p1:   Processing mode

                0: Current mode

                1: Recall mode

SMD p1 Make memory block setting

    p1:   Memory block

                0: Auto store block

                1: Manual store block

    - In current mode, setting the p1 value to "0" causes auto store, and setting it to "1" causes manual store.

    - In recall mode, the command specifies the memory block for recalling data.

    - May not be used in the following case:

        • During processing/store

SMD ? Get memory block setting

    Response: err,p1

    p1:   Memory block

                0: Auto store block

                1: Manual store block

ADR p1   Make memory address setting

p1:   Memory address

- May not be used in current mode when auto store is carried out.
- In current mode, when manual store is carried out, the command specifies the next address for storing data.
- In recall mode, the command specifies the data address to be recalled.

ADR ?   Get memory address setting

Response: err,p1

p1:   Memory address

- May not be used in current mode when auto store is carried out.
- In current mode, when manual store is carried out, the command specifies the next address for storing data.
- In recall mode, the command specifies the data address being recalled. During recall processing display, the command returns the start address of the recall processing range.

AUT p1 p2   Make auto store setting

p1: Instantaneous value store period

    1 - 9 (ms) in 1-ms steps

    10 - 1000 (ms) in 10-ms steps

    #: Keep current setting

p2: Auto store count

    0: maximum (see auto store maximum count table)

    1 - (maximum, in 1-unit steps)

    #: Keep current setting

- If the value of p2 exceeds the possible maximum, the maximum is automatically selected.
- May not be used during processing/store

AUT ?   Get auto store setting

Response: err,p1,p2

p1:   Instantaneous value store period

1 - 9 (ms) in 1-ms steps

10 - 1000 (ms) in 10-ms steps

p2:   Auto store count

0: maximum (see auto store maximum count table)

1 - (maximum, in 1-unit steps)

RCC p1 p2 p3 Make recall processing parameter setting

p1:   Recall processing type

0: OFF	1: Pave	2: Psum	3: PΣ
4: Mean	5: L1	6: L5	7: L10
8: L50	9: L90	10: L95	11: L99
12: Reverb	#: Keep current setting		

p2:   Processing start address

p3:   Processing end address

1 - end of stored address range

#: Keep current setting

- The value of p3 must be higher than p2.

- May not in current mode.

- For manual store data, the range that satisfies the processing conditions is processed.

- In the following cases, p1 may not be "12":

  • During bar graph display, numeric display, bar graph & numeric display

  • For manual store data

  • For data other than instantaneous value data

  • For level measurement mode data

- During level/time display and bar graph & level/time display, the processing range is compressed and only intermediate values can be obtained. The specified address range therefore is automatically ad-

justed.

RCC ?　　　　Get recall processing parameter setting

Response:　err,p1,p2,p3

p1:　　　Recall processing type

| 0: | OFF | 1: | Pave | 2: | Psum | 3: | PΣ |

    4:　Mean　　　5:　L1　　　6:　L5　　　7:　L10

    8:　L50　　　9:　L90　　10:　L95　　11:　L99

    12: Reverb

p2:　　　Processing start address

p3:　　　Processing end address

　　　　　1 - end of stored address range

-　During level/time display and bar graph & level/time display, the processing address range is automatically adjusted according to the compression ratio. The address range may therefore be different from the specified setting.

System setting commands

UWT p1 p2 p3 ... p34　　　Make user weighting data setting

p1:　　　Band in which weighting is applied

　　　　　0: LOW 1　　　1: LOW 2

　　　　　2: MID　　　　3: HIGH

p2:　　　Band number 1 compensation value (weighting data)

p3:　　　Band number 2 compensation value (weighting data)

....

p34:　　　Band number 34 compensation value (weighting data)

　　　　　-120.0 to 120.0 (dB) in 0.1-dB steps

-　For information on numbers and frequencies, please refer to the tables on pages 63 and 64.

Original data	Compensation value (dB)	Display result (dB)
- 20	5.5	- 14.5
- 20	- 5.5	- 25.5

-　Compensation examples

- May not be used in the following case:

    During processing/store
- The setting cannot be made specific for 1/1 octave analysis. For 1/1 octave data, the applicable compensation values from the 1/3 octave points are used.
- To enable user-defined frequency weighting, select the analysis band with the BND command and specify user weighting with the CWT command.

UWT ?   Get user weighting data setting

For information about the data returned by this command, see the section "Response to Measurement Data Request Commands" (page 54).

CLK p1 p2 p3 p4 p5 p6   Make internal clock setting

p1:	Year 0 - 99 (last two digits)	#: Keep current setting
p2:	Month 1 - 12	#: Keep current setting
p3:	Day 1 - 31	#: Keep current setting
p4:	Hour 0 - 23 (34-hour notation)	#: Keep current setting
p5:	Minutes 0 - 59	#: Keep current setting
p6:	Seconds 0 - 59	#: Keep current setting

- May not be used in the following case:

    During processing/store
- The value of p1 is defined as follows. 80 - 99: 19XX, 0 - 79: 20XX.
- Setting example

    To set the clock to January 1, 1998, 15:00

    CLK 98 1 1 15 0 0

CLK ?   Get internal clock setting

Response: err,p1,p2,p3,p4,p5,p6

p1:   Year 1980 - 2079 (output as 4 digits)

p2:   Month 1 - 12

p3:   Day 1 - 31

p4:   Hour 0 - 23 (34-hour notation)

p5:   Minutes 0 - 59

p6:   Seconds 0 - 59

- Example

0,1998,1,1,15,0,0

Internal clock is set to January 1, 1998, 15:00

NOM p1   Make noise output mode setting

p1:   Noise output mode

0: OFF   1: ON

NOM ?   Get noise output mode setting

Response: err,p1

p1:   Noise output mode

0: OFF   1: ON

NOB p1 p2   Make noise signal type setting

p1:   Signal type

0: White noise   1: Pink noise

#: Keep current setting

p2:   Octave band noise frequency

0: AP	1: 16 Hz	2: 31.5 Hz	3: 63 Hz
4: 125 Hz	5: 250 Hz	6: 500 Hz	7: 1 kHz
8: 2 kHz	9: 4 kHz	10: 8 kHz	11: 16 kHz

#: Keep current setting

NOB ?　　　　Get noise signal type setting

Response:　err,p1,p2

p1:　　　　Signal type

　　　　　　0: White noise　　　　　1: Pink noise

p2:　　　　Octave band noise frequency

0:	AP	1:	16 Hz	2:	31.5 Hz	3:	63 Hz
4:	125 Hz	5:	250 Hz	6:	500 Hz	7:	1 kHz
8:	2 kHz	9:	4 kHz	10:	8 kHz	11:	16 kHz

NOP p1 p2 p3　Make noise output frequency setting

p1:　　　　Noise cycle mode

　　　　　　0: Continuous noise output

　　　　　　1: Intermittent noise output

　　　　　　#: Keep current setting

p2:　　　　Intermittent noise ON interval

　　　　　　1 - 99 (seconds) in 1-second steps

　　　　　　#: Keep current setting

p3:　　　　Intermittent noise OFF interval

　　　　　　1 - 99 (seconds) in 1-second steps

　　　　　　#: Keep current setting

NOP ?　　　　Get noise output frequency setting

Response:　err,p1,p2,p3

p1:　　　　Noise cycle mode

　　　　　　0: Continuous noise output

　　　　　　1: Intermittent noise output

p2:　　　　Intermittent noise ON interval

　　　　　　1 - 99 (seconds) in 1-second steps

p3:　　　　Intermittent noise OFF interval

　　　　　　1 - 99 (seconds) in 1-second steps

RMT p1   Enable remote mode

p1:   Remote mode

     0: Disable remote mode

     1: Enable remote mode

RMT ?   Get remote mode setting

Response: err,p1

p1:   Remote mode

     0: Remote mode disabled

     1: Remote mode enabled

EST ?   Get error code for immediately preceding command

Response: p1

p1:   Command error code

     0: Command was executed normally.

     2 - 4: Invalid command name

     5: Setting command parameter is out of range.

     6: Command cannot be executed. Parameter is out of range, or current operation status does not allow execution.

     7: Request command parameter is out of range.

     11: Command cannot be executed because unit is in current mode.

     12: Command cannot be executed because unit is in recall mode.

     13: Command cannot be executed because processing is in progress.

     14: Command cannot be executed because printing is in progress.

- p1 stands for the error code of the immediately preceding command. Different from other commands, this command does not have an error code of its own.

Sync data commands

Sync data are display data that are temporarily stored in the unit. When the SA-29/SA-30 receives a PUT command, it stores the current display data as sync data. The data contents are the same as obtained with the DOD/DOB command. The only difference is that with the DOD/DOB command, display data are output from the unit whereas the PUT command causes display data to be stored in the unit. The stored data can be obtained for output with the SYB command, in the same format as the output for the DOD/DOB command.

This function is useful for example when multiple SA- 29/SA-30 units are connected and you wish to obtain instantaneous value data for the same time from all units.

When power to the unit is turned off, stored sync data are lost.

Usage procedure

   (1) Establish a link to all stations.

   (2) Send the PUT command at the desired time.

   (3) Establish a link to one unit.

   (4) Use the SYD/SYB command to obtain the stored sync data.

   (5) Repeat steps (3) and (4) for the other units.

PUT   Set sync data

- The display data at the point when this command is received are stored in memory.
- May not be used in the following case:

     During processing/store

PUT ?   Get sync data status

Response: err,p1

p1:   Sync data output status

      0: Stored sync data were retrieved at least once with SYD/SYB command.

      1: Stored sync data were not retrieved.

SYD ? Get sync data in ASCII format

Response: Same as for DOD 0 ? command

See section "Response to Measurement Data Request Commands"

- May not be used in the following case:

During processing/store

SYB ? Get sync data in binary format

Response: Same as for DOB 0 ? command

See section "Response to Measurement Data Request Commands"

- May not be used in the following case:

During processing/store

Measurement data request commands

DOD p1 ?   Get display data in ASCII format

DOB p1 ?   Get display data in binary format

MRD p1 p2 p3 p4   Get memory data in ASCII format

MRB p1 p2 p3 p4   Get memory data in binary format

DRB p1 p2   Get continuous output of current instantaneous value

- For information on these commands, please refer to the section "Response to Measurement Data Request Commands" (page 54).

Response to Measurement Data Request Commands

This section describes the response to commands DOD, DOB, MRD, MRB, DRB, UWT, and the structure of these commands.

Response data configuration

Response data to each measurement data request command consist of a header line and data lines. Response data can be either ASCII or binary.

● ASCII format and binary format

When the ASCII format is used, data are converted to ASCII characters before output, using commas as delimiter. Response data to the DOD, MRD, SYS, and UWT commands are in ASCII format.

ASCII format output example
(<CR> and <LF> are hex 0Dh and 0Ah.)

```
0, RIONSA29A, 10, 0, 30 <CR><LF>
1, 1998, 1, 1, 12, 34, 56, 1, 1, 2, 0, 2, 1, 0, 0 <CR><LF>
-10. 0, -20. 0, -21. 0, -22. 0, -23. 0, -24. 0, -25. 0, -26. 0, -27. 0, -28. 0, -29. 0,
-30. 0, -31. 0, -10. 0 <CR><LF>
```

When the binary format is used, data are output as is, without being converted to ASCII. Binary data are two-byte data, sent in the order lower byte - - upper byte (except for the identifier in the header line). There is no delimiter such as a comma or similar, but a line end symbol (<CR><LF>) is output.

Response data to the DOB, MRB, DRB, and SYB commands are in binary format.

Level data output as binary data are integers which represent the level multiplied by 10.

Example: Data for -50.0 dB

-50.0 ∗ 10 = -500

-500 expressed in binary format is FE0Ch.

This is output in the order 0Ch FEh.

To calculate the actual level value from binary level data, use the following procedure (upper byte is DH and lower byte is DL).

(1) Calculate $D = DH \times 256 + DL$

(2) If $D \leq 32767$:   level (dB) = $D/10$

If $D > 32767$:   level (dB) = $(-1) \times \{(65536 - D) / 10\}$

Example: Lower byte 0Ch, upper byte FEh

$D = 254 \times 256 + 12 = 65036$

Level (dB) = $(-1) \times \{(65536 - 65036) / 10\} = -50.0$

● Header line

The header line contains the command error code and information about the data that follow. The header line configuration is the same for all measurement data request commands.

Output example (ASCII format)

<u>0</u>, <u>RIONSA29A</u>, <u>10</u>, <u>0</u>, <u>30</u> <CR><LF>
 (1)   (2)   (3) (4) (5)   (6)

(<CR> and <LF> are hex 0Dh and 0Ah.)

No.	Item	Contents	Sample meaning
1	Command error code	0 : Normal 2-4 : Invalid command name 5 : Invalid setting parameter 6 : Command cannot be execute 7 : Invalid request parameter 11 : Execution not possible because unit is in current mode 12 : Execution not possible because unit is in recall mode 13 : Execution not possible because unit is processing 14 : Execution not possible because unit is printing	Normal
2	Identifier	ASCII format : "RIONSA29A" or "RIONSA30A" Binary format : "RIONSA29B" or "RIONSA30B" in ASCII code	ASCII format
3	System version	SA-29/SA-30 system version (Version XY multiplied by 10, output as XY)	Version 1.0
4	Data category	0 : Normal measurement data (level vs. frequency) 1 : Level/time data 2 : Recall processing data 3 : Differential processing data 30 : User weighted data	Normal measurement data
5	Number of addresses	Number of addresses in file	30 addresses
6	Line end	<CR><LF>	

● Data lines

The data lines contain information about measurement parameters and measurement data. The data line configuration depends on the command type and the measurement data type.

Data line content types are listed below.

A   Measurement parameters

B   Normal measurement data

C   Level/time data

D   Recall processing data

E   Differential processing data

F   User weighted data

The following pages explain these data in detail. For information on the correlation with data request commands, please see also the section on the respective command.

A Measurement parameters

Output example (ASCII format)
(<CR> and <LF> are hex 0Dh and 0Ah.)

1, 1, 2, 4, 0, 0, 3, 2, 1, 3, 1, 0, 5, 2, 0, 2, 0, 1, 2, 3, 4, 5, 0, 0, 1, 0, 10, 1, 3, 20, 0, 0, 1, 0, 3, 40, 123, 0, 0, 1, 0, 40, 0, 11, 22, 33, 1, 0, 0, 1000, 10, 1, -1, -123, 0, -1, 940, 0, -1, -375, 0, -1, 1140, 0, 10, 0<CR><LF>   Line 1

One line of measurement parameter data is output.

$\underset{(1)(2)(3)(4)(5)(6)(7)(8)(9)(10)(11)(12)(13)(14)(15)(16)(17)(18)(19)(20)}{\underline{1},\underline{1},\underline{2},\underline{4},\underline{0},\underline{0},\underline{3},\underline{2},\underline{1},\underline{3},\ \underline{1},\ \underline{0},\ \underline{5},\ \underline{2},\ \underline{0},\ \underline{2},\ \underline{0},\ \underline{1},\ \underline{2},\ \underline{3},}$

$\underset{(21)(22)(23)(24)(25)(26)(27)(28)(29)(30)(31)(32)(33)(34)(35)(36)\ (37)(38)(39)(40)}{\underline{4},\ \underline{5},\ \underline{0},\ \underline{0},\ \underline{1},\ \underline{0},\ \underline{10},\ \underline{1},\ \underline{3},\ \underline{20},\underline{0},\ \underline{0},\ \underline{1},\ \underline{0},\ \underline{3},\ \underline{40},\underline{123},\underline{0},\ \underline{0},\ \underline{1},}$

$\underset{(41)(42)(43)(44)(45)(46)(47)(48)(49)\ (50)\ (51)(52)(53)\ (54)\ (55)(56)\ (57)\ (58)(59)\ (60)}{\underline{0},\ \underline{40},\ \underline{0},\ \underline{11},\underline{22},\underline{33},\ \underline{1},\ \underline{0},\ \underline{0},\ \underline{1000},\underline{10},\ \underline{1},\ \underline{-1},\ \underline{-123},\ \underline{0},\ \underline{-1},\ \underline{940},\ \underline{0},\ \underline{-1},\underline{-375},}$

$\underset{(61)(62)\ \ (63)\ (64)(65)(66)\ \ \ \ (67)}{\underline{0},\ \underline{-1},\underline{1140},\underline{0},\ \underline{10},\ \underline{0}\ \ \text{<CR><LF>}}$

No.	Item	Definition	Sample meaning
1	Address number	Address number	1
2	Measurement parameter format number	1 (fixed)	1
3	Input signal (Ch. A)	0 : OFF 1: Preamplifier input 2 : Direct input	Direct
4	Level range (Ch. A)	0 : -40 dB 1 : -30 dB 2 : -20 dB 3 : -10 dB 4 : 0 dB 5 : 10 dB 6 : 20 dB	0 dB
5	Analog weighting (Ch. A)	0 : FLAT 1 : A 2 : C 3 : Lvz	FLAT
6	Digital weighting (Ch. A)	0 : OFF 1 : A 2 : C 3 : Lvz 4 : Lvxy 5 : Lhnd 6 : Lcom 7 : User	OFF
7	Time constant (Ch. A)	0 : 1 mS 1 : 10 mS 2 : 35 mS 3 : 125 mS 4 : 630 mS 5 : 1 S 6 : 10 S	125 mS
8	Analysis band (Ch. A)	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	MID
9	Input signal (Ch. B)	0 : OFF 1 : Preamplifier input 2 : Direct input	Preamplifier
10	Level range (Ch. B)	0 : -40 dB 1 : -30 dB 2 : -20 dB 3 : -10 dB 4 : 0 dB 5 : 10 dB 6 : 20 dB	-10 dB
11	Analog weighting (Ch. B)	0 : FLAT 1 : A 2 : C 3 : Lvz	A
12	Digital weighting (Ch. B)	0 : OFF 1 : A 2 : C 3 : Lvz 4 : Lvxy 5 : Lhnd 6 : Lcom 7 : User	OFF
13	Time constant (Ch. B)	0 : 1 m S 1 : 10 mS 2 : 35 mS 3 : 125 mS 4 : 630 mS 5 : 1 S 6 : 10 S	1S
14	Analysis band (Ch. B)	0 : LOW1 1 : LOW2 2 : MID	MID
15	Analysis bandwidth	0 : 1/1 oct 1 : 1/3 oct 2 : Top screen 1/1 oct, Bottom screen 1/3 oct 3 : Top screen 1/3 oct, Bottom screen 1/1 oct	1/1 oct
16	Channel mode	0: Ch. A 1: Ch. B 2: Ch. A & B	Ch. A & B
17	Digital weighting display	0:OFF 1:ON	OFF
18	Selected processing type (instantaneous value)	1: Lp (fixed)	Lp

No.	Item	Definition	Sample meaning
19	Selected processing type 1	0 : None 2 : Pave 3 : Psum 4 : Max 5 : Min 6 : L1 7 : L5 8 : L10 9 : L50 10 : L90 11 : L95 12 : L99	Pave
20	Selected processing type 2	As above	Psum
21	Selected processing type 3	As above	Max
22	Selected processing type 4	As above	Min
23	Selected processing type 5	As above	None
24	Selected processing type 6	As above	None
25	Display processing mode	0 - 6 : Selected processing type number	0 (Lp)
26	Measurement mode	0 : Time measurement mode 1 : Level measurement mode	Time measurement
27	Processing time value	1 - 99	10 minutes
28	Processing time unit	0 : hours 1 : minutes 2 : seconds	
29	Delay time	0 - 5[s]	3 s
30	Threshold level	0 - 80 : Full-scale - XX [dB]	Full-scale -20 dB
31	Duration time	0 - 10 : 0 (none) - 10 s	0 s
32	Level monitoring channel	0 : Ch. A 1 : Ch. B	Ch. A
33	Max./min. hold type	0 : AP 1 : Band	Band
34	Elapsed processing time / hours	0 - 99	0 h
35	Elapsed processing time / minutes	0 - 59	3 m
36	Elapsed processing time / seconds	0 - 59	40 s
37	Elapsed processing time / milliseconds	0 - 999	123 ms
38	Trigger mode	0 : OFF 1 : ON	OFF
39	Repeat mode	0 : OFF 1 : ON	OFF
40	Trigger source	1 : Level trigger 2 : Time trigger 3 : Noise trigger 4 : External trigger	Level trigger
41	Level trigger monitoring channel	0 : Ch. A 1 : Ch. B	Ch. A
42	Level trigger level	0 - 80 : Full-scale - XX [dB]	Full-scale -40 dB
43	Level trigger slope	0 : + 1 : -	+
44	Time trigger / hours	0 - 23	11 h
45	Time trigger / minutes	0 - 59	22 m
46	Time trigger period / value	0 - 99	33 m
47	Time trigger period / unit	0 : hours 1 : minutes	
48	Noise trigger mode	0 : ON trigger 1 : OFF trigger	ON trigger
49	Memory block	0 : AUTO 1 : MANU	AUTO
50	Memory address	For auto store : total store count For manual store : address number	1000

No.	Item	Definition	Sample meaning
51	Instantaneous value auto store interval	1 - 9 [ms] (1-ms units) 10 - 1000 [ms] (10-ms units)	10 ms
52	Level conversion mode	0 : OFF 1 : ON	ON
53	Level conversion pre-conversion value exponent (Ch. A)	Y when pre-conversion value is expressed as $XXX \times 10^Y$ (Example : pre-conversion value -12.3 = -123×10^{-1}, therefore "1")	-12.3 dB
54	Level conversion pre-conversion value mantissa (Ch. A)	XXX when pre-conversion value is expressed as $XXX \times 10^Y$ (Example : pre-conversion value -12.3 = -123×10^{-1}, therefore "-123")	
55	Level conversion pre-conversion unit	0 : dB 1 : Vrms 2 : mVrms	
56	Level conversion post-conversion value exponent (Ch. A)	Y when post-conversion value is expressed as $XXX \times 10^Y$ (Example: post-conversion value 94.0 = 940×10^{-1}, therefore "1")	94.0 dB
57	Level conversion post-conversion value mantissa (Ch. A)	XXX when post-conversion value is expressed as $XXX \times 10^Y$ (Example : post-conversion value 94.0 = 940×10^{-1}, therefore "940")	
58	Level conversion post-conversion unit (Ch. A)	0 : dB 1 : Vrms 2 : mVrms 3 : mm 4 : m/s 5 : m/s^2 6 : G	
59	Level conversion pre-conversion value exponent (Ch. B)	Y when pre-conversion value is expressed as $XXX \times 10^Y$ (Example : pre-conversion value -12.3 = -123×10^{-1}, therefore "-1")	-37.5 dB
60	Level conversion pre-conversion value mantissa (Ch. B)	XXX when pre-conversion value is expressed as $XXX \times 10^Y$ (Example : pre-conversion value -12.3 = -123×10^{-1}, therefore "-123")	
61	Level conversion pre-conversion unit	0 : dB 1 : Vrms 2 : mVrms	
62	Level conversion post-conversion value exponent (Ch. B)	Y when post-conversion value is expressed as $XXX \times 10^Y$ (Example : post-conversion value 94.0 = 940×10^{-1}, therefore "1")	114.0 dB
63	Level conversion post-conversion value mantissa (Ch. B)	XXX when post-conversion value is expressed as $XXX \times 10^Y$ (Example : post-conversion value 94.0 = 940×10^{-1}, therefore "940")	
64	Level conversion post-conversion unit (Ch. B)	0 : dB 1 : Vrms 2 : mVrms 3 : mm 4 : m/s 5 : m/s^2 6 : G	
65	Level shift amount (Ch. A)	-120 to +120 [dB] (10-dB steps)	0 dB
66	Level shift amount (Ch. B)	-120 to +120 [dB] (10-dB steps)	+10 dB
67	Line end	<CR><LF>	-

B Normal measurement data

Output example (ASCII format)

(<CR> and <LF> are hex 0Dh and 0Ah.)

1, 1998, 1, 1, 12, 34, 56, 1, 1 ,2 , 0 ,2 , 0, 0, 2<CR><LF>   Line 1

-10. 0, -20. 0, -21. 0, -22. 0, -23. 0, -24. 0, -25. 0, -26. 0, -27. 0, -28. 0, -29. 0,
- 30. 0, -31. 0, -10. 0 <CR><LF>   Line 2

-10. 0, -20. 0, -21. 0, -22. 0, -23. 0, -24. 0, -25. 0, -26. 0, -27. 0, -28. 0, -29. 0,
- 30. 0, -31. 0, -10. 0 <CR><LF>   Line 3

Two to thirteen lines are output.

The first line contains measurement information and the second and subsequent lines contain the frequency data. The number of frequency data is determined by the number of screens x processing types. The number of screens is 1 if the "lower screen analysis bandwidth" item is "0", otherwise it is 2. When there are two screens, all processing data for the top screen are output first, followed by all data for the bottom screen.

(In the above output example, the number of screens is 1 and the number of processing types is 2, therefore two lines of data are output.)

Line 1 (measurement information)

$\underline{1}, \underline{1998}, \underline{1}, \underline{1}, \underline{12}, \underline{34}, \underline{56}, \underline{1}, \underline{1}, \quad \underline{2}, \quad \underline{0}, \quad \underline{2}, \quad \underline{0}, \quad \underline{0}, \quad \underline{2}$ <CR><LF>

(1)   (2)   (3) (4) (5)   (6)   (7) (8) (9) (10) (11) (12) (13) (14) (15)   (16)

No.	Item	Contents	Sample meaning
1	Address number	Address number	1
2	Measurement date / year	1980 - 2079	1998
3	Measurement date / month	1 - 12	January
4	Measurement date / day	1 - 31	1st
5	Measurement date / hours	0 - 23 (24-hour notation)	12 h
6	Measurement date / minutes	0 - 59	34 m
7	Measurement date / seconds	0 - 59	56 s
8	Data category	1 : Measurement data	Measurement data
9	Top screen analysis bandwidth	(0 : none) 1 : 1/1 oct 2 : 1/3 oct	1/1 oct
10	Top screen analysis band	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	MID
11	Bottom screen analysis bandwidth	(0: none) 1 : 1/1 oct 2 : 1/3 oct	None
12	Bottom screen analysis band	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	MID
13	Top screen overload	0 : No 1 : Yes	No
14	Bottom screen overload	0 : No 1 : Yes	No
15	Processing type	1 - 6	2
16	Line end	<CR><LF>	-

- When the number of screens is 1 (bottom screen analysis bandwidth item set to "0"), the items "bottom screen analysis band" and "bottom screen overload" are undefined.
- For information on processing type names, see the section on processing types in "A Measurement parameters".
- The measurement date indicates the collection point for instantaneous value data or the start point for processed data.

Line 2 and later (frequency data)

-10.0, -20.0, -21.0, -22.0, -23.0, -24.0, -25.0, -26.0, -27.0, -28.0, -29.0,
  (1)   (2)   (3)   (4)   (5)   (6)   (7)   (8)   (9)   (10)   (11)

-30.0, -10.0 <CR><LF>
 (12)   (13)   (14)

One line contains the frequency data for one processing type on one screen.

1/1 octave data

No.	Item				Contents
	LOW1	LOW2	MID	HIGH	
1	AP	AP	AP	AP	-XXX.X : dB
2	0.5	2	16	63	-XXX.X : dB
3	1	4	31.5	125	-XXX.X : dB
4	2	8	63	250	-XXX.X : dB
5	4	16	125	500	-XXX.X : dB
6	8	31.5	250	1 k	-XXX.X : dB
7	16	63	500	2 k	-XXX.X : dB
8	31.5	125	1 k	4 k	-XXX.X : dB
9	63	250	2 k	8 k	-XXX.X : dB
10	125	500	4 k	16 k	-XXX.X : dB
11	250	1 k	8 k	31.5 k	-XXX.X : dB
12	500	2 k	16 k	63 k	-XXX.X : dB
13	APW	APW	APW	APW	-XXX.X : dB
14	Line end				<CR><LF>

1/3 octave data

No.	Item LOW1	LOW2	MID	HIGH	Contents
1	AP	AP	AP	AP	-XXX.X : dB
2	0.4	1.6	12.5	50	-XXX.X : dB
3	0.5	2	16	63	-XXX.X : dB
4	0.63	2.5	20	80	-XXX.X : dB
5	0.8	3.15	25	100	-XXX.X : dB
6	1	4	31.5	125	-XXX.X : dB
7	1.25	5	40	160	-XXX.X : dB
8	1.6	6.3	50	200	-XXX.X : dB
9	2	8	63	250	-XXX.X : dB
10	2.5	10	80	315	-XXX.X : dB
11	3.15	12.5	100	400	-XXX.X : dB
12	4	16	125	500	-XXX.X : dB
13	5	20	160	630	-XXX.X : dB
14	6.3	25	200	800	-XXX.X : dB
15	8	31.5	250	1k	-XXX.X : dB
16	10	40	315	1.25k	-XXX.X : dB
17	12.5	50	400	1.6k	-XXX.X : dB
18	16	63	500	2k	-XXX.X : dB
19	20	80	630	2.5k	-XXX.X : dB
20	25	100	800	3.15k	-XXX.X : dB
21	31.5	125	1k	4k	-XXX.X : dB
22	40	160	1.25k	5k	-XXX.X : dB
23	50	200	1.6k	6.3k	-XXX.X : dB
24	63	250	2k	8k	-XXX.X : dB
25	80	315	2.5k	10k	-XXX.X : dB
26	100	400	3.15k	12.5k	-XXX.X : dB
27	125	500	4k	16k	-XXX.X : dB
28	160	630	5k	20k	-XXX.X : dB
29	200	800	6.3k	25k	-XXX.X : dB
30	250	1k	8k	31.5k	-XXX.X : dB
31	315	1.25k	10k	40k	-XXX.X : dB
32	400	1.6k	12.5k	50k	-XXX.X : dB
33	500	2k	16k	63k	-XXX.X : dB
34	630	2.5k	20k	80k	-XXX.X : dB
35	APW	APW	APW	APW	-XXX.X : dB
36	Line end				\<CR\>\<LF\>

C Level/time data

Output example (ASCII format)

    (<CR> and <LF> are hex 0Dh and 0Ah.)

```
1, 1998, 1, 1, 12, 34, 56,1, 1, 2, 1, 0, 50, 0, 11 <CR><LF>
-34. 1, -34. 1, -34. 1, ···, -34. 1, -34. 1, -34. 1 <CR><LF>
-43. 2, -42. 9, -44. 3, ···, -44. 3, -42. 9, -43. 7 <CR><LF>
```

Two or three lines are output.

The first line contains measurement information, and lines two to three contain level/time data. When there is only one screen, there will be no third line.

The number of screens is 1 if the "lower screen analysis bandwidth" item is "0", otherwise it is 2.

The level/time data are the 200 data shown on screen.

Line 1 (measurement information)

  1, 1998, 1, 1, 12, 34, 56, 1, 1, 2, 1, 0, 50, 0, 11 <CR><LF>
 (1) (2) (3)(4) (5) (6) (7) (8)(9) (10) (11) (12) (13) (14)(15)   (16)

No.	Item	Contents	Sample meaning
1	Address number	1	1
2	Measurement date / year	1980 - 2079	1998
3	Measurement date / month	1 - 12	January
4	Measurement date / day	1 - 31	1st
5	Measurement date / hours	0 - 23 (24-hour notation)	12 h
6	Measurement date / minutes	0 - 59	34 m
7	Measurement date / seconds	0 - 59	56 s
8	Compression ratio	1 - 32 : 1/1 - 1/32	1/1
9	Top screen analysis bandwidth	1 : 1/1 oct 2 : 1/3 oct	1/1 oct
10	Top screen analysis band	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	MID
11	Bottom screen analysis bandwidth	0 : None 1 : 1/1 oct 2 : 1/3 oct	1/1 oct
12	Bottom screen analysis band	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	LOW1
13	Leftmost address	1 -	50
14	Top screen frequencies	0 - 12 when 1/1 oct 0 - 34 when 1/3 oct	AP (No. 0 of MID)
15	Bottom screen frequencies	0 - 12 when 1/1 oct 0 - 34 when 1/3 oct	500 Hz (No. 0 of LOW 1)
16	Line end	<CR><LF>	

For information on numbers and frequencies, please refer to the tables on pages 63 and 64.

When the number of screens is 1, the bottom screen items are undefined and should be disregarded.

Line 2 and later (level/time data)

<u>-34.1</u>, <u>-34.1</u>,•••, <u>-34.1</u>, <u>-34.1</u> <u><CR><LF></u>
  (1)   (2)   (199)   (200)   (201)

No.	Item	Contents
1	Data set 1	-XXX.X : dB
2	Data set 2	-XXX.X : dB
	. . .	
199	Data set 199	-XXX.X : dB
200	Data set 200	-XXX.X : dB
201	Line end	<CR><LF>

- If data are compressed, the highest value in the data set is output.
- If there are no data on the screen, "-120.0" is output.

D Recall processing data

Output example (ASCII format)

    (<CR> and <LF> are hex 0Dh and 0Ah.)

```
1, 1998,1, 1, 12, 34, 56, 1, 1, 2, 0, 1, 50, 100 <CR><LF>
-10. 0, -20. 0, -21. 0, -22. 0, -23. 0, -24. 0, -25. 0, -26. 0, -27. 0, -28. 0, -29. 0,
-30. 0, -31. 0, -10. 0 <CR><LF>                    Line 2
-10. 0, -20. 0, -21. 0, -22. 0, -23. 0, -24. 0, -25. 0, -26. 0, -27. 0, -28. 0, -29. 0,
-30. 0, -31. 0, -10. 0 <CR><LF>                    Line 3
```

Two or three lines are output.

The first line contains measurement information, and lines two to three contain recall processing data. When there is only one screen, there will be no third line.

The number of screens is 1 if the "lower screen analysis bandwidth" item is

"0", otherwise it is 2.

Reverb time processing results are not output.

Line 1 (measurement information)

<u>1</u>, <u>1998</u>, <u>1</u>, <u>1</u>, <u>12</u>, <u>34</u>, <u>56</u>, <u>1</u>, <u>1</u>, <u>2</u>, <u>0</u>, <u>1</u>, <u>50</u>, <u>100</u> <u><CR><LF></u>
(1)   (2)   (3) (4) (5)   (6)   (7) (8) (9) (10) (11) (12) (13)   (14)   (15)

No.	Item	Contents	Sample meaning
1	Address number	1	1
2	Measurement date / year	1980 - 2079	1998
3	Measurement date / month	1 - 12	January
4	Measurement date / day	1 - 31	1st
5	Measurement date / hours	0 - 23 (24-hour notation)	12 h
6	Measurement date / minutes	0 - 59	34 m
7	Measurement date / seconds	0 - 59	56 s
8	Recall processing type	1 : Pave 2 : Psum 3 : PΣ 4 : Mean 4 : Mean 5 : L1 6 : L5 7 : L10 8 : L50 9 : L90 10 : L95 11 : L99	Pave
9	Top screen analysis bandwidth	1 : 1/1 oct 2 : 1/3 oct	1/1 oct
10	Top screen analysis band	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	MID
11	Bottom screen analysis bandwidth	0: None 1 : 1/1oct 2 : 1/3oct	None
12	Bottom screen analysis band	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	MID
13	Processing start address	1 -	50
14	Number of addresses included in processing	1 -	100
15	Line end	<CR><LF>	

Line 2 and later (frequency data)

Same as described in "B Normal measurement data".

E Differential processing data

Output example (ASCII format)
(<CR> and <LF> are hex 0Dh and 0Ah.)

```
1, 1998, 1, 1, 12, 34, 56, 1, 1, 2, 1, 0 <CR><LF>
0. 0, 2. 0, -1. 0, -2. 0, -3. 0, -4. 0, -5. 0, -6. 0, -7. 0,- 8. 0, -9. 0, 0. 0, 1. 0, 1. 0 <CR><LF>
0. 0, 2. 0, -1. 0, -2. 0, -3. 0, -4. 0, -5. 0, -6. 0, -7. 0, -8. 0, -9. 0, 0. 0, 1. 0, 1. 0 <CR><LF>
```

Two or three lines are output.

The first line contains measurement information, and lines two to three contain differential processing data. When there is only one screen, there will be no third line.

The number of screens is 1 if the "lower screen analysis bandwidth" item is "0", otherwise it is 2.

Line 1 (measurement information)

  1, 1998, 1, 1, 12, 34, 56, 1, 1, 2, 1, 0 <CR><LF>
 (1)   (2)   (3)(4) (5)   (6)   (7) (8) (9) (10) (11) (12)   (13)

No.	Item	Contents	Sample meaning
1	Address number	1	1
2	Measurement date / year	1980 - 2079	1998
3	Measurement date / month	1 - 12	January
4	Measurement date / day	1 - 31	1st
5	Measurement date / hours	0 - 23 (24-hour notation)	12 h
6	Measurement date / minutes	0 - 59	34 m
7	Measurement date / seconds	0 - 59	56 s
8	Overlay data	1 : Back layer buffer 2 : Top/bottom screen	Back layer buffer
9	Top screen analysis bandwidth	1 : 1/1 oct 2 : 1/3 oct	1/1 oct
10	Top screen analysis band	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	MID
11	Bottom screen analysis bandwidth	0 : None 1 : 1/1 oct 2 : 1/3 oct	1/1 oct
12	Bottom screen analysis band	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	LOW1
13	Line end	<CR><LF>	

Line 2 and later (frequency data)

Same as described in "B Normal measurement data".

F User weighted data

Output example (ASCII format)

(<CR> and <LF> are hex 0Dh and 0Ah.)

1, 1998, 1, 1, 12, 34, 56, 2 <CR><LF>
0. 0, -10. 0, -9. 0,···, -9. 0, -10. 0, 0. 0 <CR><LF>

Two lines are output.

The first line contains weighting information, and the second line contains the weighting data.

Line 1 (weighting information)

<u>1</u>, <u>1998</u>, <u>1</u>, <u>1</u>, <u>12</u>, <u>34</u>, <u>56</u>, <u>2</u> <u><CR><LF></u>
(1)   (2)   (3) (4) (5) (6) (7) (8)   (9)

No.	Item	Contents	Sample meaning
1	Address number	1	1
2	Measurement date / year	1980 - 2079	1998
3	Measurement date / month	1 - 12	January
4	Measurement date / day	1 - 31	1st
5	Measurement date / hours	0 - 23 (24-hour notation)	12 h
6	Measurement date / minutes	0 - 59	34 m
7	Measurement date / seconds	0 - 59	56 s
8	Applicable analysis band	0 : LOW1 1 : LOW2 2 : MID 3 : HIGH	MID
9	Line end	<CR><LF>	

Line 2 (weighting data)

1/3 octave data are output.

AP and AW data are dummy values.

0.0, -10.0, -9.0, •••, -9.0, -10.0, 0.0 <CR><LF>
 (1)   (2)   (3)   (33)   (34) (35)   (36)

No.	Item				Contents
	LOW1	LOW2	MID	HIGH	
1	AP	AP	AP	AP	-XXX.X : dB
2	0.4	1.6	12.5	50	-XXX.X : dB
3	0.5	2	16	63	-XXX.X : dB
4	0.63	2.5	20	80	-XXX.X : dB
5	0.8	3.15	25	100	-XXX.X : dB
6	1	4	31.5	125	-XXX.X : dB
7	1.25	5	40	160	-XXX.X : dB
8	1.6	6.3	50	200	-XXX.X : dB
9	2	8	63	250	-XXX.X : dB
10	2.5	10	80	315	-XXX.X : dB
11	3.15	12.5	100	400	-XXX.X : dB
12	4	16	125	500	-XXX.X : dB
13	5	20	160	630	-XXX.X : dB
14	6.3	25	200	800	-XXX.X : dB
15	8	31.5	250	1 k	-XXX.X : dB
16	10	40	315	1.25 k	-XXX.X : dB
17	12.5	50	400	1.6 k	-XXX.X : dB
18	16	63	500	2 k	-XXX.X : dB
19	20	80	630	2.5 k	-XXX.X : dB
20	25	100	800	3.15 k	-XXX.X : dB
21	31.5	125	1 k	4 k	-XXX.X : dB
22	40	160	1.25 k	5 k	-XXX.X : dB
23	50	200	1.6 k	6.3 k	-XXX.X : dB
24	63	250	2 k	8 k	-XXX.X : dB
25	80	315	2.5 k	10 k	-XXX.X : dB
26	100	400	3.15 k	12.5 k	-XXX.X : dB
27	125	500	4 k	16 k	-XXX.X : dB
28	160	630	5 k	20 k	-XXX.X : dB
29	200	800	6.3 k	25 k	-XXX.X : dB
30	250	1 k	8 k	31.5 k	-XXX.X : dB
31	315	1.25 k	10 k	40 k	-XXX.X : dB
32	400	1.6 k	12.5 k	50 k	-XXX.X : dB
33	500	2 k	16 k	63 k	-XXX.X : dB
34	630	2.5 k	20 k	80 k	-XXX.X : dB
35	APW	APW	APW	APW	-XXX.X : dB
36	Line end				<CR><LF>

Commands for getting measurement data currently shown on display

DOD p1 ?   Get display data in ASCII format

p1:   Measurement parameter output specification

    0:    Measurement parameters not output

    1:    Measurement parameters also output

    -1:   Measurement parameters only output

-    May not be used in the following case:

    During processing/store

DOB p1 ?   Get display data in binary format

p1:   Measurement parameter output specification

    0:    Measurement parameters not output

    1:    Measurement parameters also output

    -1:   Measurement parameters only output

-    May not be used in the following case:

    During processing/store

Command	SA-29/SA-30 status	Response data configuration	Remarks
DOD -1 ? DOB -1 ?	—	Header line + A	
DOD 0 ? DOB 0 ?	Normal measurement data display (except level/time)	Header line + B	Includes "bar graph & level/time"
	Normal measurement data display (level/time)	Header line + C	
	Recall processing results display	Header line + D	Includes "bar graph & level/time" Excludes reverb time processing
	Differential processing results display	Header line + E	Includes "overlay & differential processing display"
DOD 1 ? DOB 1 ?	Normal measurement data display (except level/time)	Header line + A + B	Includes "bar graph & level/time"
	Normal measurement data display (level/time)	Header line + A + C	
	Recall processing results display	Header line + A + D	Includes "bar graph & level/time" Excludes reverb time processing
	Differential processing results display	Header line + A + E	Includes "overlay & differential processing display"

- When compression with a factor of 2 or higher is carried out for level/ time display, the maximum and minimum data are shown linked by a line on the screen, but the output contains only the maximum value.
- When bar graph & level/time display is selected, only bar graph data are output.
- Reverb time processing results are not output. While reverb time processing results are displayed, level/time data are output.

Commands for getting memory data

MRD p1 p2 p3 p4 Get memory data in ASCII format

p1:   Measurement parameter output specification

      0:     Measurement parameters not output

      1:     Measurement parameters also output

     -1:   Measurement parameters only output

p2:   Memory block

      0:     Auto memory block

      1:     Manual memory block

p3:   Request range start address

      1 - p4

p4:   Request range end address

      p3 - highest address containing stored data

    - May not be used in the following case:

      During processing/store

MRB p1 p2 p3 p4 Get memory data in binary format

p1:   Measurement parameter output specification

      0:     Measurement parameters not output

      1:     Measurement parameters also output

     -1:   Measurement parameters only output

p2:   Memory block

      0:     Auto memory block

      1:     Manual memory block

p3:   Request range start address

      1 - p4

p4:   Request range end address

        p3 - highest address containing stored data

   - May not be used in the following case:

        During processing/store1 - p4

Requested data	Command	Response data configuration	Remarks
Auto memory block measurement parameters	MRD -1 0 0 0 ?	Header line + A	
Auto memory block address p3 - p4 data	MRD 0 0 p3 p4 ?	Header line + B + B + · · · + B	B is output as often as number of addresses
Auto memory block measurement parameters and address p3 - p4 data	MRD 1 0 p3 p4 ?	Header line + A + B + B + · · · + B	B is output as often as number of addresses
Manual memory block address p3 - p4 data	MRD -1 1 p3 p4 ?	Header line + A + A + · · · + A	A is output as often as number of addresses
Manual memory block address p3 - p4 data	MRD 0 1 p3 p4 ?	Header line + B + B + · · · + B	B is output as often as number of addresses
Manual memory block address p3 - p4 measurement parameters and address	MRD 1 1 p3 p4 ?	Header line + A + B + + A + B + ... + A + B	A and B are output as often as number of addresses

- Measurement parameters and measurement data stored in specified address block range are output in ascending order of address numbers.
- "Measurement parameters (A)" exists once for the entire auto memory block and once for each address of the manual memory block.
- When measurement parameters only are requested, p3 and p4 of the auto memory block are filled with dummy values.

Command for getting continuous instantaneous value data

DRB p1 p2 Get continuous output of current instantaneous value

      p1:   Measurement parameter output specification

              0: Measurement parameters not output

              1: Measurement parameters also output

      p2:   Data period

                    Data update cycle of SA-29/SA-30

                    9600 bps: 200 - 1000 (ms)

                    19200 bps: 100 - 1000 (ms)

                    Specified in 10-ms steps

    -   May not be used in the following cases:

                    During processing/store

                    In recall mode

Command	Response data configuration	Remarks
DRB 0 200 ?	Header line + B + B · · ·	Output until B is interrupted
DRB 1 200 ?	Header line + A + B + B · · ·	Output until B is interrupted

- The command serves to obtain continuous measurement data in binary format.
- In the data period specification, the "1" digit is omitted.
- After the SA-29/SA-30 receives a positive acknowledgment from the host, it sends data at the next update period. If it receives no positive acknowledgment from the host within the update period, data are updated only internally and not output.

Example

Update period 200 ms specified, at 19200 bps

When positive AC adapter was received within update period

| 200 mS | 200 mS | 200 mS | 200 mS |

Send data   Send data   Send data   Send data

Positive acknowledgment   Positive acknowledgment   Positive acknowledgment   Positive acknowledgment
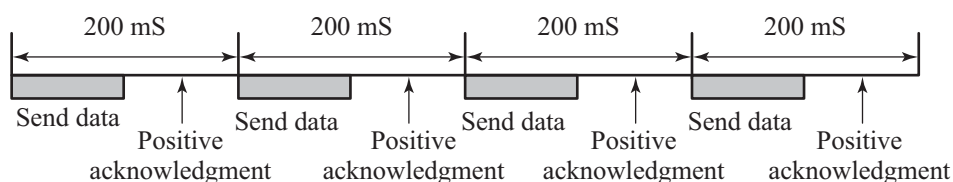
When positive AC adapter was not received within update period
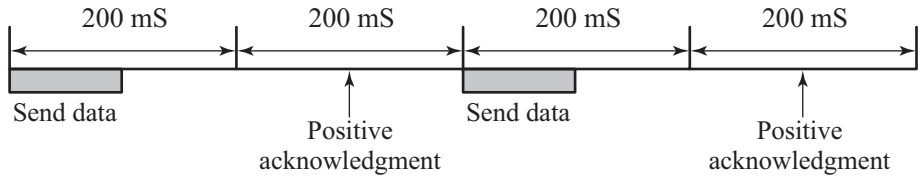
- To terminate the transmission, the host should send a break link command (DLE+EOT) to the SA-29/SA-30.
- One data set sent from the SA-29/SA-30 (dark section in above illustration) contains the following information.
  The transmission time at 19200 bps and 9600 bps is 2 times or 4 times that of the transmission time at 38400 bps.

Data	Transfer rate	Transmission time
1/1 oct 1 screen	115200 bps	approx. 6 ms
	38400 bps	approx. 18 ms
1/3 oct 1 screen	115200 bps	approx. 10 ms
	38400 bps	approx. 30 ms
1/1 oct 2 screens	115200 bps	approx. 8 ms
	38400 bps	approx. 24 ms
1/3 oct 2 screens	115200 bps	approx. 16 ms
	38400 bps	approx. 48 ms
1/1 oct & 1/3 oct	115200 bps	approx. 12 ms
	38400 bps	approx. 36 ms

Command for getting user weighting data

UWT ?   Get user weighting data in ASCII format

Command	Response data configuration	Remarks
UWT ?	Header line + F	—

Frequency number tables

1/1 octave   Unit: Hz

No.	LOW1	LOW2	MID	HIGH
0	AP	AP	AP	AP
1	0.5	2	16	63
2	1	4	31.5	125
3	2	8	63	250
4	4	16	125	500
5	8	31.5	250	1 k
6	16	63	500	2 k
7	31.5	125	1 k	4 k
8	63	250	2 k	8 k
9	125	500	4 k	16 k
10	250	1 k	8 k	31.5 k
11	500	2 k	16 k	63 k
12	APW	APW	APW	APW

1/3 octave   Unit: Hz

No.	LOW1	LOW2	MID	HIGH
0	AP	AP	AP	AP
1	0.4	1.6	12.5	50
2	0.5	2	16	63
3	0.63	2.5	20	80
4	0.8	3.15	25	100
5	1	4	31.5	125
6	1.25	5	40	160
7	1.6	6.3	50	200
8	2	8	63	250
9	2.5	10	80	315
10	3.15	12.5	100	400
11	4	16	125	500
12	5	20	160	630
13	6.3	25	200	800
14	8	31.5	250	1 k
15	10	40	315	1.25 k
16	12.5	50	400	1.6 k
17	16	63	500	2 k
18	20	80	630	2.5 k
19	25	100	800	3.15 k
20	31.5	125	1 k	4 k
21	40	160	1.25 k	5 k
22	50	200	1.6 k	6.3 k
23	63	250	2 k	8 k
24	80	315	2.5 k	10 k
25	100	400	3.15 k	12.5 k
26	125	500	4 k	16 k
27	160	630	5 k	20 k
28	200	800	6.3 k	25 k
29	250	1 k	8 k	31.5 k
30	315	1.25 k	10 k	40 k
31	400	1.6 k	12.5 k	50 k
32	500	2 k	16 k	63 k
33	630	2.5 k	20 k	80 k
34	APW	APW	APW	APW

- For the level/time display parameter setting command (LVT), APW (1/1 octave: number 12; 1/3 octave: number 34) cannot be specified.
- For the user weighting data setting command (UWT), bands other than AP and APW (1/1 octave: 1 - 11; 1/3 octave: 1 - 33) contain the compensation values.

Maximum auto store count

Number of stored screens	Number of stored processing types	1/1 oct	1/3 oct	1/1&1/3
1	1	6000	2400	-
	2	3000	1200	-
	3	2000	800	-
	4	1500	600	-
	5	1200	500	-
	6	1000	400	-
2	1	3000	1200	1200
	2	1500	600	600
	3	1000	400	400
	4	700	300	300
	5	600	200	200
	6	500	200	200

The number of stored screens for auto store of bar graph & level/time display and for bar graph & numeric display is 1.

The number of stored processing types is the same as the number of processing names shown in reverse at the top of the screen (including instantaneous value Lp).

Command index