



HDMI SOURCE TESTER

VA-1830

Terminal Command Manual

Ver 1.01



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2009.12

Ver.1.01

ASTRODESIGN,Inc

CONTENTS

Concerning the configuration of this manual.....	v
Chapter 1 CONCERNING THE TERMINAL COMMANDS	1
1.1 Introduction.....	1
1.2 Communication specifications	1
1.2.1 RS-232C	1
■ Communication parameters.....	1
■ Connectors	1
1.2.2 LAN	1
■ Communication parameters.....	1
■ Connectors	1
1.2.3 USB.....	2
■ Communication parameters.....	2
■ Connectors	2
1.3 Connection configuration.....	2
1.3.1 RS-232C	2
1.3.2 LAN	2
1.3.3 USB.....	2
1.4 Transmission control characters, data and error commands.....	3
1.4.1 Concerning BCC (Block Check Code).....	3
1.5 Error code.....	4
1.6 Command formats.....	5
1.6.1 When setting commands are sent.....	5
1.6.2 When the get command is sent.....	5
1.7 Communication protocol.....	6
1.7.1 Type1	6
1.7.2 Type2	7
1.7.3 Type3	8
1.7.4 Type4	9
1.7.5 Type5	10
1.7.6 Type6	12
1.8 Concerning timeouts	13
Chapter 2 OPERATION SETTING COMMANDS	15
2.1 [0x20 0x40]: Set EDID	15
2.2 [0x30 0x40]: Load EDID	16
2.3 [0x20 0x41]: Set Color Palette.....	17
2.4 [0x30 0x41]: Load Color Palette	18
2.5 [0x20 0x42]: Set Pixel Color Pattern.....	19
2.6 [0x30 0x42]: Load Pixel Color Pattern	20
2.7 [0x20 0x43]: Set Line Block	21
2.8 [0x30 0x43]: Load Line Block	22
2.9 [0x20 0x44]: Set Video Timing.....	23

2.10	[0x30 0x44]: Load Video Timing Setting	24
2.11	[0x20 0x45]: Set Audio	25
2.12	[0x30 0x45]: Load Audio Setting.....	26
2.13	[0x20 0x46]: Set Packet	27
2.14	[0x30 0x46]: Load Packet Setting.....	28
2.15	[0x20 0x47]: Set Through mode	29
2.16	[0x30 0x47]: Load Through mode.....	30
2.17	[0x20 0x48]: Set CEC Logical Address.....	31
2.18	[0x30 0x48]: Load CEC Logical Address Setting	32
2.19	[0x20 0x49]: Set CEC Response.....	33
2.20	[0x30 0x49]: Load CEC Response Setting	34
2.21	[0x20 0x4A]: Set CEC Reception Confirmation	35
2.22	[0x30 0x4A]: Load CEC Reception Confirmation Setting	36
2.23	[0x20 0x4B]: Send CEC Command.....	37
2.24	[0x20 0x4C]: Set Ethernet	38
2.25	[0x30 0x4C]: Load Ethernet Setting	39
2.26	[0x20 0x4D]: Set Auto Pixel Color Pattern.....	40
2.27	[0x20 0x4E]: Set Auto Line Block	41
2.28	List of operation setting commands.....	42
Chapter 3	MEASUREMENT RESULT ACQUISITION COMMANDS.....	43
3.1	[0x20 0x50]: Reset Measurements.....	43
3.2	[0x30 0x50]: Load All Measurement Results	44
3.3	[0x30 0x51]: Load EDID Access Measurement Result	45
3.4	[0x30 0x52]: Load Video Data Measurement Result	46
3.5	[0x30 0x53]: Load Video Data	47
3.6	[0x30 0x54]: Load Video Timing measurement result.....	48
3.7	[0x30 0x55]: Load Audio measurement result	49
3.8	[0x30 0x56]: Load HDCP measurement result	50
3.9	[0x30 0x57]: Load CEC Measurement result.....	51
3.10	[0x30 0x58]: Load Packet Measurement result	52
3.11	[0x30 0x59]: Load Video Timing	53
3.12	[0x30 0x5A]: Load Audio	54
3.13	[0x30 0x5B]: Load Packet	56
3.14	[0x30 0x5C]: Load DDC Line Monitor.....	58
3.15	[0x30 0x5D]: Load CEC Line Monitor	59
3.16	List of measurement result acquisition commands.....	60
Chapter 4	EQUIPMENT INFORMATION COMMANDS	61
4.1	[0x20 0x60]: Save Operation Settings (internal).....	61
4.2	[0x30 0x60]: Load Operation Settings (internal)	62
4.3	[0x20 0x61]: Save Operation Settings (USB)	63
4.4	[0x30 0x61]: Load Operation Settings (USB)	64
4.5	[0x30 0x62]: Load VA-1830 Version Information	65
4.6	[0x20 0x63]: Set Date/Time	66

4.7	[0x30 0x63]: Load Date/Time	67
4.8	[0x20 0x64]: Initialize Operation Settings	68
4.9	[0x20 0x6F]: Execute Calibration.....	69
4.10	List of equipment information commands.....	70
Chapter 5	CONTROL METHODS	71
5.1	Measurement sequence.....	71
5.2	Operation setting.....	72
5.2.1	EDID setting	72
5.2.2	Video Data setting	72
	■ Manual setting	72
	■ Auto setting.....	74
	■ Setting for interlaced timing	75
5.2.3	Set Video Timing	75
5.2.4	Set Audio.....	75
5.2.5	Set Packet.....	76
5.2.6	Through mode.....	77
5.2.7	CEC-related settings	77
	■ Set CEC Logical Address.....	77
	■ Set CEC Response.....	77
	■ Set CEC Reception Confirmation	78
5.2.8	Saving and Loading the Operation Settings	78
5.2.9	Initializing the operation settings	78
	■ EDID	78
	■ Color Palette	79
	■ Pixel Color Pattern.....	79
	■ Line Block	79
	■ Video Timing	79
	■ Audio.....	79
	■ Packet.....	79
	■ Through Mode	79
	■ CEC Logical Address.....	79
	■ CEC Response	79
	■ Set CEC Reception Confirmation	80
	■ Set Ethernet.....	80
5.3	Reset Measurements	80
5.4	Measurement	81
5.4.1	EDID access measurement, DDC Line monitor	81
5.4.2	Video Data measurement.....	82
	■ Measurement with YC422 color space	82
5.4.3	Load Video Data.....	82
	■ Measurement with YC422 color space	82
5.4.4	Loading the Video Timing measurement result	83
5.4.5	Load Audio measurement result.....	85

5.4.6	Load HDCP measurement result	85
5.4.7	Load CEC measurement result, CEC Line monitor	85
5.4.8	Load Packet Measurement result.....	86

Concerning the configuration of this manual

This instruction manual contains the terminal commands used by the VA-1830 series. It describes the setting methods, precautions and other matters using the configuration shown below. Read through the manual carefully so as to ensure that you will perform the operations and settings correctly.

- Please read this first!

Chapter 1. CONCERNING THE TERMINAL COMMANDS

This chapter gives an outline of the terminal commands.

- VA-1830 series terminal commands

Chapter 2. OPERATION SETTING COMMANDS

This chapter describes the commands which are used to set the measurement methods.

Chapter 3. MEASUREMENT RESULT ACQUISITION COMMANDS

This chapter describes the commands which are used to acquire the measurement results.

Chapter 4. EQUIPMENT INFORMATION COMMANDS

This chapter describes the commands which are used to save and load the operation settings and to set the date and time.

- Examples of usage

Chapter 5. CONTROL METHODS

This chapter describes how the terminal commands are used.



1

CONCERNING THE TERMINAL COMMANDS

1.1 Introduction

This manual describes the reception and transmission of the commands and data which are required to operate the HDMI source tester (hereafter “the VA-1830”) from an external computer (such as a personal computer). The commands and data are received and sent through the RS-232C serial input/output port, LAN or USB peripheral.

1.2 Communication specifications

1.2.1 RS-232C

■ Communication parameters

Communication system	Asynchronous system
Interface	RS-232C
Baud rate	9600 bps
Data length	8 bits, fixed
Stop bits	1
Parity	NONE
Flow control	None

■ Connectors

Computer end			VA-1830 end	
Pin No.	Signal		Pin No.	Signal
2	RXD (Received data)	→	2	TXD (Transmitted data)
3	TXD (Transmitted data)	→	3	RXD (Received data)
5	GND (Signal ground)	→	5	GND (Signal ground)
7	RTS (Request to send)	→	7	CTS (Clear to send)
8	CTS (Clear to send)	→	8	RTS (Request to send)

1.2.2 LAN

■ Communication parameters

- 10BASE-T, 100BASE-TX
- UDP/IP

■ Connectors

- RJ-45

1.2.3 USB

■ Communication parameters

- USB2.0

■ Connectors

- B connectors

1.3 Connection configuration

1.3.1 RS-232C



Fig. Connections using RS-232C port

1.3.2 LAN

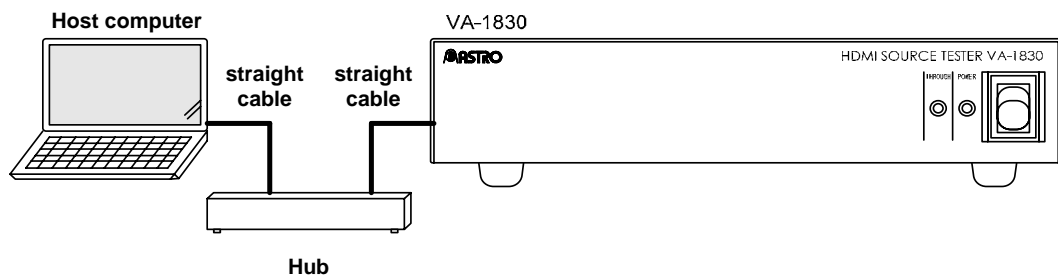


Fig. Connections using LAN

1.3.3 USB

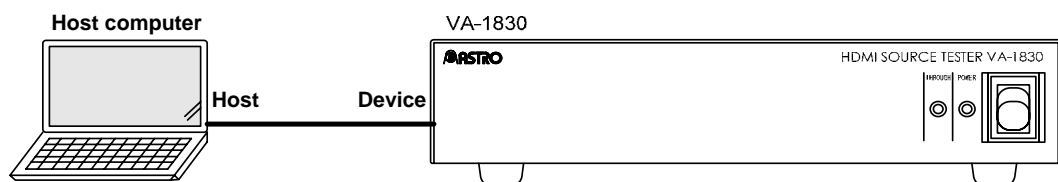


Fig. Connections using USB

1.4 Transmission control characters, data and error commands

Symbol	HEX code	Description
STX	0x02	Transmission text (command) start
ETB	0x17	Transmission text (data) end (but next data follows)
ETX	0x03	Transmission text (command, data) end
ENQ	0x05	Request to start terminal mode
EOT	0x04	Request to end terminal mode
ACK	0x06	Positive acknowledge character
NAK	0x15	Negative acknowledge character
TRDT	0x10	Data transmission
ESTS	0x11	Error status transmission
BCC	Any code	Refer to "1.4.1 Concerning BCC (Block Check Code)."

1.4.1 Concerning BCC (Block Check Code)

BCC is used to check the legality of the commands.

When a command is sent, the total sum from setting command CMD1 up to ETX (ETB) of the command to be sent is calculated, and one byte is sent immediately after ETX (ETB). When this is done, the VA-1830 checks the data, and if the data and BCC fail to match, BCC_ERR is returned from the VA-1830.

When a command is received, the total sum from **CMD1** to ETX (ETB) of the command received is calculated, and the legality of the data is checked using BCC of the received command and the calculated BCC.

■ Example of BCC preparation

0x30, 0x42: When a pixel color pattern is loaded and sent

STX	0x02		
CMD1	0x30		
CMD2	0x42		
PARM	0x01	Input channel	} Target of BCC preparation
ETX	0x03		
BCC	Check sum		

1.5 Error code

Symbol	HEX code	Description
PARAM_SIZE_ERR	0x01	The parameter size is not correct. Alternatively, the data length and volume of data sent do not match (only with type 5 or 6).
PARAM_DATA_ERR	0x02	The parameter value is not correct.
CMD_EXEC_ERR	0x03	The execution of the processing instructed by the command failed.
BAD_CMD_ERR	0x04	The command is not the correct one. (CMD1, 2)
BCC_ERR	0x05	The check sum does not match.
CEC_SEND_HAND	0x10	Error handling was returned in response to the CEC send command.
CEC_SEND_BUSSF	0x11	The CEC command could not be sent because BUSS was not free.
CEC_SEND_ARB	0x12	An arbitration error occurred in response to the CEC send command. (In the Start or Initiator section)
CEC_SEND_ACK	0x13	ACK was not returned in response to the CEC send command.
CEC_SEND_IMP	0x14	An arbitration error occurred in response to the CEC send command. (In a section other than the Start or Initiator section)

1.6 Command formats

1.6.1 When setting commands are sent

Sending of commands from the computer to the VA-1830 (PC → VA)

STX	CMD1	CMD2	ETX	BCC
-----	------	------	-----	-----

Alternatively:

STX	CMD1	CMD2	PARM	ETX	BCC
-----	------	------	------	-----	-----

Return value from VG generator to computer after command transmission (PC ← VA)

ACK

Alternatively:

STX	ESTS	ErrorCode	ETX	BCC
-----	------	-----------	-----	-----

When data is required, transmission is as shown below only when the commands were sent and ACK was returned. (PC → VA)

STX	TRDT	PARM	ETB	BCC
-----	------	------	-----	-----

Alternatively:

STX	TRDT	PARM	ETX	BCC
-----	------	------	-----	-----

Return value from the VA to the computer after data transmission (PC ← VA)

ACK

Alternatively:

STX	ESTS	ErrorCode	ETX	BCC
-----	------	-----------	-----	-----

1.6.2 When the get command is sent

Sending of commands from the computer to the VA-1830 (PC → VA)

STX	CMD1	CMD2	ETX	BCC
-----	------	------	-----	-----

Alternatively:

STX	CMD1	CMD2	PARM	ETX	BCC
-----	------	------	------	-----	-----

Return value from VA generator to computer after command transmission (PC ← VA)

ACK

Alternatively:

STX	ESTS	ErrorCode	ETX	BCC
-----	------	-----------	-----	-----

Reception is as shown below only when ACK is returned. (PC ← VA)

STX	TRDT	PARM	ETB	BCC
-----	------	------	-----	-----

Alternatively:

STX	TRDT	PARM	ETX	BCC
-----	------	------	-----	-----

1.7 Communication protocol

1.7.1 Type1

This is the sequence when the terminal commands are started.

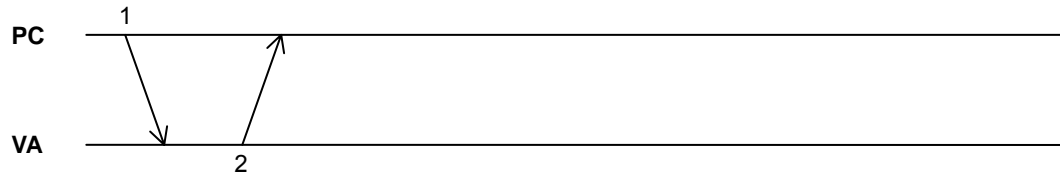


Fig. Type1

Sequence no.	Command	Send/receive direction
1	ENQ	Send
2	ACK	Receive

1.7.2 Type2

This is the sequence when commands containing only CMD (command) and PARM (parameter) (where required) are sent.

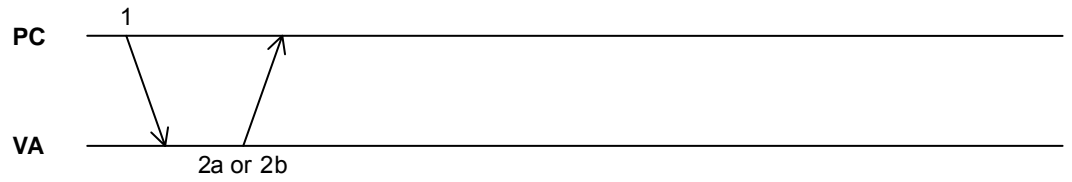


Fig. Type2

Sequence no.	Command					Send/receive direction
1	STX	CMD *	(PARM)	ETX	BCC	Send
2a (Successful)	ACK					Receive
2b (Failed)	STX	ESTS	ErrorCode	ETX	BCC	Receive

* It is assumed that the following two codes are contained in the CMD (command) section.

CMD1	CMD2
------	------

1.7.3 Type3

This is the sequence for receiving the VA data.

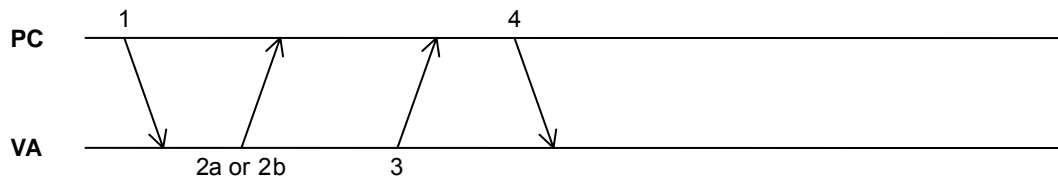


Fig. Type3

Sequence no.	Command					Send/receive direction
1	STX	CMD *1	(PARM)	ETX	BCC	Send
2a (Successful)	ACK					Receive
2b (Failed)	STX	ESTS	ErrorCode	ETX	BCC	Receive
3	STX	TRDT	PARM	ETX	BCC	Receive
4	ACK					Send

*1 It is assumed that the following two codes are contained in the CMD (command) section.

CMD1	CMD2
------	------

*2 The flow is terminated at 2b if communication failed.

1.7.4 Type4

This is the sequence for sending the VA data.

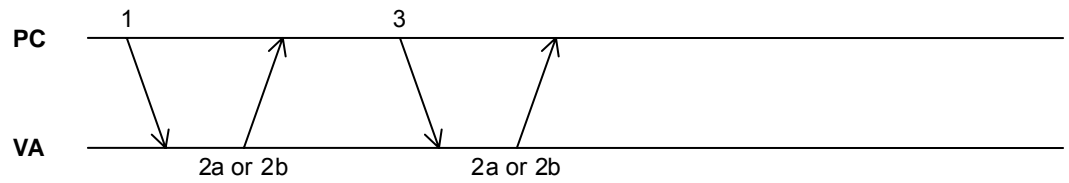


Fig. Type4

Sequence no.	Command					Send/receive direction
1	STX	CMD *1	(PARM)	ETX	BCC	Send
2a (Successful)	ACK					Receive
2b (Failed)	STX	ESTS	ErrorCode	ETX	BCC	Receive
3	STX	TRDT	PARM	ETX	BCC	Send
2a (Successful)	ACK					Receive
2b (Failed)	STX	ESTS	ErrorCode	ETX	BCC	Receive

*1 It is assumed that the following two codes are contained in the CMD (command) section.

CMD1	CMD2
------	------

*2 The flow is terminated at 2b if communication failed.

1.7.5 Type5

This is the sequence for receiving the VA data. PARM (parameter) must be received for the desired number of times.

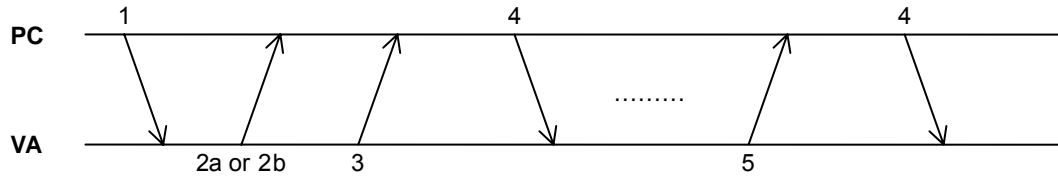


Fig. Type5

Sequence no.	Command					Send/receive direction
1	STX	CMD *1	(PARM)	ETX	BCC	Send
2a (Successful)	ACK					Receive
2b (Failed)	STX	ESTS	ErrorCode	ETX	BCC	Receive
3	STX	TRDT	PARM	ETB	BCC	Receive
4	ACK					Send
3 and 4 repeated for the desired number of times						
5	STX	TRDT	PARM	ETX	BCC	Receive
4	ACK					Send

*1 It is assumed that the following two codes are contained in the CMD (command) section.

CMD1	CMD2
------	------

*2 The flow is terminated at 2b if communication failed.

*3 The data is configured as shown below in PARM in flow 3 or 5.

Data Length1	Data Length2	Packet No.	(Data)	...	(Data)
--------------	--------------	------------	--------	-----	--------

Item	Description
Data Length	The number of bytes in PARM in each flow is saved here. (3 + number of data bytes to be sent)
Packet No.	What "n" is when the transmission of the data is the nth transmission (1st, 2nd, 3rd, 4th, 5th, etc.) for each flow is saved here. (number of times the data bytes have been sent - 1)
Data	The data received is saved here.

Shown below is an example of the commands in "3.5 [0x30 0x53]: Load Video Data."

- Acquiring the data of dots 1 to 640
 - First return command (sequence no.3)

STX	1 byte	0x02
TRDT	1 byte	0x10
PARM	0x03F9 byte	
Data Length	2 bytes	0x03F9 (Data Length1 = 0x03, Data Length2 = 0xF9)
Packet No	1 byte	0x00 ←Data of (number of times returned - 1) is saved here.
R (1 dot) data	2 bytes	0x0000 to 0x0FFF
G (1 dot) data	2 bytes	0x0000 to 0x0FFF
B (1 dot) data	2 bytes	0x0000 to 0x0FFF
:		
R (338 dots) data		

	G (338 dots) data		
	B (338 dots) data	2 bytes	0x0000 to 0x0FFF
ETB		1 byte	0x17 ← ETB is saved since not all the data has been returned.
BCC		1 byte	Check sum

- Second return command (sequence no.5)

STX		1 byte	0x02
TRDT		1 byte	0x10
PARM		0x03F9 byte	
	Data Length	2 bytes	0x038D
	Packet No	1 byte	0x01 ← Data of (number of times returned - 1) is saved here.
	R (339 dots) data	2 bytes	0x0000 to 0x0FFF
	G (339 dots) data	2 bytes	0x0000 to 0x0FFF
	B (339 dots) data	2 bytes	0x0000 to 0x0FFF
	:		
	R (640 dots) data	2 bytes	0x0000 to 0x0FFF
	G (640 dots) data	2 bytes	0x0000 to 0x0FFF
	B (640 dots) data	2 bytes	0x0000 to 0x0FFF
ETX		1 byte	0x03 ← ETX is saved since this is the last return command.
BCC		1 byte	Check sum

1.7.6 Type6

This is the sequence for sending the VA data. PARM (parameter) must be sent for the desired number of times.

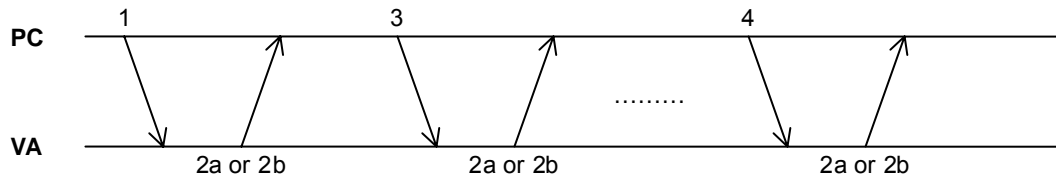


Fig. Type6

Sequence no.	Command					Send/receive direction
1	STX	CMD *1	(PARM)	ETX	BCC	Send
2a (Successful)	ACK					Receive
2b (Failed)	STX	ESTS	ErrorCode	ETX	BCC	Receive
3	STX	TRDT	PARM	ETB	BCC	Send
2a (Successful)	ACK					Receive
2b (Failed)	STX	ESTS	ErrorCode	ETX	BCC	Receive
3 and 2a or 2b are repeated for the desired number of times.						
4	STX	TRDT	PARM	ETX	BCC	Send
2a (Successful)	ACK					Receive
2b (Failed)	STX	ESTS	ErrorCode	ETX	BCC	Receive

*1 It is assumed that the following two codes are contained in the CMD (command) section.

CMD1	CMD2
------	------

*2 The flow is terminated at 2b if communication failed.

*3 The data is configured as shown below in PARM in flow 3 or 5.

Data Length1	Data Length2	Packet No.	(Data)	...	(Data)
--------------	--------------	------------	--------	-----	--------

Item	Description
Data Length	The number of bytes in PARM in each flow is set here. (3 + number of data bytes to be sent)
Packet No.	What "n" is when the transmission of the data is the nth transmission (1st, 2nd, 3rd, 4th, 5th, etc.) for each flow is set here. (number of times the data bytes have been sent - 1)
Data	The transmission data is set here.

Shown below is an example of the commands in "2.1 [0x20 0x40]: Set EDID."

■ Data in two blocks (256 bytes) are set in 128-byte increments.

- First return command (sequence no.3)

STX	1 byte	0x02
TRDT	1 byte	0x10
PARM	0x03F9 byte	
Data Length	2 bytes	0x0083
Packet No	1 byte	0x00 ←Data of (number of times returned - 1) is saved here.
First byte data	2 bytes	0x0000 to 0x0FFF
:		
128th byte data	2 bytes	0x0000 to 0x0FFF
ETB	1 byte	0x17 ←ETB is saved since not all the data has been sent.
BCC	1 byte	Check sum

- Second return command (sequence no.4)

STX	1 byte	0x02
TRDT	1 byte	0x10
PARM	0x03F9 byte	
Data Length	2 bytes	0x0083
Packet No	1 byte	0x01 ←Data of (number of times returned - 1) is saved here.
129th byte data	2 bytes	0x0000 to 0x0FFF
:		
256th byte data	2 bytes	0x0000 to 0x0FFF
ETX	1 byte	0x03 ←ETX is saved since this is the last return command.
BCC	1 byte	Check sum

1.8 Concerning timeouts

During the transmission of commands, disconnections or other factors may prevent signals from being returned from the VA-1830 or transmission may be terminated in the middle of a command. For this reason, provide a timeout three seconds after the commands have been sent from the computer.



2

OPERATION SETTING COMMANDS

2.1 [0x20 0x40]: Set EDID

Function: This command is used to set the EDID of the VA-1830. Up to 2048 bytes (16 blocks) can be set for EDID.

Sequence: Type6

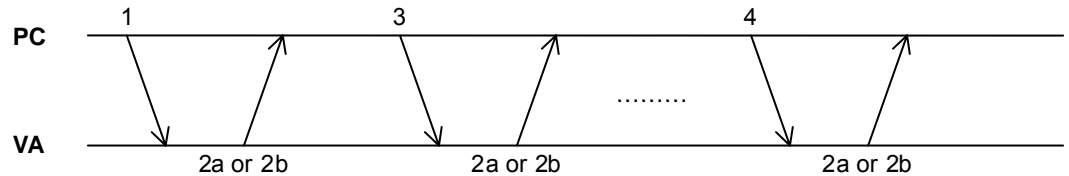


Fig. Type6

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x40

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x05: BCC_ERR

Send commands (sequence no.3, 4)		
PARM	Data Length byte	
Data Length	2 bytes	0x0003 to 0x03FB
Packet No	1 byte	0x00 to 0xFF
Data	1 byte	0x00 to 0xFF
:		
Data	1 byte	0x00 to 0xFF



**Be absolutely sure to set EDID for each of the blocks concerned. (The number of valid blocks is determined by the volume set.)
If the volume of the data which has been sent cannot be divided by 128 bytes (= 1 block), the remaining data will be erased. ***

* If, for instance, the data which has been sent consists of 130 bytes, the two bytes following the first 128 bytes (= 1 block) are erased.

2.2 [0x30 0x40]: Load EDID

Function: This command is used to load EDID of the VA-1830. The size of EDID which can be received depends on the volume of data set using the "2.1 [0x20 0x40]: Set EDID" command up to the maximum size of 2048 bytes (= 16 blocks).

Sequence: Type5

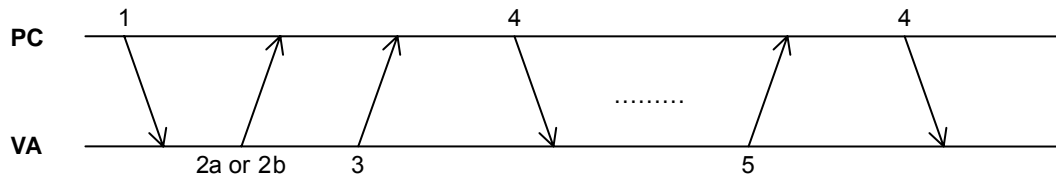


Fig. Type5

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x40

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR ----- 0x05: BCC_ERR

Return command (sequence no.3, 5)		
PARM	Data Length byte	
Data Length	2 bytes	0x0003 to 0x03FB
Packet No	1 byte	0x00 to 0xFF
Data	1 byte	0x00 to 0xFF
:		
Data	1 byte	0x00 to 0xFF

2.3 [0x20 0x41]: Set Color Palette

Function: This command is used to set the color palette.

Sequence: Type2

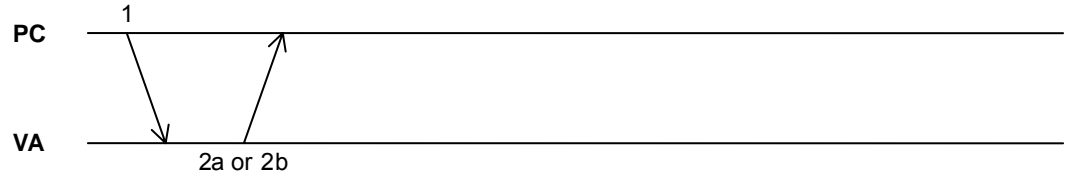


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x41
PARM	13 bytes	
Palette No.	1 byte	0x01 to 0x0F
R/Cr Max Data *	2 bytes	0x0000 to 0x0FFF
R/Cr Min Data *	2 bytes	0x0000 to 0x0FFF
G/Y Max Data *	2 bytes	0x0000 to 0x0FFF
G/Y Min Data *	2 bytes	0x0000 to 0x0FFF
B/Cb Max Data *	2 bytes	0x0000 to 0x0FFF
B/Cb Min Data *	2 bytes	0x0000 to 0x0FFF

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR

* Select one of the following settings for [*Max Data] and [*Min Data] depending on the bit width of the input video.

Bit width of input video	Setting
8 bits	Color data × 16
10 bits	Color data × 4
12 bits	Color data

2.4 [0x30 0x41]: Load Color Palette

Function: This command is used to load the color palette.

Sequence: Type3

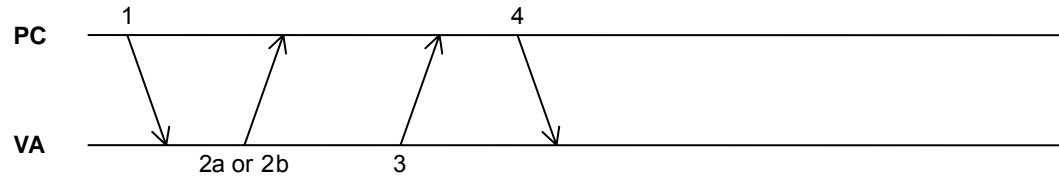


Fig. Type3

Command:

Send commands (sequence no.1)			
CMD1	1 byte	0x30	
CMD2	1 byte	0x41	
PARM		1 byte	
Palette No.	1 byte	0x01 to 0x0F	

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR

Return command (sequence no.3)			
PARM		12 bytes	
R/Cr Max Data	2 bytes	0x0000 to 0x0FFF	
R/Cr Min Data	2 bytes	0x0000 to 0x0FFF	
G/Y Max Data	2 bytes	0x0000 to 0x0FFF	
G/Y Min Data	2 bytes	0x0000 to 0x0FFF	
B/Cb Max Data	2 bytes	0x0000 to 0x0FFF	
B/Cb Min Data	2 bytes	0x0000 to 0x0FFF	

2.5 [0x20 0x42]: Set Pixel Color Pattern

Function: This command is used to set the color pattern of each pixel.

Sequence: Type6

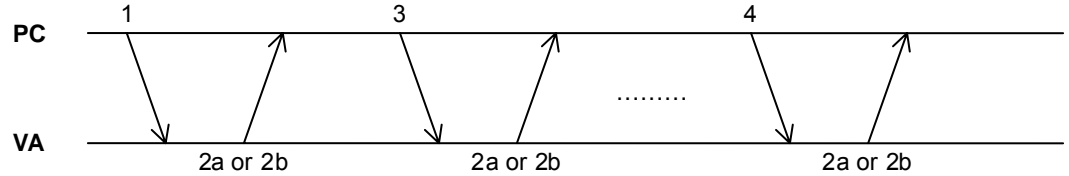


Fig. Type6

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x42

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR

Return command (sequence no.3, 4)		
PARAM	Data Length byte	
Data Length	2 bytes	0x0003 to 0x03F0
Packet No	1 byte	0x00 to 0xFF
Data	1 byte	0x00 to 0xFF
:		
Data	1 byte	0x00 to 0xFF

* A pixel color pattern consists of the [Pattern No.] (1 byte) and [Palette No.] (0.5 byte) equivalent to the resolution. The data section is mapped in the configuration shown below.

Pattern No. (= 0x01 to 0x03)	
Palette No.1	Palette No.0
:	:
Palette No.n	Palette No.(n-1)

Palette No. data equivalent to H resolution (n)

If the above data cannot be sent in one time, use sequence 3 to send it in a multiple number of times.

Pattern No.		← Sending using sequence 3
Palette No.1	Palette No.0	
Palette No.m	Palette No.(m-1)	
Palette No.(m+2)	Palette No.(m+1)	← Sending using sequence 4
:	:	
Palette No.n	Palette No.(n-1)	

2.6 [0x30 0x42]: Load Pixel Color Pattern

Function: This command is used to load the color pattern of each pixel.

Sequence: Type5

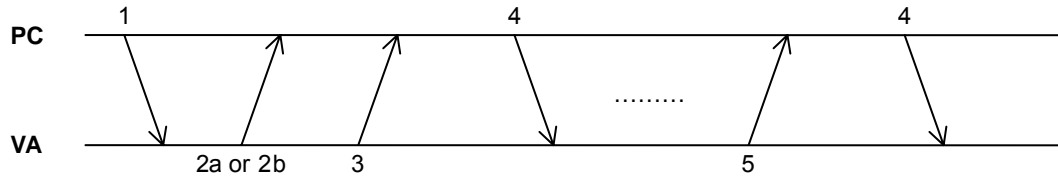


Fig. Type5

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x42
PARM	1 byte	
Pattern No.	1 byte	0x01 to 0x03

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR ----- 0x02: PARM_DATA_ERR ----- 0x05: BCC_ERR

Return command (sequence no.3, 5)		
PARM	Data Length byte	
Data Length	2 bytes	0x0003 to 0x03F0
Packet No	1 byte	0x00 to 0xFF
Data	1 byte	0x00 to 0xFF
:		
Data	1 byte	0x00 to 0xFF

* A pixel color pattern consists of the [Pattern No.] (1 byte) and [Palette No.] (0.5 byte) equivalent to the resolution. The data section is mapped in the configuration shown below.

Palette No.1	Palette No.0	Palette No. data equivalent to H resolution (n)
:	:	
Palette No.n	Palette No.(n-1)	

If the above data cannot be returned in one time, use sequence 3 to return it in a multiple number of times.

Palette No.1	Palette No.0	← Sending using sequence 3
:	:	
Palette No.m	Palette No.(m-1)	← Sending using sequence 5
Palette No.(m+2)	Palette No.(m+1)	
:	:	
Palette No.n	Palette No.(n-1)	

2.7 [0x20 0x43]: Set Line Block

Function: This command is used to set the line block.

Sequence: Type2

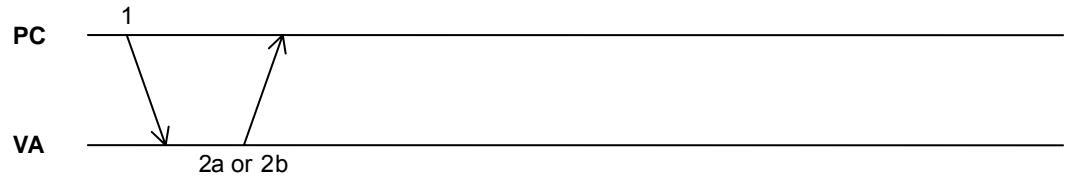


Fig. Type2

Command:

Send commands (sequence no.1)			
CMD1	1 byte	0x20	
CMD2	1 byte	0x43	
PARM	512 bytes		
Pattern No.	2 bits	00: Disable	01 to 11: Pattern No.
:			
Pattern No.	2 bits	00: Disable	01 to 11: Pattern No.

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x05: BCC_ERR

* The line block consists of the [Pattern No.] (2 bits). The pattern no. section is mapped in the configuration shown below.

Pattern No.3	Pattern No.2	Pattern No.1	Pattern No.0	Palette No. data equivalent to V resolution (n)
:				
Pattern No.n	Pattern No.(n-1)	Pattern No.(n-2)	Pattern No.(n-3)	

2.8 [0x30 0x43]: Load Line Block

Function: This command is used to load the line block.

Sequence: Type3

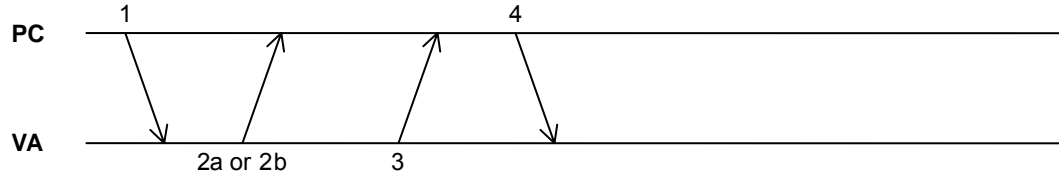


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x43

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR ----- 0x05: BCC_ERR

Return command (sequence no.3)			
PARM	512 bytes		
Pattern No.	2 bits	00: Disable	01 to 11: Pattern No.
:			
Pattern No.	2 bits	00: Disable	01 to 11: Pattern No.

* The line block consists of the [Pattern No.] (2 bits). The pattern no. section is mapped in the configuration shown below.

Pattern No.3	Pattern No.2	Pattern No.1	Pattern No.0	Palette No. data equivalent to V resolution (n)
:				
Pattern No.n	Pattern No.(n-1)	Pattern No.(n-2)	Pattern No.(n-3)	

2.9 [0x20 0x44]: Set Video Timing

Function: This command is used to set the video timing.

Sequence: Type2

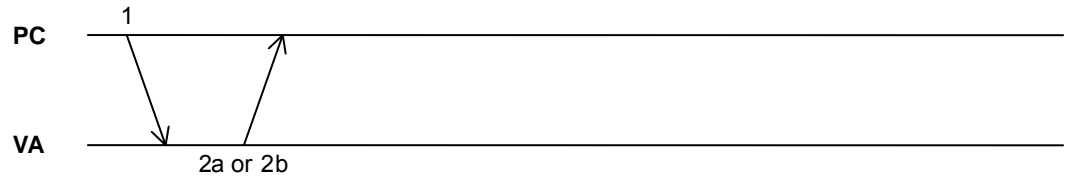


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x44
PARAM	15 bytes	
V Freq.	2 bytes	0x0000 to 0xFFFF (= V Frequency[Hz] × 100)
H Total	2 bytes	0x0000 to 0x1FFF[pixel]
H Active	2 bytes	0x0000 to 0x1FFF[pixel]
H Back Porch	2 bytes	0x0000 to 0x1FFF[pixel]
V Total Line	2 bytes	0x0000 to 0x0FFF[line]
V Active Total	2 bytes	0x0000 to 0x0FFF[line]
V Back Porch Field1	2 bytes	0x0000 to 0x0FFF (= V Back Porch[line] × 2)
Interlace	1 byte	0x00: Progressive 0x01: Interlace

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR

2.10 [0x30 0x44]: Load Video Timing Setting

Function: This command is used to load the video timing setting.

Sequence: Type3

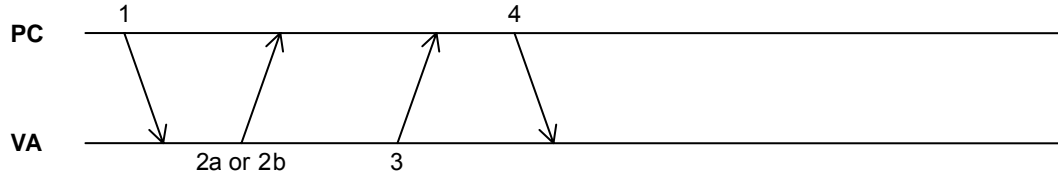


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x44

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR ----- 0x05: BCC_ERR

Return command (sequence no.3)		
PARM	15 bytes	
V Freq.	2 bytes	0x0000 to 0xFFFF (= V Frequency[Hz] × 100)
H Total	2 bytes	0x0000 to 0x1FFF[pixel]
H Active	2 bytes	0x0000 to 0x1FFF[pixel]
H Back Porch	2 bytes	0x0000 to 0x1FFF[pixel]
V Total Line	2 bytes	0x0000 to 0x0FFF[line]
V Active Total	2 bytes	0x0000 to 0x0FFF[line]
V Back Porch Field1	2 bytes	0x0000 to 0x0FFF (= V Back Porch[line] × 2)
Inter / Prog	1 byte	0x00: Progressive 0x01: Interlace

2.11 [0x20 0x45]: Set Audio

Function: This command is used to set the audio.

Sequence: Type2

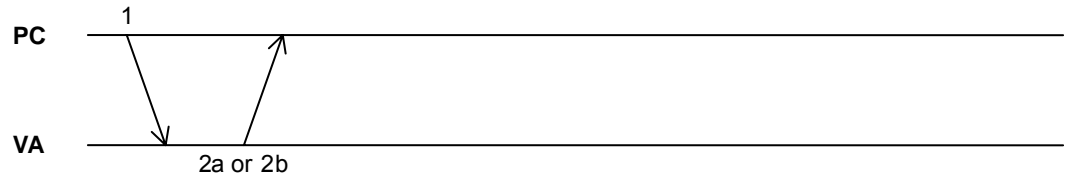


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x45
PARM	14 bytes	
Channel No.	1 byte	0x01 to 0x08
Enable	1 byte	0x00: Disable 0x01: Enable
Max Frequency	3 bytes	0x000000 to 0xFFFFFFFF
Min Frequency	3 bytes	0x000000 to 0xFFFFFFFF
Max Volume	3 bytes	0x000000 to 0x7FFFFFFF
Min Volume	3 bytes	0x000000 to 0x7FFFFFFF

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR

- * Select one of the following settings for [Max Volume] and [Min Volume] depending on the bit width of the input audio.
- * Measurement is undertaken only for those channel numbers set to enable.
- * The channel numbers are based on the Channel Count of the Audio InfoFrame and Speaker Placement.

Bit width of input audio	Setting
16 bits	Volume value × 16
20 bits	Volume value × 4
24 bits	Volume value



“Audio Type” can be measured using this command only when it has been selected as the “Audio Sample” (= linear PCM) setting.



For details on how the speakers for the channel numbers are configured, refer to “CEA-861-E Table 28 Audio InfoFrame Date Byte 4” under the CEA Standard.

2.12 [0x30 0x45]: Load Audio Setting

Function: This command is used to load the audio setting.

Sequence: Type3

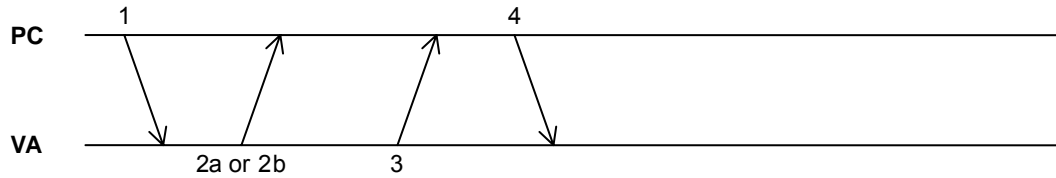


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x45
PARM	1 byte	
Channel No.	1 byte	0x01 to 0x08

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR 0x02: PARM_DATA_ERR 0x05: BCC_ERR

Return command (sequence no.3)			
PARM	13 bytes		
Enable	1 byte	0x00: Disable	0x01: Enable
Max Frequency	3 bytes	0x000000 to 0xFFFFFFFF	
Min Frequency	3 bytes	0x000000 to 0xFFFFFFFF	
Max Volume	3 bytes	0x000000 to 0x7FFFFFFF	
Min Volume	3 bytes	0x000000 to 0x7FFFFFFF	

2.13 [0x20 0x46]: Set Packet

Function: This command is used to set the packet.

Sequence: Type2

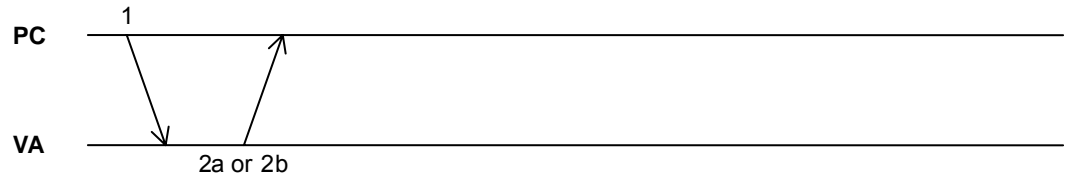


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x46
PARAM	33 bytes	
No.	1 byte	0x00 to 0x07
Enable	1 byte	0x00: Disable 0x01: Enable
Packet Type	1 byte	0x03: General Control Packet
		0x04: ACP Packet
		0x05: ISRC1
		0x06: ISRC2
		0x0A: Gamut Metadata Packet
		0x81: Vendor Specific InfoFrame
		0x82: AVI InfoFrame
		0x83: Source Product Descriptor InfoFrame
		0x84: Audio InfoFrame
		0x85: MPEG InfoFrame
0x86: NTSC VBI InfoFrame		
0xF0: Channel Status Bit		
Header-1 *	1 byte	0x00 to 0xFF
Header-2 *	1 byte	0x00 to 0xFF
Data0	1 byte	0x00 to 0xFF
:		
Data27	1 byte	0x00 to 0xFF

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARAM_SIZE_ERR
		0x02: PARAM_DATA_ERR
		0x05: BCC_ERR

- * If Packet Type is other than 0xF0 (Channel Status Bit) or 0x03 (General Control Packet), set Packet "HB1" and "HB2" under the HDMI Standard for [Header-1] and [Header-2]. If Packet Type is 0xF0 (Channel Status Bit) or 0x03 (General Control Packet), this item is to be ignored.
- * If Packet Type is other than 0xF0 (Channel Status Bit), set Packet "PB0" to "PB27" under the HDMI Standard for [Data0] to [Data27]. If Packet Type is 0x03 (General Control Packet), only CD (Color Depth) is valid. If Packet Type is 0xF0 (Channel Status Bit), set the data in sequence starting with [Data0].

2.14 [0x30 0x46]: Load Packet Setting

Function: This command is used to load the packet setting.

Sequence: Type3

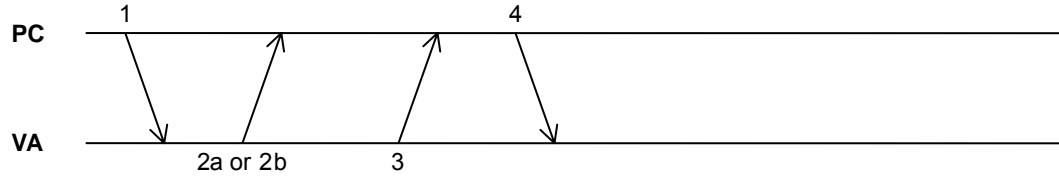


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x46
PARM	1 byte	
No.	1 byte	0x00 to 0x07

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR 0x02: PARM_DATA_ERR 0x05: BCC_ERR

Return command (sequence no.3)			
PARM	32 bytes		
Enable	1 byte	0x00: Disable	0x01: Enable
Packet Type	1 byte	0x03: General Control Packet 0x04: ACP Packet 0x05: ISRC1 0x06: ISRC2 0x0A: Gamut Metadata Packet 0x81: Vendor Specific InfoFrame 0x82: AVI InfoFrame 0x83: Source Product Descriptor InfoFrame 0x84: Audio InfoFrame 0x85: MPEG InfoFrame 0x86: NTSC VBI InfoFrame 0xF0: Channel Status Bit	
Header-1 *	1 byte	0x00 to 0xFF	
Header-2 *	1 byte	0x01 to 0xFF	
Data0	1 byte	0x00 to 0xFF	
:			
Data27	1 byte	0x00 to 0xFF	

2.15 [0x20 0x47]: Set Through mode

Function: This command is used to set the through mode.

Sequence: Type2

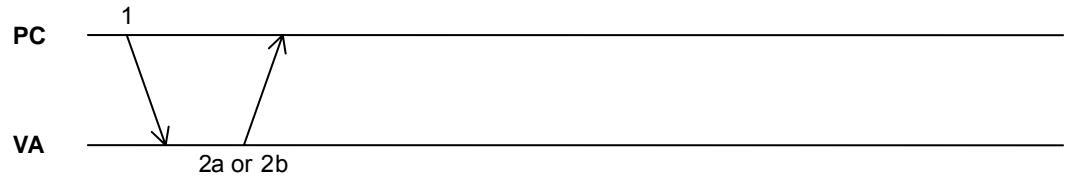


Fig. Type2

Command:

Send commands (sequence no.1)			
CMD1	1 byte	0x20	
CMD2	1 byte	0x47	
PARAM	1 byte		
MODE	1 byte	0x00: Disable	0x01: Through

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR

2.16 [0x30 0x47]: Load Through mode

Function: This command is used to load the through mode.

Sequence: Type3

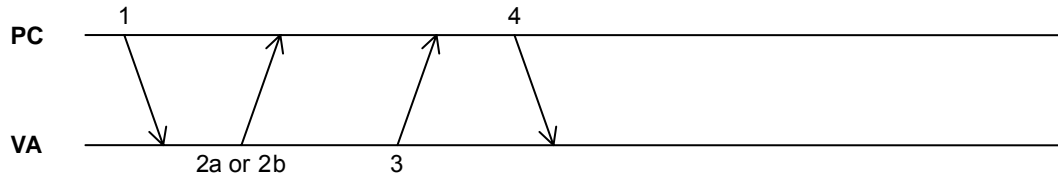


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x47

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR ----- 0x05: BCC_ERR

Return command (sequence no.3)			
PARM	1 byte		
MODE	1 byte	0x00: Disable	0x01: Through

2.17 [0x20 0x48]: Set CEC Logical Address

Function: This command is used to set the CEC logical address of the VA-1830.

Sequence: Type2

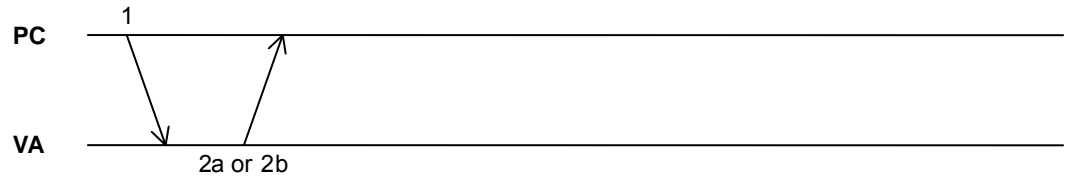


Fig. Type2

Command:

Send commands (sequence no.1)			
CMD1	1 byte	0x20	
CMD2	1 byte	0x48	
PARAM	2 bytes		
Enable	1 byte	0x00: Disable	0x01: Enable
Logical Address	1 byte	0x00 to 0x0F	

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR

2.18 [0x30 0x48]: Load CEC Logical Address Setting

Function: This command is used to load the CEC logical address setting of the VA-1830.

Sequence: Type3

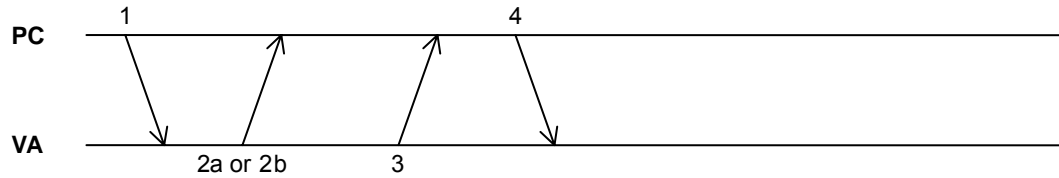


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x48

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR 0x05: BCC_ERR

Return command (sequence no.3)			
PARM		2 bytes	
Enable	1 byte	0x00: Disable	0x01: Enable
Logical Address	1 byte	0x00 to 0x0F	

2.19 [0x20 0x49]: Set CEC Response

Function: This command is used to set the CEC response.

Sequence: Type2

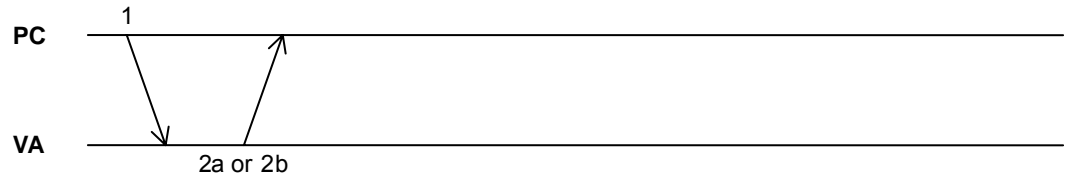


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x49
PARAM	37 bytes	
No.	1 byte	0x00 to 0x0F
Enable	1 byte	0x00: Disable 0x01:Enable
Receive OP Code	1 byte	0x00 to 0xFF
Receive Data Length	1 byte	0x00 to 0x0F
Receive Data 1	1 byte	0x00 to 0xFF
:		
Receive Data 15	1 byte	0x00 to 0xFF
Directly or Broadcast	1 byte	0x00: Directly Address 0x01:Broadcast
Response OP Code	1 byte	0x00 to 0xFF
Response Data Length	1 byte	0x00 to 0x0F
Response Data 1	1 byte	0x00 to 0xFF
:		
Response Data 15	1 byte	0x00 to 0xFF

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR

* Only the data in the sizes corresponding to [Receive Data Length] and [Response Data Length] is valid for [Receive Data] and [Response Data], respectively.

2.20 [0x30 0x49]: Load CEC Response Setting

Function: This command is used to load the CEC response setting.

Sequence: Type3

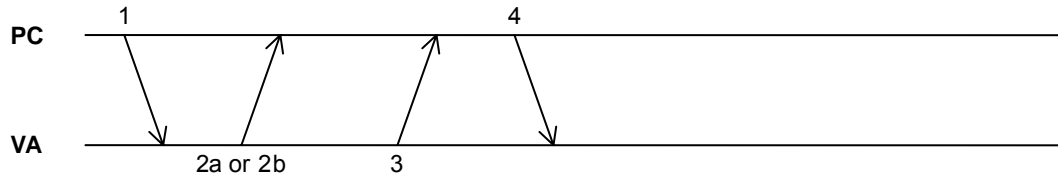


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x49
PARM	1 byte	
No.	1 byte	0x00 to 0x0F

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR 0x02: PARM_DATA_ERR 0x05: BCC_ERR

Return command (sequence no.3)			
PARM	36 bytes		
Enable	1 byte	0x00: Disable	0x01: Enable
Receive OP Code	1 byte	0x00 to 0xFF	
Receive Data Length	1 byte	0x00 to 0x0F	
Receive Data 1	1 byte	0x00 to 0xFF	
:			
Receive Data 15	1 byte	0x00 to 0xFF	
Directly or Broadcast	1 byte	0x00: Directly Address	0x01: Broadcast
Response OP Code	1 byte	0x00 to 0xFF	
Response Data Length	1 byte	0x00 to 0x0F	
Response Data 1	1 byte	0x00 to 0xFF	
:			
Response Data 15	1 byte	0x00 to 0xFF	

2.21 [0x20 0x4A]: Set CEC Reception Confirmation

Function: This command is used to set the CEC reception confirmation.

Sequence: Type2

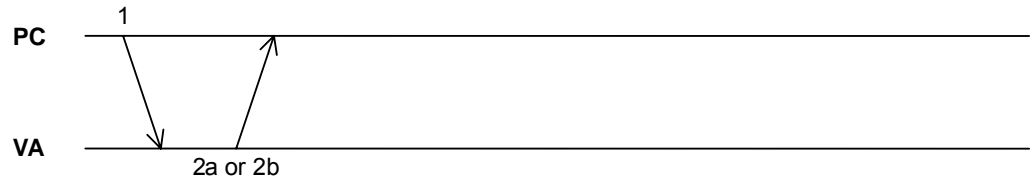


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x4A
PARAM	17 bytes	
Receive OP Code	1 byte	0x00 to 0xFF
Receive Data Length	1 byte	0x00 to 0x0F
Receive Data 1	1 byte	0x00 to 0xFF
:		
Receive Data 15	1 byte	0x00 to 0xFF

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARAM_SIZE_ERR
		0x02: PARAM_DATA_ERR
		0x05: BCC_ERR

2.22 [0x30 0x4A]: Load CEC Reception Confirmation Setting

Function: This command is used to load the CEC reception confirmation setting.

Sequence: Type3

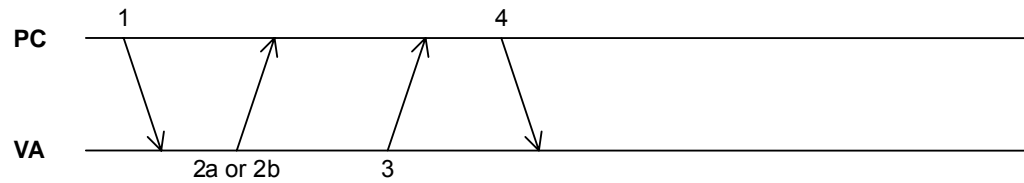


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x4A

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR 0x05: BCC_ERR

Return command (sequence no.3)		
PARAM	17 bytes	
Receive OP Code	1 byte	0x00 to 0xFF
Receive Data Length	1 byte	0x00 to 0x0F
Receive Data 1	1 byte	0x00 to 0xFF
:		
Receive Data 15	1 byte	0x00 to 0xFF

2.23 [0x20 0x4B]: Send CEC Command

Function: This command is used to send the CEC commands.

Sequence: Type2

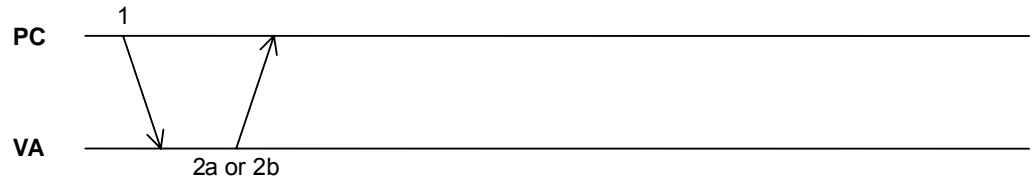


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x4B
PARM	18 bytes	
Destination Address	1 byte	0x00 to 0x0F
OP Code	1 byte	0x00 to 0xFF
Data Length	1 byte	0x00 to 0x0F
Trans Data 1	1 byte	0x00 to 0xFF
:		
Trans Data 15	1 byte	0x00 to 0xFF

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR
		0x10: CEC_SEND_HAND (Error Handling was returned in response to the send command.)
		0x11: CEC_SEND_BUSSF The CEC command could not be sent because BUSS was not free.
		0x12: CEC_SEND_ARB An arbitration error occurred in response to the CEC send command. (In the Start or Initiator section)
		0x13: CEC_SEND_ACK ACK was not returned in response to the CEC send command.
		0x14: CEC_SEND_IMP An arbitration error occurred in response to the CEC send command. (In a section other than the Start or Initiator section)

2.24 [0x20 0x4C]: Set Ethernet

Function: This command is used to establish the Ethernet setting.

Sequence: Type2

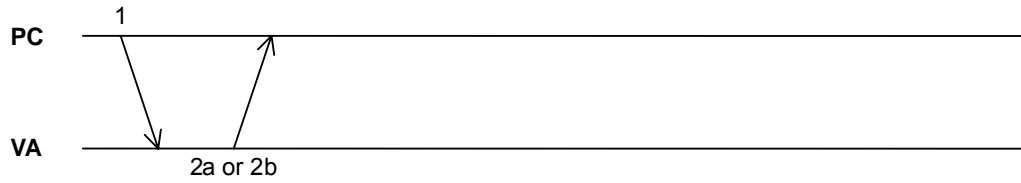


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x4C
PARAM	14 bytes	
IP ADDRESS	4 bytes	0xXX 0xXX 0xXX 0xXX
SUB NET MASK	4 bytes	0xXX 0xXX 0xXX 0xXX
GATE WAY	4 bytes	0xXX 0xXX 0xXX 0xXX
Port No.	2 bytes	0XXXXX

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR 0x05: BCC_ERR

2.25 [0x30 0x4C]: Load Ethernet Setting

Function: This command is used to load the Ethernet setting.

Sequence: Type3

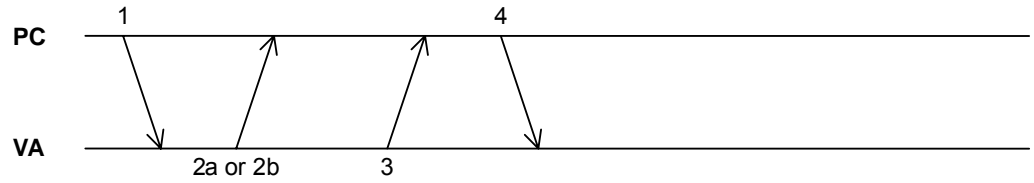


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x4C

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	14 bytes	
IP ADDRESS	4 bytes	0xXX 0xXX 0xXX 0xXX
SUB NET MASK	4 bytes	0xXX 0xXX 0xXX 0xXX
GATE WAY	4 bytes	0xXX 0xXX 0xXX 0xXX
Port No.	2 bytes	0XXXXX

2.26 [0x20 0x4D]: Set Auto Pixel Color Pattern

Function: This command is used to compare the input Video Data with the Color Palette which has already been set to set the Pixel Color Pattern automatically.

Sequence: Type2

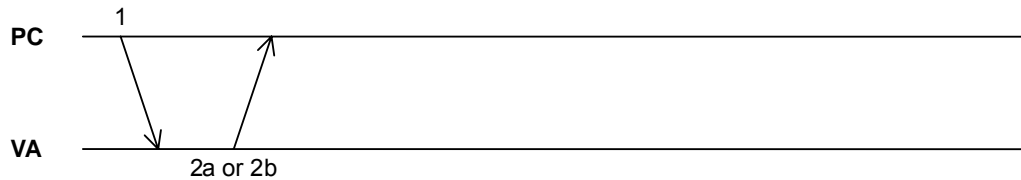


Fig. Type2

Command:

Send commands (sequence no.1)			
CMD1	1 byte	0x20	
CMD2	1 byte	0x4D	
PARM	4 bytes		
Mode	1 byte	0x00: Mode1	0x01: Mode2
Line	2 bytes	0x0001 to 0x0800	
Pattern No.	1 byte	0x01 to 0x03	

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

* Depending on the [Mode] setting, the following is set automatically.

Mode1	If there are colors other than those of the Color Palette which has been set, their pixels will be used as Color Palette No.0 (unchecked area).
Mode2	If there are colors other than those of the Color Palette which has been set, "CMD_EXEC_ERR" will be returned by sequence 2b.

2.27 [0x20 0x4E]: Set Auto Line Block

Function: This command is used to compare the currently input signals with the Pixel Color Pattern which has already been set to set the Line Block automatically.

Sequence: Type2

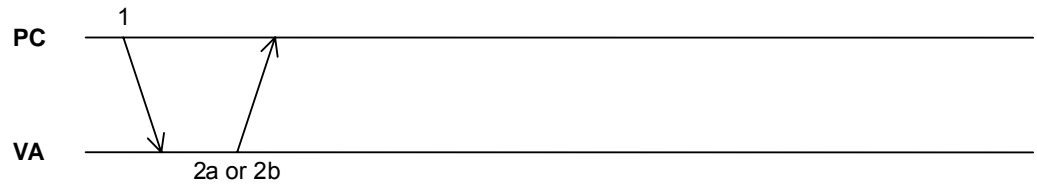


Fig. Type2

Command:

Send commands (sequence no.1)			
CMD1	1 byte	0x20	
CMD2	1 byte	0x4E	
PARM	1 byte		
Mode	1 byte	0x00: Mode1	0x01: Mode2

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

- * It will take some time (several minutes) to establish the Line Block setting automatically. While the setting is being established, the THROUGH LED on the front panel blinks. (The current setting is restored when the setting is completed.) While the automatic setting is being established, no signals will be returned even if commands are sent.
- * Depending on the [Mode] setting, the following is set automatically.

Mode1	If there is a pattern other than that of the Pixel Color Pattern which has been set, it will be used as Pixel Color Pattern No.0 (unchecked area).
Mode2	If there is a pattern other than that of the Pixel Color Pattern which has been set, "CMD_EXEC_ERR" will be returned by sequence 2b.

2.28 List of operation setting commands

CMD1	CMD2	Description	Type
0x20	0x40	Set EDID	6
0x30	0x40	Load EDID	5
0x20	0x41	Set Color Palette	2
0x30	0x41	Load Color Palette	3
0x20	0x42	Set Pixel Color Pattern	6
0x30	0x42	Load Pixel Color Pattern	5
0x20	0x43	Set Line Block	2
0x30	0x43	Load Line Block	3
0x20	0x44	Set Video Timing	2
0x30	0x44	Load Video Timing Setting	3
0x20	0x45	Set Audio	2
0x30	0x45	Load Audio Setting	3
0x20	0x46	Set Packet	2
0x30	0x46	Load Packet Setting	3
0x20	0x47	Set Through mode	2
0x30	0x47	Load Through mode	3
0x20	0x48	Set CEC Logical Address	2
0x30	0x48	Load CEC Logical Address Setting	3
0x20	0x49	Set CEC Response	2
0x30	0x49	Load CEC Response Setting	3
0x20	0x4A	Set CEC Reception Confirmation	2
0x30	0x4A	Load CEC Reception Confirmation Setting	3
0x20	0x4B	Send CEC Command	2
0x20	0x4C	Set Ethernet	2
0x30	0x4C	Load Ethernet Setting	3
0x20	0x4D	Set Auto Pixel Color Pattern	2
0x20	0x4E	Set Auto Line Block	2

3

MEASUREMENT RESULT ACQUISITION COMMANDS

3.1 [0x20 0x50]: Reset Measurements

Function: This command is used to initialize some of the measurements. When it is sent, the hot plug at the VA-1830 input side outputs Not detect for a 100 ms period.

Sequence: Type2

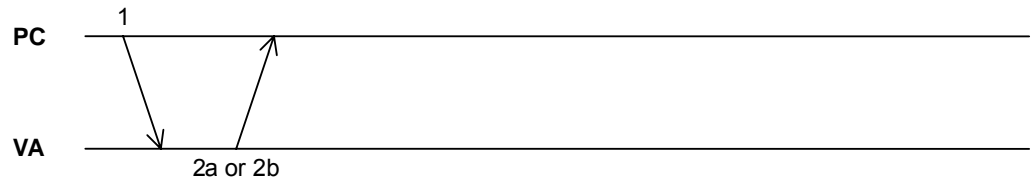


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x50

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x05: BCC_ERR

* For the measurements which are initialized by this command, refer to “5.3 Reset Measurements.”

3.2 [0x30 0x50]: Load All Measurement Results

Function: This command is used to load all the EDID, Video Data, Video Timing, Audio, HDCP, CEC and Packet measurement results.

Sequence: Type3

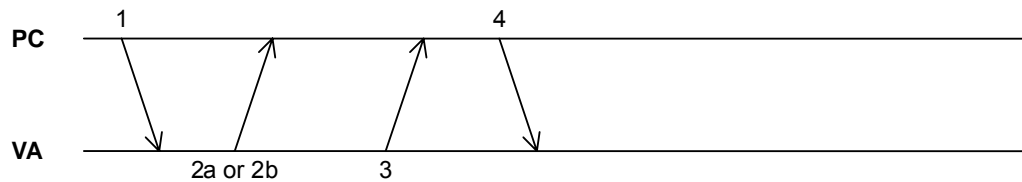


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x50

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR ----- 0x04: CMD_EXEC_ERR ----- 0x05: BCC_ERR

Return command (sequence no.3)			
PARM	16 bytes		
All Result	1 byte	0x00: Success	0x01: ERROR
EDID Result	1 byte	0x00: Success ----- 0x01 and up: Refer to [Result] of "3.3 [0x30 0x51]: Load EDID Access Measurement Result."	
Video Data Result	4 bytes	0x00000000: Success ----- 0x00000001 and up: Refer to [Result] of "3.4 [0x30 0x52]: Load Video Data Measurement Result."	
Video Timing Result	2 bytes	0x0000: Success ----- 0x0001 and up: Refer to [Result] of "3.6 [0x30 0x54]: Load Video Timing Measurement Result."	
Audio Result	4 bytes	0x00000000: Success ----- 0x00000001 and up: Refer to [Result] of "3.7 [0x30 0x55]: Load Audio Measurement Result."	
HDCP Result	1 byte	0x00: Success ----- 0x01 and up: Refer to [Result] of "3.8 [0x30 0x56]: Load HDCP Measurement Result."	
CEC Result	1 byte	0x00: Success ----- 0x01 and up: Refer to [Result] of "3.9 [0x30 0x57]: Load CEC Measurement Result."	
Packet Result	2 bytes	0x00: Success ----- 0x01 and up: Refer to [Result] of "3.10 [0x30 0x58]: Load Packet Measurement Result."	

3.3 [0x30 0x51]: Load EDID Access Measurement Result

Function: This command is used to load whether the source device was able to access the EDID of the VA-1830 correctly.

Sequence: Type3

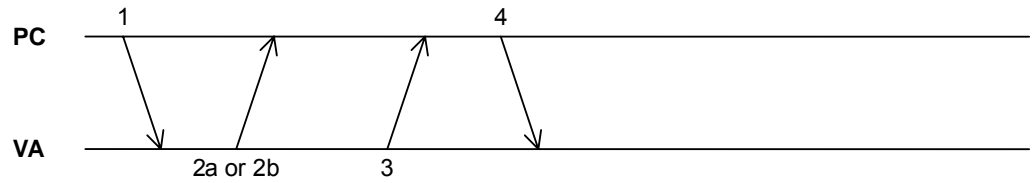


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x51

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	1 byte	
Result	1 byte	0x00: Success
		0x01: Part or all of the EDID of the VA-1830 has not been loaded from the source device.
		0x02: The EDID which was set and the EDID which was loaded from the source device do not match.

3.4 [0x30 0x52]: Load Video Data Measurement Result

Function: This command is used to load the Video Data measurement result.

Sequence: Type3

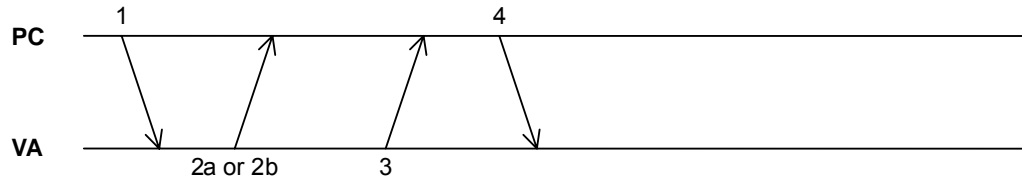


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x52

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	4 bytes	
Result	4 bytes	0x00000000: Success
		0x80000000: The video signals cannot be received.
		0x00XXXXXX: The video data for the 0x00XXXXXX pixels does not match the setting. (The number of pixels does not match).

3.5 [0x30 0x53]: Load Video Data

Function: This command is used to load the Video Data.

Sequence: Type5

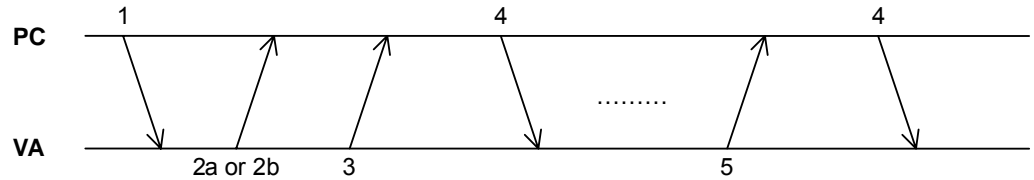


Fig. Type5

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x53
PARM	6 bytes	
Line	2 bytes	0x0001 to 0x07FF
Transmission start pixel	2 bytes	0x0001 to 0x0800 pixels
Transmission end pixel	2 bytes	0x0001 to 0x0800 pixels

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

Return command (sequence no.3, 5)		
PARM	Data Length byte	
Data Length	2 bytes	0x0003 to 0x03F9
Packet No	1 byte	0x00 to 0xFF
R/Cr Data	2 bytes	0x0000 to 0x0FFF
G/Y Data	2 bytes	0x0000 to 0x0FFF
B/Cb Data	2 bytes	0x0000 to 0x0FFF
:		
B/Cb Data	2 bytes	0x0000 to 0x0FFF

3.6 [0x30 0x54]: Load Video Timing measurement result

Function: This command is used to load the Video Timing measurement result.

Sequence: Type3

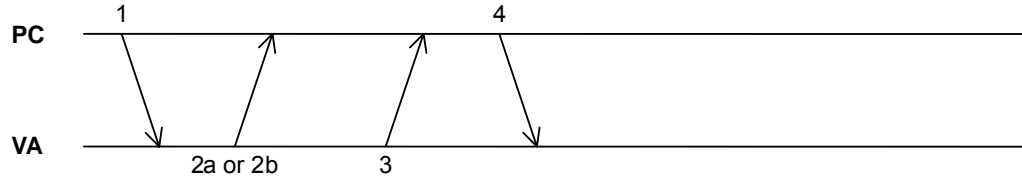


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x54

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR ----- 0x04: CMD_EXEC_ERR ----- 0x05: BCC_ERR

Return command (sequence no.3)		
PARM	2 bytes	
Result	2 bytes	0x0000: Success ----- 0x8000: The video signals cannot be received. ----- 0x0-**: "○" does not match the setting. *

* The parameter with ** set to 1 corresponds to "○." The parameters are mapped as shown below.

Bit	Parameter	Bit	Parameter
0	V Freq	4	V Total Line
1	H Total	5	V Active Total
2	H Active	6	V Back Porch Field1
3	H Back Porch	7	Interlace

3.7 [0x30 0x55]: Load Audio measurement result

Function: This command is used to load the Audio measurement result.

Sequence: Type3

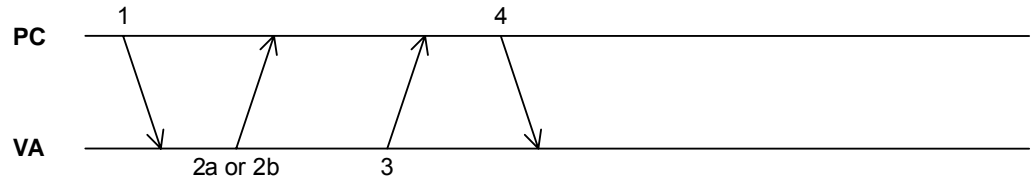


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x55

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	4 bytes	
Result	4 bytes	0x00000000: Success
		0x80000000: Audio cannot be received.
		0x0000--**: The frequency of channel ○ is not within the range of the setting. *
		0x0000**--: The volume level of channel ○ is not within the range of the setting. *
		0x00010000: An Audio Type other than PCM has been input.
		0x00020000: The Audio FIFO error has occurred.
		0x00040000: The PLL LOCK error has occurred.

- * The channel with ** set to 1 corresponds to "○." The mapping is as follows: bit 0 = channel 1, bit 1 = channel 2 ... bit 7 = channel 8.
- * Measurement is undertaken only for those channel numbers set to enable.
- * The channel numbers are based on the Channel Count of the Audio InfoFrame and Speaker Placement.



"Audio Type" can be measured using this command only when it has been selected as the "Audio Sample" (= linear PCM) setting.



For details on how the speakers for the channel numbers are configured, refer to "CEA-861-E Table 28 Audio InfoFrame Date Byte 4" under the CEA Standard.

3.8 [0x30 0x56]: Load HDCP measurement result

Function: This command is used to load the HDCP measurement result.

Sequence: Type3

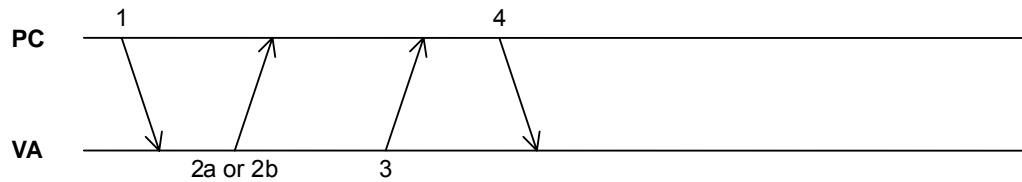


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x56

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	1 byte	
Result	1 byte	0x00: Success
		0x01: The initial authorization has not been performed.
		0x02: Encryption has not been performed.

3.9 [0x30 0x57]: Load CEC Measurement result

Function: This command is used to load the CEC measurement result.

Sequence: Type3

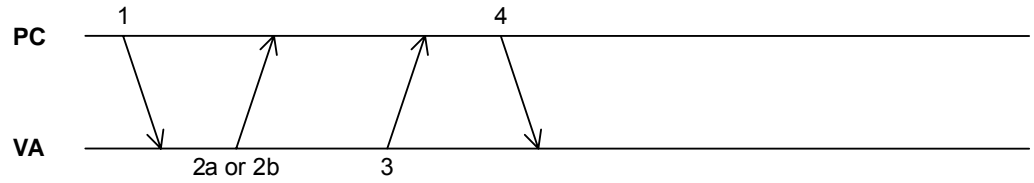


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x57

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	1 byte	
Result	1 byte	0x00: Success
		0x01: The CEC command cannot be received.
		0x02: The CEC command which was set and the command which was received do not match.

3.10 [0x30 0x58]: Load Packet Measurement result

Function: This command is used to load the Packet measurement result.

Sequence: Type3

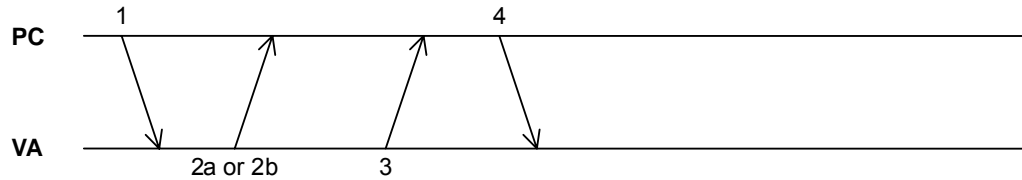


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x58

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	2 bytes	
Result (No.0)	2 bits	00: Success 01: The packet which was set in No.0 has not been sent. 10: The packet which was set in No.0 does not match the setting.
Result (No.1)	2 bits	00: Success 01: The packet which was set in No.1 has not been sent. 10: The packet which was set in No.1 does not match the setting.
:		
Result (No.7)	2 bits	00: Success 01: The packet which was set in No.7 has not been sent. 10: The packet which was set in No.7 does not match the setting.

* The parameters are mapped as shown below.

Result (No.3)	Result (No.2)	Result (No.1)	Result (No.0)
Result (No.7)	Result (No.6)	Result (No.5)	Result (No.4)

3.12 [0x30 0x5A]: Load Audio

Function: This command is used to load the Audio data.

Sequence: Type3

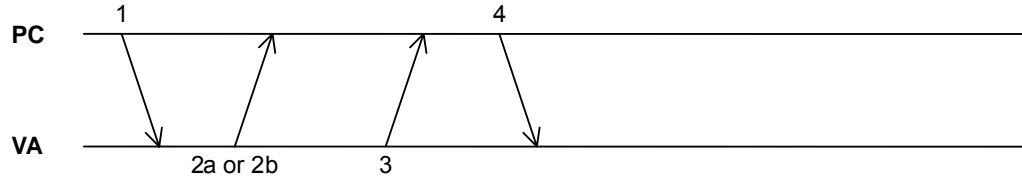


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x5A

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	55 bytes	
Audio Decode	1 byte	0x00: Decode
		0x01: PLL LOCK ERROR
Audio Type	1 byte	0x02: AUDIO FIFO ERROR
		0x00: Audio Sample
		0x01: One Bit Audio
		0x02: High Bitrate Audio
		0x03: NULL
		0x04: AC-3
		0x05: Refer to SMPTE 338M
		0x06: Pause
		0x07: MPEG1-L1
		0x08: MPEG1-L2, L3 or MPEG2 without extension
		0x09: MPEG2 extension
		0x0A: MPEG2 AAC
		0x0B: MPEG2-1
		0x0C: MPEG2-2
		0x0D: MPEG2-3
		0x0E: DTS type1
0x0F: DTS type2		
0x10: DTS type3		
0x11: ATRAC		
0x12: ATRAC2		
0x13: ATRAC-X		
0x14: DTS HD		
0x15: WMA pro		
0x16: MPEG2 AAC half		

		0x17: MPEG2 AAC quarter
		0x18: DD+
		0x19: Dolby True HD
		0x1A: Reserved
		0x1B: Reserved
		0x1C: Reserved
		0x1D: Reserved
		0x1E: Refer to SMPTE 338M
		0x1F: Refer to SMPTE 338M
		0x20: Refer to SMPTE 338M
		0x21: Refer to SMPTE 338M
		0x22: Extended data type
N	2 bytes	0x0000 to 0xFFFF
CTS	3 bytes	0x000000 to 0xFFFFFFFF
1CH Frequency	3 bytes	0x000000 to 0xFFFFFFFF
2CH Frequency	3 bytes	0x000000 to 0xFFFFFFFF
:	:	:
8CH Frequency	3 bytes	0x000000 to 0xFFFFFFFF
1CH Volume	3 bytes	0x000000 to 0x7FFFFFFF
:	:	:
8CH Volume	3 bytes	0x000000 to 0x7FFFFFFF



"*CH Frequency" and "*CH Volume" are available only when "Audio Sample" (= linear PCM) has been selected as the "Audio Type" setting.



For details on how the speakers for the channel numbers are configured, refer to "CEA-861-E Table 28 Audio InfoFrame Date Byte 4" under the CEA Standard.

3.13 [0x30 0x5B]: Load Packet

Function: This command is used to load Packet.

Sequence: Type3

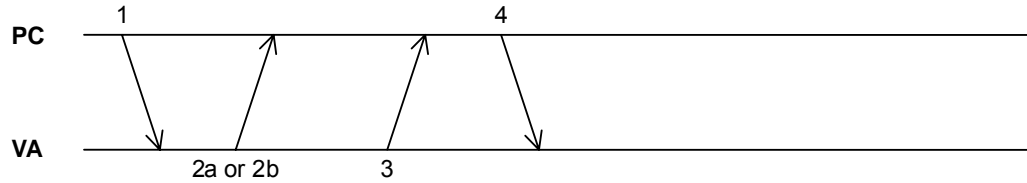


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x5B
PARM	1 byte	
Packet Type	1 byte	0x03: General Control Packet
		0x04: ACP Packet
		0x05: ISRC1
		0x06: ISRC2
		0x0A: Gamut Metadata Packet
		0x81: Vendor Specific InfoFrame
		0x82: AVI InfoFrame
		0x83: Source Product Descriptor InfoFrame
		0x84: Audio InfoFrame
		0x85: MPEG InfoFrame
		0x86: NTSC VBI InfoFrame
		0xF0: Channel Status Bit

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x04: CMD_EXEC_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	31 bytes	
Packet Type *1	1 byte	0x00 to 0xFF (0x00: The specified Packet cannot be received.)
Header-1 *2	1 byte	0x00 to 0xFF
Header-2 *2	1 byte	0x00 to 0xFF
Data0	1 byte	0x00 to 0xFF
:	:	
Data27	1 byte	0x00 to 0xFF

* If Packet Type is other than 0xF0 (Channel Status Bit) or 0x03 (General Control Packet), set Packet "HB1" and "HB2" under the HDMI Standard for [Header-1] and [Header-2]. If Packet Type is 0xF0 (Channel Status Bit) or 0x03 (General Control Packet), this item is to be ignored.

* If Packet Type is other than 0xF0 (Channel Status Bit), Packet "PB0" to "PB27" under the HDMI Standard are saved for [Data0] to [Data27]. However, if Packet Type is 0x03 (General Control

Packet), only Set_AVMUTE, Clear_AVMUTE and CD (Color Depth) are valid. If Packet Type is 0xF0 (Channel Status Bit), the data in sequence starting with [Data0] is saved.

3.14 [0x30 0x5C]: Load DDC Line Monitor

Function: This command is used to monitor the DDC Line.

Sequence: Type5

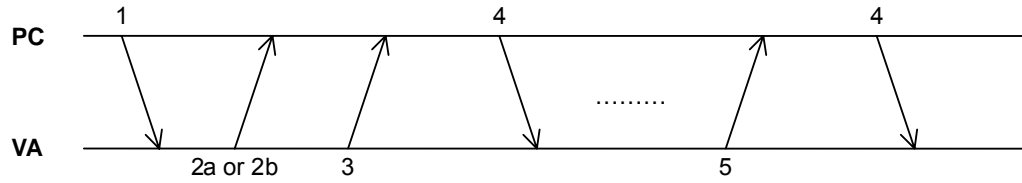


Fig. Type5

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x5C

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR 0x05: BCC_ERR

Return command (sequence no.3, 5)		
PARAM	Data Length byte	
Data Length	2 bytes	0x0003 to 0x03F0
Packet No	1 byte	0x00 to 0xFF
Data Type *	1 byte	Bit 0: No ack (0: ack, 1: no ack), bit 1: Stop, bit 2: Start, bit 3: Full
Data *	1 byte	0x00 to 0xFF
TimeStamp	4 bytes	0x00000000 to 0xFFFFFFFF (/0.5 ms)
Data Type *	1 byte	Bit 0: No ack (0: ack, 1: no ack), bit 1: Stop, bit 2: Start, bit 3: Full
Data *	1 byte	0x00 to 0xFF
:		
Data *	1 byte	0x00 to 0xFF
TimeStamp	4 bytes	0x00000000 to 0xFFFFFFFF (/0.5 ms)

* Whether the [Data Type] and [Data] parameters are valid (○) or invalid (×) is determined depending on the [Full], [Start] and [Stop] values.

[Full]	[Start]	[Stop]	[ack]	[Data]
1	×	×	×	×
0	1	×	×	×
0	×	1	×	×
0	0	0	○	○

3.15 [0x30 0x5D]: Load CEC Line Monitor

Function: This command is used to monitor the CEC Line.

Sequence: Type5

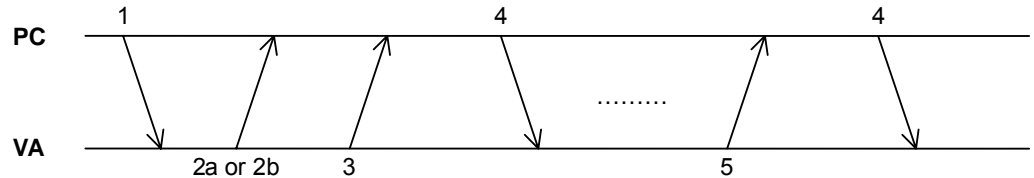


Fig. Type5

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x5D

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x05: BCC_ERR

Return command (sequence no.3, 5)		
PARM	Data Length byte	
Data Length	2 bytes	0x0003 to 0x03F0
Packet No	1 byte	0x00 to 0xFF
Data Type *	1 byte	Bit 0: ack (0: logic 0, 1: logic 1), bit 1: EOM, bit 2: Start, bit 3: error
Data *	1 byte	0x00 to 0xFF
TimeStamp	4 bytes	0x00000000 to 0xFFFFFFFF (/0.5 ms)
Data Type *	1 byte	Bit 0: No ack (0: logic 0, 1: logic 1), bit 1: Start, bit 2: EOM, bit 3: error
:		
TimeStamp	4 bytes	0x00000000 to 0xFFFFFFFF (/0.5 ms)

* Whether the [Data Type] parameter is valid (○) or invalid (×) is determined depending on the [Error] value.

[error]	[EOM]	[Start]	[ack]
0 (= not error)	○	○	○
1 (= error)	×	×	×

* The significance of the [Data] parameter depends on the [error] value.

[error]	[Data]
0 (= not error)	"Information bit" part of the CEC command
1 (= error)	---- -1: Illegal bit timing (bit period is too long)
	---- -1-: Illegal bit timing (bit period is too short)
	---- -1--: Error Handling has occurred.
	---- 1--: The VA-1830 executed Error Handling because there was an error in the command addressed to the VA-1830.
	---1 ----: There was an event (other than Start) in the CEC line before the CEC command was commenced (recognized).
-1-- ----: The capacity of the FIFO for saving the CEC command was exceeded.	

3.16 List of measurement result acquisition commands

CMD1	CMD2	Description	Type
0x20	0x50	Reset Measurements	2
0x30	0x50	Load All Measurement Results	3
0x30	0x51	Load EDID Read Measurement Result	3
0x30	0x52	Load Video Data Measurement Result	3
0x30	0x53	Load Video Data	5
0x30	0x54	Load Video Timing Measurement Result	3
0x30	0x55	Load Audio Measurement Result	3
0x30	0x56	Load HDCP Measurement Result	3
0x30	0x57	Load CEC Measurement Result	3
0x30	0x58	Load Packet Measurement Result	3
0x30	0x59	Load Video Timing	3
0x30	0x5A	Load Audio Timing	3
0x30	0x5B	Load Packet	3
0x30	0x5C	Load DDC Line Monitor	5
0x30	0x5D	Load CEC Line Monitor	5

4

EQUIPMENT INFORMATION COMMANDS

4.1 [0x20 0x60]: Save Operation Settings (internal)

Function: This command is used to save the operation settings in the VA-1830 main unit. Ten types of operation settings can be saved. Select the number to be saved using PARM.

Sequence: Type2

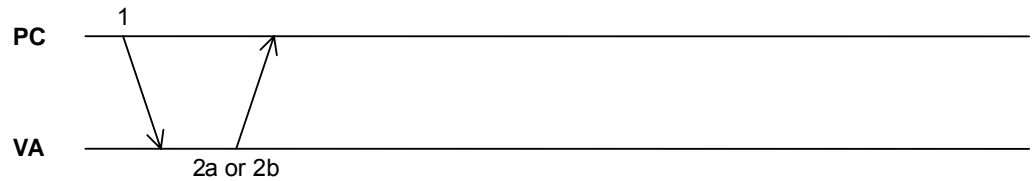


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x60
PARM	1 byte	
No.	1 byte	0x00 to 0x09

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x04: CMD_EXEC_ERR (failure to save operation settings)
		0x05: BCC_ERR



ACK is returned after the settings have been saved. Do not turn off the power until ACK is returned.

* At startup, the operation settings saved in 0x00 are loaded.

4.2 [0x30 0x60]: Load Operation Settings (internal)

Function: This command is used to specify the operation setting data from among the operation setting data saved in the VA-1830 main unit and load them into the VA-1830 main unit.

Sequence: Type2

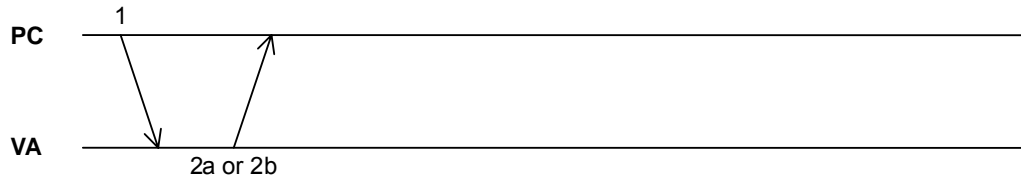


Fig. Type2

Command:

Send commands (sequence no.1)			
CMD1	1 byte	0x30	
CMD2	1 byte	0x60	
PARM	1 byte		
No.	1 byte	0x00 to 0x09	

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x04: CMD_EXEC_ERR (failure to load operation settings)
		0x05: BCC_ERR

4.3 [0x20 0x61]: Save Operation Settings (USB)

Function: This command is used to save the operation settings in an external memory (USB). A total of 256 operation settings can be saved. Select the number to be saved using PARM.

Sequence: Type2

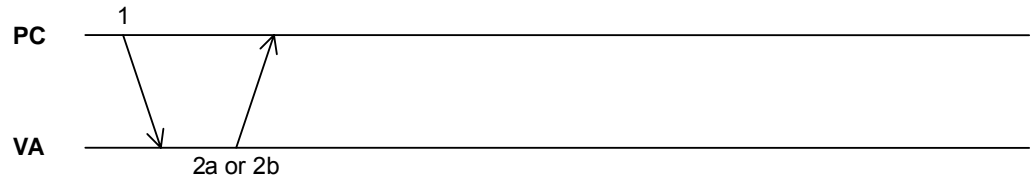


Fig. Type2

Command:

Send commands (sequence no.1)			
CMD1	1 byte	0x20	
CMD2	1 byte	0x61	
PARM	1 byte		
No.	1 byte	0x00 to 0xFF	

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x04: CMD_EXEC_ERR (failure to save operation settings)
		0x05: BCC_ERR

4.4 [0x30 0x61]: Load Operation Settings (USB)

Function: This command is used to specify the operation setting data from among the operation setting data saved in the external memory (USB) and load them into the VA-1830 main unit.

Sequence: Type2

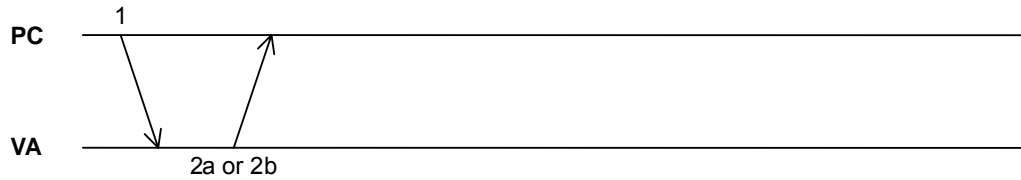


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x61
PARM	1 byte	
No.	1 byte	0x00 to 0xFF

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x04: CMD_EXEC_ERR (failure to load operation settings)
		0x05: BCC_ERR

4.5 [0x30 0x62]: Load VA-1830 Version Information

Function: This command is used to load the VA-1830 version information.

Sequence: Type3

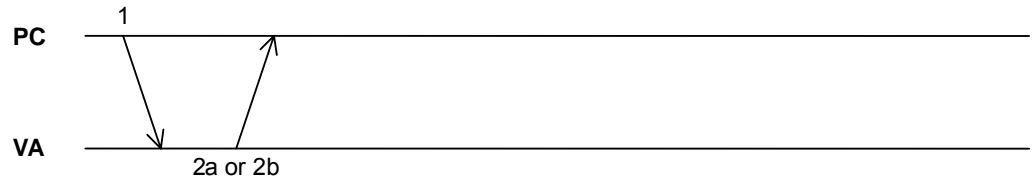


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x62

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	12 bytes	
FW Version	2 bytes	0x0000 to 0xFFFF
FPGA Version	2 bytes	0x0000 to 0xFFFF
Calibration	8 bytes	"0.000000" to "9.999999" (character string)

4.6 [0x20 0x63]: Set Date/Time

Function: This command is used to set the date and time of the clock inside the VA-1830.

Sequence: Type2

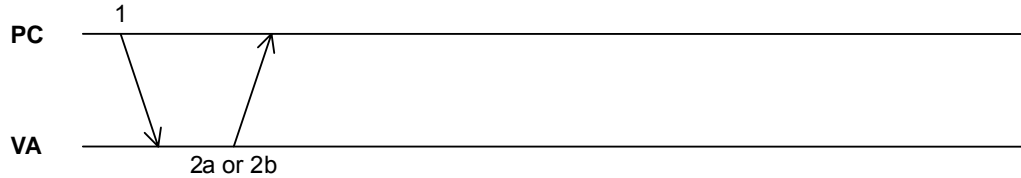


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x63
PARM	6 bytes	
Year	1 byte	0x00 to 0x63 1970+Year
Month	1 byte	0x01 to 0x0C
Day	1 byte	0x01 to 0x1F
Hour	1 byte	0x00 to 0x17
Min	1 byte	0x00 to 0x3B
Sec	1 byte	0x00 to 0x3B

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR



The internal clock is charged by the power supply which is used for operation at the time when the power of the VA-1830 is turned on, and the charge is retained for several days. However, when the date and time at which the operation setting files are saved are to be set precisely, ensure that the date and time are set as precisely as possible when the power is turned on.

4.7 [0x30 0x63]: Load Date/Time

Function: This command is used to load the date and time of the clock inside the VA-1830.

Sequence: Type3

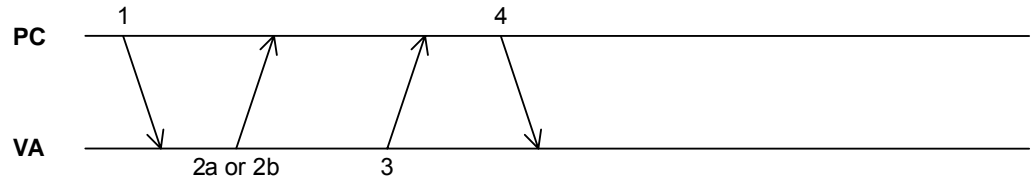


Fig. Type3

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x30
CMD2	1 byte	0x63

Return commands (sequence no.2b)		
Error Code	1 byte	0x01: PARM_SIZE_ERR
		0x02: PARM_DATA_ERR
		0x05: BCC_ERR

Return command (sequence no.3)		
PARM	6 bytes	
Year	1 byte	0x00 to 0xFF 1970+Year
Month	1 byte	0x00 to 0xFF
Day	1 byte	0x00 to 0xFF
Hour	1 byte	0x00 to 0xFF
Min	1 byte	0x00 to 0xFF
Sec	1 byte	0x00 to 0xFF

4.8 [0x20 0x64]: Initialize Operation Settings

Function: This command is used to initialize the operation settings. When it is sent, all the operation setting data saved in the VA-1830 main unit is erased.

Sequence: Type2

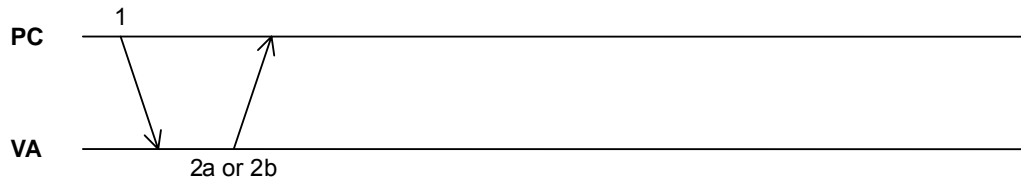


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x64

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x04: CMD_EXEC_ERR (failure to initialize)
		0x05: BCC_ERR

4.9 [0x20 0x6F]: Execute Calibration

Function: This command is used to execute calibration in order to perform the Video Timing measurement. When it is sent, the Calibration setting data saved in the VA-1830 main unit is re-set.

Sequence: Type2

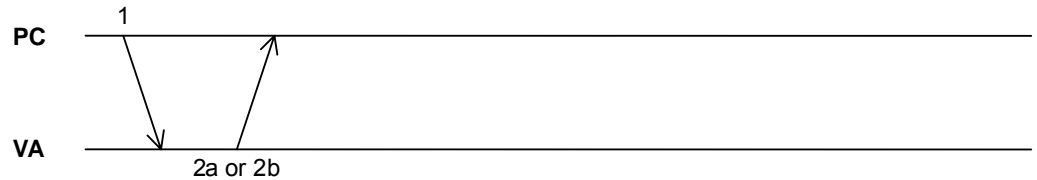


Fig. Type2

Command:

Send commands (sequence no.1)		
CMD1	1 byte	0x20
CMD2	1 byte	0x6F

Return commands (sequence no.2b)		
ErrorCode	1 byte	0x01: PARM_SIZE_ERR
		0x04: CMD_EXEC_ERR (failure to calibrate)
		0x05: BCC_ERR

- * When performing the Calibration setting, input a Video Timing signal (EIA 640 × 480p format with 60 Hz frequency) and execute calibration.
- * When an illegal Calibration setting is performed, it may not be possible to undertake the measurements accurately.

4.10 List of equipment information commands

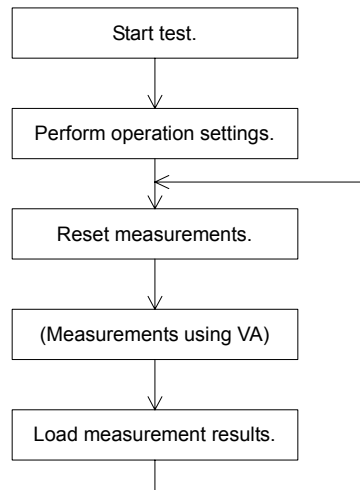
CMD1	CMD2	Description	Type
0x20	0x60	Save Operation Settings (internal)	2
0x30	0x60	Load Operation Settings (internal)	2
0x20	0x61	Save Operation Settings (USB)	2
0x30	0x61	Load Operation Settings (USB)	2
0x30	0x62	Load VA-1830 Version Information	3
0x20	0x63	Set Date/Time	2
0x30	0x63	Load Date/Time	3
0x20	0x64	Initialize Operation Settings	2
0x20	0x6F	Execute Calibration	2

5

CONTROL METHODS

5.1 Measurement sequence

Shown below is an outline of the measurement sequence.



Item	Description
Operation setting	This item sets in the VA-1830 the conditions under which the source device is to be measured.
Reset measurements	This item clears the measurement results.
Load measurement result	This item loads the measurement results from the VA-1830.

5.2 Operation setting

These settings are used to set in the VA-1830 the conditions under which the source device is to be measured. For the commands, refer to “Chapter 4 EQUIPMENT INFORMATION COMMANDS.”

5.2.1 EDID setting

This setting is used to set in the VA-1830 the EDID of what kind of sink device, which has been connected to the source device, whose output is to be measured.

The EDID access measurement is determined by whether the data of this EDID has been loaded correctly for the size of the data concerned. This size depends on the volume of the data which has been set using the “2.1 [0x20 0x40]: Set EDID” command. For this reason, set the data corresponding to all the blocks.

Up to 2048 bytes (= 16 blocks) can be set for the EDID.

5.2.2 Video Data setting

This setting is used to set the conditions under which the video data in the video period (Disp Enable period) is to be measured.

Item	Description
Set Color Palette	The color information (12 bits each for R, G and B) is set in each palette. Up to 15 colors can be set. (Excluding the unchecked areas.)
Set Pixel Color Pattern	The palette numbers of the color palettes are set in the horizontal (H) direction. Up to three patterns can be set. (Excluding the unchecked areas.) Up to 2048 pixels can be set per pattern.
Set Line Block	The pattern numbers of the pixel color patterns are specified in the vertical (V) direction. Up to 2048H can be set.

■ Manual setting

Given below is an example of the Video Data setting using Manual when a pattern such as the one shown below is received.

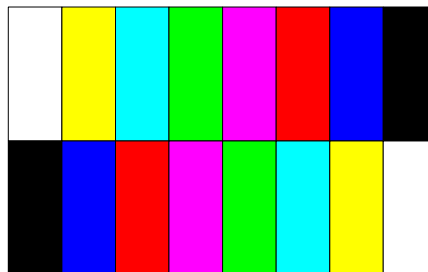
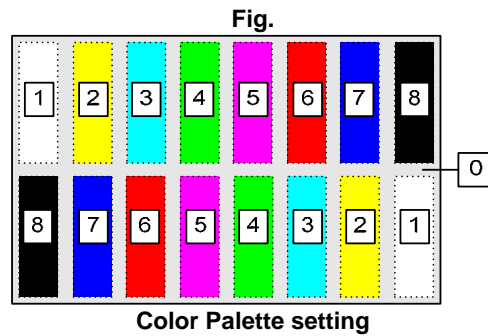


Fig. Pattern received

- (1) The video data is sorted into areas to be measured and areas not to be measured, the areas to be measured are grouped together using the same colors, and a number ([Color Palette No.]) is entered for each area. Following this, the color information is set for each color palette (refer to “2.3 [0x20 0x41]: Set Color Palette”). In the example given here, the input video consists of 8 bits so the color data is multiplied by 16 when it is set. Since it is assumed that the colors are checked using the fixed values, the same colors are set in [*Max Data] and [*Min Data], respectively. If the colors of the images received vary, it is also possible to set [*Max Data] and [*Min Data] to different values and to specify the range.



Color Palette No.	Description of Color Palette		
	R	G	B
0	Unchecked areas (areas not be measured) * Color Palette No.0 can be used only for an unchecked area.		
1	255	255	255
2	255	255	0
3	0	255	255
4	0	255	0
5	255	0	255
6	255	0	0
7	0	0	255
8	0	0	0
9 - 15	Not used		

- (2) The areas are grouped together using lines, each consisting of the same horizontal pattern. For each Pixel Color Pattern, the pattern information is set dot by dot using the Color Palette No. (Refer to “2.5 [0x20 0x42]: Set Pixel Color Pattern.”)

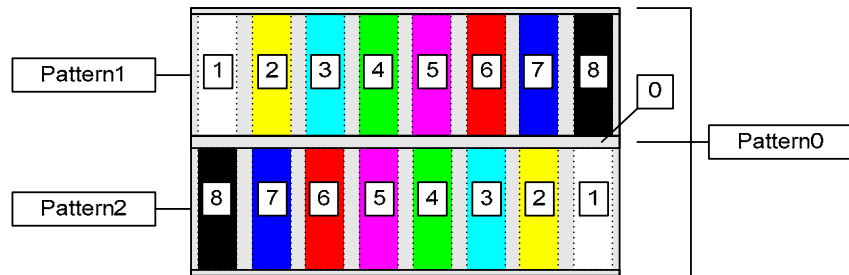
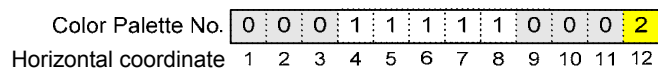


Fig. Pixel Color Pattern setting

Pixel Color Pattern No. (Line Block)	Pixel Color Pattern
Pattern 0	Unchecked area * Pattern 0 can be used only for an unchecked area.
Pattern 1	0 → 1 → 0 → 2 → 0 → 3 → 0 → 4 → 0 → 5 → 0 → 6 → 0 → 7 → 0 → 8 → 0
Pattern 2	0 → 8 → 0 → 7 → 0 → 6 → 0 → 5 → 0 → 4 → 0 → 3 → 0 → 2 → 0 → 1 → 0

If the part near coordinate 1 of pattern 1 is as shown below when enlarged, settings such as the ones below are selected for the parameters of the command.



PARM		Data Length byte	
Data Length	2 bytes	Any setting	
Packet No	1 byte	0x01	
Pattern No.	1 byte	0x01	
Palette No.	1 byte	Palette No.(2) = 0x0	Palette No.(1) = 0x0
Palette No.	1 byte	Palette No.(4) = 0x1	Palette No.(3) = 0x0
Palette No.	1 byte	Palette No.(6) = 0x1	Palette No.(5) = 0x1
Palette No.	1 byte	Palette No.(8) = 0x1	Palette No.(7) = 0x1
Palette No.	1 byte	Palette No.(10) = 0x0	Palette No.(9) = 0x0
Palette No.	1 byte	Palette No.(12) = 0x2	Palette No.(11) = 0x0
:			

- (3) A Pixel Color Pattern number (Line Block) for each line is then set (vertically in the sequence of Pattern 0 → Pattern 1 → Pattern 0 → Pattern 2 → Pattern 0). (Refer to “2.7 [0x20 0x43]: Set Line Block.”)

If the part near coordinate 1 of V is as shown below when enlarged, settings such as the ones below are selected for the parameters of the command.

Pixel Color	0	1 Vertical
Pattern No.	0	2 coordinate
	0	3
	1	4
	1	5
	1	6
	1	7
	1	8
	0	9
	0	10
	0	11
	2	12

PARM		512 bytes			
Pattern No.	1 byte	Pattern No.(4) = 01	Pattern No.(3) = 00	Pattern No.(2) = 00	Pattern No.(1) = 00
Pattern No.	1 byte	Pattern No.(8) = 01	Pattern No.(7) = 01	Pattern No.(6) = 01	Pattern No.(5) = 01
Pattern No.	1 byte	Pattern No.(12) = 10	Pattern No.(11) = 00	Pattern No.(10) = 00	Pattern No.(9) = 00
:					

If the color information of the input data is not known, it can be checked using the “3.5 [0x30 0x53]: Load Video Data” command. Refer to “5.4.3 Load Video Data.”

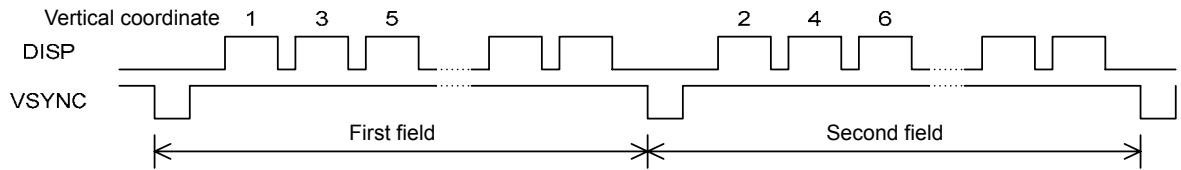
■ Auto setting

When only the Color Palettes are set ahead of time and then the “2.26 [0x20 0x4D]: Set Auto Pixel Color Pattern” and “2.27 [0x020 0x4E]: Set Auto Line Block” commands are executed, the Pixel Color Pattern and Line Block settings will be performed in line with the current input video.

It is possible to set, when colors or Pixel Color Patterns other than the ones registered are present, whether an error is to be returned or they are to be set the unchecked areas. This setting can be selected using [Mode] of the parameter.

■ Setting for interlaced timing

When interlaced timing applies to the input signals, the Line Block setting becomes the setting based on 1 frame (= 2 fields). The vertical coordinates are the coordinates which result after the picture has been superimposed in two fields.



5.2.3 Set Video Timing

This sets the conditions under which Video Timing is to be checked. Refer to “5.2.3 Set Video Timing.”

Given below is an example of the parameter settings for signals with a 1280 x 720p format and 59.94 Hz frequency.

V Freq.	0x176A (= V Frequency×100)
H Total	0x0672 (= 1653 pixel)
H Active	0x0500 (= 1280 pixel)
H Back Porch	0x00DC (= 220 pixel))
V Total Line	0x02EE (= 750H)
V Active Total	0x02D0 (= 720H)
V Back Porch Field1	0x0028 (= 40/2 = 20H)
Interlace	0x00 (= Progressive)

5.2.4 Set Audio

This sets the conditions under which Audio is to be checked. (Refer to “2.11 [0x20 0x45]: Set Audio.”) Audio can be set only when “Audio Sample” (= linear PCM) has been selected as the “Audio Type” setting.

The Audio frequency is measured by calculating it from the sampling frequency which is reproduced from the HDMI signals received. For this reason, the settings must be selected with the error in the sampling frequency factored in when measuring the Audio frequency.

Given below is an example of the parameter settings for Audio channel 1 with an audio frequency of 1 kHz, a sampling frequency of 48 kHz and a volume level ranging from 0x0CB0 to 0x0CE0 (with 16 bits).

Channel No.	0x01
Max Frequency	0x0003FE
Min Frequency	0x0003D3
Max Volume	0x0CE000
Min Volume	0x0CB000

* Error calculation

$$\frac{1}{1/f + 1/F_s} = \frac{1}{1/1k(\text{Hz}) + 1/48k(\text{Hz})} \approx 979\text{Hz} (0x0003D3)$$

$$\frac{1}{1/f - 1/F_s} = \frac{1}{1/1k(\text{Hz}) - 1/48k(\text{Hz})} \approx 1022\text{Hz} (0x0003FE)$$

f: Audio frequency

F_s: Sampling frequency

Select settings with all decimal places rounded off for measuring the Audio frequency.

5.2.5 Set Packet

This sets the conditions under which the control data (such as InfoFrame) among the HDMI signals is to be checked. (Refer to "2.13 [0x20 0x46]: Set Packet.") Up to eight Packet data can be set. (The data of one packet can be set for [No.] of one parameter.)

Example: Parameters when the AVI InfoFrame, Audio InfoFrame and Channel Status Bit packets are to be measured.

No.	Enable	Packet Type	Header-1	Header-2	Data0-27
0x1	0x01	0x82 (= AVI InfoFrame)	0x02	0x0D	PB0-PB13 (Data14- : n/a)
0x2	0x01	0x84 (= Audio InfoFrame)	0x01	0x0A	PB0-PB10 (Data11- : n/a)
0x3	0x01	0xF0 (= Channel Status Bit)	--	--	Data0-4 (Data5- : n/a)
0x4-0x8	0x00	--	--	--	--

If Packet Type other than Channel Status Bit or General Control Packet is to be set, set Packet "HB1" and "HB2" as defined under the HDMI Standard for [Header-1] and [Header-2]. When setting Channel Status Bit, this item is to be ignored.

If Packet Type is other than Channel Status Bit or General Control Packet, set Packet "PB0" to "PB27" under the HDMI Standard for [Data0] to [Data27]. When setting Channel Status Bit, set the data in sequence starting with [Data0]. When setting General Control Packet, set only CD (Color Depth) under the HDMI standard. The size for which [Data*] is valid depends on Packet Type.

Packet Type	Valid data
0x03 (General Control Packet)	Data1 (LSB 4 bit)
0x04 (ACP Packet)	Data0 to Data27
0x05 (ISRC1)	Data0 to Data27
0x06 (ISRC2)	Data0 to Data27
0x0A (Gamut Metadata Packet)	Data0 to Data27
0x81 (Vendor Specific InfoFrame)	Data0 to Data27
0x82 (AVI InfoFrame)	Data0 to Data13
0x83 (Source Product Descriptor InfoFrame)	Data0 to Data27
0x84 (Audio InfoFrame)	Data0 to Data10
0x85 (MPEG InfoFrame)	Data0 to Data27
0x86 (NTSC VBI InfoFrame)	Data0 to Data27
0xF0 (Channel Status Bit)	Data0 to Data4

5.2.6 Through mode

In the through mode, the signals supplied to the HDMI input connector of the VA-1830 are output straight through to the HDMI output connector. (Refer to “2.15 [0x20 0x47]: Set Through Mode.”) If the through mode is disabled, the signals will not be output from the HDMI output connector.

If the through mode is executed, it will not be possible to perform some of the checks. The items indicated in the table below with an “×” cannot be checked.

Send CEC Command	×	Measure CEC	×
Measure EDID access	×	Measure Packet	×
Measure Video Data	×	Load Video Timing	×
Load Video Data	×	Load Audio	×
Measure Video Timing	×	Load Packet	×
Measure Audio	×	Load DDC Line Monitor	○
Measure HDCP	×	Load CEC Line Monitor	○

5.2.7 CEC-related settings

It is possible to check whether the CEC commands have been sent correctly by registering the commands to be sent ahead of time. It is also possible to emulate the devices in the VA-1830 to ensure that a response is returned.

■ Set CEC Logical Address

If ACK is required in response to a CEC command sent, it is possible to ensure that ACK is returned by specifying the CEC Logical Address in the VA-1830. (Refer to “2.17 [0x20 0x48]: Set CEC Logical Address.”)

■ Set CEC Response

If a response command is required in response to a CEC command sent, it is possible to ensure that a response is returned by specifying the response command in the VA-1830. These responses can be numbered, and 16 types can be saved. (Refer to “2.19 [0x20 0x49]: Set CEC Response.”)

Given below as an example of the parameter settings where [Report Physical Address] is returned from the VA-1830 after the source device has sent [Give Physical Address] to No.0.

No.	1 byte	0x00 (= No.0)
Enable	1 byte	0x01 (= Enable)
Receive OP Code	1 byte	0x83 (= Give Physical Address)
Receive Data Length	1 byte	0x00 (= 0)
Receive Data 1	1 byte	-- (= n/a)
:		
Receive Data 15	1 byte	-- (= n/a)
Directly or Broadcast	1 byte	0x00: Directly Address
Response OP Code	1 byte	84 (= Report Physical Address)
Response Data Length	1 byte	0x03 (= 3)
Response Data 1	1 byte	0x00
Response Data 2	1 byte	0x00
Response Data 3	1 byte	0x00
Response Data 4	1 byte	-- (= n/a)
:		
Response Data 15	1 byte	-- (= n/a)

■ Set CEC Reception Confirmation

This sets the CEC command to be sent. (Refer to “2.21 [0x20 0x4A]: Set CEC Reception Confirmation.”) The parameter setting method is the same as for [Receive**] of Set CEC Response described above.

* End of Message (EOM) and ACK are not checked.

5.2.8 Saving and Loading the Operation Settings

The data to be set using the Operation Setting commands ([0x20 0x40 to 0x4E]) can be numbered and saved in the VA-1830 main unit or external memory (USB flash memory). Data can also be loaded from what has been set and saved previously.

The table below gives the number of settings which can be saved.

Device	No. of settings saved
VA-1830 main unit	10
USB flash memory	256

* At startup, the operation setting data saved in 0x00 of the VA-1830 main unit are loaded.

5.2.9 Initializing the operation settings

The operation settings are initialized when the “4.8 [0x20 0x64]: Initialize Operation Settings” command is sent. When this command is set, all the operation setting data saved in the VA-1830 main unit is erased.

The initial values for the operation settings are listed below.

■ EDID

	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
0-	00	FF	FF	FF	FF	FF	FF	00	06	8F	11	B0	01	00	00	00
1-	00	13	01	03	80	0C	09	78	0A	1E	AC	98	59	56	85	28
2-	29	52	57	00	00	00	01	01	01	01	01	01	01	01	01	01
3-	01	01	01	01	01	01	8C	0A	D0	8A	20	E0	2D	10	10	3E
4-	96	00	81	60	00	00	00	18	01	1D	80	18	71	1C	16	20
5-	58	2C	25	00	81	49	00	00	00	9E	00	00	00	FC	00	56
6-	41	2D	31	38	33	30	0A	20	20	20	20	20	20	00	00	FD
7-	00	17	3D	0D	2E	11	00	0A	20	20	20	20	20	20	01	AF
8-	02	03	2E	71	4D	82	05	04	01	10	11	14	13	1F	06	15
9-	03	12	26	09	7F	07	0F	7F	77	83	4F	00	00	E3	05	03
A-	01	6C	03	0C	00	10	00	B8	2D	00	00	00	00	00	01	1D
B-	00	72	51	D0	1E	20	6E	28	55	00	81	49	00	00	00	1E
C-	D6	09	80	A0	20	E0	2D	10	10	60	A2	00	81	60	00	08
D-	08	18	8C	0A	D0	90	20	40	31	20	0C	40	55	00	81	60
E-	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F-	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	AA
10-	00															
:	:															
17-	00															

* The hexadecimal format (with “0x” omitted) is used for all the values listed above.

■ Color Palette

Palette No.	R Max	R Min	G Max	G Min	B Max	B Min
0x1 to 0xF	0x0	0x0	0x0	0x0	0x0	0x0

■ Pixel Color Pattern

Pattern No.	Palette No.
0x1 to 0x3	All 0x00

■ Line Block

Pattern No.	All 00

■ Video Timing

V Freq.	0x176A	V Total Line	0x02EE
H Total	0x0672	V Active Total	0x02D0
H Active	0x0500	V Back Porch Field1	0x0028
H Back Porch	0x00DC	Interlace	0x00

■ Audio

Channel No.	Enable	Max Freq	Min Freq	Max Vol	Min Vol
0x1 to 0x8	0x0	0x0	0x0	0x0	0x0

■ Packet

No.	Enable	Packet Type	Header-1	Header-2	Data0 to Data27
0x1 to 0x8	0x00	0x00	0x00	0x00	0x00

■ Through Mode

MODE	0x00

■ CEC Logical Address

Enable	0x01	Logical Address	0x00

■ CEC Response

No. = 0x00			
Enable	0x01	Directly or Broadcast	0x00
Receive OP Code	0xFF	Response OP Code	0x00
Receive Data Length	0x00	Response Data Length	0x02
Receive Data 1 to 15	0x00	Response Data 1	0xFF
		Response Data 2	0x04
		Response Data 3 to 15	0x00

No. = 0x01 to 0x0F			
Enable	0x01	Directly or Broadcast	0x00
Receive OP Code	0x00	Response OP Code	0x00
Receive Data Length	0x00	Response Data Length	0x00
Receive Data 1 to 15	0x00	Response Data 1 to 15	0x00

■ Set CEC Reception Confirmation

Rcv OP Code	Rcv Data Length	Rcv Data 1 to 15
0xFF	0x00	0x00

■ Set Ethernet

IP Address	Sub Net Mask	GateWay	Port No
192.168.0.0	255.255.255.0	192.168.0.1	8000

5.3 Reset Measurements

When the “3.1 [0x20 0x50]: Reset Measurement” command is sent, some of the measurement results and other data are initialized. Once the EDID access measurements and CEC measurements have been accessed correctly, the results are retained until this command is sent. Therefore, before starting the measurements, be absolutely sure to initialize the previous measurements using the “3.1 [0x20 0x50]: Reset Measurement” command.

The results which are initialized by the “3.1 [0x20 0x50]: Reset Measurement” command are listed below.

Item	Automatic updating	Initializing by Reset Measurement command
Measure EDID access		<input type="radio"/>
Measure Video Data	<input type="radio"/>	
Load Video Data	<input type="radio"/>	
Measure Video Timing	<input type="radio"/>	
Measure Audio	<input type="radio"/>	
Measure HDCP		<input type="radio"/>
Measure CEC		<input type="radio"/>
Measure Packet	<input type="radio"/>	
Load DDC Line Monitor		<input type="radio"/> (Both FIFO and TimeStamp initialized)
Load CEC Line Monitor		<input type="checkbox"/> (Both FIFO and TimeStamp initialized)

When only the automatic updating items are to be measured, there is no need to send the Reset Measurement command.

When this command is sent, the hot plug of the VA-1830 outputs Not detect for a 100 ms period. This means that operation can be started for the source device from the place where the plug has been connected.

5.4 Measurement

After the HDMI signals have been output from the source device, the measurement results are loaded. For the commands, refer to “Chapter 3 MEASUREMENT RESULT ACQUISITION COMMANDS.”

5.4.1 EDID access measurement, DDC Line monitor

The EDID access measurement is determined by whether the source device connected to the VA-1830 has correctly read out the EDID data set using the “2.1 [0x20 0x40]: Set EDID” command for the size of the data concerned. (Refer to “3.3 [0x30 0x51]: Load EDID Access Measurement Result.”)

The measurement results are retained until the “[0x20 0x50]: Reset Measurement” command is sent. For this reason, proceed with the resetting before starting the measurements.

Furthermore, by using the “3.14 [0x30 0x5C]: Load DDC Line Monitor” command, the EDID access can be checked in detail. The transfer of the commands on the DDC line can be checked using the DDC line monitor. The DDC line command is stored in FIFO, and each time it is sent, the FIFO data can be loaded. FIFO is cleared by the “[0x20 0x50]: Reset Measurement” command. However, the capacity of the FIFO is limited so FIFO must be accessed periodically in order for all the data to be acquired accurately. When commands exceeding the capacity of the FIFO have been received, [Full] of the third bit of [Data Type] in the parameter is set. In this case, the correct data cannot be received until the “[0x20 0x50]: Reset Measurement” command is sent.

As an example, the parameters for “3.14 [0x30 0x5C]: Load DDC Line Monitor” when the following DDC command has been sent are shown below:

Start (0.5 ms) + 0x74[A] (0.5 ms) + 0x15[A] (0.5 ms) + 0x00[A] (0.5 ms) + Stop (0.5 ms)

([A]: ACK)

Data Length	2 bytes	0x0F
Packet No	1 byte	0x00
Data Type *	1 byte	bit 0: --, bit 1: --, bit 2: 1 (= Start), bit 3: 0 (= not Full)
Data *	1 byte	--
TimeStamp	4 bytes	0x00000001
Data Type *	1 byte	Bit 0: 0 (= ack), bit 1: 0 (=no Stop), bit 2: 0 (= no Start), bit 3: 0 (= not Full)
Data *	1 byte	0x74
TimeStamp	4 bytes	0x00000001
Data Type *	1 byte	Bit 0: 0 (= ack), bit 1: 0 (=no Stop), bit 2: 0 (= no Start), bit 3: 0 (= not Full)
Data *	1 byte	0x15
TimeStamp	4 bytes	0x00000001
Data Type *	1 byte	Bit 0: 0 (= ack), bit 1: 0 (=no Stop), bit 2: 0 (= no Start), bit 3: 0 (= not Full)
Data *	1 byte	0x00
TimeStamp	4 bytes	0x00000001

If this command has been sent while the DDC is being received, the command up to the received section will be returned. If this is the case, the data that follows can be received if the command is sent again.

5.4.2 Video Data measurement

The Video Data measurement is determined by whether the Video Data which was set using the “2.3 [0x20 0x41]: Set Color Palette,” “2.5 [0x20 0x42]: Set Pixel Color Pattern” and “2.7 [0x20 0x43]: Set Line Block” commands has been received. (Refer to “3.4 [0x30 0x52]: Load Video Data Measurement Result.”) This determination is made on a frame by frame basis, and the measurement result is updated at the active edge of VSYNC. If there are errors in the measurement result, the number of errors per frame can be checked.

The Video Data measurement supports a resolution of 2048 pixels horizontally and 2048 lines vertically.

■ Measurement with YC422 color space

If the color space of the input is YC422, the Video Data as shown below is received.

Video Data	Y1	Y2	Y3	Y4	Y5	Y6
	Cb1	Cr2	Cb3	Cr4	Cb5	Cr6
Horizontal coordinates	1	2	3	4	5	6

Therefore, in the case of the YC422 color space, Cr0 is not measured when the horizontal coordinate is an odd number; Cb0 is not measured when the horizontal coordinate is an even number.

If, with AVI InfoFrame, video data repeated two or more times has been received, the video data is measured on the assumption that toggling between Cb and Cr takes place every number of times of the repetition.

An example of what is received in the case of two Repetitions is shown below.

Video Data	Y1	Y2	Y3	Y4	Y5	Y6
	Cb1	Cb2	Cr3	Cr4	Cb5	Cb6
Horizontal coordinates	1	2	3	4	5	6

When the horizontal coordinates are $2xn$ or $2xn+1$ in this scenario, Cr0 is not measured; when they are $2x(n+1)$ or $2x(n+1)+1$, Cb0 is not measured.

5.4.3 Load Video Data

With Video Data loading, the Video Data of the lines specified is captured in the frame following the frame in which the “3.5 [0x30 0x53]: Load Video Data” command was sent, and this data is returned. For this reason, it takes a maximum period of time equivalent to $2 \times$ VSYNC periods for the data to be returned. The data is captured only once immediately after the command has been sent. (The capturing of the data is not executed until the next command is sent.)

■ Measurement with YC422 color space

If the color space of the input is YC422, the Video Data as shown below is received.

Video Data	Y1	Y2	Y3	Y4	Y5	Y6
	Cb1	Cr2	Cb3	Cr4	Cb5	Cr6
Horizontal coordinates	1	2	3	4	5	6

Therefore, with the YC422 color space, indefinite values are input for Cr0 when the horizontal coordinates are an odd number and for Cb0 when they are an even number.

If, with AVI InfoFrame, the video data has been received with two or more repetitions, Cb and Cr are toggled with each repetition and input. Therefore, indefinite values are input for those data parts which have not been received in the same way.

5.4.4 Loading the Video Timing measurement result

Video Timing measurement result loading is determined by whether the Video Timing which was set using the “2.9 [0x20 0x44]: Set Video Timing” command has been received. (Refer to “3.6 [0x30 0x54]: Load Video Timing Measurement Result.”) Video Timing is checked at intervals of approximately 100 ms.

Furthermore, by using the “3.11 [0x30 0x59]: Load Video Timing” command, more detailed Video Timing data can be acquired.

The parameters which can be acquired using Load Video Timing are listed below.

Item	Figure	Description	
Pixel Clock		Pixel frequency	
H Freq.		HSYNC frequency	
V Freq.		VSYNC frequency	
H Total Pixels	HT	HTOTAL width	
H Active Pixels	HD	HDISP width	
H Sync Pixels	HS	HSYNC width	
H Back Porch Pixels	HB	Back Porch width of HSYNC	
H Front Porch Pixels	HF	Front Porch width of HSYNC	
H Sync Polarity		HSYNC polarity	
V Total Lines	VT	VTOTAL width (in 1-frame increments)	
V Active TOTAL	VD (= VD1+VD2)	VDISP width (in 1-frame increments)	
V Active Field1	VD1	VDISP width	1-frame increments for progressive scanning, value of first field for interlaced scanning
V Sync Field1	VS1	VSYNC width	
V Back Porch Field1	VB1	Back Porch width of VSYNC	
V Front Porch Field1	VF1	Front Porch width of VSYNC	
HV Sync OffSet1	HVOFF	H and V phase difference *	
V Active Field2	VD2	Width of VDISP in second field during interlaced scanning	
V Sync Field2	VS2	Width of VSYNC in second field during interlaced scanning	
V Back Porch Field2	VB2	Back porch width of VSYNC in second field during interlaced scanning	
V Front Porch Field2	VF2	Front porch width of VSYNC in second field during interlaced scanning	
HV Sync OffSet2	HVOFF	Phase difference between H and V in second field during interlaced scanning *	
V Sync Polarity		VSYNC polarity	
Interlace		Interlaced or progressive scanning	

* If a positive number is indicated for HV Sync Offset*, it means that the VSYNC active edge comes several minutes **after** the |HV Sync Offset| of the HSYNC active edge; if a negative number is indicated, it means that it comes several minutes **before** the same.

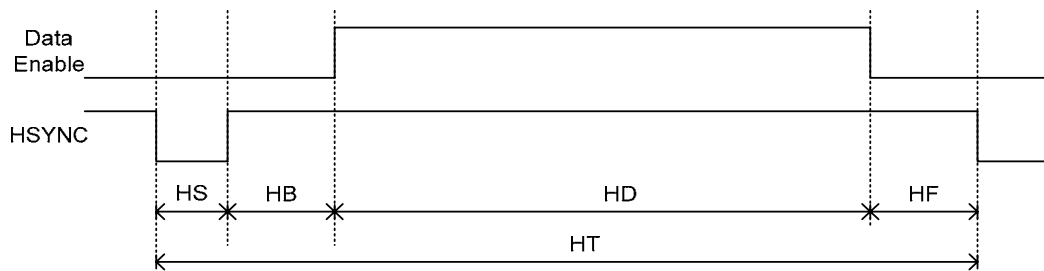


Fig. Horizontal sync signal

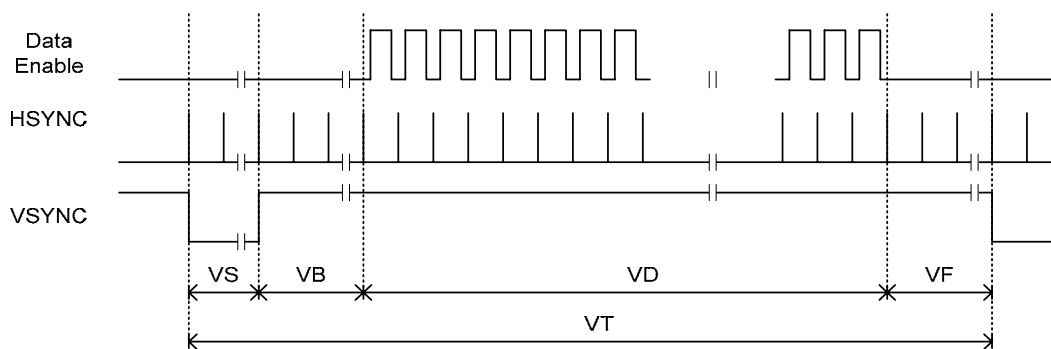


Fig. Vertical sync signal (progressive scanning)

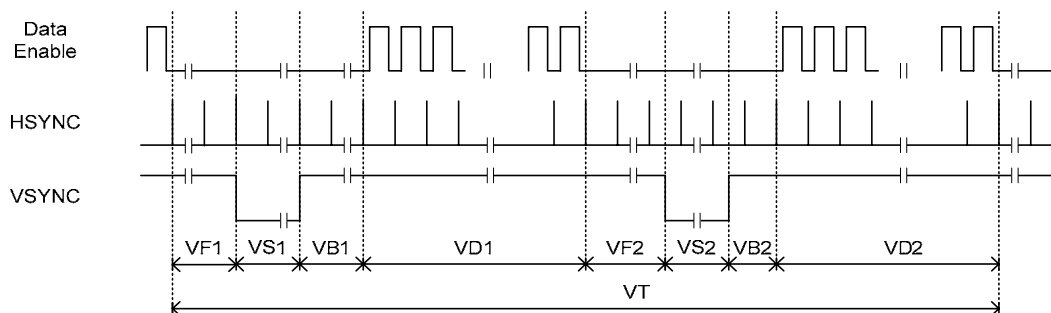


Fig. Vertical sync signal (interlaced scanning)

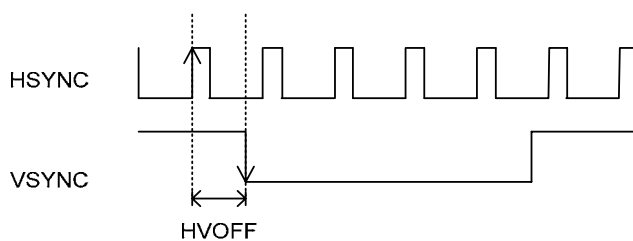


Fig. Phase difference between horizontal and vertical sync signals

5.4.5 Load Audio measurement result

Audio measurement result loading is determined by whether the parameters of Audio which were set using the “2.11 [0x20 0x45]: Set Audio” command have been received. (Refer to “3.7 [0x30 0x55]: Load Audio Measurement Result.”) Audio measurement is checked at intervals of approximately 100 ms. Furthermore, Audio can be measured using this command only when “Audio Sample” (= linear PCM) has been selected as the “Audio Type” setting.

Moreover, by using the “3.12 [0x30 0x5A]: Load Audio” command, more detailed Audio data can be acquired.

The Audio frequency is measured by calculating it from the sampling frequency which is reproduced from the HDMI signals received. For this reason, the measured value may deviate from the actual Audio frequency by an amount equivalent to the sampling frequency.

5.4.6 Load HDCP measurement result

HDCP measurement result loading is determined by whether initial authorization was given for whether the input signals have executed HDCP and by checking whether the images were encrypted after the initial authorization. (Refer to “3.8 [0x30 0x56]: Load HDCP Measurement Result.”)

5.4.7 Load CEC measurement result, CEC Line monitor

CEC measurement result loading checks whether the CEC command specified using the “2.21 [0x20 0x4A]: Set CEC Reception Confirmation” command was received after the Reset Measurement command. (Refer to “3.9 [0x30 0x57]: Load CEC Measurement Result.”) The results are retained until the Reset Measurement command is sent. For this reason, be absolutely sure to issue this command after making changes to any of the settings.

Furthermore, by using the “3.15 [0x30 0x5D]: Load CEC Line Monitor” command, the CEC access can be checked in more detail. The CEC line monitor enables the transfer of the commands on the CEC line to be checked.

The CEC line command is stored in FIFO, and each time it is sent, the FIFO data is loaded. FIFO is cleared by the “[0x20 0x50]: Reset Measurement” command. However, the capacity of the FIFO is limited so FIFO must be accessed periodically in order for all the data to be acquired accurately. When commands exceeding the capacity of the FIFO have been received, [Error] of the third bit of [Data Type] in the parameter is set, and 0x20 (= Monitor FIFO Full) is returned to the [Data] section. If this is the case, the correct data cannot be received until the Reset Measurement command is sent.

As an example, the parameters for “3.15 [0x30 0x5D]: Load CEC Line Monitor” when the following CEC command has been sent are shown below:

Start (0 ms) + 0x1F[F][N] (10 ms) + 0x84[F][N] (20 ms) + 0x00[F][N] (30 ms) + 0x00[F][N] (40 ms) + 0x00[E][N] (50 ms)

([F]: (EOM=0), [E]: (EOM=1), [N]: (ACK logic 1))

Data Length	2 bytes	0x0021
Packet No	1 byte	0x00
Data Type	1 byte	Bit 0: 1 (= ack logic 1), bit 1: 1 (= Start), bit 2: 0 (= EOM = 0), bit 3: 0 (no error)
Data	1 byte	0x1F
TimeStamp	4 bytes	0x00000000
Data Type	1 byte	Bit 0: 1 (= ack logic 1), bit 1: 0 (= no Start), bit 2: 0 (= EOM = 0), bit 3: 0 (no error)

Data	1 byte	0x84
TimeStamp	4 bytes	0x00000014
Data Type	1 byte	Bit 0: 1 (= ack logic 1), bit 1: 0 (= no Start), bit 2: 0 (= EOM = 0), bit 3: 0 (no error)
Data	1 byte	0x00
TimeStamp	4 bytes	0x00000028
Data Type	1 byte	Bit 0: 1 (= ack logic 1), bit 1: 0 (= no Start), bit 2: 0 (= EOM = 0), bit 3: 0 (no error)
Data	1 byte	0x00
TimeStamp	4 bytes	0x0000003C
Data Type	1 byte	Bit 0: 1 (= ack logic 1), bit 1: 0 (= no Start), bit 2: 0 (= EOM = 0), bit 3: 0 (no error)
Data	1 byte	0x00
TimeStamp	4 bytes	0x00000050

If this command has been sent while the CEC command is being received, the CEC command up to the received section will be returned. If this is the case, the data that follows can be received if the command is sent again.

5.4.8 Load Packet Measurement result

In the packet measurement result loading, whether the packets specified by the “2.13 [0x20 0x46]: Set Packet” command have been received is checked. (Refer to “3.10 [0x30 0x58]: Load Packet Measurement Result.”)

Furthermore, by using the “3.13 [0x30 0x5B]: Load Packet” command, the received data of the packets can be checked in more detail. The valid size of the data in [Data*] in the parameters of this command depends on Packet received. Refer to “5.2.5 Set Packet.”

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