

SONY[®]

DATA PROJECTOR

VPL-EX130

VPL-EX7

VPL-EX70

PROTOCOL MANUAL

1st Edition (Revised 1)

Serial No. 7300001 through 7399999: VPL-EX7 (EU)

Serial No. 7300001 through 7399999: VPL-EX70 (EU)

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1. Overview

1-1. Introduction

The projector is remotely controllable over RS-232C. It is useful for setting up the projector away from the operator.

This protocol manual describes the specifications such as packet format and procedures for controlling the projector.

In the following sections below, the term “CONTROLLER” is used as a device which controls the projector. CONTROLLER can be a PC or other specific device that is able to handle RS-232C.

Although most of commands are available for both RS-232C.

1-2. Glossary of Terms

Table 1-1 Glossary of Terms

Terms	Abbreviated	Description
CONTROLLER	–	Command initiator such as PCs.
PROJECTOR	–	Front projector.

1-3. Protocol Stack Structure

The protocol stack structure diagram is shown below. Though the stack is drawn for RS-232C, the following portions are common.

Table 1-2 Common Portions in Protocol Stack

Layer Name	Description
Sub Command	Value is assigned for projector’s functions. Refer to the section 2-1 for detail description.
Simplified Command	Packet format for sending/receiving “Sub Command”. Refer to the section 3-6-1 for detail description.

(1) RS-232C

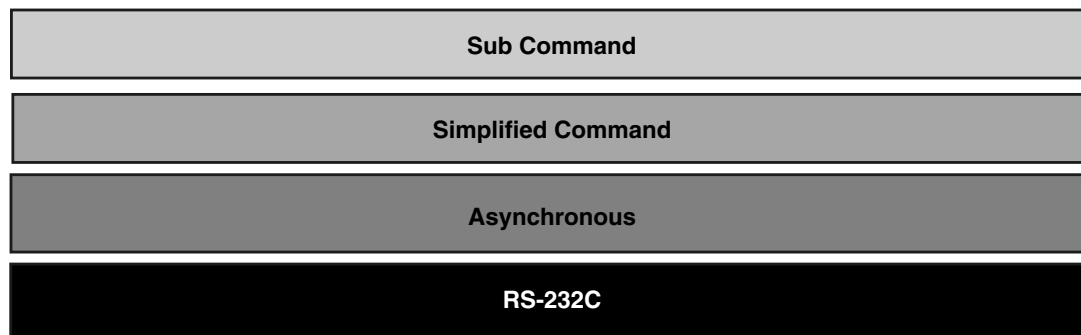


Fig. 1-1 RS-232C Protocol Stack

“RS-232C” layer is physical portion and “Asynchronous” is the traditional protocol layer as shown in the section 3-2.

2. Common Commands

2-1. Sub Commands

Sub Command is the value which is used by Simplified Command. Value is assigned for executing function. For example, if you want to change the picture mode, the appropriate value assigned for the desired picture mode should be chosen.

2-1-1. ITEM List

Item list tables are described below. Tables are shown per function category.

Table 2-1 ITEM List For Picture

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Picture Mode	00h	02h	Dynamic	0000h	Set/Get
			Standard	0001h	
			Game	0003h	
			Living	0004h	
			Cinema	0005h	
			Presentation	0006h	
Contrast	00h	10h	Set Value	0000h to 0064h (0 to 100)	
Brightness	00h	11h	Set Value	0000h to 0064h (0 to 100)	
Color	00h	12h	Set Value	0000h to 0064h (0 to 100)	
Hue	00h	13h	Set Value	0000h to 0064h (0 to 100)	
Sharpness	00h	14h	Set Value	0000h to 0064h (0 to 100)	
Color Temp.	00h	17h	High	0000h	
			Mid	0001h	
			Low	0002h	
DDE	00h	18h	Off	0000h	
			Progressive	0001h	
			Film	0002h	
Lamp Mode	00h	40h	High	0000h	
			Standard	0001h	

Table 2-2 ITEM List For Screen

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Aspect	00h	20h	Normal	0001h	Set/Get
			Wide Zoom	0002h	
			Zoom	0003h	
			Full1	0007h	
			Full2	0008h	
			4 : 3	0009h	
			16 : 9	000Ah	

Table 2-3 ITEM List For Audio

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Volume	00h	16h	Set Value	0000h to 0064h (0 to 100)	Set/Get
Audio Muting	00h	31h	Off	0000h	
			On	0001h	

Table 2-4 ITEM List For Setup

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Input	00h	01h	Video	0000h	Set/Get
			S Video	0001h	
			Input A	0002h	
			Input B	0003h	
Picture Muting	00h	30h	Off	0000h	
			On	0001h	
Input-A Signal Sel	00h	32h	Auto	0000h	
			Computer	0001h	
			Component	0002h	
			Video GBR	0003h	

Table 2-5 ITEM List For Status

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Status Error	01h	01h	No Error	0000h	Get only
			Lamp Error	0001h	
			Fan Error	0002h	
			Cover Error	0004h	
			Temp Error	0008h	
Status Power	01h	02h	Standby	0000h	
			Startup Lamp	0002h	
			Power On	0003h	
			Cooling1	0004h	
			Cooling2	0005h	
			Saving Cooling1	0006h	
			Saving Cooling2	0007h	
Saving Standby	0008h				
Lamp Timer	01h	13h	Lamp Use Time	0000h to FFFFh *1	
ROM Version	01h	1Dh	Main ROM Version	0000h to FFFFh *2	
Status Security *3	01h	1Fh	Disable	0000h	
			Enable	0001h	

*1 Example) In case the lamp timer indicates 1000H, return value is [03E8h].

*2 Example) In case the Software Version is 1.03, return value is [0103h].

*3 In case the security lock is set, whether the password input screen is displayed can be checked after the power turns on. When the password input screen is being displayed, return values is [0001h].

Table 2-6 ITEM List For Infrared Remote Command

<Table 1>			<Table 2>			Remarks
Item Number			Data			
Item	Upper byte	Lower byte	Data	Upper byte	Lower byte	
Infrared Remote Command (15 bit category)	17h	Refer to the section 2-1-2 *1. (Table 2-7 - Table 2-10)	—	00h	00h	Set Only*2
Infrared Remote Command (20 bit category)	19h	Refer to the section 2-1-2 *1. (Table 2-8 - Table 2-11)	—	00h	00h	

*1: By using this Item Number, it is possible to simulate the infrared remote controller.
Choose your desired Code from the table in the section 2-1-2 and use it as the Lower byte of Item Number.

Note

Depending on the category, different value (Upper byte) is assigned.

*2: It is corresponded to single command only.

2-1-2. Infrared Remote Command Code

Tables are shown per function category.

- 15 bit PROJECTOR: Table 2-7-Table 2-10
- 20 bit PROJECTOR-E: Table 2-8-Table 2-11

Table 2-7 Infrared Remote Command Code For Picture

CATEGORY		Code	Name
15 bit PROJECTOR	20 bit PROJECTOR-E		
○	–	18	CONTRAST +HIGH
○	–	19	CONTRAST –LOW
○	–	1A	COLOR +HIGH
○	–	1B	COLOR –LOW
○	–	1E	BRIGHTNESS +BRIGHT
○	–	1F	BRIGHTNESS –DARK
○	–	20	HUE +PURPLISH
○	–	21	HUE –GREENISH
○	–	22	SHARPNESS +SHARP
○	–	23	SHARPNESS –SOFT

Table 2-8 Infrared Remote Command Code For Screen

CATEGORY		Code	Name
15 bit PROJECTOR	20 bit PROJECTOR-E		
○	–	47	RGB SIZE
○	–	48	RGB SHIFT
–	○	60	APA
–	○	61	DOT PHASE
–	○	67	FREEZE
–	○	6A	DIGITAL ZOOM+
–	○	6B	DIGITAL ZOOM–

Table 2-9 Infrared Remote Command Code For Audio

CATEGORY		Code	Name
15 bit PROJECTOR	20 bit PROJECTOR-E		
○	–	12	VOLUME + UP
○	–	13	VOLUME – DOWN
○	–	14	AUDIO MUTING

Table 2-10 Infrared Remote Command Code For Setup

CATEGORY		Code	Name
15 bit PROJECTOR	20 bit PROJECTOR-E		
○	–	15	POWER ON/OFF *1
○	–	24	PICTURE MUTING
○	–	25	STATUS ON
○	–	26	STATUS OFF
○	–	29	MENU
○	–	2A	VIDEO
○	–	2B	INPUT A
○	–	2C	INPUT B
○	–	2E	POWER ON *1
○	–	2F	POWER OFF *1
○	–	33	CURSOR →
○	–	34	CURSOR ←
○	–	35	CURSOR ↑
○	–	36	CURSOR ↓
○	–	57	INPUT SELECT
○	–	5A	ENTER
○	–	5F	S VIDEO
○	–	7B	RESET

*1: Send the command twice when this unit is in standby mode (Low) state.

Table 2-11 Infrared Remote Command Code For Installation

CATEGORY		Code	Name
15 bit PROJECTOR	20 bit PROJECTOR-E		
–	○	3A	V KEYSTONE

2-2. Reply

<Table 3>			
Item Number		Data	
Item	Data	Upper byte	Lower byte
ACK	Complete	00h	00h
NAK	Select Error	01h	05h

When sending a command, wait for at least 50 msec after the reception of response.
No response may be returned when turning on the power.

3. RS-232C

3-1. Connection

Communication is enabled by the use of a D-Sub 9 Pin cross (reverse) cable.
 The pin assignment of D-Sub 9 Pin and D-Sub 25 Pin is as follows.

D-Sub 9 Pin	D-Sub 25 Pin	Name	
Shell = FG	1	FG	Grounding for safety protection or cable shield
3	2	TxD	Transmission data
2	3	RxD	Reception data
7	4	RTS	Transmission request
8	5	CTS	Transmission permission
6	6	DSR	Data set ready
5	7	SG	GND for signal
1	8	DCD	Data channel signal carrier detection
4	20	DTR	Data terminal ready
9	22	RI	Calling display (Presence/absence of calling signal)

Pin numbers indicated as D-Sub 25 Pin are not used.

Assured cable length: 15 m (However, assurance may not be applicable for some cables.)

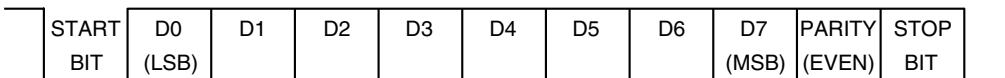
The software for controlling the projector from a PC is intended for performing transmission and reception for only the TxD and RxD lines.

Therefore the handshake normally performed by RS-232C is not necessary.

3-2. Communication Specifications

- Full duplex communication channels (Flow control not performed.)
- Start-stop synchronism system
- Baud rate: 38.4 kbps (bits per second)
- The bit configuration is defined as follows.

1 START Bit + 8 DATA Bits + 1 PARITY Bit + 1 STOP Bit



EVEN Parity Total number of “1”s from D0 to D7 is an even number. ⇔ 0
 Total number of “1”s from D0 to D7 is an odd number. ⇔ 1

3-3. Communication Procedure

3-3-1. Outline of Communication

All communication between CONTROLLER (PC, etc.) and DEVICE (PROJECTOR) is performed by the command block format. Communication is started by the issue of a command at CONTROLLER and ended when the return data is sent to CONTROLLER after DEVICE receives the command. CONTROLLER is prohibited from sending several commands at one time. This means that after CONTROLLER sends one command, it cannot send other commands until DEVICE returns the return data. DEVICE sends the return data after processing the command. The time from when CONTROLLER sends the command until the return data is returned differs according to the contents of the command.

Note

When infrared remote commands are sent, return data may not be returned in some cases.

3-4. Communication Rules

- When sending a command from CONTROLLER, the return data from PROJECTOR should be received first before sending the next command. Even if the next command is sent before receiving the return data, since PROJECTOR will not be able to receive that command, it does not return a response to CONTROLLER. Consequently, no error code is also sent.
For detail of the waiting times for PROJECTOR to return the return data after CONTROLLER sends the command, refer to the section 3-5.
- When a communication error occurs, PROJECTOR ignores the data received until now, and set into the reception standby state.
- For undefined commands or commands determined as invalid by PROJECTOR, PROJECTOR will send the "NAK" return data to CONTROLLER .
- Take note that when data is written when the input signal of PROJECTOR is unstable, that data (value) will not be incorporated.
- When INDEX specified infrared remote commands are transmitted, leave an interval of 45 msec until the next transmission. (Do not return the return data (ACK, NAK) when the infrared remote commands are received.)

3-5. Approximate Return Waiting Times

The await-return time is approx. 200 msec.

Note

This is the case, unless the communications are interfered anyway.

3-6. Command Block Format

The block format of Simplified Command for RS-232C as shown in the Fig. 1-1. In this section, the block format for Simplified Command is provided.

3-6-1. Simplified Command

[Send]

The block format for sending request is shown below.

B0	START CODE	[A9h]
B1	ITEM NUMBER	Put the item number. Refer to the item list in the sections 2-1-1 and 2-1-2.
B2		
B3	TYPE	SET: 00h (Set data) GET: 01h (Get data)
B4	DATA	SET: Put the Data value described in the item list in the sections 2-1-1 and 2-1-2. GET: Unused. Set Dummy data [00h, 00h]
B5		
B6	CHECK SUM*1	Check Sum
B7	END CODE	[9Ah]

[Receive (without data)]

The block format for response which includes no return data is shown below. Response is always sent by PROJECTOR.

B0	START CODE	[A9h]
B1	ACK / NAK	Refer to the reply definition table in the section 2-2.
B2		
B3	TYPE	[03h]
B4	DUMMY DATA	This data does not mean any senses. Dummy Data [00h, 00h] is stored.
B5		
B6	CHECK SUM*1	Check Sum
B7	END CODE	[9Ah]

[Receive (with data)]

The block format for response which includes return data is shown below. Response is always sent by PROJECTOR.

B0	START CODE	[A9h]
B1	ITEM NUMBER	Refer to the item list in the sections 2-1-1 and 2-1-2.
B2		
B3	TYPE	[02h] Express data to be Reply data
B4	DATA	Data value described in the item list in the sections 2-1-1 and 2-1-2.
B5		
B6	CHECK SUM*1	Check Sum
B7	END CODE	[9Ah]

*1: CHECK SUM: B1 to B5 are calculated by OR. Refer to the example below.

<Example of Calculation>

0xA9	1010	1001	0xA9	1010	1001
0xA9	1010	1001	0x9A	1001	1010
Answer	1010	1001	Answer	1011	1011
		0xA9			0xBB

3-7. Packet Examples

3-7-1. Change “Aspect” to “Zoom”

START CODE = A9h
ITEM NUMBER = 0020h (Aspect)
SET/GET = 00h (SET)
DATA = 0003h (Zoom)
CHECK SUM = 23h
END CODE = 9Ah

You will receive the packet below if the process is successfully completed.

START CODE = A9h
ACK/NAK = 0000h (Complete)
ACK = 03h
DUMMY DATA = 0000h
CHECK SUM = 03h
END CODE = 9Ah

3-8. AMX Device Discovery

This model is equipped with the protocol that conforms to the Device Discovery stipulated by AMX. Contact AMX for details about the Device Discovery.

3-9. Communication When Standby Mode is Set in “Low”

- When sending the infrared remote commands “POWER ON” or “POWER ON/OFF”, these commands should be sent twice.
- Only the infrared remote commands “POWER ON” and “POWER ON/OFF” can work in this state.
- Within 3 to 4 seconds after the projector power is turned ON, “NAK” is returned as the response for the command.

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