SONY®

VIDEO PROJECTOR

VPL-HW60
VPL-HW65
VPL-HW68

PROTOCOL MANUAL

1st Edition

⚠警告

このマニュアルは，サービス専用です。
お客様が，このマニュアルに記載された設置や保守，点検，修理などを行うと感電や火災，人身事故につながることがあります。
危険をさけるため，サービストレーニングを受けた技術者のみご使用ください。

⚠WARNING

This manual is intended for qualified service personnel only.
To reduce the risk of electric shock, fire or injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

⚠WARNUNG

Die Anleitung ist nur für qualifiziertes Fachpersonal bestimmt.
Alle Wartungsarbeiten dürfen nur von qualifiziertem Fachpersonal ausgeführt werden. Um die Gefahr eines elektrischen Schlages, Feuergefahr und Verletzungen zu vermeiden, sind bei Wartungsarbeiten strikt die Angaben in der Anleitung zu befolgen. Andere als die angegeben Wartungsarbeiten dürfen nur von Personen ausgeführt werden, die eine spezielle Befähigung dazu besitzen.

⚠AVERTISSEMENT

Ce manual est destiné uniquement aux personnes compétentes en charge de l’entretien. Afin de réduire les risques de décharge électrique, d’incendie ou de blessure n’effectuer que les réparations indiquées dans le mode d’emploi à moins d’être qualifié pour en effectuer d’autres. Pour toute réparation faire appel à une personne compétente uniquement.

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1. Overview

1-1. Introduction

The projector is remotely controllable over RS-232C as well as Ethernet. It is useful for controlling 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 or Ethernet.
Although most of commands are available for both RS-232C and Ethernet, some commands are dedicated to Ethernet.

∗ Ethernet is a registered trademark of Xerox Corporation.

1-2. Glossary of Terms

Table 1-1 Glossary of Terms

Terms	Abbreviated	Description
CONTROLLER	–	Command initiator such as PCs.
PROJECTOR	–	Front projector. (device)
SDAP	Simple Display Advertisement Protocol	Protocol name for advertising the projector status over Ethernet.
SDCP	Simple Display Control Protocol	Protocol name for controlling projector over Ethernet.
DDDP	Dynamic Device Discovery Protocol	AMX Device Discovery is the protocol name by AMX to enable to configure the AMX control system and other intended devices.
SDCP	Simple Display Control Protocol	Protocol name for controlling projector over Ethernet.
SDDP	Simple Device Discover Protocol	Simple Device Discover Protocol is the protocol name by Control4 to allow devices to be easily added to a control system.
CIP	Crestron Internet Protocol	Protocol name used in Crestron RoomView and control system by Crestron.

1-3. Protocol Stack Structure

The protocol stack structure diagram is shown below. Though the stack is drawn for RS-232C and Ethernet separately, 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

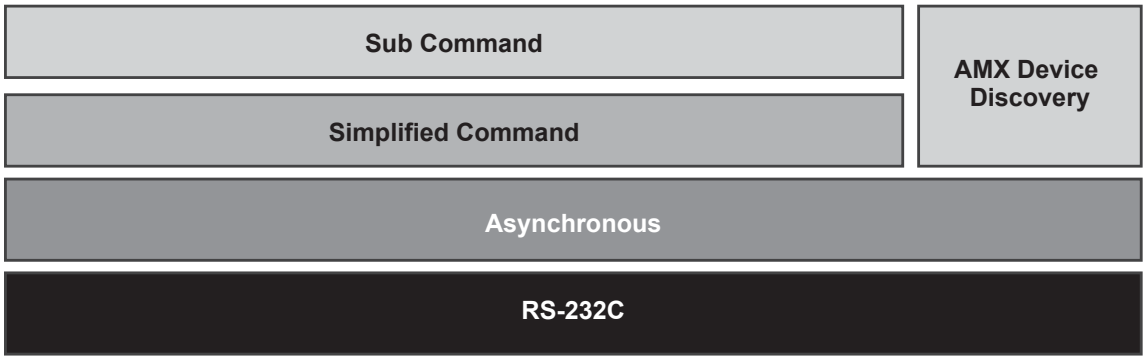

Fig. 1-1 RS-232C Protocol Stack

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

(2) Ethernet

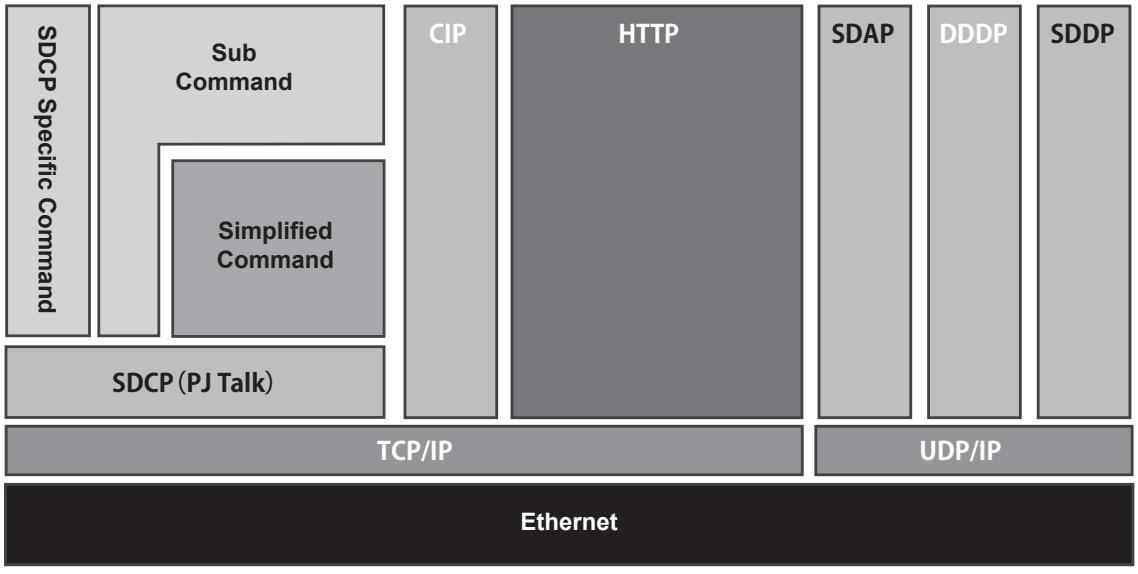

Fig. 1-2 Ethernet Protocol Stack

Because of traditional portions for Ethernet general layer, "TCP/IP", "UDP/IP", and "HTTP" are out of scope in this document.
SDCP specific command is described in the section 4-3-2.
SDAP and SDCP are SONY original protocol stack, which are described in the sections 4-3-1 and 4-3-2 respectively.

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 Quality Setting

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Power	01h	30h	Off	0000h	Set/Get
			On	0001h	
Calib. Preset	00h	02h	Cinema Film 1	0000h	
			Cinema Film 2	0001h	
			REF	0002h	
			TV	0003h	
			Photo	0004h	
			Game	0005h	
			BRT CINE	0006h	
			BRT TV	0007h	
			User	0008h	
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	D93	0000h	
			D75	0001h	
			D65	0002h	
			Custom1	0003h	
			Custom2	0004h	
			Custom3	0005h	
			Custom4	0006h	
			Custom5	0008h	
			D55	0009h	
Lamp Control	00h	1Ah	Low	0000h	
			High	0001h	
Contrast Enhancer	00h	1Ch	Off	0000h	
			Low	0001h	
			High	0002h	
			Middle	0003h	

(Continued)

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Advanced Iris	00h	1Dh	Off	0000h	Set/Get
			Full	0002h	
			Limited	0003h	
Film Mode	00h	1Fh	Off	0000h	
			Auto	0002h	
Gamma Correction	00h	22h	Off	0000h	
			1.8	0001h	
			2.0	0002h	
			2.1	0003h	
			2.2	0004h	
			2.4	0005h	
			2.6	0006h	
			Gamma7	0007h	
			Gamma8	0008h	
			Gamma9	0009h	
			Gamma10	000Ah	
NR	00h	25h	Off	0000h	
			Low	0001h	
			Middle	0002h	
			High	0003h	
			Auto	0004h	
Color Space	00h	3Bh	BT.709	0000h	
			Color Space1	0003h	
			Color Space2	0004h	
			Color Space3	0005h	
			Custom	0006h	
User Gain Red	00h	50h	Set Value	FFE2h to 001Eh (–30 to 30)	
User Gain Green	00h	51h	Set Value	FFE2h to 001Eh (–30 to 30)	
User Gain Blue	00h	52h	Set Value	FFE2h to 001Eh (–30 to 30)	
User Bias Red	00h	53h	Set Value	FFE2h to 001Eh (–30 to 30)	
User Bias Green	00h	54h	Set Value	FFE2h to 001Eh (–30 to 30)	
User Bias Blue	00h	55h	Set Value	FFE2h to 001Eh (–30 to 30)	
Iris Brightness	00h	57h	Set Value	0000h to 0064h (0 to 100)	
Motionflow	00h	59h	Off	0000h	
			Smooth High	0001h	
			Smooth Low	0002h	
			Impulse	0003h	
			Combination	0004h	
			True Cinema	0005h	
xvColor	00h	5Ah	Off	0000h	
			On	0001h	
Reality Creation	00h	67h	Off	0000h	
			On	0001h	
Resolution	00h	68h	Set Value	0001h to 0064h (1 to 100)	

(Continued)

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Noise Filtering	00h	69h	Set Value	0001h to 0064h (1 to 100)	Set/Get
Clear White	00h	6Bh	Off	0000h	
			Low	0001h	
			High	0002h	
MPEG NR	00h	6Ch	Off	0000h	
			Low	0001h	
			Middle	0002h	
			High	0003h	
			Auto	0004h	
Smooth Gradation	00h	6Dh	Off	0000h	
			Low	0001h	
			Middle	0002h	
			High	0003h	
Color Space Custom Red: Cyan - Red	00h	76h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Space Custom Red: Green - Magenta	00h	77h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Space Custom Green: Cyan - Red	00h	78h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Space Custom Green: Green - Magenta	00h	79h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Space Custom Blue: Cyan - Red	00h	7Ah	Set Value	FFCEh to 0032h (–50 to 50)	
Color Space Custom Blue: Green - Magenta	00h	7Bh	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction	00h	86h	Off	0000h	
			On	0001h	
Color Correction Red: Hue	00h	87h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Red: Color	00h	88h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Red: Brightness	00h	89h	Set Value	FFE2h to 001Eh (–30 to 30)	
Color Correction Yellow: Hue	00h	89h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Yellow: Color	00h	8Ah	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Yellow: Brightness	00h	8Bh	Set Value	FFE2h to 001Eh (–30 to 30)	
Color Correction Green: Hue	00h	8Ch	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Green: Color	00h	8Dh	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Green: Brightness	00h	8Fh	Set Value	FFE2h to 001Eh (–30 to 30)	

(Continued)

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Color Correction Cyan: Hue	00h	90h	Set Value	FFCEh to 0032h (–50 to 50)	Set/Get
Color Correction Cyan: Color	00h	91h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Cyan: Brightness	00h	92h	Set Value	FFE2h to 001Eh (–30 to 30)	
Color Correction Blue: Hue	00h	93h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Blue: Color	00h	94h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Blue: Brightness	00h	95h	Set Value	FFE2h to 001Eh (–30 to 30)	
Color Correction Magenta: Hue	00h	96h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Magenta: Color	00h	97h	Set Value	FFCEh to 0032h (–50 to 50)	
Color Correction Magenta: Brightness	00h	98h	Set Value	FFE2h to 001Eh (–30 to 30)	
Input Lag Reduction	00h	99h	Off	0000h	
			ON	0001h	

Table 2-2 ITEM List For Screen Setting

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Aspect	00h	20h	Normal	0001h	Set/Get
			V Stretch	000Bh	
			Stretch	000Eh	
			Squeeze	000Fh	

Table 2-3 ITEM List For Initial Setting

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Input	00h	01h	HDMI1	0002h	Set/Get
			HDMI2	0003h	
Picture Muting	00h	30h	Off	0000h	
			On	0001h	
HDMI1 Dynamic Range	00h	6Eh	Auto	0000h	
			Limit	0001h	
			Full	0002h	
HDMI2 Dynamic Range	00h	6Fh	Auto	0000h	
			Limit	0001h	
			Full	0002h	
Settings Lock	00h	73h	Off	0000h	
			Level A	0001h	
			Level B	0002h	

Table 2-4 ITEM List For 3D Setting

<Table1>			<Table2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
2D-3D Display Sel.	00h	60h	Auto	0000h	Set/Get
			3D	0001h	
			2D	0002h	
3D Format	00h	61h	Simulated 3D	0000h	
			Side-by-Side	0001h	
			Over-Under	0002h	
3D Depth Adjust	00h	62h	Set Value	FFFEh to 0002h (–2 to 2)	
Simulated 3D Effect	00h	63h	High	0000h	
			Middle	0001h	
			Low	0002h	
3D Glass Brightness	00h	64h	High	0000h	
			Middle	0001h	
			Low	0002h	

Table 2-5 ITEM List For Status

<Table 1>			<Table 2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Status Error*1	01h	01h	No Error	0000h	Get only
			Lamp Error	0001h	
			Fan Error	0002h	
			Cover Error	0004h	
			Temp Error	0008h	
			D5V Error	0010h	
			Power Error	0020h	
			Temp Warning	0040h	
Status Power*1	01h	02h	Standby	0000h	
			Start Up	0001h	
			Startup Lamp	0002h	
			Power On	0003h	
			Cooling1	0004h	
			Cooling2	0005h	
Lamp Timer	01h	13h	Use Time	0000h to FFFFh *2	
Status Error (2)*1	01h	25h	No Error	0000h	
			Highland Warning	0020h	

*1: Send the command twice when this unit is in the state of network management “OFF” and standby mode.
*2: Example) In case the lamp timer indicates 1000H, return value is [03E8h].

Table 2-6 ITEM List for Technical Applications

<Table1>			<Table2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Status	00h	A4h	Off	0000h	Set/Get
			On	0001h	
Language*1	00h	A5h	English	0000h	
			Dutch	0001h	
			French	0002h	
			Italian	0003h	
			German	0004h	
			Spanish	0005h	
			Portuguese	0006h	
			Russian	0007h	
			Swedish	0008h	
			Norwegian	0009h	
			Turkish	0010h	
			Polish	0012h	
			Japanese	000Ah	
			Chinese (Simplified)	000Bh	
			Chinese (Traditional)	000Ch	
			Korean	000Dh	
			Thai	000Eh	
			Arabic	000Fh	
Menu Position	00h	A6h	Bottom Left	0000h	
			Center	0001h	
High Altitude Mode	00h	A7h	Off	0000h	
			On	0001h	
Power Saving	00h	AAh	Off	0000h	
			Standby	0002h	
Image Flip	00h	ADh	Off	0000h	
			HV	0001h	
			H	0002h	
			V	0003h	
Blanking (Left) Blanking (Right) Blanking (Up) Blanking (Down)	00h	B0h B1h B2h B3h	Set Value	0000h to 0032h (0 to 50)	
Trigger Select (Trigger1)	00h	C2h	Off	0000h	
			Power	0001h	
			V Stretch	0002h	
			2.35:1 Zoom	0003h	
Blanking (On/Off)	00h	C8h	Off	0000h	
			On	0001h	
Panel Alignment Enable	00h	ECh	Off	0000h	
			On	0001h	

*1: This item is disabled VPL-HW60.

(Continued)

<Table1>			<Table2>		Remarks
Item Number			Data		
Item	Upper byte	Lower byte	Data	Byte	
Settings Reset	01h	6Ah	Picture Data	0000h	Set only
Maintenance Complete	01h	D2h	Lamp	0001h	
Mainsoftware Version	01h	1Eh	Get Value	xxxxh*2	Get only

*2: Example: For version 1.23, the return values are [01h] (upper byte) and [23h] (lower byte).

Table 2-7 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 2-8 to Table 2-11)	–	00h	00h	Set Only
Infrared Remote Command (20 bit category)	19h	Refer to the section 2-1-2 *1. (Table 2-8 to Table 2-11)	–	00h	00h	
Infrared Remote Command (20 bit category)	1Bh	Refer to the section 2-1-2 *1. (Table 2-9,Table 2-12)	–	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.

2-1-2. Infrared Remote Command Code

Tables are shown per function category.

- 15 bit PROJECTOR: Table 2-8 to Table 2-11
- 20 bit PROJECTOR-E: Table 2-8 to Table 2-11
- 20 bit PROJECTOR-EE: Table 2-9, Table 2-12

Table 2-8 Infrared Remote Command Code For Picture

CATEGORY			Code	Name
15 bit PROJECTOR	20 bit PROJECTOR-E	20 bit PROJECTOR-EE		
○	–	–	05	MOTIONFLOW TOGGLE
○	–	–	07	CONTRAST ENHANCER TOGGLE
○	–	–	18	CONTRAST +HIGH
○	–	–	19	CONTRAST –LOW
○	–	–	1A	COLOR +HIGH
○	–	–	1B	COLOR –LOW
○	–	–	1E	BRIGHTNESS +BRIGHT
○	–	–	1F	BRIGHTNESS –DARK
○	–	–	20	HUE +GREENISH
○	–	–	21	HUE –PURPLISH
○	–	–	22	SHARPNESS +SHARP
○	–	–	23	SHARPNESS –SOFT
–	○	–	4B	COLOR SPACE TOGGLE
–	○	–	4C	REALITY CREATION PALETTE
–	○	–	51	CALIB. PRESET BRT TV
–	○	–	52	CALIB. PRESET TV
–	○	–	53	CALIB. PRESET CINEMA FILM 1
–	○	–	54	CALIB.PRESET USER
–	○	–	55	CALIB. PRESET REF
–	○	–	56	CALIB. PRESET GAME
–	○	–	57	CALIB. PRESET PHOTO
–	○	–	58	CALIB. PRESET CINEMA FILM 2
–	○	–	59	CALIB. PRESET BRT CINE
–	○	–	5B	PICTURE MODE TOGGLE
–	○	–	5C	COLOR TEMP TOGGLE
–	○	–	5E	GAMMA COLLECTION TOGGLE
–	○	–	5F	IRIS MODE TOGGLE*1
–	–	○	1C	COLOR CORRECTION

Table 2-9 Infrared Remote Command Code For Screen

CATEGORY			Code	Name
15 bit PROJECTOR	20 bit PROJECTOR-E	20 bit PROJECTOR-EE		
–	○	–	6E	ASPECT
–	–	○	41	ASPECT NORMAL
–	–	○	44	ASPECT V STRETCH
–	–	○	47	ASPECT STRETCH
–	–	○	48	ASPECT SQUEEZE

Table 2-10 Infrared Remote Command Code For Setup

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

*1: Send the command twice when this unit is in the state of network management “OFF” and standby mode.

Table 2-11 Infrared Remote Command Code For Installation

CATEGORY			Code	Name
15 bit PROJECTOR	20 bit PROJECTOR-E	20 bit PROJECTOR-EE		
–	○	–	3B	3D ON/OFF

Table 2-12 Infrared Remote Command Code For 3D

CATEGORY	Code	Name
20 bit PROJECTOR-EE		
○	12	2D-3D DISPLAY SEL. TOGGLE
○	13	3D FORMAT TOGGLE
○	14	3D GLASSES BRIGHTNESS TOGGLE
○	15	3D DEPTH + HIGH
○	16	3D DEPTH – LOW
○	17	SIMULATED 3D EFFECT TOGGLE
○	32	2D-3D DISPLAY SEL. AUTO
○	33	2D-3D DISPLAY SEL. 3D
○	34	2D-3D DISPLAY SEL. 2D
○	35	3D FORMAT OVER-UNDER
○	36	3D FORMAT SIDE-BY-SIDE
○	37	3D FORMAT SIMULATED 3D
○	38	3D GLASSES BRIGHTNESS HIGH
○	39	3D GLASSES BRIGHTNESS MIDDLE
○	3A	3D GLASSES BRIGHTNESS LOW
○	3B	SIMULATED 3D EFFECT HIGH
○	3C	SIMULATED 3D EFFECT MIDDLE
○	3D	SIMULATED 3D EFFECT LOW

2-2. Reply

<Table 3>			
Item Number		Data	
Item	Data	Upper byte	Lower byte
ACK	Complete	00h	00h
NAK	Undefined Command	01h	01h
	Size Error		04h
	Select Error		05h
	Range Over		06h
	Not Applicable		0Ah
	Check Sum Error	F0h	10h
	Framing Error		20h
	Parity Error		30h
	Over Run Error		40h
	Other Comm Error		50h

Error description

Check Sum Error
A check sum error occurred.

Framing Error
A framing error occurred.

Parity Error
A parity error occurred.

Over Run Error
An overrun error occurred.

Other Comm Error
Other error occurred.

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 not 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

START BIT	D0 (LSB)	D1	D2	D3	D4	D5	D6	D7 (MSB)	PARITY (EVEN)	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 Command is sent, return data is not sent.

3-4. Communication Rules

- When sending a command from CONTROLLER (PC, etc.), the return data from DEVICE (PROJECTOR) should be received first before sending the next command. Even if the next command is sent before receiving the return data, since DEVICE 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 DEVICE to return the return data after CONTROLLER sends the command, refer to the section 3-5.
- When a communication error occurs, DEVICE ignores the data received until now, and set into the reception standby state.
- For undefined commands or commands determined as invalid by DEVICE, DEVICE will send the “NAK” return data to CONTROLLER .
- Take note that when data is written when the input signal of DEVICE is unstable, that data (value) will not be incorporated.
- When INDEX specified Infrared Remote command is transmitted, leave an interval of 45 msec until the next transmission. (Do not return the return data (ACK, NAK) when the SIRCS direct command is received.)

3-5. Approximate Return Waiting Times

The await-return time is approx. 30 to 3200 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 “1.85:1 Zoom”

START CODE = A9h
ITEM NUMBER = 0020h (ASPECT)
SET/GET = 00h (SET)
DATA = 000Ch (1.85:1 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 = 0Ch
END CODE = 9Ah

There’s another way to realize the same purpose. There is “ASPECT” key on the infrared remote controller. By using this key, aspect can be changed. Issue the Infrared Remote Command for this key several times to set aspect “1.85:1 Zoom”. Packet format will make as follows. Refer to the Table 2-9 for ASPECT.

START CODE = A9h
ITEM NUMBER = 196Eh (ASPECT)
SET/GET = 00h (SET)
DATA = 0000h
CHECK SUM = 7Fh
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.

Tip

AMX is a trademark of AMX Corporation.

4. Ethernet

4-1. Service

4-1-1. Advertisement

The advertisement service is provided to facilitate development of a PC application that can automatically detect a projector on the network. This function is achieved by broadcasting the equipment information periodically to the network.
This protocol is set to ON by default.

[Information]
The equipment information shown below is transmitted as the broadcast packet periodically (at certain intervals).

Information	Description
Category	Category of the equipment
Equipment name	Name of the equipment
Serial number	Serial number of the equipment
Installation information	Installation location of the equipment
Community	Community name of the equipment
Power status	Power status of the equipment

Tip

- The category of projector is 0Ah.
- The power status sets FFFFh if communication error occurs.

[Protocol]
The SDAP protocol is defined in order to provide this service.

Item	Description
Protocol name	SDAP (Simple Display Advertisement Protocol)
Transport	UDP
Port number	53862
Broadcast interval	Once every 30 seconds
Community	“SONY”

4-1-2. PJ Talk

By using PJ Talk, it is possible to communicate with PROJECTOR over Ethernet network. Both of set and get method are provided.
This protocol is set to ON by default.

Note

When the network management mode is “OFF”, this model cannot be started using the PJ Talk related devices. Use the remote start.

[Protocol]

Item	Description
Protocol name	SDCP (Simple Display Control Protocol)
Transport	TCP
Port number	53484
TCP connection timeout	30 seconds
Community	“SONY”

4-2. Communication Procedure

Communication sequence is shown below. SDCP commands must be issued by CONTROLLER and PROJECTOR responses to it. On the other hand, SDAP commands are sent by PROJECTOR and have no response from CONTROLLER.

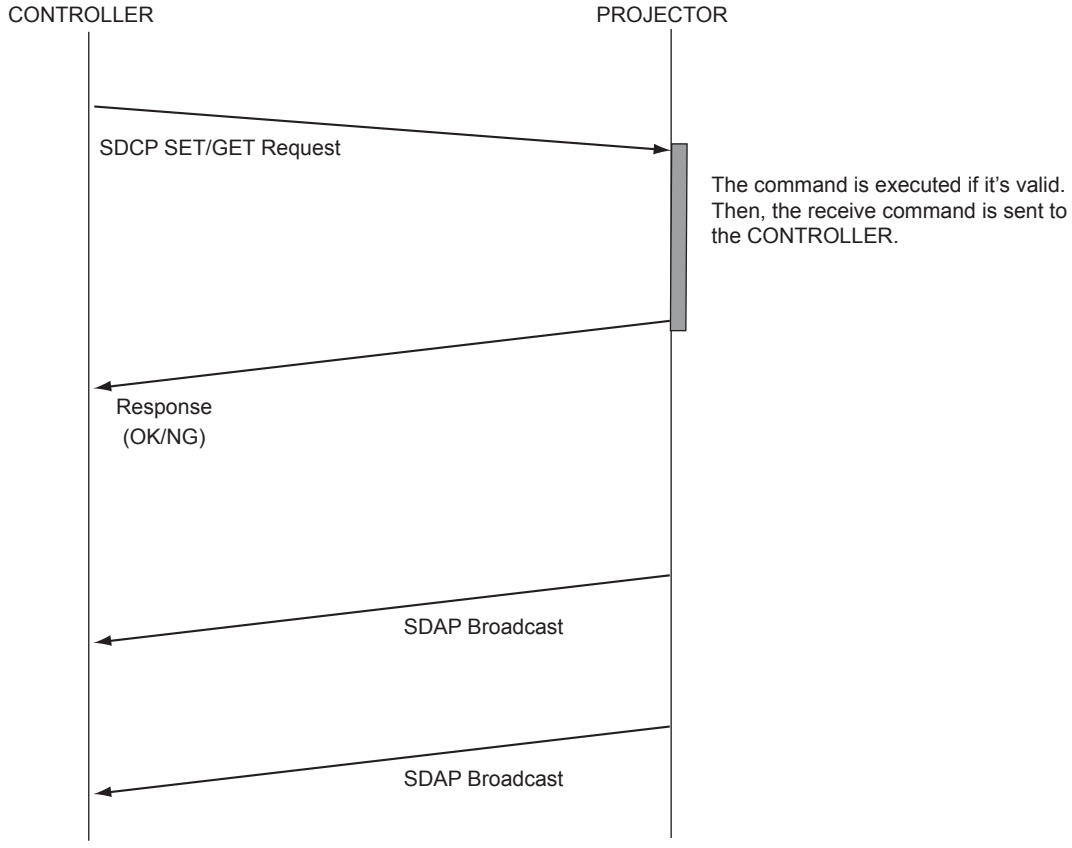

Fig. 4-1 Command Sequence

It is prohibited that CONTROLLER send another command before receiving the response to the previous command. Since PROJECTOR executes the command before sending the return data, CONTROLLER must wait a while before receiving the response. The waiting time depends on not only the commands but also network traffic.

4-3. Protocols

4-3-1. SDAP

This section describes the SDAP packet structure. The number in the brackets shows byte.

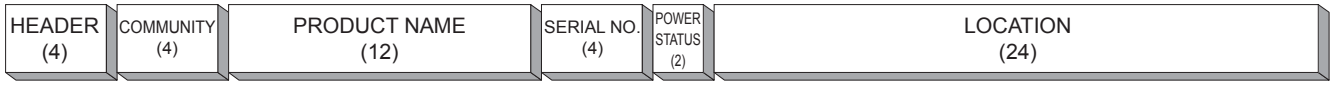

Fig.4-2 Packet structure

1. Header
   The header consists of ID (2 bytes), version (1 byte) and category (1 byte).

4441h (2)	VERSION (1)	CATEGORY (1)

Fig. 4-3 HEADER

ID
It is fixed to “4441h”.

VERSION
This indicates the version number of protocol.
It is fixed to 01h (version 1).

CATEGORY
Category number 0Ah of the projector is entered here.

2. COMMUNITY (Refer to 3. of the section 4-3-2.)
   The community that is set in the display equipment is entered.

COMMUNITY (4)

Fig. 4-4 COMMUNITY

3. Equipment Information

PRODUCT NAME
Name of equipment (Maximum twelve characters)
In case, less than twelve characters, 00h is entered in the blank space.

SERIAL NO.
Serial number is entered.

POWER STATUS
Power supply status of the equipment is entered.

LOCATION
Information of installation location (Maximum twenty four characters)
In case, less than twenty four characters, 00h is entered in the blank space.

4-3-2. SDCP

1. Packet Structure

The Fig. 4-5 shows SDCP packet format. The number in the brackets shows byte. The statement for each field is described bellow.

Fig. 4-5 SDCP Packet Structure

2. HEADER Field

The HEADER field consists of VERSION and CATEGORY sub field shown below. The length of each sub field is 1 byte.

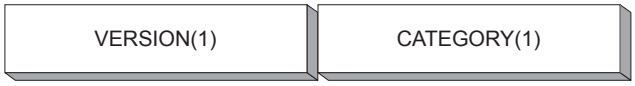

Fig. 4-6 HEADER Field

(1) VERSION sub field
This is a fixed value of 02h, which means “version2”.

(2) CATEGORY sub field
Category number 0Ah of the projector is entered here. Projector checks the category number. If a different category number is entered, the request is ignored.

3. COMMUNITY Field

When the community data matches the community that is set in the display equipment, the request is executed. COMMUNITY field should consist of four alphanumeric characters (case sensitive). All display equipment has the default value “SONY”.

4. COMMAND Field

There are 2 types of COMMAND field, which are REQUEST and RESPONSE. REQUEST command is sent to the PROJECTOR from CONTROLLER. On the other hand, RESPONSE command is sent by PROJECTOR as a response to the REQUEST command.

(1) REQUEST Command

COMMAND filed for REQUEST has 3 sub fields shown as follows.

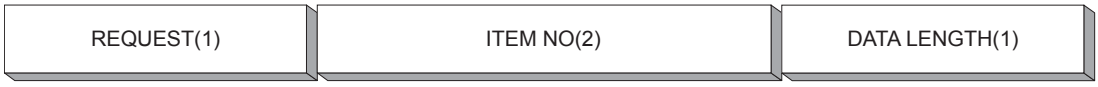

Fig. 4-7 COMMAND Filed for REQUEST

1) REQUEST sub field
   There are only two types of request. One is the GET request to acquire the projector information and status. The other is the SET request to modify the projector setup.

   SET (00h) Used to control turning the power on/off and to control the input selector, and to change the various setups.
   GET (01h) Used to acquire the installation information, equipment status and various setup values.

2) ITEM NO sub field
   Refer to 6. of the section 4-3-2.

3) DATA LENGTH sub field
   This sub field shows the length in byte of the DATA field in the SDCP packet. The maximum data length is 128 bytes. If there is no data to be sent, its value should be 0h.

(2) RESPONSE Command

COMMAND field for RESPONSE has 3 sub fields shown as follows.

RESPONSE(1)	ITEM NO(2)	DATA LENGTH(1)

Fig. 4-8 COMMAND Filed for RESPONSE

1) RESPONSE sub field
The response returns the result of the request.

OK (01h) Indicates that the request was executed correctly.
NG (00h) Indicates that the request is illegal or cannot be executed.

(1-1) OK Response
For SET Request, the packet format will be as follows.

OK[01h]	ITEM NO(2)	DATA LENGTH[00h]

If the response for SET Request is OK, DATA field should be 00h. Therefore, DATA LENGTH field should be 00h as well.

For Get Request, the packet format will be as follows.

OK[01h]	ITEM NO(2)	DATA LENGTH(2)

If the response for GET Request is OK, the DATA field which follows the DATA LENGTH field should be filled with returned data.

(1-2) NG Response
For SET/GET Request

NG[00h]	ITEM NO(2)	DATA LENGTH(2)

If the response for SET/GET Request is no good, DATA field which follows the DATA LENGTH field should be filed with “ERROR CODE”. “ERROR CODE” are defined in 7. of the section 4-3-2.

2) ITEM NO sub field
Refer to 6. of the section 4-3-2.

3) DATA LENGTH sub field
This sub field shows the length in byte of the DATA field in the SDCP packet. The maximum data length is 128 bytes. If there is no data to be sent, its value should be 0h.

5. DATA Field

The content to be filled in this field depends on the COMMAND field. For SET Request commands, appropriate DATA value accompanied with ITEM NO should be chosen. ITEM NO (item number) and its data is shown in the section 2-1-1.
For the GET REQUEST and OK RESPONSE, this field should not be provided. In that case, DATA LENGTH should be 0h.

6. Items

ITEM NO sub field has 2 bytes long. Some of the value for ITEM NO (item number) are defined in the section 2-1-1 as a part of the Sub Command.

Table 4-1 ITEM List For SDCP

ITEM NO	Remarks	SET	GET
0000h – 00FFh	Item Numbers are defined in the section 2-1-1. Use the value of <Table2> (Data) for DATA Field.	○	○
0100h – 01FFh	Item Numbers are defined in the section 2-1-1. Use the value of <Table2> (Data) for DATA Field.	○	○
1700h – 17FFh	Item Numbers are defined in the section 2-1-1. Use the value of <Table2> (Data) for DATA Field.	○	–
1900h – 19FFh	Item Numbers are defined in the section 2-1-1. Use the value of <Table2> (Data) for DATA Field.	○	–
1B00h – 1BFFh	Item Numbers are defined in the section 2-1-1. Use the value of <Table2> (Data) for DATA Field.	○	–
7000h – 7001h	This is the RS-232C encapsulation mode. “Simple Command” can be encapsulated in the DATA field. For the packet format of the command, refer to the section 3-6-1. Use 7000h for the command which the response is expected. Use 7001h for the command which no response is expected.	○	–
8000h – 80FFh	For acquiring equipment information. Refer to the (1).	–	○
9000h – 90FFh	For acquiring the network setup information. Refer to the (2).	–	○

[SDCP Specific Command]

(1) Acquire Equipment Information

This is for acquiring information of PROJECTOR. While the higher byte is fixed as 80h shown in the table above, the lower byte is defined as follows.

Lower byte	Contents	SET	GET
00h	Category Code	–	○
01h	Model name	–	○
02h	Serial number	–	○
03h	Installation location	○	○

0x8000 Category code

1 byte

0x8001 Model name
Alphanumeric 12 characters
If the number of characters is less than 12, the remaining digits are filled with 00h.

0x8002 Serial number
4 bytes
Note
The serial number is in the range of 00000000 to 99999999.

0x8003 Installation location
Alphanumeric 24 characters
If the number of characters is less than 24, the remaining digits are filled with 00h.

(2) Acquire Network Setup Information
This is for acquiring network setting of PROJECTOR. While the upper byte is fixed as 90h, the lower byte is defined as follows.

Lower bytes	Contents	SET	GET
00h	MAC Address	–	○
01h	IP Address	–	○
02h	Subnet Mask	–	○
03h	Default Gateway	–	○
04h	DHCP	–	○

0x9000 Mac Address
6 bytes

0x9001 IP Address
4 bytes

0x9002 Subnet Mask
4 bytes

0x9003 Default Gateway
4 bytes

0x9004 DHCP
1 byte
DHCP disable: 0
DHCP enable: 1

7. ERROR CODE

ERROR CODE has 2 bytes long. The table below shows the error code. Each error category is explained as follows.

Category	Error	Error Code
Item Error (01**h)	Invalid Item	01h
Invalid Item Request	02h	
Invalid Length	03h	
Invalid Data	04h	
Short Data	11h	
Not Applicable Item	80h	
Community Error (02**h)	Different Community	01h
Request Error (10**h)	Invalid Version	01h
Invalid Category	02h	
Invalid Request	03h	
Short Header	11h	
Short Community	12h	
Short Command	13h	
Network Error (20**h)	Timeout	01h
Comm Error (F0**h)	Timeout	01h
Check Sum Error	10h	
Framing Error	20h	
Parity Error	30h	
Over Run Error	40h	
Other Comm Error	50h	
Unknown Response	F0h	
NVRAM Error (F1**h)	Read Error	10h
Write Error	20h	

(1) Item Error

This error occurs when the Item No. of a request is illegal or its data is illegal. The conditions for occurrence of the respective errors are shown below.

Invalid Item

An unsupported Item No. is specified.

Example 1: The unsupported category A**h is specified.
Example 2: The unsupported Item No. 8010h is specified.

Invalid Item Request

The Item No. is supported but an unsupported Request is issued.
Example: An attempt is made to set data in the Model Name (8001h).

Invalid Length

Data length of the specified Item No. is too long.
Example: An attempt is made to set 25 bytes data in the installation location (8003h).

Invalid Data

Data of the specified Item No. is outside the setting range.
Example: An attempt is made to set 101 in the Item when the setting range of the Item is 1 to 100.

Short Data

The length of data is shorter than the value specified by the data length.
Example: The actual data length is 9 bytes but the specified value is 10.

Not Applicable Item

An item that is not valid at present is specified.
Example: The item to switch the display is specified when the main power is off.

(2) Community Error

This error occurs when community is different.
Example: “ABCD” is specified when “SONY” is set.

(3) Request Error
This error occurs when header or command is illegal. The conditions of occurrence of the respective errors are shown below.

Invalid Version
The version of the header is other than 2.

Invalid Category
The category does not match.
Example: 0Bh is specified in the device of category = 0Ah.

Invalid Request
An unsupported request is specified.
Example: Request = 02h is specified.

Short Header
The received data is 1 byte.

Short Community
The received data is in the range of 2 to 5 bytes.

Short Command
The received data is in the range of 6 to 9 bytes.

(4) Network Error
There is something wrong with TCP/IP.

Timeout
Communication was interrupted.

(5) Comm Error
Communication between Ethernet controller and main CPU has been failed.

Timeout
Timeout occurred.

Check Sum Error
A check sum error occurred.

Framing Error
A framing error occurred.

Parity Error
A parity error occurred.

Over Run Error
An overrun error occurred.

Other Comm Error
Another error occurred.

Unknown Response
The data cannot be processed was received.

(6) NVRAM Error
Read Error
Reading from NVRAM was failed.

Write Error
Writing to NVRAM was failed.

8. Packet Examples

For setting the picture mode to dynamic, the packet should be as follows.

HEADER (VERSION, CATEGORY) = (02h, 0Ah)
COMMUNITY = “SONY” = (534F4E59h)
COMMAND (REQUEST, ITEM NO, DATA LENGTH) = (00h, 0002h, 02h)
DATA = 0000h

The same result can be obtained by using ENCAPSULATION mode as well.

HEADER (VERSION, CATEGORY) = (02h, 0Ah)
COMMUNITY = “SONY” = (534F4E59h)
COMMAND (REQUEST, ITEM NO, DATA LENGTH) = (00h, 7000h, 08h)
DATA (START CODE, ITEM NO, SET/GET, DATA, CHECK SUM, END CODE)
= (A9h, 0002h, 00h, 0000h, 02h, 9Ah)

4-3-3. DDDP

This unit is equipped with the protocol conforming DDDP stipulated by AMX.
For details about DDDP, contact AMX.
This protocol is set to ON by default.

Note

- Proper communication may not be possible without setting the default gateway.
- This model cannot be started using the AMX related devices. Use the remote start.
- When the network management mode is “OFF”, this model cannot be started using the AMX related devices. Use the remote start.

4-3-4. SDDP

This unit is equipped with the protocol conforming SDDP stipulated by Control4.
For details about SDDP, contact Control4.
This protocol is set to ON by default.
IPv6 is not supported.

Note

- Proper communication may not be possible without setting the default gateway.
- This model cannot be started using the Control4 related devices. Use the remote start.
- When the network management mode is “OFF”, this model cannot be started using the Control4 related devices. Use the remote start.

4-3-5. CIP

The protocol that operates in the application “Crestron RoomView” provided by Crestron is implemented in this unit.
Crestron RoomView is an integrated control system which enables the integrated monitoring and control of multiple devices connected over the network.
For details of Crestron RoomView, refer to the Crestron website.
Select “Setup” in the web setup window. Then, you can set this function in “Service” of “Advanced Menu”.
IPv6 is not supported.

Note

Set network management to ON beforehand by menu operation when using this function.

Tip

Crestron and RoomView are registered trademarks of Crestron Electronics, Inc.

VPL-HW60 (J)
VPL-HW60 (SY)
VPL-HW65 (SY)
VPL-HW65 (UC)
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