

ESC/VP Level 6 Serial Communication Manual (Abridged Edition) Ver.1

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REVISION STATUS

Revision	Issued Date	Description
1	2001.1.15	First Release

1. OUTLINE

This manual describes the ESC/VP Level 6 protocol for communication with projectors manufactured by Seiko Epson. The manual is an abridged edition which summarizes the most commonly-used functions. If further details are required, please refer to the full edition of the manual.

2. APPLICATION

This manual applies to the following models.

[Applicable models]

- EMP-8100/9100
- EMP-8150
- EMP-7700/7600/5600

3. SERIAL COMMUNICATION SPECIFICATIONS

The projectors can be controlled by connecting a serial cable to the projector (Mouse/Com port) and a computer so that ESC/VP commands can be sent from the computer to the projector.

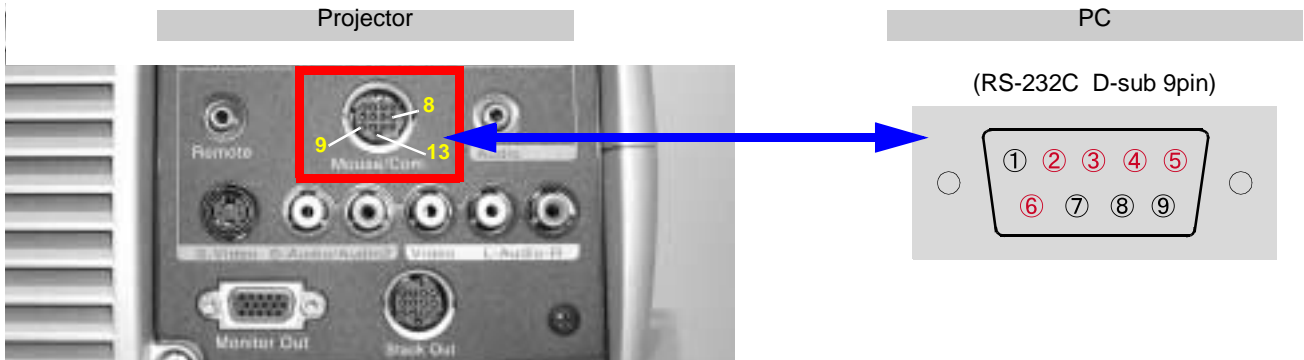
[Communication Conditions]

- | | |
|-----------------------|---|
| • Communication Speed | Standard speed: 9600 bps (EMP-8100/9100/8150/7700: 9600 to 57600 bps)
(EMP-7600/5600: 9600 to 38400 bps) |
| • Bit length | 8 bit |
| • Parity | None |
| • Stop bit | 1 bit |
| • Flow control | Hardware (DTR/DSR) |

[Connectors]

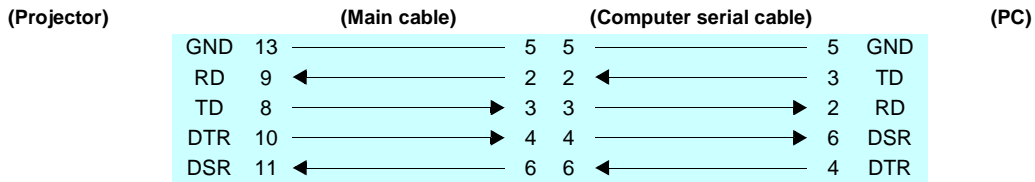
Connector type: D-sub 9pin

(The pins which are actually used are the five pins from 2 to 6. These pins are used to send and receive data, for flow control and for grounding.)

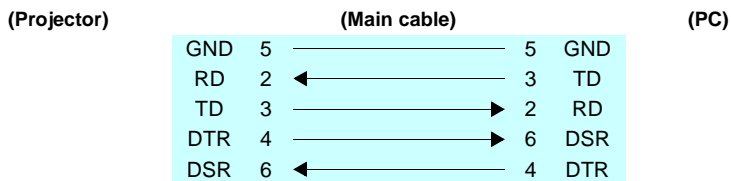


[Serial cable connection diagram]

<EMP-8100/8150/9100>



<EMP-7700/7600/5600>



List of Signal Function

Signal	Function
GND	Ground
TD	Data transmission
RD	Data reception
DSR	Data set ready
DTR	Data terminal ready

4. COMMAND TYPES

The types of commands used can be divided into apply commands and reply commands. Both of these command types can be further divided into setting commands, acquisition commands and initialization commands. Apply commands are used to make settings, acquire information and carry out initialization, and reply commands provide responses to apply commands.

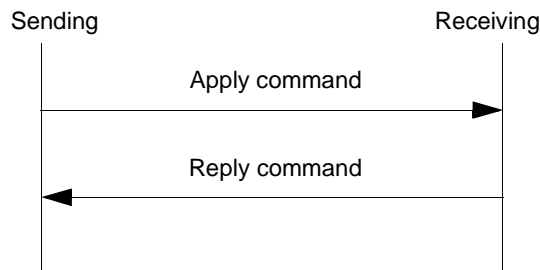


Figure 4-1. Apply/Reply Command

The table below gives details on each command.

Table 4-1. Details on each command

Command Types		Caption
Apply command	Set/Report/Indicate/Request	Sets, reports, indicates and requests values
	Get	Gets the current value.
	Initialize	Initializes a value.
	Package	Command which combines the attributes of setting, reporting, indicating and requesting
Reply command	Set/Report/Indicate/Request	Response to an apply command for setting, reporting, indicating or requesting
	Get	Return Packet for getting
	Initialize	Return Packet for initializing
	Package	Response to a package apply command
	Alert	Alert response to apply commands

5. COMMAND STRUCTURE

- ECommands are expressed as hexadecimal codes.
- All commands start with an ID code and end with a checksum.

When an ESC/VP command which is sent from the computer is received by the projector, a reply is returned. However, the replies which are returned by the projector only indicate whether the initial command was received by the projector, and do not indicate whether the command was executed or not.

Acquisition commands are sent in order to check the execution of a command.

In addition, if the next command is sent before the reply to a previous command has been received from the projector, it may result in a communication error.

The command structure is shown below.

* The maximum length for a command is 1024 bytes.

* Command layout is BigEndian.

(1) STX	(2) Size	(3) Attribute	(4) FromTo	(5) Group	(6) Item	(7) Parameter	(8) Check Sum
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(1) STX

: 0x1D (1 byte)

(2) Size

: Size of a command packet (Specifies a number of the data from 1D to CS) (2 bytes)

Example) To turn the power on over a serial connection

1D 000x 01 01 00 03 01 CS ---> 0x0009

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

Example) To check the power status over a serial connection

1D 000x 02 01 00 03 CS ---> 0x0008

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

(3) Attribute

: Indicates attributes such as apply command/reply command, OK/Not OK, etc. (1 byte)

The attribute codes are shown below.

Table 5-1. Attribute of the Apply command

Attribute	Attribute code	Caption
Set	0x01	Sets, reports and indicates values.
Get	0x02	Gets the current value.
Initialize	0x03	Initializes a value.
Package	0x05	Command which combines the attributes of setting, reporting, indicating and requesting.

Table 5-2. Attribute of the Reply command

Attribute	Attribute code	Caption
Return Packet for setting (OK)	0x81	Indicates that the set command received was analyzed correctly.
Return Packet for setting (NG)	0xC1	Indicates that the set command received was not analyzed correctly.
Return Packet for getting (OK)	0x82	Indicates that the get command received was analyzed correctly.
Return Packet for getting (NG)	0xC2	Indicates that the get command received was not analyzed correctly.
Return Packet for initializing (OK)	0x83	Indicates that the initialize command received was analyzed correctly.
Return Packet for initializing (NG)	0xC3	Indicates that the initialize command received was not analyzed correctly.
Response to package (OK)	0x85	Indicates that the combined attribute command received has been parsed correctly.
Response to package (not OK)	0xC5	Indicates that the combined attribute command received has not been parsed correctly.
Alert response to commands	0x8F	Indicates that the command received contained an error and could not be parsed correctly.

(4) FromTo

: Specifies the sending and receiving ends of the FromTo command. (1 byte)
 Indicates sending end between 7th and 4th bit and receiving end between 3rd to 0th bit.

The basic FromTo combination is shown below.

Table 5-3. List of FromTo codes (bit)

Machines	Code (bit)
PC (RS-232C communication)	0x00
Master projector or stand-alone projector	0x01

The apply/reply codes using FromTo combinations are shown below.

Table 5-4. List of FromTo codes for apply commands

From	To	Apply
PC (Serial)	Projector (Master)	0x01

Table 5-5. List of FromTo codes for reply commands

From	To	Reply
PC (Serial)	Projector (Master)	0x10

(5) Functional Classification (Group)

: Represents the functional classification as classification codes. (1 byte)

Table 5-6. List of Functional Classification

Functional classification	Group Code	Caption
Special control (Special)	0x00	Performs switching and resetting the operating mode.
Screen control (Screen)	0x01	Controls the display screen.
Audio control (Audio)	0x02	Controls the audio.
PC control (PC)	0x03	Controls PC's image quality.
VIDEO control (Video)	0x04	Controls Video's image quality.
Display control (Display)	0x05	Controls the display.
Option (Option)	0x06	Sets the additional functions for the whole projector.
Custom (Custom)	0x07	Sets the additional functions that user can program.
Reserved	0x08	
Reserved	0x09	
Reserved	0x0E	
Reserved	0x0F	
Stack control (Stack)	0x10	Performs various kinds of controls of Stack.
Reserved	0x20	

* Refer to the full manual if using stack control.

(6) Function (Item)

: ESC/VP functions and the classification code for those are as follows. (1 byte)

Table 5-7. List of Function

Functional classification	Group Code	Function	Item Code	Functional classification	Group Code	Function	Item Code
Special Control (Special)	0x00	※ Power	0x03	Video Control (Video)	0x04	※ Brightness	0x00
		※ Communication rate	0x06			※ Contrast	0x01
		Initialize all	0x07			※ Sharpness	0x02
		※ Lamp on	0x09			※ Color	0x03
		Cursor Speed	0x10			※ Tint	0x04
		△ Password	0x11			※ Video mode	0x05
		※ Error Information	0x12	Display Control (Display)	0x05	Smooth motion	0x06
		△ Administrator Log on	0x13			Horizontal Position	0x00
		△ Administrator Log off	0x14			Vertical Position	0x01
		※ Key code	0x16			※ Rear Proj.	0x02
		Serial command	0x17			※ Ceiling	0x03
		○ Max/Min	0x18			Color Temperature	0x04
		Alert	0x19			Black Level	0x08
		○ Product ID	0x20			White Level	0x09
		○ Software version	0x21			Auto color temperature	0x0A
		○ Protocol version	0xFF			Select color temperature	0x0B
Screen Control (Screen)	0x01	※ Input source	0x00	Option (Option)	0x06	Color temperature Red	0x0C
		※ Input mode	0x01			Color temperature Green	0x0D
		○ ※ Freeze	0x02			Color temperature Blue	0x0E
		○ ※ A/V Mute	0x03			○ Language	0x00
Audio Control (Audio)	0x02	Volume	0x00			※ Source Prompt	0x03
		Bass	0x06			※ Blank	0x04
		Treble	0x07			Set user gamma	0x08
		SRS SPACE	0x08			※ BNC	0x09
		SRS CENTER	0x09			※ Keystone	0x0F
PC Control (PC)	0x03	※ Brightness	0x00			※ Startup screen	0x10
		※ Contrast	0x01			※ Message	0x11
		※ Sync.	0x02			Comp2 Sync termination	0x13
		※ Tracking	0x03			※ V keystone	0x14
		Get tracking base	0x04			※ DelayON	0x15
		Get PC Frequency	0x0A			※ Comp1/DVI	0x16
		Get Resolution	0x0B			※ Sleep Mode	0x17
		Sharpness	0x0D			○ ※ Computer2 input format	0x19
		※ Resolution	0x0E	Custom (Custom)	0x07	※ PinP	0x08
		Preset	0x0F			○ ※ PinP audio selection setting	0x09
		○ Automatic setup	0x12	Stack Control (Stack)	0x10	○ Check Stack state	0x00
		○ Automatic black level adjustment	0x13			○ Check Stack	0x01
		○ Automatic white level adjustment	0x14			Lock/Unlock	0x04
						○ Source changing	0x06

○ : Valid for Master projector or Stand-alone projector only

△ : Valid for Master projector only

※ : Commands listed in the abridged manual

(7) Parameters

: Parameters differ for each command, so refer the separate descriptions for each command.

- * In the case of items for which the setting range can be adjusted, the parameter values are the values in the table below which have been converted to hexadecimal format.

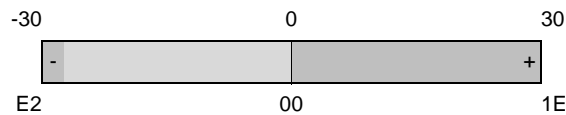


Table 5-8. Hexadecimal conversion list

Decimal	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Hexadecimal	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E

Decimal	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24	-25	-26	-27	-28	-29	-30
Hexadecimal	FF	FE	FD	FC	FB	FA	F9	F8	F7	F6	F5	F4	F3	F2	F1	F0	EF	EE	ED	EC	EB	EA	E9	E8	E7	E6	E5	E4	E3	E2

- * If a reply command contains an error attribute, the following parameter (2 bytes) is set.

Table 5-9. List of error parameters

Parameters	Error type	Error condition
0x0001	Network in use	An attempt was made to communicate with the projector via a network connection, but another computer was already communicating with the projector.
0x0002	No applicable setting	Parameter is outside the setting range and FromTo is incorrect. Command is not supported, or unknown command.
0x0003	Resource error	Insufficient EasyMP.net resources.
0x0004	Download in progress	Projector is in download mode.
0x0005	Setting not currently possible	The apply command received cannot be processed.
0x0006	Lamp off	Projector lamp is switched off.
0x0007	Error between projector and EasyMP.net	When the command was sent via EasyMP.net and too many retries or timeouts occur between EasyMP.net and the projector, it indicates an error upstream from EasyMP.net.
0x0008	EasyMP.net rebooting	EasyMP.net is at end sequence.
0x0009	Status mismatch	A command which was different from the expected command was received.
0x000A	Projector error	When too many retries or timeouts occur between master and slave projectors when connected in a stack, it indicates an error upstream from the master projector.
0x000B	Network not connected	An attempt at communication with the computer (network) was made, but no computer (network) exists.
0x000C	Locked	An item which has been locked by the administrator (installer) was specified.
0x000D	Not available for stack	A command which cannot be used for a stack configuration was specified.

(8) Checksum

: Represent checksum (1 byte)

Checksum calculation method

All bytes of data from the size to the parameters is added together, and the two's complement of the result in hexadecimal format is subtracted from 0x0100 to obtain the checksum.

Example) For the command "1D 0007 01 10 00 02 0A CS"

$$0x00 + 0x07 + 0x01 + 0x10 + 0x00 + 0x02 + 0x0A = 0x24 \quad \text{--->} \quad 0x0100 - 0x24 = \mathbf{0xDC}$$

6. CONTROL CODE

00 SPECIAL CONTROL

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum

03 : Power

Controls the projector power and gets the present power state.

[Parameter] Data relating to the power states.

0x00: PowerOFF

0x01: PowerON

0x02: Suspend

0x10: During Startup

0x11: Cool down

0x20: System fault

* Although setting 0x02 and later in parameter and sending command to the projector, returns NG in replay. 0x02 and later are available just for informing from the projector.

Set	1D	0009	01	01	00	03	00 01	CS	1D	0008 000A	81 C1	10	00	03	-- PARA	CS
Get	1D	0008	02	01	00	03	--	CS	1D	0009 000A	82 C2	10	00	03	PARA	CS

06 : Communication rate

Controls the communication rate.

[Parameter] Data relating to communication rate.

<For EMP-8100/9100/8150/7700>

0x00: 9600bps

0x01: 19200bps

0x02: 38400bps

0x03: 57600bps

<For EMP-7600/5600>

0x00: 9600bps

0x01: 19200bps

0x02: 38400bps

Set	1D	0009	01	01	00	06	PARA	CS	1D	0008 000A	81 C1	10	00	06	-- PARA	CS
Get	1D	0008	02	01	00	06	--	CS	1D	0009 000A	82 C2	10	00	06	PARA	CS
Initialize	1D	0008	03	01	00	06	--	CS	1D	0009 000A	83 C3	10	00	06	PARA	CS

09 : Lamp Hour

Gets the present lamp hour.

[Parameter] Returns the present lamp hour (in hours) (2 bytes)

Get	1D	0008	02	01	00	09	--	CS	1D	000A 000A	82 C2	10	00	09	PARA	CS
-----	----	------	----	----	----	----	----	----	----	--------------	----------	----	----	----	------	----

12 : Error information

Gets and reports projector error information.

[Parameter] Projector error information

The following data is set with an OR:

0x00: No error or error is cancelled.

0x01: Fan problem

0x04: Internal temperature is abnormally high.

0x08: Lamp life expectancy is closed to end.

0x20: Lamp problem

0x40: Other failures

0x80: Stack failure (EMP-8100/8150/9100 only)

Set	1D	0009	01	01	00	12	--	CS	1D	0008 000A	81 C1	10	00	12	-- PARA	CS
Get	1D	0008	02	01	00	12	--	CS	1D	0009 000A	82 C2	10	00	12	PARA	CS

00 SPECIAL CONTROL

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum

16 : Key codes

Controls the key codes.

[Parameter] Key attribute length, key attribute, key code length, key code and reserved space are returned in order (12 bytes).

Key attribute length: Size of the key attribute (2 bytes)Key attribute: Indicates whether following bits are ON or OFF (2 bytes)

Bit 0: 0 = key OFF, 1 = key ON

Bit 1: 0 = shift key OFF, 1 = shift key ON

Key code length: Size of key code (2 bytes)Key code: (2 bytes)

0x0001: Power	0x0201: HEMP	0x0600: Left mouse button click
0x0002: reserved	0x0202: Enter	0x0601: Right mouse button click
0x0100: Source	0x0203: ESC	0x0700: Volume+
0x0101: Computer	0x0300: Auto	0x0701: Volume-
0x0102: Computer-P	0x0301: Tracking+	0x0702: A/V Mute
0x0103: DVI	0x0302: Tracking-	0x0703: Zoom+
0x0104: Computer2	0x0303: Sync+	0x0704: Zoom-
0x0110: Video	0x0304: Sync-	0x0705: Resize
0x0111: S-Video	0x0500: F1	0x0706: Freeze
0x0112: Video-P	0x0501: F2	0x0707: PinP
0x0113: BNC	0x0502: F3	0x0708: Preset
0x0120: EasyMP.net	0x0503: F4	0x0709: Keystone+
0x0200: Menu	0x0504: F5	0x070A: Keystone-

Reserved: 0x00000000 (4 bytes)

Set	1D	0014	01	01	00	16	PARA	CS	1D	0008 000A	81 C1	10	00	16	-- PARA	CS
-----	----	------	----	----	----	----	------	----	----	--------------	----------	----	----	----	------------	----

01 SCREEN CONTROL

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Checksum	STX	Size	Attribute	From To	Group	Item	Parameter	Checksum

00 : Input Source

Controls the input source

[Parameter] Data relating to input source.

<For EMP-8100/8150/9100/7700>

0x10: PC1

0x20: Reserved

0x21: Video (Composite)

0x22: Video (S)

0x30: BNC (RGB)

0x40: BNC (YCrCb)

0x50: DVI

0xE1: Reserved

0xE2: EasyMP.net

<For EMP-7600/5600>

0x10: PC1

0x11: PC2 (RGB)

0x12: Component Video (YCbCr)

0x13: Component Video (YPbPr)

0x21: Video (Composite)

0x22: Video (S)

0x50: DVI

Set	1D	0009	01	01	01	00	PARA	CS	1D	0008 000A	81 C1	10	01	00	-- PARA	CS
Get	1D	0008	02	01	01	00	--	CS	1D	0009 000A	82 C2	10	01	00	PARA	CS
Initialize	1D	0008	03	01	01	00	--	CS	1D	0009 000A	83 C3	10	01	00	PARA	CS

01 : Input mode

Controls the input mode.

[Parameter] Data relating to input mode

0x00: No mode (NoSignal)

0x01: PC

0xE0: NTSC

0xE1: NTSC4.43

0xE2: PAL

0xE3: PALN

0xE4: PALM

0xE5: PAL60

0xE6: SECAM

0xE7: NTSC50

0xE8: YCrCb(50Hz)

0xE9: YCrCb(60Hz)

0xEA: 480P

0xEB: 720P

0xEC: 1080I

0xED: 1080P

0xD0: Not Supported

Set	1D	0009	01	01	01	01	PARA	CS	1D	0008 000A	81 C1	10	01	01	-- PARA	CS
Get	1D	0008	02	01	01	01	--	CS	1D	0009 000A	82 C2	10	01	01	PARA	CS

02 : Freeze

(* Only valid for Standalone/Master projector)

Controls the Freeze.

Freeze ON: Freezes the image.

[Parameter] Data relating to Freeze

0x00: Freeze OFF

0x01: Freeze ON

0x02: Toggle switch

Set	1D	0009	01	01	01	02	PARA	CS	1D	0008 000A	81 C1	10	01	02	-- PARA	CS
Get	1D	0008	02	01	01	02	--	CS	1D	0009 000A	82 C2	10	01	02	PARA	CS
Initialize	1D	0008	03	01	01	02	--	CS	1D	0009 000A	83 C3	10	01	02	PARA	CS

03 : A/V Mute

(* Only valid for Standalone/Master projector)

Controls the A/V Mute.

A/V Mute ON: Temporarily mutes the image and sound.

[Parameter] Data relating to A/V Mute

0x00: A/V Mute OFF

0x01: A/V Mute ON

Set	1D	0009	01	01	01	03	PARA	CS	1D	0008 000A	81 C1	10	01	03	-- PARA	CS
Get	1D	0008	02	01	01	03	--	CS	1D	0009 000A	82 C2	10	01	03	PARA	CS
Initialize	1D	0008	03	01	01	03	--	CS	1D	0009 000A	83 C3	10	01	03	PARA	CS

03 PC CONTROL

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum

00 : Brightness

Controls the screen brightness for the currently-selected PC input source.

[Parameter] Brightness Value (1 byte)
Setting range: E2 to FF, 00 to 1E

Set	1D	0009	01	01	03	00	PARA	CS	1D	0008 000A	81 C1	10	03	00	-- PARA	CS
Get	1D	0008	02	01	03	00	--	CS	1D	0009 000A	82 C2	10	03	00	PARA	CS
Initialize	1D	0008	03	01	03	00	--	CS	1D	0009 000A	83 C3	10	03	00	PARA	CS

01 : Contrast

Controls the screen contrast for the currently-selected PC input source.

[Parameter] Contrast Value (1 byte)
Setting range: E2 to FF, 00 to 1E

Set	1D	0009	01	01	03	01	PARA	CS	1D	0008 000A	81 C1	10	03	01	-- PARA	CS
Get	1D	0008	02	01	03	01	--	CS	1D	0009 000A	82 C2	10	03	01	PARA	CS
Initialize	1D	0008	03	01	03	01	--	CS	1D	0009 000A	83 C3	10	03	01	PARA	CS

02 : Sync.

Controls the screen synchronization for the currently-selected PC input source.

Adjusts disturbance, blurring and vertical noise that appears on the Computer image.

[Parameter] Sync. Value (1 byte)
Setting range: 00 to 3F

Set	1D	0009	01	01	03	02	PARA	CS	1D	0008 000A	81 C1	10	03	02	-- PARA	CS
Get	1D	0008	02	01	03	02	--	CS	1D	0009 000A	82 C2	10	03	02	PARA	CS
Initialize	1D	0008	03	01	03	02	--	CS	1D	0009 000A	83 C3	10	03	02	PARA	CS

03 : Tracking

Controls the screen tracking for the currently-selected PC input source.

Adjusts vertical stripes that appear on the Computer image.

[Parameter] Tracking Value (2 bytes)
Setting range: 80 to FF, 00 to 7F

Set	1D	000A	01	01	03	03	PARA	CS	1D	0008 000A	81 C1	10	03	03	-- PARA	CS
Get	1D	0008	02	01	03	03	--	CS	1D	000A 000A	82 C2	10	03	03	PARA	CS
Initialize	1D	0008	03	01	03	03	--	CS	1D	000A 000A	83 C3	10	03	03	PARA	CS

0D : Sharpness

Controls the screen sharpness for the currently-selected PC input source.

[Parameter] Sharpness Value (1 byte)
Setting range: FA to FF, 00 to 05

Set	1D	0009	01	01	03	0D	PARA	CS	1D	0008 0008	81 C1	10	03	0D	--	CS
Get	1D	0008	02	01	03	0D	--	CS	1D	0009 000A	82 C2	10	03	0D	PARA	CS
Initialize	1D	0008	03	01	03	0D	--	CS	1D	0009 000A	83 C3	10	03	0D	PARA	CS

03 PC CONTROL

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum

0E : Input Resolution

Controls the screen input resolution for the currently-selected PC input source.

[Parameter]	Input Resolution (1 byte)															
	0x00: AUTO					0x0D: 720x350						0x1B: 1280x960(1B)				
	0x01: NTSC(I)					0x0E: 720x400						0x1C: 1280x1024(1C)				
	0x02: PAL(I)					0x0F: 800x600						0x1D: 1600x1024(1D)				
	0x03: 1024x768(I)					0x10: MAC16						0x1E: 1600x1200(1E)				
	0x04: 1120X750(I)					0x11: 960x720						0x1F: 1600x1280(1F)				
	0x05: 1280X1024(I)					0x12: 720P						0x20: 1920x1080				
	0x06: 1600X1200(I)					0x13: 1024x480						0x21: 1400x1050				
	0x07: 1920X1034(I)					0x14: 1024x600						0x80: Preset 1				
	0x08: 1920x1080(I)					0x15: 1024x768						0x81: Preset 2				
	0x09: 640x350					0x16: MAC19						0x82: Preset 3				
	0x0A: 640x400					0x17: 1024x1024						0x83: Preset 4				
	0x0B: 640x480/MAC13					0x18: 1152x864						0x84: Preset 5				
	0x0C: 480P					0x19: MAC21						0xA0: Custom 1				
						0x1A: 152x900(1A)						0xA1: Custom 2				

Set	1D	0009	01	01	03	0E	PARA	CS	1D	0008 000A	81 C1	10	03	0E	-- PARA	CS
Get	1D	0008	02	01	03	0E	--	CS	1D	0009 000A	82 C2	10	03	0E	PARA	CS
Initialize	1D	0008	03	01	03	0E	--	CS	1D	0009 000A	83 C3	10	03	0E	PARA	CS

12 : Automatic setup

(* Only valid for Standalone/Master projector)

Reports the start and end of automatic setup.

[Parameter] Data relating to automatic setup status, horizontal resolution and vertical resolution are returned in that order.

(1) Data relating to automatic setup status: (1 byte)

0x00: Start

0x01: Normal completion

0x02: Abnormal completion

(2) Horizontal resolution: (2 bytes)

Only valid at start. NULL is embedded at end.

(3) Vertical resolution: (2 bytes)

Only valid at start. NULL is embedded at end.

Set	1D	000D	01	01	03	12	PARA	CS	1D	0008 000D	81 C1	10	03	12	-- PARA	CS
------------	----	------	----	----	----	----	------	----	----	--------------	----------	----	----	----	------------	----

04 VIDEO CONTROL

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Checksum	STX	Size	Attribute	From To	Group	Item	Parameter	Checksum

00 : Brightness

Controls the screen brightness for the currently-selected video input source.

[Parameter] Brightness Value (1 byte)
Setting range: F1 to FF, 00 to 0F

Set	1D	0009	01	01	04	00	PARA	CS	1D	0008 000A	81 C1	10	04	00	-- PARA	CS
Get	1D	0008	02	01	04	00	--	CS	1D	0009 000A	82 C2	10	04	00	PARA	CS
Initialize	1D	0008	03	01	04	00	--	CS	1D	0009 000A	83 C3	10	04	00	PARA	CS

01 : Contrast

Controls the screen contrast for the currently-selected video input source.

[Parameter] Contrast Value (1 byte)
Setting range: F1 to FF, 00 to 0F

Set	1D	0009	01	01	04	01	PARA	CS	1D	0008 000A	81 C1	10	04	01	-- PARA	CS
Get	1D	0008	02	01	04	01	--	CS	1D	0009 000A	82 C2	10	04	01	PARA	CS
Initialize	1D	0008	03	01	04	01	--	CS	1D	0009 000A	83 C3	10	04	01	PARA	CS

02 : Sharpness

Controls the screen sharpness for the currently-selected video input source.

[Parameter] Sharpness Value (1 byte)
Setting range: FB to FF, 00 to 06

Set	1D	0009	01	01	04	02	PARA	CS	1D	0008 000A	81 C1	10	04	02	-- PARA	CS
Get	1D	0008	02	01	04	02	--	CS	1D	0009 000A	82 C2	10	04	02	PARA	CS
Initialize	1D	0008	03	01	04	02	--	CS	1D	0009 000A	83 C3	10	04	02	PARA	CS

03 : Saturation

Controls the screen saturation for the currently-selected video input source.

[Parameter] Saturation Value (1 byte)
Setting range: F1 to FF, 00 to 0F

Set	1D	0009	01	01	04	03	PARA	CS	1D	0008 000A	81 C1	10	04	03	-- PARA	CS
Get	1D	0008	02	01	04	03	--	CS	1D	0009 000A	82 C2	10	04	03	PARA	CS
Initialize	1D	0008	03	01	04	03	--	CS	1D	0009 000A	83 C3	10	04	03	PARA	CS

04 : Tint

Controls the screen tint for the currently-selected video input source.

[Parameter] Tint Value (1 byte)
Setting range: F1 to FF, 00 to 0F

Set	1D	0009	01	01	04	04	PARA	CS	1D	0008 000A	81 C1	10	04	04	-- PARA	CS
Get	1D	0008	02	01	04	04	--	CS	1D	0009 000A	82 C2	10	04	04	PARA	CS
Initialize	1D	0008	03	01	04	04	--	CS	1D	0009 000A	83 C3	10	04	04	PARA	CS

04 VIDEO CONTROL

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Checksum	STX	Size	Attribute	From To	Group	Item	Parameter	Checksum

05 : Video Mode

Controls the video mode for the currently-selected video input source.

[Parameter] Data relating to video mode

* The video signal method will be automatically set up in the [Auto] mode, but do not use the [Auto] mode for the PAL system (60Hz).

0x00: AUTO

0x03: PAL

0x06: PAL60

0x01: NTSC

0x04: PAL N

0x07: SECAM

0x02: NTSC4.43

0x05: PAL M

0x08: NTSC50

Set	1D	0009	01	01	04	05	PARA	CS	1D	0008 000A	81 C1	10	04	05	-- PARA	CS
Get	1D	0008	02	01	04	05	--	CS	1D	0009 000A	82 C2	10	04	05	PARA	CS
Initialize	1D	0008	03	01	04	05	--	CS	1D	0009 000A	83 C3	10	04	05	PARA	CS

06 : Smooth Motion

(Applicable models: EMP-8100/8150/9100)

Controls whether smooth motion is on or off.

Images, etc., will move smoothly when seen after this has been set at [ON].

[Parameter] Data relating to whether smooth motion is on or off (1 byte)

0x00: OFF

0x01: ON

Set	1D	0009	01	01	04	06	PARA	CS	1D	0008 000A	81 C1	10	04	06	-- PARA	CS
Get	1D	0008	02	01	04	06	--	CS	1D	0009 000A	82 C2	10	04	06	PARA	CS
Initialize	1D	0008	03	01	04	06	--	CS	1D	0009 000A	83 C3	10	04	06	PARA	CS

05 DISPLAY CONTROL

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum

02 : Rear Proj.

Controls rear projection for the images being projected.

[Parameter] Data relating to whether rear projection is on or off
 0x00: OFF 0x01: ON

Set	1D	0009	01	01	05	02	PARAMETER	CS	1D	0008 000A	81 C1	10	05	02	-- PARAMETER	CS
Get	1D	0008	02	01	05	02	--	CS	1D	0009 000A	82 C2	10	05	02	PARAMETER	CS
Initialize	1D	0008	03	01	05	02	--	CS	1D	0009 000A	83 C3	10	05	02	PARAMETER	CS

03 : Ceiling

Controls ceiling for the images being projected.

[Parameter] Data relating to whether ceiling is on or off
 0x00: OFF 0x01: ON

Set	1D	0009	01	01	05	03	PARAMETER	CS	1D	0008 000A	81 C1	10	05	03	-- PARAMETER	CS
Get	1D	0008	02	01	05	03	--	CS	1D	0009 000A	82 C2	10	05	03	PARAMETER	CS
Initialize	1D	0008	03	01	05	03	--	CS	1D	0009 000A	83 C3	10	05	03	PARAMETER	CS

06 OPTION

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum

03 : Source Prompt

Controls whether input source name is displayed or not displayed.

[Parameter] Data relating to whether input source name is displayed or not.
 0x00: OFF
 0x01: ON

Set	1D	0009	01	01	06	03	PARA	CS	1D	0008 000A	81 C1	10	06	03	-- PARA	CS
Get	1D	0008	02	01	06	03	--	CS	1D	0009 000A	82 C2	10	06	03	PARA	CS
Initialize	1D	0008	03	01	06	03	--	CS	1D	0009 000A	83 C3	10	06	03	PARA	CS

04 : Blank

Controls the screen color when the screen is blank.

[Parameter] Data relating to Blank color
 0x00: Black
 0x01: Blue
 0x02: User Logo

Set	1D	0009	01	01	06	04	PARA	CS	1D	0008 000A	81 C1	10	06	04	-- PARA	CS
Get	1D	0008	02	01	06	04	--	CS	1D	0009 000A	82 C2	10	06	04	PARA	CS
Initialize	1D	0008	03	01	06	04	--	CS	1D	0009 000A	83 C3	10	06	04	PARA	CS

09 : BNC Input Source Type

(Applicable models: EMP-8100/8150/9100/7700)

Controls the input format for the BNC connector.

[Parameter] Data relating to input format for the BNC connector
 0x00: RGB
 0x01: YCrCb
 0x02: YPbPr

Set	1D	0008	01	01	06	09	PARA	CS	1D	0008 000A	81 C1	10	06	09	-- PARA	CS
Get	1D	0008	02	01	06	09	--	CS	1D	0009 000A	82 C2	10	06	09	PARA	CS
Initialize	1D	0008	03	01	06	09	--	CS	1D	0009 000A	83 C3	10	06	09	PARA	CS

0F : Keystone

Controls the keystone correction for the projected images.

Adjusts trapezoid distortion.

[Parameter] Keystone Value (1 byte)
 Setting range: 80 to FF, 00 to 7F

Set	1D	0009	01	01	06	0F	PARA	CS	1D	0008 000A	81 C1	10	06	0F	-- PARA	CS
Get	1D	0008	02	01	06	0F	--	CS	1D	0009 000A	82 C2	10	06	0F	PARA	CS
Initialize	1D	0008	03	01	06	0F	--	CS	1D	0009 000A	83 C3	10	06	0F	PARA	CS

10 : Start up Screen

Controls whether the startup screen is displayed or no displayed.

Displays the user logo during warm-up after the power has been switched on.

[Parameter] Data relating to whether the startup screen is displayed or no displayed
 0x00: Non-display
 0x01: Display

Set	1D	0009	01	01	06	10	PARA	CS	1D	0008 000A	81 C1	10	06	10	-- PARA	CS
Get	1D	0008	02	01	06	10	--	CS	1D	0009 000A	82 C2	10	06	10	PARA	CS
Initialize	1D	0008	03	01	06	10	--	CS	1D	0009 000A	83 C3	10	06	10	PARA	CS

06 OPTION

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Checksum	STX	Size	Attribute	From To	Group	Item	Parameter	Checksum

11 : Message

Controls the screen state when no signal is input.

[Parameter] Data relating to screen state when no signal is input
 0x00: Non-display
 0x01: Black
 0x02: Blue
 0x03: Logo

Set	1D	0009	01	01	06	11	PARA	CS	1D	0008 000A	81 C1	10	06	11	-- PARA	CS
Get	1D	0008	02	01	06	11	--	CS	1D	0009 000A	82 C2	10	06	11	PARA	CS
Initialize	1D	0008	03	01	06	11	--	CS	1D	0009 000A	83 C3	10	06	11	PARA	CS

14 : V Keystone

Adjusts the projected image in the vertical direction during keystone correction.

[Parameter] Vertical Keystone Value (1 byte)
 Setting range: 80 to FF, 00 to 7F

Set	1D	0009	01	01	06	14	PARA	CS	1D	0008 000A	81 C1	10	06	14	-- PARA	CS
Get	1D	0008	02	01	06	14	--	CS	1D	0009 000A	82 C2	10	06	14	PARA	CS
Initialize	1D	0008	03	01	06	14	--	CS	1D	0009 000A	83 C3	10	06	14	PARA	CS

15 : DelayON

(Applicable models: EMP-8100/8150/9100/7700)

Controls the DelayON ON/OFF setting.

When set to ON, the lamp is on when power is being supplied through the power cable. When set to OFF, this function is disabled.

[Parameter] Data relating to DelayON ON/OFF setting (1 byte)
 0x00: OFF
 0x01: ON

Set	1D	0009	01	01	06	15	PARA	CS	1D	0008 000A	81 C1	10	06	15	-- PARA	CS
Get	1D	0008	02	01	06	15	--	CS	1D	0009 000A	82 C2	10	06	15	PARA	CS
Initialize	1D	0008	03	01	06	15	--	CS	1D	0009 000A	83 C3	10	06	15	PARA	CS

16 : Comp1/DV1 selection

Sets the Computer1 or DVI image bus independent of the I/F panel slide switch setting.

Gets the current image bus setting (Computer or DVI).

[Parameter] Data relating to image bus setting (1 byte)
 0x00: Computer1
 0x01: DVI

Set	1D	0009	01	01	06	16	PARA	CS	1D	0008 000A	81 C1	10	06	16	-- PARA	CS
Get	1D	0008	02	01	06	16	--	CS	1D	0009 000A	82 C2	10	06	16	PARA	CS

19 : Computer2 input format

(Applicable models: EMP-7600/5600)

Controls the input format for the Computer2 terminal.

[Parameter] Data relating to Computer2 terminal input format
 0x00: RGB
 0x01: YCbCr
 0x02: YPbCr

Set	1D	0008	01	01	06	19	PARA	CS	1D	0008 000A	81 C1	10	06	19	-- PARA	CS
Get	1D	0008	02	01	06	19	--	CS	1D	0009 000A	82 C2	10	06	19	PARA	CS
Initialize	1D	0008	03	01	06	19	--	CS	1D	0009 000A	83 C3	10	06	19	PARA	CS

07 CUSTOM

Command structure Type	Apply								Reply							
	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum	STX	Size	Attribute	From To	Group	Item	Parameter	Check-sum

08 : PinP

Controls the input source which is input by PinP.

PinP: Adds a sub-screen to the image.

[Parameter] Data relating to input source which is input by PinP

0x00: Composite video

0x01: S-Video

Set	1D	0009	01	01	07	08	PARA	CS	1D	0008 000A	81 C1	10	07	08	-- PARA	CS
Get	1D	0009	02	01	07	08	--	CS	1D	0009 000A	82 C2	10	07	08	PARA	CS
Initialize	1D	0008	03	01	07	08	--	CS	1D	0009 000A	83 C3	10	07	08	PARA	CS

09 : PinP audio selection setting (Applicable models: EMP-7600/5600)

Controls the audio selections which are enabled for PinP.

[Parameter] Audio enabled for PinP

0x00: Main screen

0x01: Sub screen

Set	1D	0009	01	01	07	09	PARA	CS	1D	0008 000A	81 C1	10	07	09	-- PARA	CS
Get	1D	0009	02	01	07	09	--	CS	1D	0009 000A	82 C2	10	07	09	PARA	CS
Initialize	1D	0008	03	01	07	09	--	CS	1D	0009 000A	83 C3	10	07	09	PARA	CS