

PROTOCOL MANUAL

MODEL

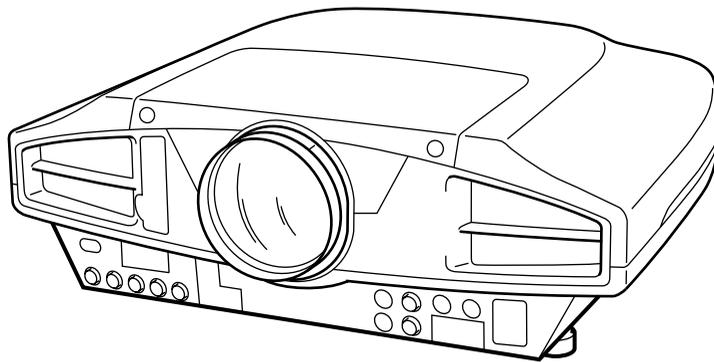
DEST.

MODEL

DEST.

VPL-FX51

WORLD



DATA PROJECTOR

SONY[®]

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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.

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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 angegebenen Wartungsarbeiten dürfen nur von Personen ausgeführt werden, die eine spezielle Befähigung dazu besitzen.

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1. Introduction

This protocol manual describes the basic configuration and basic operations of various commands used for projector. Projector can be controlled using the commands in the List of Commands provided in Section 4 “Appendix”. Using an external CONTROLLER , etc., inputs can be switched and the power can also be turned on and off. In the following paragraphs, “CONTROLLER” means an external device such as a PC which controls projector using these commands.

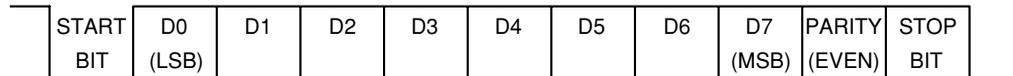
2. RS-232C

2-1. Communication Specifications

<RS-232C Communication Signal>

- 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.

2-2. Command Block Format

The code from B0 to B7 as described below are transmitted.

	Transmission from the Master side	Transmission from the Master side	Reception in the Master side (With Data)
B0	START CODE : 0 × A9		
B1	ITEM NUMBER	ACK / NAK	ITEM NUMBER
B2			
B3	SET / GET	ACK	REPLY
B4	DATA	DUMMY DATA	DATA
B5			
B6	CHECK SUM		
B7	END CODE : 0 × 9A		

B0 START CORD

Common in the all FORMAT

B6 CHECK SUM

B1 to B5 are calculated by OR;

<Example of Calculation>

0 × A9	1010	1001	0 × A9	1010	1001
0 × A9	1010	1001	0 × 9A	1001	1010
Answer	1010	1001	Answer	1011	1011
		0 × A9			0 × BB

B7 END CODE

Common in the all FORMAT

2-3. Block Format

Transmission from the Master side		Data transmission to the Projector
B0	START CODE	Start of Command
B1	ITEM NUMBER	Set the Data Category Value desired. Refer to the Table 1 for details.
B2		
B3	SET / GET	SET: 0 x 00 (Set data) GET: 0 x 01 (Get data)
B4	DATA	SET: Data to be set (Refer to the Table 2) GET: Unused. Set Dummy data [0 x 00, 0 x 00]
B5		
B6	CHECK SUM	Check Sum
B7	END CODE	End of Command
Reception in the Master side		Receive results of the data transmission from the Projector.
B0	START CODE	Start of Command
B1	ACK / NAK	Results correspond with the data transmission Refer to the Table 3 for the data in detail.
B2		
B3	ACK	[0 x 03] Express Reply data either of ACK, or NAK
B4	DUMMY DATA	This data does not mean any senses. Dummy Data [0 x 00, 0 x 00] is stored.
B5		
B6	CHECK SUM	Check Sum
B7	END CODE	End of Command
Reception in the Master side (With Data)		Receive data from the Projector
B0	START CODE	Start of Command
B1	ITEM NUMBER	Received data Refer to the Table 1 in detail.
B2		
B3	REPLY	[0 x 02] Express data to be Reply data
B4	DATA	Received data Refer to the Table 2 in detail.
B5		
B6	CHECK SUM	Check Sum
B7	END CODE	End of Command

2-4. Connection

<RS-232C 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)

Pins 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 there is no handshake normally performed by RS-232C.

2-5. Communication Procedure

2-5-1. 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.

In some cases, CONTROLLER may receive data from DEVICE even though it has not sent a command. (For example, during SYS setting, SIRCS command, and switcher information when switcher is selected.)

Note

When Sircs Direct Command is sent, return data may not be returned in some cases.

2-6. 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.

The following lists the approximate waiting times for PROJECTOR to return the return data after CONTROLLER sends the command.

- 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 SIRCS direct 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.)

2-7. Approximate Return Waiting Times

The await-return time is approx. 30 msec.

Note

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

3. NETWORK

3-1. Introduction

This protocol manual describes version 2 of the Simple Display Control Protocol which is used to control the professional-use display via a network. Version 1 used the same format as that of the RS-232C/-485 protocol for projectors. The new protocol has been developed because the version 1 protocol using RS-232C/-485, which assumes a one-to-one connection with a PC, could not make full use of the advantages of networks in order to simultaneously control multiple display equipment.

3-1-1. Features of Version 2

Community

When simultaneously controlling multiple displays, a wrong IP address could be used, and it is not possible to prevent illegal access from other PCs. The community can be set in the same way as SNMP to prevent such mis-operations and illegal access.

Information

In version 1, basic information about the equipment such as equipment name and serial number cannot be obtained. In version 2, such equipment information can be obtained.

3-2. Packet Structure

This section describes the packet structure of version 2.



Fig. 1 Packet structure

3-2-1. Header

The header consists of Version (8 bits) and Category (8 bits).

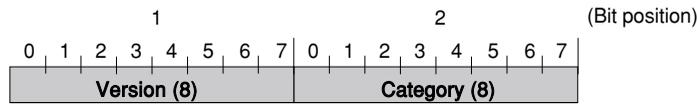


Fig. 2 Header structure

Version

This indicates the version number of protocol.

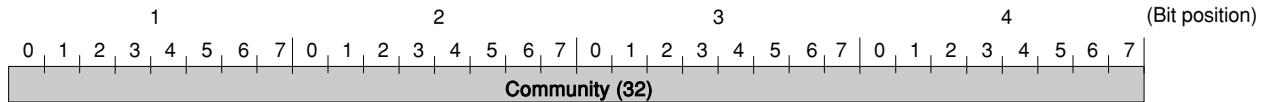
It is fixed to 02h (version 2).

Category

The category number of the display equipment to be controlled is entered here. The display equipment side checks the category number, and if a different category number is entered, the request is ignored.

3-2-2. Community

When the community data matches the community that is set in the display equipment, the request is executed. Community consists of four alphanumeric characters (case sensitive). All display equipment has the default value “SONY” when shipped from the factory.

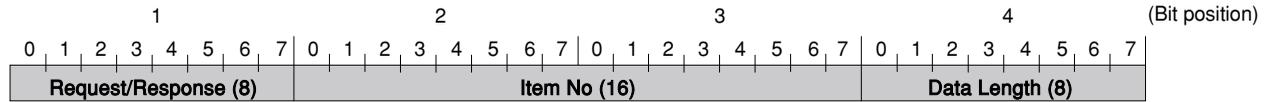


Note

Community should be entered with four characters. Three characters or less are not accepted.

3-2-3. Command

This section describes the format of the request command and the response command.



3-2-3-1. Request

This section describes the format of the request command which is used to issue requests from the host PC to the display.

Community

This is the same alphanumeric characters as those of community that is set in the display-sending request.

Request

This is the request for display.

Item No.

This is the item number of the request target.

Data Length

This is the length of the data accompanying the request. The maximum length is 128 bytes. If there is no data, it is 0.

Data

This is the data accompanying the request.

3-2-3-2. Response

This section describes the format of the response command which is used to return a response to the host PC from the display.

Community

The same alphanumeric characters as those of the request is entered.

Response

The result of the request is entered.

Item No.

The same value as those of the request is entered.

Data Length

This is the length of the data accompanying the response. The maximum length is 128 bytes. If there is no data, it is 0.

Data

This is the data accompanying the response.

3-2-4. Broadcast Support

Broadcasting is not supported.

3-2-5. Multi-cast Support

Multi-casting is not supported.

3-3. Request/Response

This section describes the requests and responses.

3-3-1. Request

There are only two types of request. One is the GET request to acquire the display information and status. The other is the SET request to modify the display setup.

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

3-3-2. Response

The response returns the result of executing the request from the host PC.

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

3-3-3. SET Request

The SET request is used to set a new value in the specified item. Details of the request and the response are described below.

Request

Request	Item No.	Data Length	Data
00h	Item No.	n	Set Data (n byte)

Response

OK (01h)	Item No.	0
----------	----------	---

3-3-4. Get Request

The GET request is used to acquire the value of the specified item. Details of the request and the response are described below.

Request

Request	Item No.	Data Length
01h	Item No.	0

Response

OK (01h)	Item No.	n	Get Data (n byte)
----------	----------	---	-------------------

3-3-5. ERROR Response

When an error occurs in the contents of a request or in the result of execution, NG is returned as the response.

NG (00h)	Item No.	2	Error Code (16)
----------	----------	---	-----------------

3-4. Items

In addition to the items that are supported by version 1, item (80**h) that enables information about new equipment to be acquired is added.

Category	Contents	SET	GET
00**h	Used to control and to change the various setups.	<input type="radio"/>	<input type="radio"/>
01**h	Used to acquire the status.		<input type="radio"/>
03**h	Used to reset memory.	<input type="radio"/>	
17**h	Sircs (15 bit category)	<input type="radio"/>	
19**h	Sircs (20 bit category)	<input type="radio"/>	
80**h	Used to acquire equipment information.		<input type="radio"/>
90**h	Used to acquire network setup information.		<input type="radio"/>

3-4-1. Model Dependent Category

The supported contents of 00**h, 01**h, 03**h, 17**h and 19**h change depending on the model. Details are shown on the 4. Appendix.

3-4-2. 80**h

Used to acquire the equipment information.

Lower byte	Contents	SET	GET
00h	Category Code		<input type="radio"/>
01h	Model name		<input type="radio"/>
02h	Serial number		<input type="radio"/>
03h	Installation location	<input type="radio"/>	<input type="radio"/>

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.

3-4-3. 90**h

Used to acquire the network setup information.

Lower bytes	Contents	SET	GET
00h	MAC Address		<input type="radio"/>
01h	IP Address		<input type="radio"/>
02h	Subnet Mask		<input type="radio"/>
03h	Default Gateway		<input type="radio"/>
04h	DHCP		<input type="radio"/>

0x9000 Mac Address

6 bytes

0x9001 IP Address

4 bytes

0x9002 Subnet Mask

4 bytes

0x9003 Default Mask

4 bytes

0x9004 DHCP

1 byte

DHCP invalid DATA Value: 0

DHCP valid DATA Value: 1

3-5. Error Code

The error code list is shown below with a detailed description of each.

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

3-5-1. 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 0xA** is specified.

Example 2: The unsupported Item No. 0x8010 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 (0x8001).

Invalid Length

Data Length of the specified Item No. is too long.

Example: An attempt is made to set 25 byte data in the installation location (0x8003).

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 Data Length 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.

3-5-2. Community Error

This error occurs when community is different.

Example: "ABCD" is specified when "SONY" is set.

3-5-3. 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.

Note

When another version is supported, an error occurs in all versions other than the supported version.

Invalid Category

The category does not match.

Example: 0x0B is specified in the device of Category = 0x0A.

Invalid Request

An unsupported request is specified.

Example: Request = 0x02 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.

3-5-4. Network Error

This is an error that occurs in TCP/IP. The conditions of occurrence of the respective errors are shown below.

Timeout

Communication was interrupted.

3-5-5. Comm Error

This is an error in communication with the main control microprocessor of the display.

Timeout

Reception data is not returned after data is sent.

Check Sum Error

A check sum error occurred in the main control microprocessor of the display.

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.

3-5-6. NVRAM Error

Read Error

Reading from NVRAM was failed.

Write Error

Writing to NVRAM was failed.

3-6. Service Application Specifications

This section describes the specifications, performance and operation of the service application provided for end-users.

3-6-1. Advertisement Service

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.

3-6-1-1. Specifications

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

Protocol

Item	Description
Protocol name	SDAP (Simple Display Advertisement Protocol)
Transport	UDP
Port number	53862
BC interval	Once every 30 seconds (initial value)

3-6-1-2. Function

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

Notes

- The category of projector is 0x0a.
- The power status is acquired from the main microprocessor immediately before broadcast.
- In the power status, the return data from the main microprocessor is set as is. If a communication error occurs, ffffh is set.

3-6-1-3. Setup Items

The items that can be set for the advertisement service are described below.

Setup items	Description
Port	Port number
Interval	Broadcast interval

3-6-2. Remote Control Service

The SDCP protocol, which is required for remote control of equipment via a network, is provided. This machine is equipped with SDCP that enables basic information such as equipment name and serial numbers to be acquired.

3-6-2-1. Specifications

Protocol

Item	Description
Protocol name	SDCP (Simple Display Control Protocol)
Transport	TCP
Port number	53495
TCP connection timeout	30 seconds

3-6-2-2. Function

This responds to the control command and requests for acquiring the status and information supplied from clients.

Control request

Enables the input to be selected and picture control to be adjusted.

SIRCS request

Enables remote control by sending the SIRCS code.

Status request

Enables equipment status information such as power status, error information and power-on time to be acquired.

Information request

Enables equipment information such as equipment name, serial number and installation information to be acquired.

3-6-2-3. Processing Method

Client requests can be classified into two categories: requests that can be processed by the network block only, and requests that need to be processed upon completion of communication with the main microprocessor of the equipment. The processing method of each category is described below.

Network block

Performs processing of the information request.

Note

Part of the information that the network block possesses belongs to the information request item.

Main Microprocessor

Performs processing of the control request, SIRCS request and status request. Because serial communication with the main microprocessor and SDCP use different protocols, format conversion of the protocol is required.

3-6-2-4. Setup Items

The items that can be set for the remote control service are described below.

Setup item	Description
Port	Port number
Timeout	TCP connection timeout time

4. Appendix

< Table 1 >			<Table 2>			Remarks
Item Number			Data			
Item	Upper byte	Lower byte	Data	Upper byte	Lower byte	
INPUT	00h	01h	VIDEO	00h		Set/Get
			S VIDEO	01h		
			INPUT A	02h		
			INPUT B	03h		
			INPUT C	04h		
CONTRAST	00h	10h	00h ~ 64h (0 ~ 100)			
BRIGHTNESS	00h	11h	00h ~ 64h (0 ~ 100)			
COLOR	00h	12h	00h ~ 64h (0 ~ 100)			
HUE	00h	13h	00h ~ 64h (0 ~ 100)			
SHARPNESS	00h	14h	00h ~ 64h (0 ~ 100)			
RGB ENHANCER	00h	15h	00h ~ 64h (0 ~ 100)			
VOLUME	00h	16h	00h ~ 64h (0 ~ 100)			
COL TEMP	00h	17h	LOW	00h		
			HIGH	01h		
DDE	00h	18h	OFF	00h		
			PROGRESSIVE	01h		
			FILM	02h		
ASPECT	00h	20h	16 : 9	00h		
			4 : 3	01h		
SCAN CONV	00h	21h	OFF	00h		
			ON	01h		
PICTURE MUTING	00h	30h	OFF	00h		
			ON	01h		
INPUT A	00h	32h	COMPUTER	00h		
			COMPONENT	01h		
			VIDEO GBR	02h		
LAMP MODE	00h	40h	HIGH	00h		
			STANDARD	01h		
GAIN RED	00h	80h	00h ~ FFh (0 ~ 255)			
GAIN GREEN	00h	81h	00h ~ FFh (0 ~ 255)			
GAIN BLUE	00h	82h	00h ~ FFh (0 ~ 255)			
BIAS RED	00h	83h	00h ~ FFh (0 ~ 255)			
BIAS GREEN	00h	84h	00h ~ FFh (0 ~ 255)			
BIAS BLUE	00h	85h	00h ~ FFh (0 ~ 255)			
STATUS ERROR	01h	01h	NO ERROR	00h		Get only
			LAMP ERROR	01h		
			FAN ERROR	02h		
			COVER ERROR	04h		
			TEMP ERROR	08h		
			D5V ERROR	10h		
			POWER ERROR	20h		
			WARNING ERROR	40h		

< Table 1 >			<Table 2>			Remarks
Item Number			Data			
Item	Upper byte	Lower byte	Data	Upper byte	Lower byte	
STATUS POWER	01h	02h	STANBY	00h		
			START UP	01h		
			STARTUP LAMP	02h		
			POWER ON	03h		
			COOLING1	04h		
			COOLING2	05h		
			SAVING COOLING1	06h		
			SAVING COOLING2	07h		
			SAVING STABY	08h		
CONTROL MODE SEL	01h	05h	USER	00h		
			SERVICE	01h		
LAMP TIMER	01h	13h	USE TIME	00h-ffffh		
ROM VERSION	01h	1Dh	ROM VER			
SC ROM VERSION	01h	1Eh	SC VER			
Channel Memory Reset	03h	01h		0000h		Set only
Status Memory Reset		02h				
Set Memory Reset		03h				
W/B All Save		04h				
W/B Low Save		05h				
W/B High Save		06h				
Sircs (15bit category)	17h			0000h		Set only
Sircs (20bit category)	19h					(Subject to the command only)

< Table 3 >			
Item Number			
Item		Upper byte	Lower byte
ACK		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 Rub Error		40h
	Other Comm Error		50h

**List of SIRCS CODE
(1) 15BIT Category**

	x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	xA	xB	xC	xD	xE	xF
0x																
1x						POWER ON/OFF			CONTRAST + HIGH	CONTRAST - LOW	COLOR + HIGH	COLOR - LOW			BRITNESS + BRIGHT	BRITNESS - DARK
2x					PICTURE MUTING	STATUS ON	STATUS OFF			MENU	VIDEO	INPUT A	INPUT B		POWER ON	POWER OFF
3x					CURSOR ←	CURSOR ↑	CURSOR ↓									
4x									RGB SIZE							
5x									RGB SHIFT	INPUT SELECT	ENTER				MEMORY	S VIDEO
6x																INPUT C
7x					FOCUS F	FOCUS N		ZOOM L	ZOOM S			RESET			PATTERN	
					LENS SHIFT ↑	LENS SHIFT ↓										

(2) 20BIT Category

	x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	xA	xB	xC	xD	xE	xF
0x																
1x																
2x																
3x											KEYSTONE					
4x																
5x																
6x	APA	DOT PHASE	LENS ZOOM	LENS SHIFT	LENS FOCUS			FREEZE			DIGITAL ZOOM +	DIGITAL ZOOM -				
7x									LENS TOGGLE							

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