

PROTOCOL MANUAL

For General Release

MODEL

DEST.

VPL-FE100U

US/CND

VPL-FE100E

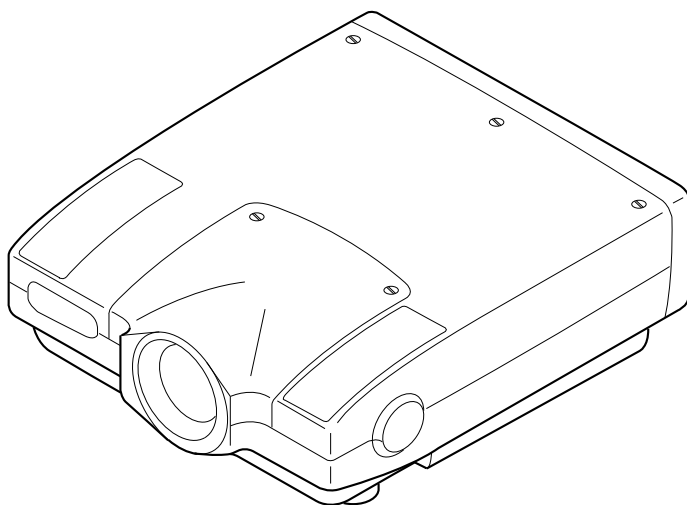
AEP

VPL-FE100M

E

VERSION 1.0

Projector Firmware ARC32



LCD DATA PROJECTOR

SONY[®]

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

AVERTISSEMENT

Ce manuel 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. INTRODUCTION

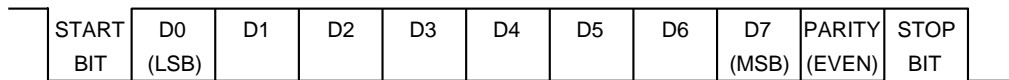
This protocol manual describes the basic configuration and basic operations of various commands used for projector. Projector can be controlled using the commands in the List of Commands provided in Section 10 “COMMANDS”. Using an external CONTROLLER or SWITCHER, etc., inputs can be switched and the 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. COMMUNICATION SPECIFICATIONS

2-1. RS-232C COMMUNICATION SIGNAL

- Full duplex communication channels (Flow control not performed.)
- Start-stop synchronism system
- Baud rate: 38.4 k, 19.2 k, 9600 bps (bits per second)
- The bit configuration is defined as follows.
- RS-422A and PJ COM have the same bit configuration.

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. RS-422A COMMUNICATION SIGNAL

- Full duplex (4-wire) communication channels
- Start-stop synchronism system bit serial word serial digital signal
- Baud rate: 38.4 k, 19.2 k, 9600 bps (bits per second)
- Refer to "2-1. RS-232C Communication Signal" for details on the bit configuration.

2-3. PJ COM COMMUNICATION SIGNAL

- Half duplex (4-wire) PROJECTOR dedicated communication channels
- Start/stop system bit serial word serial digital signal
- Baud rate: 38.4 k, 19.2 k, 9600 bps (bits per second)
- Refer to "2-1. RS-232C Communication Signal" for details on the bit configuration.

3. COMMAND BLOCK FORMAT

The code from B0 to B (m + 2) as described below is/are transmitted.

①
B0
Start Code

②				
B1	B2	B3	B4	B5
Peripheral Index	Group Index		Device Index	
RECEIVER (To) Index				

③				
B6	B7	B8	B9	B10
Peripheral Index	Group Index		Device Index	
SENDER (From) Index				

④		
B11	B12	B13
Cmd1	Cmd2	Cmd3
COMMAND		

⑤
B14
Data Length 1 (B16 + 2) (02 — 81 h)
Check Data Length

⑥	⑦
B15	B16
Data Length 2 (B15 *128)	Data Length 3 (00 — 7 Fh)
Total Data Length B15 *128 + B16	
Data Length	

⑧	
Bn	Bm
Data (n)	Data (n + 1,2,3,4...)
Data	

Bn = B (16 + 1)
Bm = B (16 + Total Data Length)

⑨
B (m + 1)
Check SUM

⑩
B (m + 2)
End Code

4. DATA OF CODE

① Start Condition

Bn	NAME	DATA	NOTE
B0	Start Code	A5	Indicates the first packet

② INDEX Header

/*- RECEIVER INDEX -*/

B1	PERIPHERAL INDEX	00 – 03	00 : All, 01 : Projector, 02 : Switcher, 03 : Controller
B2	GROUP INDEX UPPER BYTE	00	Group Index = 0000 – 0063 hex
B3	GROUP INDEX LOWER BYTE	00 – 63	
B4	DEVICE INDEX UPPER BYTE	00	Device Index = 0000 – 0063 hex
B5	DEVICE INDEX LOWER BYTE	00 – 63	

/*- SENDER INDEX -*/

B6	PERIPHERAL INDEX	01 – 03	01 : Projector, 02 : Switcher, 03 : Controller
B7	GROUP INDEX UPPER BYTE	00	Group Index = 0001 – 0063 hex
B8	GROUP INDEX LOWER BYTE	01 – 63	
B9	DEVICE INDEX UPPER BYTE	00	Device Index = 0001 – 0063 hex
B10	DEVICE INDEX LOWER BYTE	01 – 63	

/*- Command -*/

B11	CMD1	Refer to attached		
B12	CMD2	Refer to attached		
B13	CMD3		Receiving Device Peripheral INDEX = 01	Receiving Device Peripheral INDEX = 02
		00	Projector All	Switcher All
		10 – 7F	CRT Projector (10 CRT All)	10 : PC-3000
		80 – AF	LCD Projector (80 LCD All)	
		B0 – FF	DMD Projecto	

Note : CMD1 and CMD2 are assigned with different commands for each unit. Consequently, there is no compatibility of commands between units. For details of the commands, refer to the respective list of commands for the units.

③ Sub Data Size

B14	Data Length 1	02 – 81	(B16 + 2 hex) Data Size
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Note : Error when 82 to FF hex codes are included.

④ Data Size (*1)

B15	Data Length 2	00 – 10	(B15 *80 hex) Data Size
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Note : Error when 11 to FF hex codes are included.

⑤ **Data Size**

B16	Data Length 3	00 – 7F	Size of ⑥
-----	---------------	---------	-----------

Note : Error when 80 to FF hex codes are included.

Calculate the actual ⑥ Data length using the following method.
 Calculate the Total Data Length using the B15 (*1) and B16 Data.

<Example>

If B15 = 02 h and B16 = 7 Fh, calculate the Total Data Size as follows.

Data Length indicated by B15.

$$2 * 128 = 256 \text{ Byte}$$

Data Length indicated by B16.

$$127 \text{ Byte}$$

The Data Length indicated by Total is ;

$$(B15) 256 \text{ Byte} + B (16) 127 \text{ Byte} = 383 \text{ Byte.}$$

⑥ **Data**

Bn~Bm	Data	XX	Indicates the last packet
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$$Bn = B (16 + 1)$$

$$Bm = B (16 + \text{Total Data Length})$$

⑦ **Check SUM**

B (m + 1)	Check Sum	XX	Checksum of Data from ② to ⑥ (Calculate the XOR of the Data from ② to ⑥.)
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XOR is the exclusive OR.

It is as follows when calculated by 1 bit.

Taking A XOR B = C ;

A	B	C
0	0	0
1	0	1
0	1	1
1	1	0

<Example of Calculation>

When 0XA5 (165) and 0XA5 (165) are calculated by XOR ;

A5	10100101	(165)
A5	10100101	(165)
Answer	00000000	(0)

When 0XA5 (165) and 0X5A (90) are calculated by XOR ;

Answer

A5	10100101	(165)
5A	01011010	(90)
Answer	11111111	(255)

⑧ **End Condition**

B (m + 2)	END Code	5A	No Data in some cases
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5. BASIC OPERATIONS

5-1. COMMON OPERATIONS OF RS-232C/422A

RS-232C and RS-422A use the same port. Transmission and reception are performed only for the TX line and RX line in the case of softwares using the same commands (based on the software conditions). Handshaking normally established by RS-232C is therefore not performed.

5-2. PJ COM OPERATIONS

PJ COM is a port specially developed for projector based on RS-485. It therefore has no compatibility with the commercially available RS-485. (Special uses only)

PJ COM is a half duplex communication composed of the data line and control line. The control line is normally called as busy line, indicating whether the PJ COM line is available for use. Transmission is performed only when this line is free. If in use, data is transmitted to the Data line.

5-3. BASIC OPERATIONS

Transmission and reception by RS-232C/422A and PJ COM are performed using the same protocols. The data received by RS-232C/422A is input to the unit once to confirm that there are no errors in the data, and it is then transmitted to PJ COM again. Basic operations at PJ COM are the same. The data input to the unit once is checked that there are no errors, and is transmitted to RS-232C/422A again. The unit serves as a communication bridge.

6. CONNECTION

6-1. 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.)

6-2. RS-422A CONNECTION

If the distance between the CONTROLLER and PROJECTOR is long, the transmission distance can be extended with the use of the following conversion tool.

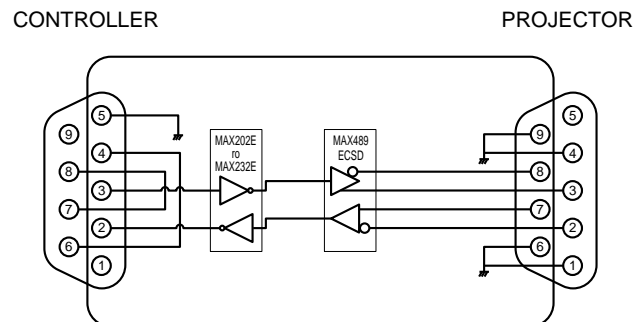
Assured cable length : 50 m (However, assurance may not be applicable for some cables.)

Conversion tool

Connector : 9 Pin D-subminiature female (D-9S)

If CONTROLLER is wired with RS-232C and PROJECTOR is with RS-422A, the following connection is recommended.

signal	pin	Controller	Projector or Switcher
	1	NC	GND
	2	RX DA	$\overline{\text{TX}}$
	3	TX DA	RX
	4	DTR	GND
	5	GND	NC
	6	DSR	GND
	7	RTS	$\overline{\text{TX}}$
	8	CTS	$\overline{\text{RX}}$
	9	NC	GND



6-3. PJ COM CONNECTION

Port for connecting PROJECTOR and SWITCHER.

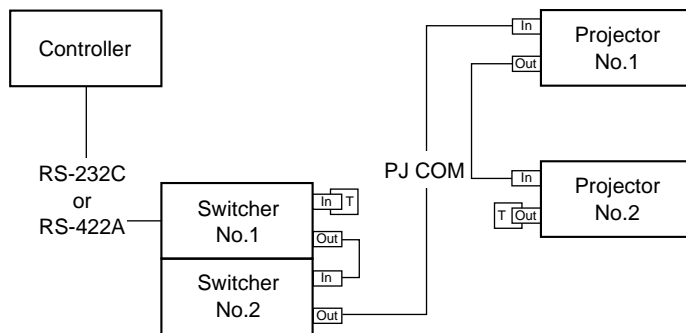
Communication is enabled by using the normal 9Pin D-Sub straight (normal) cable (RS-232C cable). This however applies to cables which are connected to all pins only.

Note : Connect all models by cascade connection and terminate each.

Assured cable length : 50 m (However, assurance may not be applicable for some cables.)
The total length including extension should be within 500 m.

6-4. CONNECTION EXAMPLE

System consisting of two SWITCHERS and two PROJECTORS.



Connect CONTROLLER to the RS-232C Port of the nearest unit.
Connect PROJECTOR and SWITCHER using the PJ COM Port.

7. COMMUNICATION PROCEDURE

All communication between CONTROLLER (PC, etc.) and DEVICE (PROJECTOR, SWITCHER) is performed by the transfer 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 All (00 hex) is specified for the INDEX No., return data may not be returned in some cases.

8. COMMUNICATION RULES

- Set the INDEX NUMBER of PROJECTOR and SWITCHER from “01.”
- When sending a command from CONTROLLER, the return data (CMD1 = 10 hex) from PROJECTOR and SWITCHER 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 or SWITCHER 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 (When the Index is specified only.). Be very careful that the switcher will not send the “NAK”.
- Take note that when data is written when the input signal of PROJECTOR or SWITCHER is unstable, that data (value) will not be incorporated.
- When INDEX specified SIRCS direct command (CMD1 = 17 hex) 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.)

9. APPROXIMATE RETURN WAITING TIMES

CMD2 (hex)	TIME (mSec)
11	15
13	35
15	20
30	15
32	30

Note : The times shown in this table are when communication is performed one to one between **CONTROLLER** and **DEVICE**, and in the condition that it will not be interrupted by some reason.

10. COMMANDS

FUNCTION	COMMAND	DIRECTION	CMD1	CMD2	DATA
RETURN DATA FROM PJ <CMD1=10 hex>	ACK(ACKNOWLEDGE)	PC ← PROJ	10	10	00
	ACK WITH DATA	PC ← PROJ	10	20	DATA #1 DATA #2 — DATA #N
	NAK(NOT ACKNOWLEDGE)	PC ← PROJ	10	F0	ERROR DATA COMMAND ERROR 01 UNDEFINED COMMAND 02 PROJECTOR HEAD IS NOT POWER ON 04 SIZE ERROR 05 SELECT ERROR 06 RANGE OVER 0A Not Applicable/Data invalid in current mode COMMUNICATION ERROR 10 CHECK SUM ERROR 20 FRAMING ERROR 30 PARITY ERROR 40 OVER ERROR 50 OTHER ERROR
STATUS SENSE <CMD1=11 hex>	DEVICE TYPE REQUEST	PC → PROJ	11	00	XX
	RETURN DATA	PC ← PROJ	10	20	SET NAME 32 Bytes(MAX) ASCII CHARACTER
	ERROR STATUS SENSE	PC → PROJ	11	01	XX
	RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 MAIN MCU ERROR 00 NO ERROR 01 POWER ERROR 02 FAN ERROR 03 COVER ERROR 04 TEMP ERROR 05 LAMP ERROR ERROR LAMP NO.
	POWER STATUS SENSE	PC → PROJ	11	02	XX
	RETURN DATA	PC ← PROJ	10	20	POWER 00 OFF 01 ON 02 COOLING 03 PS COOLING 04 PS STANDBY
SET MODE ACT STATUS SENSE	PC → PROJ	11	03	XX	
RETURN DATA	PC ← PROJ	10	20	SET MODE 00 USER 01 SERVICE	
INPUT CH STATUS SENSE	PC → PROJ	11	04	XX	
RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 INPUT CHANNEL CHANNEL PC-3000 00 VIDEO 11-18 SW'ER1-1-8 01 S VIDEO 21-28 SW'ER2-1-8 02 INPUT A 31-38 SW'ER3-1-8 03 INPUT B 41-48 SW'ER4-1-8 04 INPUT C 51-58 SW'ER5-1-8 05 PC-3000 61-68 SW'ER6-1-8 71-78 SW'ER7-1-8 81-88 SW'ER8-1-8	

FUNCTION	COMMAND	DIRECTION	CMD1	CMD2	DATA
	COLOR SYS SETTING SENSE	PC → PROJ	11	10	XX
	RETURN DATA	PC ← PROJ	10	20	COLOR SYS 00 AUTO 01 NTSC 02 PAL 03 SECAM 04 NTSC443 05 PALM
	COLOR TEMP. SETTING SENSE	PC → PROJ	11	11	XX
	RETURN DATA	PC ← PROJ	10	20	COL TEMP 00 HIGH 01 LOW
	D PICTURE SETTING SENSE	PC → PROJ	11	12	XX
	RETURN DATA	PC ← PROJ	10	20	D PICTURE 00 OFF 01 ON
	GAMMA MODE SETTING SENSE	PC → PROJ	11	14	XX
	RETURN DATA	PC ← PROJ	10	20	GAMMA MODE 00 GRAPHICS 01 TEXT
	ASPECT SETTING SENSE	PC → PROJ	11	20	XX
	RETURN DATA	PC ← PROJ	10	20	ASPECT 00 4:3 01 16:9
	SCAN CONV SETTING SENSE	PC → PROJ	11	21	XX
	RETURN DATA	PC ← PROJ	10	20	SCAN CONV 00 ON 01 OFF
	H FILTER SETTING SENSE	PC → PROJ	11	22	XX
	RETURN DATA	PC ← PROJ	10	20	H FILTER 00 ON 01 OFF
	MEMORY NO STATUS SENSE	PC → PROJ	11	23	XX
	RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 ORIGINAL MEM NO. USER MEM NO. 00 UNKNOWN 01—200 USER 01—PRESET NO. 255 UNUSED
	APA STATUS SENSE	PC → PROJ	11	28	XX
	RETURN DATA	PC ← PROJ	10	20	APA 00 OFF 01 ON
	OSD SHOW STATUS SENSE	PC → PROJ	11	30	XX
	RETURN DATA	PC ← PROJ	10	20	OSD SHOW 00 ON 01 OFF
	SPEAKER SETTING SENSE	PC → PROJ	11	31	XX
	RETURN DATA	PC ← PROJ	10	20	SPEAKER 00 ON 01 OFF
	OSD LANGUAGE SETTING SENSE	PC → PROJ	11	32	XX
	RETURN DATA	PC ← PROJ	10	20	OSD LANGUAGE 00 ENGLISH 01 FRENCH 02 GERMAN 03 ITALIAN 04 SPANISH 05 JAPANESE 06 CHINESE

FUNCTION	COMMAND	DIRECTION	CMD1	CMD2	DATA
	OPERATION TIME STATUS SENSE	PC → PROJ	11	52	XX
	RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 DATA #3 DATA #4 SET ACTIVE TIME 4 Bytes (hour)
	LAMP TIMER STATUS SENSE	PC → PROJ	11	53	XX
	RETURN DATA	PC ← PROJ	10	20	DATA #1 — DATA #4 DATA #5—8 DATA #9—12 DATA #13—16 LAMP 1 ACTIVE TIME 4 Bytes (min) LAMP 2 LAMP 3 LAMP 4 4 Bytes (min) 4 Bytes (min) 4 Bytes (min)
	IP STATUS SENSE	PC → PROJ	11	54	XX
	RETURN DATA	PC ← PROJ	10	20	I/P 00 PROGRESSIVE 01 INTERLACE
	RESOLUTION STATUS SENSE	PC → PROJ	11	55	XX
	RETURN DATA	PC ← PROJ	10	20	RESOLUTION 0 VIDEO60 1 VIDEO50 2 15K60 3 15K50 4 HDTV 5 640X350 6 640X400 7 640X480 8 800X600 9 832X624 10 1024X768 11 1152X864 12 1152X900 13 1280X960 14 1280X1024 15 1600X1200 16 480 60P 17 575 50P 18 1080 50I 20 720 60P 21 720 50P 22 1080 48I
	LENS CONTROL SETTING SENSE	PC → PROJ	11	60	XX
	RETURN DATA	PC ← PROJ	10	20	LENS CONTROL 00 ON 01 OFF
	ON DELAY STATUS SENSE	PC → PROJ	11	62	XX
	RETURN DATA	PC ← PROJ	10	20	ON DELAY 00 OFF 01 ON
SYSTEM SELECT <CMD1=13 hex>	POWER REQUEST	PC → PROJ	13	02	POWER 00 OFF 01 ON
	SET MODE ACT SELECT	PC → PROJ	13	03	SET MODE 00 USER 01 SERVICE
	INPUT CH SELECT	PC → PROJ	13	04	DATA #1 DATA #2 INPUT CHANNEL DUMMY BYTE 00 VIDEO XX 01 S VIDEO XX 02 INPUT A XX 03 INPUT B XX 04 INPUT C XX (PC-3000 Channel is selectable only by SIRCS format command)
	COLOR SYS SETTING SELECT	PC → PROJ	13	10	COLOR SYS 00 AUTO 01 NTSC 02 PAL 03 SECAM 04 NTSC443 05 PALM

FUNCTION	COMMAND	DIRECTION	CMD1	CMD2	DATA
	COLOR TEMP. SETTING SELECT	PC → PROJ	13	11	COL TEMP 00 HIGH 01 LOW
	D PICTURE SETTING SELECT	PC → PROJ	13	12	D PICTURE 00 OFF 01 ON
	GAMMA MODE SETTING SELECT	PC → PROJ	13	14	GAMMA MODE 00 GRAPHICS 01 TEXT
	ASPECT SETTING SELECT	PC → PROJ	13	20	ASPECT 00 4:3 01 16:9
	SCAN CONV SETTING SELECT	PC → PROJ	13	21	SCAN CONV 00 ON 01 OFF
	H FILTER SETTING SELECT	PC → PROJ	13	22	H FILTER 00 ON 01 OFF
	APA START	PC → PROJ	13	28	APA 01 START
	OSD SHOW STATUS SELECT	PC → PROJ	13	30	OSD SHOW 00 ON 01 OFF
	SPEAKER SETTING SELECT	PC → PROJ	13	31	SPEAKER 00 ON 01 OFF
	OSD LANGUAGE SETTING SELECT	PC → PROJ	13	32	OSD LANGUAGE 00 ENGLISH 01 FRENCH 02 GERMAN 03 ITALIAN 04 SPANISH 05 JAPANESE 06 CHINESE
	INSTALLATION SETTING SELECT	PC → PROJ	13	33	INSTALLATION 00 FRONT-FLOOR 01 REAR-FLOOR 02 FRONT-CEILING 03 REAR-CEILING
	POWER SAVING SETTING SELECT	PC → PROJ	13	34	POWER SAVING 00 OFF 01 ON
	SIRCS RECEIVER SETTING SELECT	PC → PROJ	13	35	SIRCS RECEIVER 00 FRONT&REAR 01 FRONT 02 REAR 03 OFF
	PICTURE MUTING STATUS SELECT	PC → PROJ	13	38	PICTURE MUTING 00 OFF 01 ON
	AUDIO MUTING STATUS SELECT	PC → PROJ	13	39	AUDIO MUTING 00 OFF 01 ON
	INPUT A SETTING SELECT	PC → PROJ	13	40	INPUT A 20 COMPUTER 30 COMPONENT 40 DTV-YBPBR 41 DTV-GBR
	INPUT B SETTING SELECT	PC → PROJ	13	41	INPUT B 10 VIDEO 11 SVIDEO 20 COMPUTER 30 COMPONENT 40 DTV-YBPBR 41 DTV-GBR

FUNCTION	COMMAND	DIRECTION	CMD1	CMD2	DATA
	INPUT C SETTING SELECT	PC → PROJ	13	42	INPUT C 10 VIDEO 11 SVIDEO 20 COMPUTER 30 COMPONENT 40 DTV-YBPBR 41 DTV-GBR
	LENS CONTROL SETTING SELECT	PC → PROJ	13	60	LENS CONTROL 00 ON 01 OFF
	ON DELAY STATUS SELECT	PC → PROJ	13	62	ON DELAY 00 OFF 01 ON
INTERNAL TEST SIGNAL GEN <CMD1=15 hex>	PATTERN STATUS SENSE	PC → PROJ	15	11	XX
	RETURN DATA	PC ← PROJ	10	20	USE PATTERN 00 OFF 01 WHITE 02 YELLOW 03 CYAN
	PATTERN SELECT	PC → PROJ	15	20	PATTERN 00 OFF 01 WHITE 02 YELLOW 03 CYAN
SIRCS CODE DIRECT <CMD1=17 hex>	SIRCS CODE DIRECT SEND	PC → PROJ	17	0	DATA #1 DATA #2 DATA #3 DATA #4 DATA #5 DATA #6 CATEGORY (2 Bytes) SIRCS CODE REPEAT REPEAT NUMBER(2 Bytes) 85 5A : 20bit 00-7F *see attached 00 ONE SHOT 40 54 : 15bit 01 REPEAT
ACTIVE MEMORY READ <CMD1=30 hex>	CONTRAST DATA READ	PC → PROJ	30	10	XX
	RETURN DATA	PC ← PROJ	10	20	CONTRAST
	BRIGHTNESS DATA READ	PC → PROJ	30	11	XX
	RETURN DATA	PC ← PROJ	10	20	BRIGHTNESS
	COLOR DATA READ	PC → PROJ	30	12	XX
	RETURN DATA	PC ← PROJ	10	20	COLOR
	HUE DATA READ	PC → PROJ	30	13	XX
	RETURN DATA	PC ← PROJ	10	20	HUE
	SHARPNESS DATA READ	PC → PROJ	30	14	XX
	RETURN DATA	PC ← PROJ	10	20	SHARPNESS
	VOLUME DATA READ	PC → PROJ	30	18	XX
	RETURN DATA	PC ← PROJ	10	20	VOLUME
	DOT PHASE DATA READ	PC → PROJ	30	20	XX
	RETURN DATA	PC ← PROJ	10	20	DOT PHASE
	SIZE DATA READ	PC → PROJ	30	21	XX
RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 SIZE (2 Bytes)	
SHIFT DATA READ	PC → PROJ	30	22	XX	
RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 DATA #3 DATA #4 H SHIFT (2 Bytes) V SHIFT (2 Bytes)	
TOP BLANKING DATA READ	PC → PROJ	30	23	XX	
RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 TOP BLANKING (2 Bytes)	
BOTTOM BLANKING DATA READ	PC → PROJ	30	24	XX	
RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 BOTTOM BLANKING (2 Bytes)	
RIGHT BLANKING DATA READ	PC → PROJ	30	25	XX	
RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 RIGHT BLANKING (2 Bytes)	
LEFT BLANKING DATA READ	PC → PROJ	30	26	XX	
RETURN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 LEFT BLANKING (2 Bytes)	
GAIN DATA READ	PC → PROJ	30	30	XX	
REUTRN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 DATA #3 GAIN R GAIN G GAIN B	
BIAS DATA READ	PC → PROJ	30	31	XX	
REUTRN DATA	PC ← PROJ	10	20	DATA #1 DATA #2 DATA #3 BIAS R BIAS G BIAS B	

FUNCTION	COMMAND	DIRECTION	CMD1	CMD2	DATA
ACTIVE MEMORY WRITE <CMD1=32 hex>	CONTRAST DATA WRITE	PC PROJ	32	10	CONTRAST
	BRIGHTNESS DATA WRITE	PC PROJ	32	11	BRIGHTNESS
	COLOR DATA WRITE	PC PROJ	32	12	COLOR
	HUE DATA WRITE	PC PROJ	32	13	HUE
	SHARPNESS DATA WRITE	PC PROJ	32	14	SHARPNESS
	VOLUME DATA WRITE	PC PROJ	32	18	VOLUME
	DOT PHASE DATA WRITE	PC PROJ	32	20	DOT PHASE
	SIZE DATA WRITE	PC PROJ	32	21	DATA #1 DATA #2 SIZE (2 Bytes)
	SHIFT DATA WRITE	PC PROJ	32	22	DATA #1 DATA #2 DATA #3 DATA #4 H SHIFT(2 Bytes) V SHIFT (2 Bytes)
	TOP BLANKING DATA WRITE	PC PROJ	32	23	DATA #1 DATA #2 TOP BLANKING (2 Bytes)
	BOTTOM BLANKING DATA WRITE	PC PROJ	32	24	DATA #1 DATA #2 BOTTOM BLANKING (2 Bytes)
	RIGHT BLANKING DATA WRITE	PC PROJ	32	25	DATA #1 DATA #2 RIGHT BLANKING (2 Bytes)
	LEFT BLANKING DATA WRITE	PC PROJ	32	26	DATA #1 DATA #2 LEFT BLANKING (2 Bytes)
	GAIN DATA WRITE	PC PROJ	32	30	DATA #1 DATA #2 DATA #3 GAIN R GAIN G GAIN B
BIAS DATA WRITE	PC PROJ	32	31	DATA #1 DATA #2 DATA #3 BIAS R BIAS G BIAS B	
MEMORY TRIGGER	PC PROJ	32	FE	ITEM 00 WHITE BALANCE	

SIRCS CODE

15 Bit Category (4054 hex)

	x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	xA	xB	xC	xD	xE	xF
0x											SWITCHER 1-1	SWITCHER 1-2	SWITCHER 1-3	SWITCHER 1-4	SWITCHER 1-5	SWITCHER 1-6
1x	SWITCHER 1-7	SWITCHER 1-8	VOLUME + UP	VOLUME _ DOWN	AUDIO MUTING	POWER ON/OFF			CONTRAST + HIGH	CONTRAST _ LOW	COLOR + HIGH	COLOR _ LOW	LIOGHT ON	LIGHT OFF	BRITNESS + BRIGHT	BRITNESS _ DARK
2x	HUE + PURPLISH	HUE _ GREENISH	SHARPNESS + SHARP	SHARPNESS _ SOFT	PICTURE MUTING	STATUS ON	STATUS OFF			MENU	VIDEO	INPUT A	INPUT B	CENT	POWER ON	POWER OFF
3x	SYSTEM SET UP	POSITION +	POSITION _	CURSOR	CURSOR _	CURSOR	CURSOR	SWITCHER 2-1	SWITCHER 2-2	SWITCHER 2-3	SWITCHER 2-4	SWITCHER 2-5	SWITCHER 2-6	SWITCHER 2-7	SWITCHER 2-8	
4x		ADJ R	ADJ G	ADJ B				RGB SIZE	RGB SHIFT	CENT R	CENT G	CENT B	SIZE	LIN	SKEW	BOW
5x	KEY	PIN	W/B GAIN	W/B BIAS	FOCUS MG	FOCUS LENS	ZONE		BLANKING		ENTER				MEMORY	VIDEO/ S VIDEO
6x	INDEX 0 (ALL)	INDEX 1	INDEX 2	INDEX 3	INDEX 4	INDEX 5	INDEX 6	INDEX 7	INDEX 8	INDEX 9	SCREEN UP	SCREEN DOWN	SCREEN STOP			INPUT C
7x	INPUT D										INPUT OTHER	RESET		NORMAL	PATTERN	

20 Bit Category (855A hex)

	x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	xA	xB	xC	xD	xE	xF
0x											SWITCHER 3-1	SWITCHER 3-2	SWITCHER 3-3	SWITCHER 3-4	SWITCHER 3-5	SWITCHER 3-6
1x	SWITCHER 3-7	SWITCHER 3-8	SWITCHER 4-1	SWITCHER 4-2	SWITCHER 4-3	SWITCHER 4-4	SWITCHER 4-5	SWITCHER 4-6	SWITCHER 4-7	SWITCHER 4-8	SWITCHER 5-1	SWITCHER 5-2	SWITCHER 5-3	SWITCHER 5-4	SWITCHER 5-5	SWITCHER 5-6
2x	SWITCHER 5-7	SWITCHER 5-8	SWITCHER 6-1	SWITCHER 6-2	SWITCHER 6-3	SWITCHER 6-4	SWITCHER 6-5	SWITCHER 6-6	SWITCHER 6-7	SWITCHER 6-8	SWITCHER 7-1	SWITCHER 7-2	SWITCHER 7-3	SWITCHER 7-4	SWITCHER 7-5	SWITCHER 7-6
3x	SWITCHER 7-7	SWITCHER 7-8	SWITCHER 8-1	SWITCHER 8-2	SWITCHER 8-3	SWITCHER 8-4	SWITCHER 8-5	SWITCHER 8-6	SWITCHER 8-7	SWITCHER 8-8						
4x	GP INDEX 0 (ALL)	GP INDEX 1	GP INDEX 2	GP INDEX 3	GP INDEX 4	GP INDEX 5	GP INDEX 6	GP INDEX 7	GP INDEX 8	GP INDEX 9						
5x																
6x	APA	DPT PHASE	LENS ZOOM	LENS SHIFT	LENS FOCUS											
7x																

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