T470 User's Guide Part B

Display Device Support V135- This manual covers the display devices supported by the T470.

Devices are covered in alphabetical order of manufacturer, with projectors first, followed by flat panels.

Codes can be entered via the JED PC application: entering the 4-digit code here will then show an ID message giving a summary of the selection and key variables (e.g. baud rate or volume range). The "Previous" and "Next" buttons can also be used to roll the selection through available codes. (The list rolls over at the upper and lower ends.)

Phantom device driver

The T470 device data-base includes four "Phantom" devices for test purposes … they send out descriptive text strings at 9600 baud 8N1 format and are a useful training and familiarisation tool. All channels are allocated with imagined sources and a channel number. Try allocating sources to keys and use the Monitor mode to see the results.

Phantom devices ID are:

Phantom Abs Vol	;Code 0000	Phantom Inc Vol	; Code 0010
Phantom Abs Blank Mute	;Code 0020	Phantom Toggle Blank Mute	; Code 0030

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Projectors

Acer

Code 0400

P7213/F213/PF-X14/P7215/F217/PF-X16 Series, but these general codes probably support many other Acer devices. Manuals, with codes, are at: https://www.acer.com/ac/en/AU/content/support-product/4438?b=1

Note: This is an interim release, pending more detail on the VGA2 interface RS232 codes. The projector has two VGA DB15 connectors (called VGA1 and VGA2), as well as analog VGA inputs on the DVI-I connector (called DVI-A). The codes below support both PC and Component (YPbPr) modes for both VGA1 and DVI-A. The codes do not currently support VGA2 either for PC or Component modes. The code does, however, support three HDMI interfaces (although the above models only have one HDMI interface. This is done by simply sending two or three HDMI commands to select respectively HDMI2 or HDMI3. We have left 1 second between the second (and third) transmissions for these selections (yes, weird!). This is currently untested and may need to be varied. Please provide feedback if a two or three-HDMI model Acer is found on whether this works or not.

Source	Label/Connector	Code sent	Comments
0	RGB-VGA1	'* 0 IR 015',00DH	DB15-1
1	RGB-DVIA	'* 0 IR 028',00DH	RGB analog in DVI-I
4	Component	'* 0 IR 020',00DH	3 x RCA
5	YPbPr-VGA1	'* 0 IR 017',00DH	Via DB15-1
6	YPbPr-DVIA	'* 0 IR 029',00DH	Via analog in DVI-I
7	Video	'* 0 IR 019',00DH	RCA
8	S-Video	'* 0 IR 018',00DH	DIN 4
9	DVI-D	'* 0 IR 016',00DH	On DVI-I
A	HDMI or HDMI 1	'* 0 IR 050',00DH	HDMI 1
D	HDMI 2	'* 0 IR 050',00DH x two	(Some only)

F	HDMI 3	'* 0 IR 050',00DH x three	(Some only)

- Blank (hide) Toggle, Audio mute toggle and Freeze toggle, are all supported if appropriate buttons are allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is NOT supported; and
- "Control Channel" must be set to "RS232"

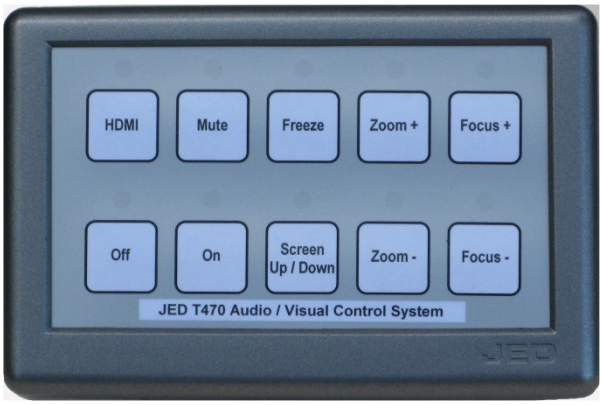
BenQ

Code 1000 (baud 19200), Code: 1005 (baud 9600)

Recent models only are supported: BenQ have many older models which don't support RS232 comms well.

Source	Label/Connector	Code sent	Comments
0	Computer 1: DSUB RGB	00DH,'*sour=RGB#',00DH	
1	Computer 2: DSUB RGB 2	00DH,'*sour=RGB2#',00DH	Some only
2	USB-A mem.	00DH,'*sour=usbreader#',00DH	Some only
3	USB-B Disp.	00DH,'*sour=usbdisplay#',00DH	Some only
4	Component /1	00DH,'*sour=ypbr#',00DH	
5	Component /2	00DH,'*sour=ypbr2#',00DH	Some only
6	DVI-A	00DH,'*sour=dviA#',00DH	Some only
7	Composite	00DH,'*sour=vid#',00DH	
8	S-Video	00DH,'*sour=svid#',00DH	
9	DVI-D	00DH,'*sour=dvid#',00DH	Some only
A	HDMI 1	00DH,'*sour=hdmi#',00DH	
B	HDMI 2	00DH,'*sour=hdmi2#',00DH	Some only
C	DisplayPort	00DH,'*sour=dp#',00DH	Some only
D	Wireless	00DH,'*sour=wireless#',00DH	Some only
E	Network	00DH,'*sour=net#',00DH	Some only
F	HDBaseT	00DH,'*sour=hdbaset#',00DH	Some only

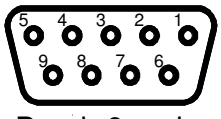
- **BlankOn/BlankOff, SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;



- Special keys labelled: **Zoom +, Zoom-, Focus+ and Focus-** are supported for projectors with RS232 commands for these functions, e.g. the PW9500. These keys auto-repeat. See layouts KB1021A (photo) as an example;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Audio Volume range is limited and incremental. Some BenQ projectors do not have audio out, and audio inputs are often limited;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is assumed at 19200 8N1. The projector may need to be setup to this if it is adjustable;
- "Source scan", or "Quick Auto Search" must be turned off using normal on-screen menu options;
- In "System Setup: Advanced" | Standby Settings | press Enter, then set "Network" to ON to enable RS232 comms; and
- You must turn off "Auto Power Off" and "Direct Power On" in "Config" menu.

RS232 connections to BenQ projectors with D9, female on projector

These all use a D-sub 9-pin connector, female on projector, male on cable. Communications runs at 19200 8N1.

Function/Direction	**T470 serial Connection**	**Projector Connector (Male on cable)**	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the

controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

BenQ No CR: Code 1200

BenQ SH960 (These differ from usual BenQ codes, in that there is no <CR> either side of command string.)

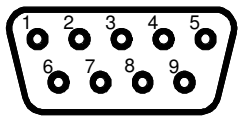
Source	Label/Connector	Code sent	Comments
0	Computer 1: DSUB RGB	'*sour=RGB#'	
1	Computer 2: DSUB RGB 2	'*sour=RGB2#'	
4	Component	'*sour=ypbr#'	
7	Composite	'*sour=vid#'	
A	HDMI	'*sour=hdmi#'	
D	S-Video	'*sour=svid#'	

- **BlankOn/BlankOff, SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Audio Volume range is limited and incremental. Some BenQ projectors do not have audio out, and audio inputs are often limited;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is NOT supported ;
- In System Setup: “Auto Power Off” -> “Disable, “Sleep Time” -> Disable, “Quick Auto Search” -> Off;
- In Advanced Setup: In Lan Control Settings -> Control by RS232;
- In Advanced Setup: In Baud rate -> 19200;
- In Advanced Setup: Direct Power On -> Set OFF, Direct Power Off -> Set OFF

RS232 connections to BenQ projectors with D9, female on cable

Most recent models use a 9-pin-D9 male on the projector, female on cable. Communications is at 19200 baud, 8N1.

Function/Direction	T470 serial Connection	“Serial” Port Connector	
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	

Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	 D-sub 9 female solder side

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Canon ASCII

Code 1400

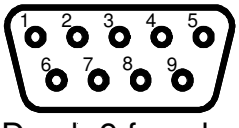
SX6000/WX6000, WUX4000/WUX5000, SX80 MkII / SX800, WUX10 Mk II

Source	Label/Connector	Code sent	Comments
0	A-RGB1	'INPUT=A-RGB1',00DH	Used if 2 RGB analog in (DB15)
1	A-RGB2	'INPUT=A-RGB2',00DH	Used if 2 RGB analog in (DVI-I)
2	A-RGB	'INPUT=A-RGB',00DH	Used if only 1 RGB analog in (DVI-I)
4	Component	'INPUT=COMP',00DH	On DB15 (some only)
7	Video	'INPUT=VIDEO',00DH	
9	D-RGB	'INPUT=D-RGB',00DH	On DVI-I (Some only)
A	HDMI	'INPUT=HDMI',00DH	(Some only)
D	S-Video	'INPUT=S-VIDEO',00DH	(Some only)
F	USB-A	'INPUT=USB',00DH	(Some only)

- **BlankOn/BlankOff,** are all supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- No audio commands are provided;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is NOT supported;
- There may well be auto-source functions to turn off and standby mode to setup to enable RS232. These are not mentioned in the manual.

RS232 connections to Canon projectors with D9,female on cable

This uses a 9-pin-D9 male on the projector, female on cable. Communications is at 19200 baud, 8N1.

Function/Direction	T470 serial Connection	"Serial" Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Casio

Code 1600

XJ-V1, XJ-V2, XJ-UT310WN, XJ-A, XJ-M, XJ-H, XJ-ST, XJ-V, XJ-F

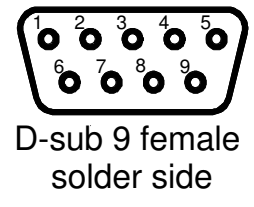
Manuals, with codes are at: http://support.casio.com/en/manual/manuallist.php?cid=007

Source	Label/Connector	Code sent	Comments
0	RGB1	(SRC0)	Computer1 on DB15 (Shared with Component 1 in)
1	RGB2	(SRC3)	Computer2 on DB15 (Shared with Component 2 in)
2	USB-A	(SRC5)	(Some only)
3	USB-B Disp	(SRC12)	Select USB Display(Some only)
4	Component 1	(SRC1)	On DB15
5	Component 2	(SRC4)	On DB15 (some only)
6	Auto 1	(SRC6)	Auto 1 (RGB/Component)
7	Video	(SRC2)	RCA
8	S-Video	(SRC9)	DIN 4
9	Auto 2	(SRC10)	Auto 2 (RGB/Component)(Some only)
A	HDMI / HDMI 1	(SRC7)	HDMI 1
B	HDMI 2	(SRC14)	HDMI 2(Some only)
D	Network	(SRC8)	Network (Some only)
E	CAS. USB-A	(SRC13)	USB-A Calculator etc.
F	File view.	(SRC11)	USB-A memory stick (Some only)

- **BlankOn/BlankOff,** are all supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is NOT supported;
- There may well be auto-source functions to turn off and standby mode to setup to enable RS232. These are not mentioned in the manual.

RS232 connections to Casio projectors with D9,female on cable

This uses a 9-pin-D9 male on the projector, female on cable. Communications is at 19200 baud, 8N1.

Function/Direction	T470 serial Connection	"Serial" Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Dell

Code 1800

1209S, 1409X, 1420x 1430x 1510X, 1609WX, 1610HD, 4210X, 4220, 4310WX, 4320,4610X, 5100, 7700fullHD 7609WU, S300wi, S300W/WI, S320, S320wi, S500w/wi, S520, 2400mp

Manuals are at: **http://www.dell.com/support/home/us/en/19/Products/display_projector/projector**

Source	Label/Connector	Code sent	Comments
0	Computer 1	0BEH,0EFH,010H,005H,000H,0CCH,0FFH,011H,011H,001H,000H,019H	DB-15 1
1	Computer 2	0BEH,0EFH,010H,005H,000H,028H,0FEH,011H,011H,001H,000H,069H	DB-15 2
2	USB-B Disp	0BEH,0EFH,010H,005H,000H,062H,0BEH,011H,011H,001H,000H,08EH	
4	Component	0BEH,0EFH,010H,005H,000H,0DEH,03FH,011H,011H,001H,000H,020H	3 x RCA
7	Video	0BEH,0EFH,010H,005H,000H,0DFH,07FH,011H,011H,001H,000H,023H	RCA
8	S-Video	0BEH,0EFH,010H,005H,000H,01FH,0BEH,011H,011H,001H,000H,022H	DIN 4
A	HDMI 1	0BEH,0EFH,010H,005H,000H,03AH,03EH,011H,011H,001H,000H,050H	
B	HDMI 2	0BEH,0EFH,010H,005H,000H,0E9H,07FH,011H,011H,001H,000H,06BH	
C	DisplayPort	0BEH,0EFH,010H,005H,000H,02BH,03EH,011H,011H,001H,000H,06BH	
D	Wireless	0BEH,0EFH,010H,005H,000H,061H,07EH,011H,011H,001H,000H,08BH	
E	Intel WiDi	0BEH,0EFH,010H,005H,000H,0ACH,03FH,011H,011H,001H,000H,098H	Wireless Display
F	USB-A	0BEH,0EFH,010H,005H,000H,0A2H,07FH,011H,011H,001H,000H,08FH	

- **Blank On/Blank Off** and **Freeze On/Freeze Off** are supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **Aspect Ratio** key is allocated. This is a rolling function with no LED indication of state;
- No blink OFF coms status is available;
- Run-time On-state Reply Mode is NOT supported;
- There may well be auto-source functions to turn off and standby mode to setup to enable RS232. These are not mentioned in the manual.

RS232 connections to DELL projectors.

Communication is at 19200 8N1

To connect the T470 to these projectors use a mini-DIN 6 male on the cable:

Function/Direction	**T470 "projector" Connection**	**Projector Connector 6-pin mini-DIN**	Mini-DIN 6 solder side
Ground	Ground	Mini-DIN Pins 1, 2	
Data from T470 to projector	Tx	Mini-DIN Pin 3 (RXD)	
Reply data from projector to T470	Rx	Mini-DIN Pin 5 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Eiki/Sanyo

Code 1C00

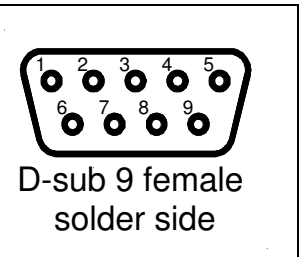
Recent models only are supported. Sanyo was taken over by Panasonic, but there are many still “out there”.

Source	Label/Connector	Code sent	Comments
0	Computer 1 (C50)	'C50',00DH	
1	Computer 2 (C06)	'C06',00DH	
3	Computer 2 (C25)	'C25',00DH	
4	Component 1 (C54)	'C54',00DH	
5	Component 2 (C24)	'C24',00DH	
6	DVI AV HDCP (C53)	'C53',00DH	Some only
7	Video (C07)	'C07',00DH	
8	Video (C33)	'C33',00DH	
9	DVI PC Digital (C52)	'C52',00DH	Some only
A	HDMI 1 (C04)	'C04',00DH	Some only
B	HDMI 2 (C4F)	'C4F',00DH	Some only
E	Network (C08)	'C08',00DH	
F	S-Video (C34)	'C34',00DH	Some only

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Audio Volume range is 0-21 absolute using the extended command CF VOLUME;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is assumed at 19200 8N1. The projector may need to be setup to this if it is adjustable;
- You must turn “Standby Mode” to “Normal” and “On Start” to “Off”in the “Setting” menu

RS232 connections to Sanyo/ Eiki projectors

Most recent use a 9-pin-D9 male on the projector, female on cable. Communications is at 19200 baud, 8N1.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Epson

Epson VP21 Two VGA Net53: Code 2000
Epson VP21 Two VGA Net50: Code 2010
Epson VP21 VGA/BNC Net53, G/Z series.: Code 2020
Epson VP21 3xHDMI, VGA SRC10 G/Z series.: Code 2025

Epson VP21 VGA/BNC Net50: Code 2030
Epson VP21 Two VGA, Mirror, Net53: Code 2040

Most Epson projectors use **SOURCE53** for Network ,and need **Code 2000.** (Use this if no network.) Some are : EB-84, EB-85, EB-824,EB-825, EB-826W, EB-95, EB-96W, EB900, EB-905, EB-910W, EB-915W, EB-925, EB-420, EB-425W, EB-430, EB-435W,EB-440W, EB-450W, EB-450Wi, EB460, EB460i, EB-470, EB-475W, EW475Wi, EB-480, EB-480i, EB-485W, EB-485Wi, EB-1400Wi, EB-1410Wi,EB-1750, EB-1751, EB-1760W, EB-1761W, EB-1770W, EB-1771W, EB-1775W, EB-1776W, EB-1830, EB-1840W, EB-1850W, EB-1860, EB-1870, EB-1880, EB-1900, EB-1910, EB-1915, EB-1920W, EB-1925W, EB-1970W, EB-1975W, EB-1980WU, EB-1985WU, EB-G5500, EB-G5600, EB-G5650W, EB-G5800, EB-G5900, EB-G5950,EB-S18, EB-W18, EB-X18, EB-X24.

Some projectors have both two DB15 ports and a 5-BNC port so support both the "SOURCE21/24" AND SOURCEB1/B4. Depending on the installation's use of the second DB15 or BNC, either Code 2000 OR Code 2020 can be used if Network is "SOURCE 53", or either Code 2010h and Code 2030h can be used if Network is "SOURCE 50" Some are: EB-G5100, EB-G5150, EB-G5200W, EB-G5300, EB-G5350

Code 2010: (2 x VGA) Some Epson projectors use **SOURCE 50** for network. (Also called EasyMP.)
Some are: EMP-1800, EMP-1815, EB-G5100, EB-G5150, EB-G5200W, EB-G5300, EB-G5350.

Code 2030: This group has both a second DB15 connector and 5 BNC connectors, all three channels used for RGB and Component. It can also use a BNC connection for a second composite video input (SOURCE 45) (They use **SOURCE 50** for Network.) Some are: EB-G5100, EB-G5150, EB-G5200W, EB-G5300, EB-G5350

Code 2040: (2 x VGA), **SOURCE 53** for Network. This replaces Source 9 with "Source 56" for Screen Mirror for communications from tablets and phone devices with Intel "WiDi" communications to place source image onto projected image.

Consult the Source codes in the user manual to see what Source commands to allocate to keys. User's manuals are at: http://tech.epson.com.au/downloads/index.asp?select=7&sCategory=

Source	Label/Connector	Code sent 2000, 2010	Code sent 2030	Comments
0	Computer 1	'SOURCE 11',00DH	'SOURCE 11',00DH	DSUB1
1	Computer 2	'SOURCE 21',00DH	'SOURCE 21',00DH	DSUB2 (some only)
2	BNC RGB	'SOURCE B1',00DH	'SOURCE B1',00DH	BNC RGB
3	USB-B Display	'SOURCE 51',00DH	'SOURCE 51',00DH	USB-B computer input
4	Component 1	'SOURCE 14',00DH	'SOURCE 14',00DH	DSUB1
5	Component 2/**BNC**	'SOURCE 24',00DH	**'SOURCE B4',00DH**	DSUB2 **/ BNC**

6	Component 3	'SOURCE C5',00DH	'SOURCE C5',00DH	RCA COMPONENT /YPbPr
7	Video RCA	'SOURCE 41',00DH	'SOURCE 41',00DH	RCA Some only
8	Video BNC	'SOURCE 45',00DH	'SOURCE 45',00DH	BNC Some only
9	Whiteboard	'SOURCE 55',00DH	'SOURCE 55',00DH	Whiteboard, some only
9	Screen Mirror	'SOURCE 56',00DH (Code 2040)		Screen Mirror via WiDi, some only
A	HDMI1/DVI-D	'SOURCE 30',00DH	'SOURCE 30',00DH	Some only
B	HDMI2/DVI-D	'SOURCE A0',00DH	'SOURCE A0',00DH	Some only
C	DisplayPort	'SOURCE 70',00DH	'SOURCE 70',00DH	Some only
D	SDI	'SOURCE 60',00DH	'SOURCE 60',00DH	BNC, Some only
E	Network 53	'SOURCE 53',00DH	'SOURCE 53',00DH	Chosen by code 2000 / 2020
E	Network 50	'SOURCE 50',00DH	'SOURCE 50',00DH	Chosen by code 2010 / 2030
F	USB-A	'SOURCE 52',00DH	'SOURCE 52',00DH	USB-A socket (memory stick / camera / wireless LAN)

Code 2020: This group replaces the second DB15 connector with **5 BNC connectors**, used for RGB and Component. (Uses **SOURCE 53** for Network.) Also has **HDBaseT** as source 15 for G and Z series which use this in place of USB-A. Some are: EB-4550, EB-4650, EB-4750W, EB-4850WU, EB-4855WU, EB4950WU, EB-4955WU, EB-G5450WU, EB-G5750WU, EB-G6050, EB-G6150, EB-G5250W, EB-G6350, EB-G6450WU, EB-G6550WU, EB-G6650WU, EB-G6750WU.
EB-Z8000WU/WUNL, EB-Z8050W EB-Z8150, EB-Z8250NL, EB-Z8255NL, EB-Z8350WNL, EB-Z8355W/NL, EB-Z8450WU/NL, EB-Z8455WU/NL, EB-Z9750U, EB-Z9800W, EB-Z9870, EB-Z9875U, EB-Z9900W, EB-Z10000, EB-Z10000U, EB-Z10005, EB-Z10005U, EB-Z11000,EB-Z11000W, EB-Z11005.

Source	**Label/Connector**	**Code sent 2020**	**Code sent 2025**	**Comments**
0	Computer	'SOURCE 11',00DH		DSUB
1	Comp. Auto	'SOURCE 1F',00DH		DSUB
2	BNC RGB	'SOURCE B1',00DH	'SOURCE F2',00DH	BNC RGB/All HDMI toggle
3	BNC Auto	'SOURCE 51',00DH	SOURCE F0,00DH	BNC/All inputs toggle
4	Component	'SOURCE 14',00DH		DSUB
5	Component BNC	'SOURCE B4',00DH	'SOURCE 55',00DH	BNC/ Whiteboard
6	Component 3	'SOURCE C5',00DH	'SOURCE 56',00DH	RCA COMPONENT / Screen Mirror

7	Video RCA	'SOURCE 41',00DH		RCA Some only
8	Video BNC	'SOURCE 45',00DH	'SOURCE 10',00DH	BNC Some only/ New VGA code
9	S-Video	'SOURCE 42',00DH	'SOURCE C0',00DH	DIN 4/ HDMI 3
A	HDMI1/DVI-D	'SOURCE 30',00DH		Some only
B	HDMI2/DVI-D	'SOURCE A0',00DH		Some only
C	DisplayPort	'SOURCE 70',00DH		Some only
D	SDI	'SOURCE 60',00DH		BNC, Some only
E	Network 53	'SOURCE 53',00DH		LAN
F	HDBaseT	'SOURCE 80',00DH	'SOURCE 80',00DH	HdBaseT

- Combined **Blank/SoundMute**and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3, AspectRatio16:9 and Zoom are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Audio Volume range is 0-20 absolute;
- RS232 controlled Zoom and Focus can be allocated to keys if the appropriate keyboard is selected with Zoom and Focus Inc and Dec keys, e.g. KB1021. These keys are auto-repeat;
- Off LED Comms-OK (one blink) and No Comms (three blinks) is supported;
- Run-time On-state Reply Mode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

Microphone volume control has been provided for projectors which have a microphone input socket (usually a 3.5mm connector). To use this facility, a keyboard needs to be selected which supports Microphone Volume Up/Down keys, e.g. layout KB1024:

```
Source 1  |  Source 2  |  Source 3  |  Mic Vol Up      |  Vol Up
-------------------------------------------------------------------------------
  Off      | Blnk/Mute |    Freeze   |  Mic Vol Down |  Vol Down
```

The far right “Vol up” and “Vol Down” keys control all audio levels, program AND microphone. The “Mic Vol Up” and “Mic Vol Down” keys control the **ratio** of microphone to program audio sent to the speakers or audio output connector At the default of “0”, there is no microphone audio sent, and only Program audio is sent at the level controlled by the main Volume keys. If the “Mic Vol Up” key is pressed 10 times (half way up) the audio mix is even Microphone and Program. After 20 presses, the only audio is the Microphone input, with NO Program audio. The actual level is again controlled by the main volume keys.

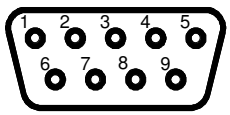
However, if you set Standby Mode to Communication On (in ECO-Standby Mode menu) and the A/V Output is set to Always On (in Extended – A/V Settings menu) audio output to the internal speakers and the audio output connector is available in “Standby” mode. The main “Volume Up” and “Volume Down” keys become operational and allow

either Program audio, a mix, or only Microphone audio to be output, and the level controlled. Audio is NOT available during projector warm-up or cool-down. The Volume Up key must be pressed to turn Standby Audio on, and then the level can be adjusted.

Note: The ratio of program to Microphone audio must be pre-set with the projector On, as the Mic Volume Up and Mic Volume Down keys and are only operational when the projector is running in display mode. They are not operational in Standby. This is a projector limitation, not a JED controller limitation.The Program audio used is the last display channel selected, and likewise, cannot be changed in Standby.

RS232 connections to Epson ESC-VP21 projectors

These use a 9-pin-D9 male on the projector, female on cable. Communications is at 9600 baud 8N1.

Function/Direction	**T470 serial Connection**	**Epson ESC-VP21 "Control" Port**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Epson IR 1

Common Power On/Off: Code 2080, (EB-S/X/U/W: 03, 04, 15,17,18, 24, 31, 32, 36 (and "+")
Epson IR 2, Sep. Power On/Off: Code 2090 (most TW, etc)

These panels are controlled either via an IR transmitter "bug" or LED IR transmitter.

Use 2080h for projectors with a single On/Off button/IR code (90h/90h).
Use 2090h for projectors with separate On/Off codes (90h/91h).Note W15/17/18/24 also respond to 91h off.

IR codes are provided for both "Absolute" source selection and for "Rolling" source selection using the "Search" option which is only available for some projectors. A good guide when setting up a keyboard layout to use these drivers is to look at the IR remote supplied with the projector (illustrated in the user manual) and choose source number entries from the table below corresponding to the ones on the IR remote.

There is a tendency to combine sources onto one button to simplify the remote control, so, for instance the "Video" button toggles between Composite Video, S-Video and HDMI (and the "HDMI1" code below is NOT used). In a similar way, the "USB" button toggles between "USB-A" (e.g. a memory stick) and "USB-B" (USB-Display).

If no absolute source buttons are allocated, use the rolling "Source" button * alone, and don't allocate any absolute key codes.Keep pressing this key until the desired source is reached. (It will only stop on active channels.)

Source	Label/Connector	IR Command Code sent	Comments
0	Computer	94H	DB15
1	Input B	9DH	DB15-B (some only)
3	USBA/B	76H	USB-A (memory stick) /USB-B (USB-Display)
4	Component	71H	3 x RCA (some only)
7	Vid/HDMI	70H	RCA Composite Video / HDMI
8	S-Video	9CH	S-Video (some only)
A	HDMI 1	73H	HDMI 1 (some only)
B	HDMI 2	77H	HDMI 2 (some only)
E	LAN	74H	LAN (some only)
F	Src-Search	8CH	Source search

- **Mute**/**Blank**and**Freeze** functions are supported;
- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports;
- **This driver MUST use T470 keyboards defined with separate OFF and ON keys**. For projectors with no absolute On and Off IR commands, the general "Power" command is sent **once** when theT470 "On"button is pressed, and the signal is sent **twice**1.2 seconds apart when the "Off" button is pressed ONCE, simulating the requirement to press the IR-remote's "power" twice, as prompted on the screen. If separate IR codes are available, the appropriate ones are sent.

Evision Projector 6500: Code 2100

- **db PowerUp, 'V99S0001',00DH**
- **db PowerDown, 'V99S0002',00DH**

Source	Label/Connector	Code sent	Comments
0	Computer 1	**'V99S0201',00DH**	DSUB1
2	BNC	**'V99S0207',00DH**	BNC
7	Video 1 (RCA)	**'V99S0204',00DH**	RCA
A	HDMI (1)	**'V99S0209',00DH**	HDMI 1
B	HDMI (2)	**'V99S0206',00DH**	HDMI 2
D	DVI	**'V99S0203',00DH**	DVI
F	HDBaseT	**'V99S0213',00DH**	

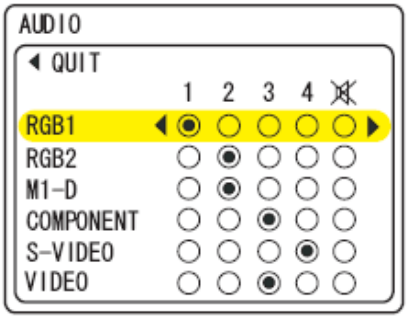
- **BlankOn/BlankOff** and **Freeze/Unfreeze** are supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state
- **Comms** at 9600 N81

Hitachi

Hitachi single audio: Code 2400, Hitachi Individual Audio: Code 2410

Code 2400 projectors have a single Increment and Decrement command for all channels. The level of all channels is controlled by this one pair of commands. So if a level has been dropped for a RGB channel, the audio level is down for the Video input and needs to be manually adjusted up.

Code 2410 has separate Increment and Decrement commands for each source channel. **All recent units are 2410 group.**



It is used when there are a number of audio inputs (2, 3 or 4) but these are unallocated to a video channel. **These must be manually allocated using the projector menu system to suit the audio sources, cables and connectors on site, but any audio input can typically be allocated to any video/RGB input.** Audio channels can be shared or a channel set to have no audio. A typical menu sequence is to go to: Menu -> Advanced menu -> Audio -> Audio, which gives a table of (a variable number of) channel names down the left column, audio inputs by number across the top, and a matrix of buttons which allows one allocation button or an OFF button to be selected per channel. Use the "down" button to select a channel, and the "left" or "right" buttons to move the "dot" to select that channel's audio. Move to the "quit" position to save and use the "left" to exit the menu.

In the back of each user's or tech manual is a list of typical channel selection messages, and manuals are available at: http://www.projectorcentral.com/Hitachi.htm or http://www.hitachi.com/products/personal/av.html

Source	Label/Connector	Code sent in byte 11 of a 12-byte hex message	Comments
0	Computer 1	000h	DSUB1
1	Computer 2	004h	DSUB2
2	BNC x 5	007h	
3	USB-B	00Ch	
4	Component (RCA)	005h	BNC x 5
5	USB-A	006h	
6			
7	Video 1 (RCA)	001h	RCA
8	Video 2 (BNC)	00Ah	BNC
9	DVI-D	009h	
A	HDMI (1)	003h	HDMI(1)/Digital/M1D/DVI
B	HDMI (2)	00Dh	
C	HDBaseT	011h	

D	S-Video	002h	
E	LAN	00Bh	
F	HDMI 3	00Eh	

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 (small), AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Audio Volume range is incremental, of variable range;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is assumed at 19200 8N1;

RS232 connections to Hitachi

These use either a D-sub 15 shrink jack pin connector, female on cable, or a DB9, female on cable.

Coms at 19200 8N1 (Note: this may have to manually set up in the projector):

Function/ Direction	**T470 serial Connection**	**Hitachi "Control" Port Connector 15-pin shrink**	**Hitachi "Control" Port Connector, DB9**
Ground	Ground	Pin 6, 7 and 10. Use all	Pin 5
Data from T470 to projector	Tx	Pin 13	Pin 2
Reply data from projector to T470	Rx	Pin 14	Pin 3

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Hitachi CP-DH300: Code 2450

This projector from Hitachi uses BenQ-like codes (but using "(" and ")" instead of "*" in the messages.)

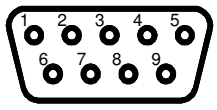
Channel codes are:

Source	Label/Connector	Message	Comments
0	Computer 1	0Dh,'(sour=RGB)',0Dh	DSUB1
1	Computer 2	0Dh,'(sour=RGB2)',0Dh	DSUB2
7	Video RCA	0Dh,'(sour=vid)',0Dh	RCA
8	S-Video	0Dh,'(sour=svid)',0Dh	
A	HDMI	0Dh,'(sour=hdmi)',0Dh	

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Audio Volume range is incremental;
- Off led blink and reply mode are both supported.

RS232 connections to Hitachi

These use a 9-pin-D9 male on the proj, female on cable. **Coms at 115200 8N1.**

Function/Direction	T470 serial Connection	"Serial" Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

InFocus

Base 9600: Code 2600

IN11x, IN12x, IN12xST, IN212x (e.g. IN126)

(Other families at different baud rates to be added as needed.)

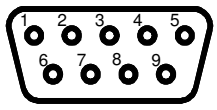
Control codes are at:
http://www.infocus.com/sites/default/files/SupportDocs/InFocus_IN120_Projector_Series/InFocus_IN126_Projector/IN12x_RS232_Commands.pdf

Source	Label/Connector	Code sent	Comments
0	VGA 1	(SRC0)	DSUB1
1	VGA 2	(SRC1)	DSUB2
7	Video 1	(SRC2)	RCA Composite Video
A	HDMI (1)	(SRC4)	HDMI
D	S-Video	(SRC3)	

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- Freeze command is NOT available;
- AspectRatioNative, AspectRatio4:3, AspectRatio16:9, Letterbox and AspectRatio16:10 (on some) are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- There is about a 10 second delay after pressing OFF before the lamp goes out and “Cooldown” starts.
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is assumed at 9600 8N1;

RS232 connections to InFocus with D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud (not adjustable), 8 bits, no parity, 1 stop.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Mimio Projector

Code 2A00

Control codes are at: http://www.mimio.com/en-AP/Support/Mimio-Product-Documentation.aspx

Source	Label/Connector	Code sent	Comments
0	Computer 1	'~vgaa'	DSUB1
1	Computer 2	'~vgab'	DSUB2
7	Video	'~composite'	RCA Composite Video
A	HDMI	'~hdmi'	HDMI
D	S-Video	'~svideo'	Din-4

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported at this stage;
- Comms is assumed at 19200 8N1;

RS232 connections to Mimio: It uses a DB9 connector, but we have been unable to determine polarityor connections.

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Mitsubishi

Mitsubishi Proj (Vol 21): Code 2B00**,**
Mitsubishi Proj (Vol 21) Slow: Code 2B01

EX10U, ES-EX100U, FD630U/G HC100, SD220U, S/XD221, S/XD420U, S/XD430U, HC900/E, WD380U-EST, WD385U-EST, WD500U-ST, WD510U, WD510U-G, WD570U, WD2000, WL639U, XD250U, XD250XD, XD280U, XD360U-EST, XD365U-EST, XD435U, XD400U, XD450U, XD460U, XD470U, XD480U, XD490U, XD500, XD510U, XD520U, XD560U, XD2000U, XL6U.

Mitsubishi Proj (Vol 21) LED: Code 2B02

NW30U, NW31U/EST, NF32U**:** short warmup-closedown, fast channel change, 0->21 volume.

Mitsubishi Proj (Vol 31): Code 2B10
Mitsubishi Proj (Vol 31) Slow: Code 2B11

FL6900, FL7000U, HD8000, MH2850U, UL7400, WL2560U, WL7050U, WL7200U, WL6700U/LU, S/XL4U, XL5U, SL6U, XL8U, XL9U, S/XL25U, XL30U, X200E, S/XD200U, XD300U, XD350U, X390U, X400U, SX490U, X500U, XL550U, XD550U, XD650U, XL650U, XL1550U, XL2550U, XL5900U, XL5950U, XL5980U/LU, XL6500U/LU, XL6600U/LU, XL7100 **InFocus** LP1200

Mitsubishi Proj (Vol 32): Code 2B20
Mitsubishi Proj (Vol 32) Slow: Code 2B21

Mitsubishi Proj (Vol 60): Code 2B30
Mitsubishi Proj (Vol 60) Slow: Code 2B31

S/XL1U, S/XL2U, S/X50U, SA51U, X70/U, X80U

Mitsubishi Proj (Vol 100): Code 2B40
Mitsubishi Proj (Vol 100) Slow: Code 2B41

SD105U, S/XD206U

Mitsubishi Proj (Vol 10): Code 2B50
Mitsubishi Proj (Vol 10) Slow: Code 2B51

Mitsubishi Proj IncDec: Code 2B60

EX320U, EW330U (projector audio range is 0->10, but there are no absolute volume commands.)

Mitsubishi Proj IncDec by 3s: Code 2B61

If there is no “Volume commands” paragraph (or no audio in the projector), use the incremental control driver .

No audio: HC1100, HC1500, HC1600, HC3000, HC3100, HC3800, HC4900, HC5000, HC5500, HC6000, HC6500, HC6800, HC7000, HD1000, HD4000, UD8400U, WD8200U/LU

Inc/dec audio: X100E, S/X120E, S/X250U, S290U, X300U

Note: We found some Mitsubishi Projectors have different audio control ranges than the Mit. manual states. If you cannot get the full volume range, try a different code or use the Max Volume setting on the setup screen.

Some Mit. Projectors have a problem with sending the volume setting too soon after sending a source command. The symptom of this is no audio after a source change until a Volume Inc/Dec is sent. If this is the case, select the "slow" codes above.

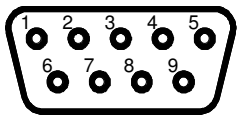
In the back of some user manuals is a list of RS232 control messages.
Also, see master RS232 code list at: (See also "Deleted" tab codes on link on this page.)
http://www.mitsubishi-presentations.com/product-support/downloads/controlcodes/

Source	Label/Connector	Code sent	Comments
0	Computer 1	'00_r1',00DH	DSUB1 Computer1/Component1
1	Computer 2	'00_r2',00DH	DSUB2 Computer2/Component2
3	USB-B Display	'00_s2',00DH	Display from PC
4	Component 1	'00_c1',00DH	3 x RCA Component input or Card 1 input
7	Video 1	'00_v1',00DH	RCA Composite Video
8	Video 2	'00_v2',00DH	RCA Composite Video or S-Video
A	HDMI1	'00_d1',00DH	HDMI 1
B	HDMI2/DVI-D	'00_d2',00DH	DVI/D or HDMI 2
C	HDMI3/SDI	'00_d3',00DH	SDI BNC or HDMI 3
E	Net	'00_n1',00DH	Network
F	USB-A	'00_s1',00DH	USB-A socket (memory stick etc)

- Combined **Blank/SoundMute** is supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- **Freeze** command is available as a toggle function if an appropriate button is allocated;
- Roll **AspectRatio**is supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to Mitsubishi projectors, D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud, 8 bits, no parity, and 1 stop.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

NEC 38400, Vol 63: Code 2C00

Some: HT1000, HT1100 (fixed 38400), LT25/LT30/LT35, NP40/NP50/NP60, NP41/NP51/NP61/NP62, NP43/NP54/NP63/NP64, NP110/NP115/NP210/NP215. HT410/HT510, LT180, LT75Z, PA500U, PA500X, PA550W, PA600X, PH1000U, , V230, V230X, V260, VT37, VT46/VT460/VT465/VT560/VT660, VT47/VT470/VT570/VT575/VT670/VT676, VT48/VT57/VT58. With no audio: PX700W, PX750U, PX800X

NEC 38400, Vol 31: Code 2C01

(It is difficult to determine whether the maximum audio level of a particular projector is 31 or 32 from the NEC data ... if one in this group actually is 32 max, please let JED know, and use the next code. Test using the IR remote.)

LT220/LT240/LT260, LT245/LT265, M230X/M260W/M260X/M300W, M271W/X, M311W/X, M361X, M300W, M300X, M350X, MW420X, MW420XV, NP216, P350W/X, P401W, P451W/X, P501X, P420, PA500U/X, PA550W, PA600X, PE401H, PE501X, U250X, U260W, U300X, U310W, UM280/330X UM280W/X, UM330W/X, UM301W/X, UM351W, UM361X, V281, V311W/X, VE280/X, VE281/X, VE282/X, WT600, WT610/WT615

NEC 38400, Vol 32: Code 2C02

S/XL1U

NEC 38400, New HDMI 1&2, Vol 32: Code 2C03

This group supports a newer series of NEC projectors with different HDMI 1 and 2 commands. It also adds a “Slot” device replacing a second Component source command.

Command for HDMI 1 is: 02H,03H,00H,00H,02H,01H,0A1H,0A9H
Command for HDMI 2 is: 02H,03H,00H,00H,02H,01H,0A2H,0AAH
Command for Slot is: 02H,03H,00H,00H,02H,01H,0ABH,0B3H

Devices that should use this code are: PA521U, PA522U, PA571W, PA572W, PA621U, PA621X, PA622U,PA622X, PA671W, PA672W, PA721X, PA722X, and the group: PX602UL-WH, PX602UP-BK, PX602WL-WH, PX602WL-BK.

NEC 19200, Vol 63: Code 2C10

NP300/NP305/NP310/NP405/NP410/W/NP510/W/WS/NP610/S, NP400/NP500/W/NP600, NP1200, NP2200, NP3200, VT45, VT49/VT59/VT490/VT590, VT480/VT580, VT595/VT695/VT700, VT650,

Canon 19200 baud, (audio status unknown)
LV-7240/LV-7245/LV-X5, LV-7250/LV-X6, LV-7255, LV-7260/LV-7265/LV-X7

NEC 9600, Vol 63: Code 2C20

LT84/LT140

NEC 4800, Vol 63: Code 2C30

This is useful for long-line communications to above projectors with alterable baud rates.

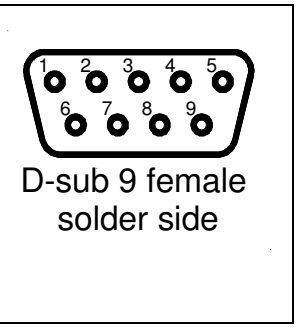
In the back of each “Installation Guide” is a list of typical channel selection messages. **This also shows baud rate**. Also, see master NEC code list athttp://www.nec-display-solutions.com/p/uk/en/products/choice.xhtml?cat=Beamer
http://necvisualsystems.com/cms/documents/UserManuals/RS232_PJ_ControlCommands.pdf

Source	Label/Connector	Code sent	Comments
0	Computer 1 In	02H,03H,00H,00H,02H,01H,01H,09H	DSUB1 Computer1/Component1
1	Computer 2 In	02H,03H,00H,00H,02H,01H,02H,0AH	DSUB2 Computer2/Component2
2	Computer 3 In	02H,03H,00H,00H,02H,01H,03H,0BH	5 x BNC Computer3/Component3
3	USB-B Disp	02H,03H,00H,00H,02H,01H,22H,2AH	Display from PC
4	Component (1)	02H,03H,00H,00H,02H,01H,10H,18H	3 x RCA Component input
5	Component (2)	02H,03H,00H,00H,02H,01H,11H,19H	3 x RCA Component input
5	Slot	02H,03H,00H,00H,02H,01H,0ABH,0B3H	Slot (Code 2C03)
6	DVI Analog	02H,03H,00H,00H,02H,01H,03H,0BH	
7	Video	02H,03H,00H,00H,02H,01H,06H,0EH	RCA Composite Video
8	HDBaseT	02H,03H,00H,00H,02H,01H, BFH,C7H	RJ45
9	DVI	02H,03H,00H,00H,02H,01H,1AH,22H	
A	HDMI1	02H,03H,00H,00H,02H,01H,1AH,22H	HDMI 1
A	HDMI 1 new	02H,03H,00H,00H,02H,01H,A1H,A9H	HDMI 1 (Code 2C03)
B	HDMI 2	02H,03H,00H,00H,02H,01H,1BH,23H	DVI/D or HDMI 2
B	HDMI 2 new	02H,03H,00H,00H,02H,01H,A2H,AAH	HDMI 2 (Code 2C03)
C	DisplayPort	02H,03H,00H,00H,02H,01H,A6H,AEH	DisplayPort
D	S-Video	02H,03H,00H,00H,02H,01H,0BH,13H	
E	Network	02H,03H,00H,00H,02H,01H,20H,28H	Network
F	USB-A View	02H,03H,00H,00H,02H,01H,1FH,27H	USB-A socket (memory stick etc)

- **BlankOn/BlankOff, SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- Roll **AspectRatio** is supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to NEC projectors, D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud, 8 bits, no parity, and 1 stop.

Function/Direction	T470 serial Connection	"Serial" Port Connector	
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

NEC IR 1, Sep. Power On/Off Commands: Code 2C70 (most models)

These panels are controlled either via an IR transmitter "bug" or LED IR transmitter.

IR codes are provided for "Absolute" source selection. NEC remotes have one source and code per key.

Source	Label/Connector	IR Command Code sent	Comments
0	Computer 1	04H	DB15 1
1	Computer 2	05H	DB15 2
3	USB-A	27H	USB-A (memory stick)
4	USB-B	52H	USB-B (USB-Display)
7	Video	03H	RCA Composite Video
8	S-Video	C6H	S-Video (some only)
A	HDMI 1	73H	HDMI 1 (some only)
B	HDMI 2	77H	HDMI 2 (some only)
E	Disp.Port	32H	Display Port (some only)
E	LAN	56H	LAN (some only)

- **Mute/Blank**, **Freeze, Aspect** and **Auto Pixel** functions are supported;
- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports.

Optoma

Optoma 1/2, Vol 0->10: Code 2C80 (Basic Optoma driver).

Optoma 1/0, Vol 0->10: Code 2C81

Optoma have most units using codes PowerUp: '~0000 1',00DH and PowerDown: '~0000 2',00DH.

An alternate group needs codes of PowerUp: '~0000 1',00DH and PowerDown: '~0000 0',00DH.

Some deliberately support BOTH “1 / 2” and “1 / 0” controls: Use Code 2C80 for these.

Optoma 1/2, Vol 0->15: Code 2C82

Optoma 1/0, Vol 0->15: Code 2C83

Optoma 1/2, Vol 0->20: Code 2C84

Optoma 1/0, Vol 0->20: Code 2C85

Optoma 1/0, Vol 0->10: Code 2C86

Optoma 1/0, Vol 0->30: Code 2C87 ZH400UST

In the back of each “User’s Manual” is a list RS232 codes. The command strings can normally be found by doing a search for the string ‘9600’ (the baud rate across all units).

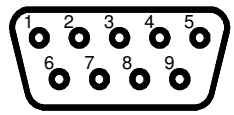
Source	Label/Connector	Code sent	Comments
0	VGA 1	'~0012 5',00DH	DSUB1
1	HDBaseT	'~0012 21',00DH	*Changed from VGA2 V130*
2	RGB BNC	'~0012 4',00DH	RGB BNC
3	USB-B Disp	'~0012 19',00DH	USB Display
4	Component 1	'~0012 8',00DH	VGA 1 Component Y, Pb/Cb, Pr/Cr
5	Component 2	'~0012 13',00DH	VGA 2 Component Y, Pb/Cb, Pr/Cr * USB Display EX565/665/675/685/695
	HDBaseT	'~0012 21',00DH	*Code 2C86*
6	Comp.t RCA	'~0012 14',00DH	RCA COMPONENT /YPbPr
	Wireless	'~0012 11',00DH	*Code 2C86*
7	Video RCA	'~0012 10',00DH	RCA
8	DVI-I	'~0012 3',00DH	DVI-I
9	DVI-D	'~0012 2',00DH	DVI-D
A	HDMI 1	'~0012 1',00DH	HDMI 1

B	HDMI 2	'~0012 15',00DH	HDMI 2
C	HDMI 3	'~0012 16',00DH	HDMI 3
D	Disp.Port	'~0012 20',00DH	DisplayPort
E	Network	'~0012 18',00DH	LAN
F	USB-A	'~0012 17',00DH	USB-A socket (memory stick

- Combined **Blank/SoundMute** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3, AspectRatio16:9 and AspectRatio16:10 (WXGA units only) are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Audio Volume range is normally 0-> 10 but a few are 0->15 or 0->20 absolute. There latter are supported with their own codes (see above);
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is 9600 8N1;

RS232 connections to Optoma projectors

These use a 9-pin-D9 male on the projector, female on cable. Communications is at 9600 baud 8N1.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Panasonic

Panasonic projectors OSH:0/1: Code 3000

(This group does not use addressed commands)

(Panasonic use several different ways to control the Blank (Shutter) function. See the code spec sheets to see how a particular projector runs this function.) e.g. PT-VW530, PT-VW535N, PT-VX60, PT-VX600, PT-VX605N, PT-VZ570, PT-VZ575

This group uses OSH1/OSH0 for Blank (Shutter) On and Off respectively.

Panasonic projectors OSH/HD1: Code 3010

This group uses OSH to turn blank (Shutter) On and a dummy channel change “02H,'IIS:HD1',03H” when blanked to turn it off. (The channel does NOT actually change, just generates an error code and un-blanks.)

Panasonic projectors OSH/OSH: Code 3020

This uses “02H,'OSH',03H” to toggle Blank (Shutter) On and Off.

In the back of each “User Guide” is a list of typical channel selection messageshttps://eww.pavc.panasonic.co.jp/projector/extranet/main/sitemap/index.html

Source	Label/Connector	Code sent	Comments
0	Computer 1	02H,'IIS:RG1',03H	DSUB1
1	Computer 2	02H,'IIS:RG2',03H	DSUB2
2	Computer 3	02H,'IIS:RG3',03H	DSUB3
4	Component YUV	02H,'IIS:YUV',03H	RCA
5	Component 1	02H,'IIS:CP1',03H	BNC
6	Component 2	02H,'IIS:CP2',03H	RCA
7	Video	02H,'IIS:VID',03H	RCA
8	Aux	02H,'IIS:AUX',03H	
9	DVI	02H,'IIS:DVI',03H	DVI
A	HDMI 1	02H,'IIS:HD1',03H	HDMI
B	HDMI 2	02H,'IIS:HD2',03H	HDMI
C	HDMI 3	02H,'IIS:HD3',03H	HDMI
D	HDMI old	02H,'IIS:HDM',03H	HDMI
E	Network	02H,'IIS:NWP',03H	
F	S-Video	02H,'IIS:SVD',03H	

Panasonic projectors Addressed mode (OSH:0/1): Code 3100

This uses “02H,'ADZZ;OSH:1',03H” to Blank (Shutter) On and “02H,'ADZZ;OSH:0',03H” Off.

Panasonic projectors Addressed mode (OSH:0/1): Code 3105

As above but with Display Port

Panasonic projectors Adr(OSH/HD1): Code 3110

This group uses “02H,'ADZZ;OSH',03H” to turn blank (Shutter) On and a dummy channel change “02H,'IIS:ADZZ;HD1',03H” when blanked to turn it off. (The channel does NOT actually change, just generates an error code and un-blanks.)

Panasonic projectors Adr (OSH/OSH): Code 3120

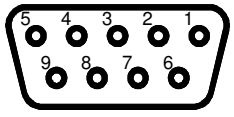
This uses “02H,'ADZZ;OSH',03H” to toggle Blank (Shutter) On and Off.

Source	Label/Connector	Code sent	Comments
0	Computer 1	02H,'ADZZ;IIS:RG1',03H	DSUB1
1	Computer 2	02H,'ADZZ;IIS:RG2',03H	DSUB2
2	Computer (PC1)	02H,'ADZZ;IIS:PC1',03H	PC1
3	Computer (PC2)	02H,'ADZZ;IIS:PC2',03H	PC2
4	Component YUV	02H,'ADZZ;IIS:YUV',03H	
	Display Port	02H,'ADZZ;IIS:DP1',03H	Code 3105
5	Component 1	02H,'ADZZ;IIS:CP1',03H	
6	Component 2	02H,'ADZZ;IIS:CP2',03H	
7	Video	02H,'ADZZ;IIS:VID',03H	RCA
8	DigitalLink 1	02H,'ADZZ;IIS:DL1',03H	Shielded CAT5e solid
9	DVI-I	02H,'ADZZ;IIS:DVI',03H	DVI
A	HDMI 1	02H,'ADZZ;IIS:HD1',03H	HDMI
B	HDMI 2	02H,'ADZZ;IIS:HD2',03H	HDMI
C	SD1	02H,'ADZZ;IIS:SD1',03H	BNC
	HDMI 3	02H,'ADZZ;IIS:HD3',03H	Code 3105
D	SD2	02H,'ADZZ;IIS:SD2',03H	BNC
E	Network	02H,'ADZZ;IIS:NWP',03H	
F	SDI	02H,'ADZZ;IIS:SDI',03H	BNC

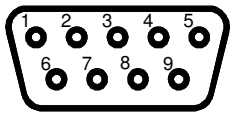
- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state. The "Toggle" code entry above (Code:3020h) uses a toggle mode for the LED, and it does NOT indicate current state for this entry.
- An **AlignPixels (AutoSetup)** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Make sure to turn off "Auto input search" if your projector includes this;
- **Make sure to set the baud rate to 9600** and no parity if an adjustment menu is provided. Select "AMX D. D." mode if only 19200 mode is shown … this will set 9600 baud.

RS232 connections to Panasonic projectors: Three systems in use:

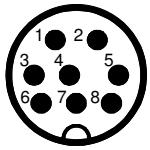
D-SUB 9 Female on projector, male on cable. Comms at 9600 8N1

Function/Direction	T470 serial Connection	Panasonic Serial Port Connector	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 2 (TXD)	

D-SUB 9 Male on projector, female on cable. Comms at 9600 8N1

Function/Direction	T470 serial Connection	Panasonic Serial Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

Mini-DIN-8 socket on projector. Comms at 9600 8N1

Function/Direction	T470 serial Connection	Panasonic Serial Port Connector	 Mini-DIN 8 solder side
Ground	Ground	mini-DIN 8 pin 4	
Data from T470 to projector	Tx	mini-DIN 8 pin 3 (RXD)	
Reply data from projector to T470	Rx	mini-DIN 8 pin 5 (TXD)	

Sharp

Sharp projectors: Code 3C00

Sharp do not appear to be still manufacturing projectors, but many are still in use.

Source	Label/Connector	Code sent	Comments
0	Computer 1	'IRGB 1',00DH	DSUB1
1	Computer 2	'IRGB 2',00DH	DSUB2, BNC, DVI or HDMI
2	Computer 3	'IRGB 3',00DH	DVI-D, HDMI or HDMI-1
3	Computer 4	'IRGB 4',00DH	DVI-D, HDMI or HDMI-1
4	Component 1	'ICMP 1',00DH	
5	Component 2	'ICMP 2',00DH	
6	DVI	'IDVI 1',00DH	
7	Video 1	'IVED 1',00DH	RCA or S-Video
8	Video 2	'IVED 2',00DH	RCA or S-Video
9	Video 3	'IVED 3',00DH	Various
A	Video 4	'IVED 4',00DH	Various
B	Video 5	'IVED 5',00DH	Various
C	Video 6	'IVED 6',00DH	Various
D	S-Video	'ISEV 1',00DH	Some

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state.
- An **AlignPixels (AutoSetup)** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Make sure to turn off “Auto input search” if your projector includes this.

RS232 connections to Sharp/Eiki projectors

These use a D-sub 9-pin connector, female or male on cable: (May be via an adaptor cable from projector 9-pin mini-DIN) Communications is at 9600 baud 8N1. Some projectors may need this to be set up via an on-screen menu.

Function/Direction	**T470 "projector" Connection**	**Sharp Control Port Connector, D-sub 9**	**Sharp Control Port Connector DIN 9**
Ground	Ground	9-pin D-sub pin 5	9-pin D-sub pin 5
Data from T470 to projector	Tx	9-pin D-sub pin 2	9-pin D-sub pin 2
Reply data from projector to T470	Rx	9-pin D-sub pin 3	9-pin D-sub pin 3

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Sony A9 Proj 8E1: Code 4000

Even parity: SONY VPL-BW5, VPL-CW125, VPL-CW255, VPL-CW258, VPL-CW275, VPL-CW278, VPL-CX61, VPL-CX63, VPL-CX80, VPL-CX85, VPL-CX86, VPL-CX100, VPL-CX120, VPL-CX125, VPL-CX130, VPL-CX131, VPL-CX135, VPL-CX150, VPL-CX155, VPL-CX160, VPL-CX161, VPL-CX165, VPL-CX235, VPL-CW238, VPL-CX275, VPL-CX278, VPL-ES4, VPL-EW7, VPL-EW130, VPL-EW225, VPL-EW226, VPL-EW245, VPL-EW246, VPL-EW275, VPL-EW276, VPL-EX4, VPL-EX5, VPL-EX7, VPL-EX50, VPL-EX70, VPL-EX71N, VPL-EX100, VPL-EX101, VPL-EX120, VPL-EX121, VPL-EX123, VPL-EX130, VPL-EX145, VPL-EX146, VPL-EX147, VPL-EX148, VPL-EX175, VPL-EX176, VPL-EX178, VPL-EX221, VPL-EX222, VPL-EX225, VPL-EX226, VPL-EX241, VPL-EX242, VPL-EX245, VPL-EX246, VPL-EX271, VPL-EX272, VPL-EX273, VPL-EX274, VPL-EX275, VPL-EX276, VPL-F400H/X , VPL-F401H, VPL-F500H, VPL-F501H , VPL-F600X, VPL-F700HL/XL, VPL-FE40, VPL-FH30, VPL-FH31, VPL-FH35, VPL-FH36, VPL-FH300L, VPL-FH500L, VPL-FW41/L, VPL-FW300L, VPL-FX30, VPL-FX35, VPL-FX37, VPL-FX40, VPL-FX41/L, VPL-FX50, VPL-FX51, VPL-FX52, VPL-FX500L, VPL-HW15, VPL-HW30, VPL-HW50, VPL-PX11, VPL-PX15, VPL-PX35, VPL-PX40, VPL-PX41, VPL-SW125, VPL-SW525/C, VPL-SW526/C, VPL-SW535/C, VPL-SX125, VPL-SX525, VPL-SX535, VPL-TX7, VPL-TX70, VPL-VW70, VPL-VW85, VPL-VW95, VPL-VW200, VPL-VW1000

Sony A9 Proj 8N1: Code 4010

No parity: VPL-ES3/EX3NEC base 4800, audio 63: Code 2C30h

A protocol manual is at:
http://www.kavena.se/fileadmin/uploads/downloads/Sony/Projektorer/RS232/Protocol_Manual_Rev13.pdf

This family has common codes, but allocates the “Inputs A/B/C/D” differently.

Source	Label/Connector	Code sent	Comments
0	Computer 1	0A9h,000h,001h,000h,000h,002h,003h,09Ah	RGB 1
1	Computer 2	0A9h,000h,001h,000h,000h,003h,003h,09Ah	RGB 2
2	Input 4 RGB E	0A9h,000h,001h,000h,000h,006h,007h,09Ah	RGB E
3	Input 4 RGB F	0A9h,000h,001h,000h,000h,007h,007h,09Ah	RGB F
7	Video	0A9h,000h,001h,000h,000h,000h,001h,09Ah	RCA Composite Video
A	HDMI1	0A9h,000h,001h,000h,000h,004h,005h,09Ah	HDMI 1
B	HDMI 2	0A9h,000h,001h,000h,000h,005h,005h,09Ah	HDMI 2
D	S-Video	0A9h,000h,001h,000h,000h,001h,001h,09Ah	

- **BlankOn/BlankOff,** and**SoundMuteOn/SoundMuteOff** are supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;

- No **Freeze** is available;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

Sony ADCP: Code 4020

This group are a new set of alphabetic codes. Comms at 38400 BAUD, Even parity, 1 stop.

Source	Label/Connector	Code sent	Comments
0	Computer 1	input “rgb1” CR LF	RGB 1
1	Computer 2	input “rgb2” CR LF	RGB 2
3	USB A	input “usb_a” CR LF	USB A
4	USB B	input “usb_b” CR LF	USB B
7	Video	input “video1” CR LF	RCA Composite Video
8	S-Video	input “svideo1” CR LF	DIN 4
9	DVI	input “dvi1” CR LF	DVI
A	HDMI 1	input “hdmi1” CR LF	HDMI 1
B	HDMI 2	input “hdmi2” CR LF	HDMI 2
D	HDBaseT	input “hdbaset1” CR LF	Cat5
E	Option 1	input “option1” CR LF	Option slot
F	Network	input “network” CR LF	Cat5

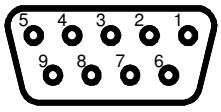
- **BlankOn/BlankOff, SoundMuteOn/SoundMuteOff**and **FreezeOn/FreezeOff**are supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to Sony projectors

These all use a D-sub 9-pin connector, male on cable.

Code 4000h and 4020h units are 38400 BAUD, Even parity, 1 stop.

Code 4010h units are 38400 BAUD, No parity, 1 stop.

Function/Direction	**T470 serial Connection**	**Projector Connector (Male on cable)**	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Sony IR controlled projectors: Code 4040

These panels are controlled either via an IR transmitter “bug” or LED IR transmitter.

There appear to be a couple of ways used for source selection with Sony projectors;

- IR codes are provided to access the “Source” menu and use the Up and Down arrows to select a line on the source table, and then use the “Enter” button to activate the selected source;
- Alternatively, just use the Source key … each press of the “Source” key increments through the source table. Leaving the high-lit selection on a different one will automatically select that one after a few seconds. Note: this projector differs from some other IR projectors/screens in that ALL sources can be selected, not just ones with an active or valid input. This makes it easy to use just a Source key for all selection functions;
- IR codes for some projectors supply direct selection of Video (and sometimes S-Video) as well as Inputs A->F. These use a normal keyboard layout, similar to RS232 controlled projectors.

Sony uses three different IR transmission formats (sometimes in the same projector):

- 12-bit SIRC code with a 7-bit “Command” followed by a 5-bit “device” string (not used here);
- 15-bit SIRC code with a 7-bit “Command” followed by an 8-bit “device” string. This is used by most commands in this driver;
- Two groups of 20-bit SIRC codes with a 7-bit “Command” followed by a 5-bit “device” string and an 8-bit “Extended” string. This is used by the “Return” (Projector-EE group), the “Freeze” and “Aspect” commands (Projector-E group).

Source	Label/Connector	IR Command Code sent	Command format	Comments
0	Source	57H	15 bit projector	Shows “Source” table
1	Up arrow	35H	15 bit projector	
2	Down arrow	36H	15 bit projector	
3	Right arrow	33H	15 bit projector	
4	Left arrow	34H	15 bit projector	
5	Enter	5AH	15 bit projector	
6	Menu	29H	15 bit projector	Enter menu setting
7	Return	6FH	Projector-EE	Exit from menu setting
8	Video	2AH	15 bit projector	Direct source command
9	S-Video	5FH	15 bit projector	Direct source command
A	Input-A	2BH	15 bit projector	Direct source command
B	Input-B	2CH	15 bit projector	Direct source command

C	Input-C	6FH	15 bit projector	Direct source command
D	Input-D	70H	15 bit projector	Direct source command
E	Input-E	71H	15 bit projector	Direct source command
F	Input-F	06H	15 bit projector	Direct source command

- **Blank, Mute, Aspect** and **Freeze** (some only)buttons aresupported by the driver, but not all projectors appear to respond to all these commands;

- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connections to the projector to get status reports;

- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic "Power" code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time.**This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state. This nicely keeps everything is step**;** and

- Volume on the projector covers a 0->100 range. The Volume Up and Down keys trigger five quick transmission of the appropriate code, so the 0->100 range is covered by 20 presses maximum. The volume keys will auto-repeat if held down, but there is no "staying on" of the associated LED, as the controller has no way of knowing when a maximum or minimum is reached.

Viewsonic 1: Code 4400

Suits models such as LS831WU operating at 115200baud 8N1

Source	Label/Connector	Code sent	Comments
0	VGA 1	06 14 00 04 00 34 13 01 00 60	Computer 1
1	VGA 2	06 14 00 04 00 34 13 01 08 68	Computer 2
2	Component	06 14 00 04 00 34 13 01 0B 6B	
3	USB Display	06 14 00 04 00 34 13 01 1A 7A	Some models only
7	Video	06 14 00 04 00 34 13 01 05 65	RCA
8	S-Video	06 14 00 04 00 34 13 01 06 66	
9	DVI-D	06 14 00 04 00 34 13 01 0A 6A	
A	HDMI 1	06 14 00 04 00 34 13 01 03 63	
B	HDMI 2	06 14 00 04 00 34 13 01 07 67	
C	HDMI3	06 14 00 04 00 34 13 01 09 69	
D	HDBaseT	06 14 00 04 00 34 13 01 0C 6C	
F	Network		
	Power On	0x06 0x14 0x00 0x04 0x00 0x34 0x11 0x00 0x00 0x5D	
	Power Off	0x06 0x14 0x00 0x04 0x00 0x34 0x11 0x01 0x00 0x5E	

- **BlankOn/BlankOff, Sound mute On/Off** and **Freeze On/Off** are supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state
- Off LED Comms-OK (one blink) and No Comms (three blinks) is supported
- Run-time On-state ReplyMode is supported

VivitekD1: Code 5C00 (also Digital Projection E-Vision series)

D series: D516, D517, D517, D518, D519, D555, D517, D557W

D791, D795, D7180UM

D86, D87, D850, D851, D853W, D855ST, D856, D858, D860, D861, D862, D863, D864, D867, D869, D871ST, D873ST

D965 (Vol 0->8), D967, D966HD,D968U

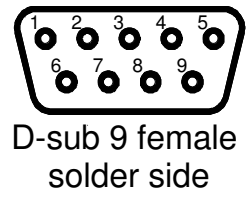
D5180HD, D5185HD, D5280U/UM, D5380u (All above are volume 0 -> 10 except where indicated)

Source	Label/Connector	Code sent	Comments
0	VGA 1	'V99S0201', 0DH	Computer 1
1	VGA 2	'V99S0202', 0DH	Computer 2
2	BNC	'V99S0207', 0DH	(some only)
4	Component	'V99S0208', 0DH	(some only) HDMI on some eg D86x, D87x series)
6	DVI-A	'V99S0203', 0DH	(some only)
7	Video	'V99S0204', 0DH	RCA
8	S-Video	'V99S0205', 0DH	
9	DVI-D	'V99S0203', 0DH	(Some only)
A	HDMI 1	'V99S0206', 0DH	(HDMI 2 on some eg D86x, D87x series))
B	HDMI 2/DP	'V99S0209', 0DH	(Some only) (DisplayPort on some, eg D5180HD, 5185HD)
C	HDMI3/DP	'V99S0210', 0DH	(Some only) (DisplayPort on some, eg D967, D966HD, D968U)
D	DisplayPrt	'V99S0211', 0DH	(Some only) (eg D5280U/UM, D7180UM) (Some MultiMedia, eg D5380u

- **BlankOn/BlankOff, (includes sound mute On/Off)** and **Freeze On/Off**are supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported;
- **Auto-source** function (under Settings 2 menu) and **Auto Power On**must be turned Off

RS232 connections to Vivitek projectors with D9,female on cable

This uses a 9-pin-D9 male on the projector, female on cable. Communications is at 9600 baud, 8N1.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

LCD Panels

AHA/Hitachi

LCD in 55”, 65”, 70”, 75”, 84”: Code 6100

Hitachi LCD HILF75101/65101: Code 6C00

Hitachi HILFU75202: Code 6C10

RS232 codes have been supplied by the importer.

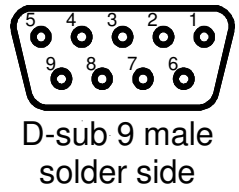
Source	Label/Connector	Code sent (6100) Hit: (6C00)*	Comments
0	RGB-PC	kb 00 07 *	VGA on D-sub 15
0	RGB	Kb 00 05 (Code 6C10)	HILFU75202 VGA
2	OPS-IntPC	kb 00 0E	OPS (Internal PC)
	OPS	Kb 00 07 (Code 6C10)	HILFU75202 OPS
4	Component (Option)	kb 00 04	3 x RCA (some only)
7	AV (Option)	kb 00 02	RCA (some only)
9	DVI-D	kb 00 08	DVI-D
10	HDMI 1	kb 00 09 *	HDMI 1
11	HDMI 2	kb 00 0a *	HDMI 2
12	HDMI 3-HD	kb 00 0b *	HDMI 3 (*Note: Possibly HDMI1 for HILF65101*)
14	DisplayPort	kb 00 0c *	DP
15	USB-A	kb 00 0d	SDI

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state. No **Freeze** is available;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Aspect rations of 4:3 and 16:9 are supported if an aspect key is provided.

RS232 connections to AHA panels:

D-SUB 9 Female on projector, male on cable. Comms at 9600 8N1

Function/Direction	T470 serial Connection	Serial Port Connector	

Ground	Ground	9-pin D-sub pin 5	 D-sub 9 male solder side
Data from T470 to projector	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 2 (TXD)	
Ground	Ground	mini-DIN 8 pin 4	

After installation wiring of any device to a T470, use a multimeter to check voltages on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms. Note voltage FROM this panel is only -0.9 volt static, but pulses go sufficiently positive. T470 output should be -5 to -9 volts.

AHA LCD Arrows / Enter select

Code 6110 uses a source key, arrows and an OK/Enter key to select.

This code options allows navigating around the vertical source options list (and selecting one with the OK / Enter key. It also is needed if one desires to navigate around the sub-menus on USB devices or selecting files or images on a USB device from a full screen matrix of files “tiles”, etc. Operation is very similar to using the arrow cluster on an IR remote, but coms is via the more reliable RS232.

A possible keyboard using keyboard code KB1007 layout is:

Source	Left Arrow	Right arrow	Up arrow	Volume Up
Off	On	Ok/Enter	Down arrow	Volume Down

Key “source” setup options are:

Key function	**Label**	**Code sent (6110)**	**Comments**
0	Source key	mc 00 ac	Brings up vertical source list or menu
1	Up arrow key	mc 00 8d	Moves up source list / menu
2	Down arrow key	mc 00 8e	Moves down source list / menu
3	OK Enter key	mc 00 8c	Selects an option
4	Right arrow key	mc 00 90	Moves between menu selections
5	Left arrow key	mc 00 8f	Moves between menu selections
6	Menu key	mc 00 95	Brings up options menu
7	Exit key	mc 00 96	

Akai

Same as LG IR

A2T

LCD 1, NEC format IR, Common Power On/Off: Code 6115

These panels are controlled either via an IR transmitter "bug" or LED IR transmitter.

IR codes are provided to access the "Input" menu and use the Left and Right arrows to select an item on the input table, and then use the OK button to activate the selected input. This is neatly done with the KB1022 10-key layout:

Input	Left arrow	Right arrow	Channel Up	Volume up
Off	On	Ok	Channel Down	Volume Down

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Mute function.

Source	Label/Connector	IR Command Code sent	Comments
0	Input	1AH	Shows "Input" table
1	Up arrow	0BH	
2	Down arrow	0EH	
3	OK Enter	0DH	Activate the function
4	Right arrow	11H	
5	Left arrow	10H	
	TVChannelUp	1FH	
	TVChannelDown	1EH	

- **A Mute button**is supported but freeze is not;
- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports;
- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic "Power" code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time**.

  This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state. This nicely keeps everything is step.

Benq

BenQ LCD 1: Code 6200 (RP550+, 551+, 552/H, 650+, 651+, 653, 700+, 703, 750/K, 840G)

BenQ LCD 3: Code 6219 (RP6501, 7501, 8601, RM55/65/75/8602K) uses 002 Standby, 9600baud

BenQ LCD 4: Code 6220 (RP652, 702, 790S, 705H, RM5501K/RM6501K/RM7501K/RM8601K) uses 38400baud, incremental audio

BenQ LCD 5: Code 6221 (RM6503, 7503, 8603) uses 002 Standby, 115200baud

Source	Label/Connector	Code sent	Comments
0	VGA 1	'801s', 22H, '000', 00DH	VGA 1
1	VGA 2	'801s', 22H, '031', 00DH	VGA 2
2	VGA 3	'801s', 22H, '032', 00DH	VGA 3
3	USB-B Disp	'801s', 22H, '011', 00DH	USB B
4	Component	'801s', 22H, '004', 00DH	3 x RCA
5	SDI	'801s', 22H, '008', 00DH	SDI
6	DVI	'801s', 22H, '006', 00DH	DVI
7	AV	'801s', 22H, '003', 00DH	RCA
8	S-Video	'801s', 22H, '005', 00DH	DIN-4
9	Multimedia	'801s', 22H, '009', 00DH	USB A
10	HDMI 1	'801s', 22H, '001', 00DH	HDMI 1
11	HDMI 2	'801s', 22H, '002', 00DH	HDMI 2 (HDMI1 RM8603)
12	HDMI 3	'801s', 22H, '021', 00DH	HDMI 3 (HDMI2 RM8603)
13	HDMI 4	'801s', 22H, '022', 00DH	HDMI 2
14	Disp.Port	'801s', 22H, '007', 00DH	Display Port
15	Network	'801s', 22H, '010', 00DH	Network

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state;No **Freeze** is available;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;

(Pinout follows code 6210 below)

Benq LCD 2/eBoard LCD

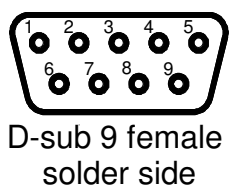
BenQ LCD 2: Code 6210, 6218, **eBoard**: Code 6700, 6708

Source	Label/Connector	Code sent	Comments
0	VGA 1	0AAh,0BBh,0CCh,002h,003h,000h,005h,0DDh,0EEh,0FFh	DSUB 15
1	VGA 2	0AAh,0BBh,0CCh,002h,004h,000h,006h,0DDh,0EEh,0FFh	DSUB 15
2	VGA 3	0AAh,0BBh,0CCh,002h,00Bh,000h,00Dh,0DDh,0EEh,0FFh	DSUB 15
4	PC	0AAh,0BBh,0CCh,002h,008h,000h,00Ah,0DDh,0EEh,0FFh	PC (maybe internal)
7	AV	0AAh,0BBh,0CCh,002h,002h,000h,004h,0DDh,0EEh,0FFh	RCA
10	HDMI 1	0AAh,0BBh,0CCh,002h,006h,000h,008h,0DDh,0EEh,0FFh	HDMI
11	HDMI 2	0AAh,0BBh,0CCh,002h,007h,000h,009h,0DDh,0EEh,0FFh	HDMI
12	HDMI 3	0AAh,0BBh,0CCh,002h,005h,000h,007h,0DDh,0EEh,0FFh	HDMI
13	HDMI 4	0AAh,0BBh,0CCh,002h,009h,000h,00Bh,0DDh,0EEh,0FFh	HDMI BenQ
13	HDMI 4K	0AAh,0BBh,0CCh,002h,00Dh,000h,00Fh,0DDh,0EEh,0FFh	HDMI 4K eBoard
14	Android	0AAh,0BBh,0CCh,002h,00Ah,000h,00Ch,0DDh,0EEh,0FFh	Network?
15	DTV	0AAh,0BBh,0CCh,002h,001h,000h,003h,0DDh,0EEh,0FFh	TV

- Codes 6210h (BenQ LCD 2) and Code 6700h (eBoard) have a normal send of source then volume 3 seconds later. Codes 6218h (BenQ LCD 2) and 6708h (eBoard) send volume **second** time 30 seconds later … some panels need this if a processing time (measured at 28 seconds) is needed before the volume send;
- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state;No **Freeze** is available;
- **TV Channel Up/Down** is supported if DTV is allocated, and an appropriate keyboard is selected;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported, as is reply mode;

RS232 connections to BenQ/eBoard LCD

These use a 9-pin-D9 male on the panel, female on cable. BenQ Coms is at 38400, 8N1. eBoard coms is 9600

Function/Direction	T470 serial Connection	LG screen RS232 Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

Blue Square Labs

LCD panels: Code 6250, 6251 (BSL75U04G baud 38400)

Source	Label/Connector	Code sent	Comments
0	VGA	SELECTSOURCE 12	VGA on D-sub 15
4	Component	SELECTSOURCE 11	
6	DVI	SELECTSOURCE 18	
7	OPS	SELECTSOURCE 20	
10	HDMI 1	SELECTSOURCE 7	HDMI 1
11	HDMI 2	SELECTSOURCE 8	HDMI 2
12	Display Port	SELECTSOURCE 19	
13	DTV	SELECTSOURCE 0	

- **SoundMute Toggle** supported if an appropriate button is allocated. These are toggle functions
- Power On and Power Off are toggle
- Comms at 115200baud

CommBox

CommBox LCD IR: LCD panels:Code 6400,

CommBox LCD Direct (via RES pin): Code6410

CommBox LCD Direct (via RL2 pin): Code 6420

These panels are controlled either via an IR transmitter “bug” or via a direct connection into a 3.5mm socket in the rear of the panel. In “Direct” mode the 5 volt signal (on the RES pin or the RL2 pin, if an optional linking resistor is installed) is terminated internally by an input resistance of about 19KOhms.

Source	Label/Connector	IR Command Code sent	Comments
0	PC	25H	DB15
4	Component 1	22H	RCA
7	Video	23H	RCA Composite Video
8	S-Video	24H	S-Video
9	DVI	26H	DVI
A	HDMI 1	27H	HDMI 1
B	HDMI 2	28H	HDMI 2

- No **Mute** or **Blank** or **Freeze** functions are supported;
- No Off-press connection report is available;
- No Run-time On-state ReplyMode is supported.

CommBox LCD via RS232 FHD 1.2: Code 6430

Source	Label/Connector	Code sent	Comments
0	VGA	'SOURCE VGA',00DH	VGA on D-sub 15
4	Component	'SOURCE YPbPr',00DH	3 x RCA
6	USB-A	'SOURCE USB',00DH	USB-A
7	Video	'SOURCE CVBS',00DH	RCA
10	HDMI 1	'SOURCE HDMI1',00DH	HDMI 1
11	HDMI 2	'SOURCE HDMI2',00DH	HDMI 2
12	HDMI 3	'SOURCE HDMI3',00DH	HDMI 3
13	HDMI 4	'SOURCE HDMI4',00DH	HDMI4 (some only)

- **SoundMute Toggle** and **Freeze Toggle** are supported if an appropriate button is allocated. These are toggle functions;
- Power On and Power Off are absolute function (not toggle);
- No Off LED Comms-OK or reply mode are supported at this stage.

CommBox Meeting Room Display: Code 6453

Source	Label/Connector	Code sent	Comments
0	VGA	EA,07,01,73,50,06,00	VGA on D-sub 15
1	OPS	EA,07,01,73,50,02,00	
6	USB-A	EA,07,01,73,50,05,00	USB-A
10	HDMI 1	EA,07,01,73,50,00,00	HDMI 1
11	HDMI 2	EA,07,01,73,50,01,00	HDMI 2

CommBox LCD via RS232 4K 1.2, 1.3: Code 6440, 6450

CommBox V4 protocol: Code 6451

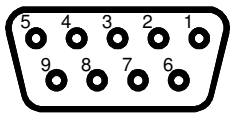
Commbox V2 protocol: Code 6452 similar to 6451 but uses Ver=2, ID=00; i.e !200INPT 111<0D>

Source	Label/Connector	Code 6440, 6450	Code 6451	Code 6452	Comments
0	VGA	69h, 0CBh, 0CBh	!1INPT 111 <0D>	!200INPT 111 <0D>	VGA D-sub 15
1	RGB-BNC	N/A	!1INPT 121<0D>	! 200INPT 121<0D>	RGB-BNC
4	Component	69h, 0C4h, 0D2h	!1INPT 151<0D>	! 200INPT 151<0D>	3 x RCA
6	USB-A	69h, 02Ah, 06Ch	!1INPT 311<0D>	! 200INPT 311<0D>	USB-A
7	Video		!1INPT 131<0D>	! 200INPT 131<0D>	Comp Video
9	Android (Vivi)			! 200INPT 411<0D>	Android
10	HDMI 1	69h, 0CAh, 0CCh	!1INPT 211<0D>	! 200INPT 211<0D>	HDMI 1
11	HDMI 2	69h, 0C9h, 0CDh	!1INPT 212<0D>	! 200INPT 212<0D>	HDMI 2
12	HDMI 3	69h, 0C8h, 0CEh	!1INPT 213<0D>	! 200INPT 213<0D>	HDMI 3
13	HDMI 4	69h, 0B1h, 0E5h	!1INPT 214<0D>	! 200INPT 214<0D>	HDMI 4
14	DVI-D		!1INPT 221<0D>	! 200INPT 221<0D>	DVI-D
15	Display Port		!1INPT 231<0D>	! 200INPT 231<0D>	Display Port

- **SoundMute Toggle** and **Freeze Toggle** are supported if an appropriate button is allocated. This is a toggle function;
- **6440:** Power On and Power Off share a common toggle code);
- **6450:** Power On and Power Off have separate commands (newer version);
- No Off LED Comms-OK or reply mode are supported at this stage.

RS232 connections to CommBox panels:

D-SUB 9 Female on projector, male on cable. Comms at 9600 8N1

Function/Direction	T470 serial Connection	Serial Port Connector	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 2 (TXD)	

Dell LCD 1

Code 6500 Target model is C7017T. Manuals are at: http://downloads.dell.com/Manuals/all-products/esuprt_display_projector/esuprt_Display/dell-c7017t-monitor_User%27s%20Guide_en-us.pdf

and https://cdn.competec.ch/documents/5/8/586579/EN_RS232-Protocol-Document-C7017T.pdf

Source	Label/Connector	Code sent (hex)	Comments
0	VGA	6E, 51, 86, EA, 62, 00, 00, 00, 40, 71	VGA on D-sub 15
10	HDMI 1/MHL	6E, 51, 86, EA, 62, 00, 00, 00, 01, 30	HDMI connector
11	HDMI 2	6E, 51, 86, EA, 62, 00, 00, 00, 02, 33	HDMI 2
12	HDMI 3	6E, 51, 86, EA, 62, 00, 00, 00, 04, 35	HDMI 3
13	Disp. port	6E, 51, 86, EA, 62, 00, 00, 00, 08, 39	Display Port

Dell LCD 2: Code 6501

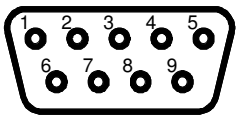
Models C5518QT/C8618QT

Source	Label/Connector	Code sent (hex)	Comments
0	VGA	37, 51, 06, EA, 62, 40, 00, 00, 00, A8	VGA on D-sub 15
10	HDMI 1	37, 51, 06, EA, 62, 01, 00, 00, 00, E9	HDMI connector
11	HDMI 2	37, 51, 06, EA, 62, 02, 00, 00, 00, EA	HDMI 2
12	HDMI 3	37, 51, 06, EA, 62, 04, 00, 00, 00, EC	HDMI 3
13	HDMI 4	37, 51, 06, EA, 62, 00, 04, 00, 00, EC	HDMI 4
14	Disp. port	37, 51, 06, EA, 62, 08, 00, 00, 00, E0	Display Port

- **SoundMute Toggle** is supported if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported, as is reply mode.

RS232 connections to Dell panels:

D-SUB 9 Female on cable, male on panel. Comms at 9600 8N1

Function/Direction	T470 serial Connection	"Serial" Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 2 (TXD)	

Donview

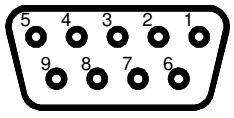
Code 9501 power toggle, Code 9502 discrete power

Source	Label/Connector	RS232 Command Code sent	Comments
0	VGA 1	099h, 024h, 00Bh, 001h, 0F4h, 0AAh	DB15
1	VGA 2	099h, 024h, 00Ch, 001h, 0F3h, 0AAh	DB15
2	VGA 3	099h, 024h, 00Dh, 001h, 0F2h, 0AAh	DB15
6	OPS	099h, 024h, 011h, 001h, 0EEh, 0AAh	
7	AV1	099h, 024h, 008h, 001h, 0F7h, 0AAh	RCA
A	HDMI 1	099h, 024h, 00Eh, 001h, 0F1h, 0AAh	HDMI 1
B	HDMI 2	099h, 024h, 00Fh, 001h, 0F0h, 0AAh	HDMI 2
C	HDMI 3	099h, 024h, 010h, 001h, 0EFh, 0AAh	HDMI 3
D			
E			
F	USB	099h, 024h, 027h, 001h, 0D8h, 0AAh	

- **SoundMute Toggle is** supported if an appropriate button is allocated. These are toggle functions;
- Power On and Power Off are absolute function (not toggle);
- No Off LED Comms-OK or reply mode are supported at this stage.

RS232 connections to Donview panels:

D-SUB 9 Male, Female on cable. Comms at 38400 baud 8N1

Function/Direction	T470 serial Connection	Serial Port Connector	
Ground	Ground	9-pin D-sub pin 5	 D-sub 9 male solder side
Data from T470 to panel	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from panel to T470	Rx	9-pin D-sub pin 2 (TXD)	

Hisense

LCD 1, NEC format IR, Common Power On/Off: Code 6A00

Eg Model 75S8, 75A7KAU These panels are controlled by an IR Emitter fixed over the IR receiver on the TV and connected to the T470 RES screw terminal.

IR codes are provided to access the “Input” menu and use the Left and Right arrows to select an item on the input table, and then use the OK button to activate the selected input. This is neatly done with the KB1022 10-key layout:

Input	Left arrow	Right arrow	Channel Up	Volume up
Off	On	Ok	Channel Down	Volume Down

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Mute function.

Source	Label/Connector	IR Command Code sent	Comments
0	Input	12H	Shows “Input” table
1	Up arrow	16H	
2	Down arrow	17H	
3	OK Enter	15H	Activate the function
4	Right arrow	18H	
5	Left arrow	19H	
	TVChannelUp	4AH	
	TVChannelDown	4BH	

- **A Mute button**is supported but freeze is not;
- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports;
- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic “Power” code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time**.

  This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state. This nicely keeps everything is step.

Hisense LCD 2, RC5 format IR, Common Power On/Off: Code 6A10

These panels are controlled either via an IR transmitter "bug" or LED IR transmitter. It has the default address for a TV of "00".

An IR code is provided to access the "Source" menu and subsequent presses roll through available sources. Stopping on the selected on automatically selects that one after about a 2 second delay. No OK button or arrow keys are needed for selection. Two keyboards are provided set out suitable for this, with and without TV channel inc/dec keys

On	Source	Volume up
Off	Mute	Volume Down

This is keyboard KB0615

On	Source	Channel Up	Volume up
Off	Mute	Channel Down	Volume Down

This is keyboard KB0815

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Mute function.

Source	Label/Connector	IR Command Code sent	Comments
0	Input	38H	Shows "Source" table
	TVChannelUp	4AH	
	TVChannelDown	4BH	

- **A Mute button** is supported but freeze is not;
- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports;
- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic "Power" code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time**.

  This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state. This nicely keeps everything is step.

Hisense Commercial LCD

Model includes 100BM66D

Baud 9600

Source	Label/Connector	Code sent	Comments
A	HDMI 1	0DDh, 0FFH, 000H, 007H, 0C1H, 008H, 000H, 001H, 001H, 00EH, 0C0H, 0BBH, 0CCH	HDMI 1
B	HDMI 2	0DDh, 0FFH, 000H, 007H, 0C1H, 008H, 000H, 001H, 001H, 00FH, 0C1H, 0BBH, 0CCH	HDMI 2
C	CMS	0A6H,01H,00H,00H,00H,04H,01H,0ACH,15H,1BH	CMS
D	Media	0A6H,01H,00H,00H,00H,04H,01H,0ACH,16H,18H	Media
E	Custom	0A6H,01H,00H,00H,00H,04H,01H,0ACH,18H,16H	Custom
F	USB	0A6H,01H,00H,00H,00H,04H,01H,0ACH,0CH,02H	USB

Hitachi LCD TV

Hitachi LCD HILF75101: code 6C00

Hitachi LCD HILFU75202: code 6C10

See AHA on page 40

Kogan LCD TV

Kogan panels via IR: Code 6C30

Eg LED75JU8100GA

These panels are controlled either via an IR emitter connected to the T470 RES pin.

An IR code is provided to access the “Source” menu and subsequent presses roll through available sources. Stopping on the selected on automatically selects that one after about a 2 second delay. No OK button or arrow keys are needed for selection. Two keyboards that are suitable for this, with and without TV channel inc/dec keys, are;

On	Source	Volume up
Off	Mute	Volume Down

This is keyboard KB0615

On	Source	Channel Up	Volume up
Off	Mute	Channel Down	Volume Down

This is keyboard KB0815

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Mute function.

Source	Label/Connector	IR Command Code sent	Comments
0	Input	40h	Shows “Source” table

1	Up Arrow	06h	
2	Down Arrow	07h	
3	Ok Enter	42h	
4	Right Arrow	43h	
5	Left Arrow	41h	
	TVChannelUp	02h	
	TVChannelDown	03h	

- **A Mute button** is supported but freeze is not
- A keyboard with separate On and Off keys must be used to keep the T470 in step with power state of the television.

LG panels, xb codes 90/91/92/93: Code 7000
LG panels, xb codes 70/80/90/A0: Code 7010

There are two standards for how the HDMI channels at selected on these, and provide both standards with these drivers. The LG manuals often have the wrong ones indicated!

In the back of each "Owner's manual" is a list of "input select" codes … examine this table to determine if it uses "xb" for device channel selection.

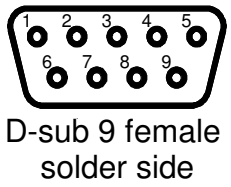
Source	Label/Connector	Code sent 7000h	Code sent 7010h	Comments
0	RGB-PC (new)	'xb 00 60', 00DH	'xb 00 60', 00DH	DB15
1	'RGBRGB-PC (old)'	'xb 00 50', 00DH	'xb 00 50', 00DH	DB15
2	DispPt.PC	'xb 00 D0', 00DH	'xb 00 D0', 00DH	DisplayPort PC
3	HDMI-PC	'xb 00 A0', 00DH	'xb 00 A0', 00DH	HDMI-PC
4	Component 1	'xb 00 40', 00DH	'xb 00 40', 00DH	RCA
5	Component 2	'xb 00 41', 00DH	'xb 00 41', 00DH	RCA
6	HDMI2-PC	'xb 00 A1', 00DH	'xb 00 A1', 00DH	HDMI2-PC
7	A/V 1	'xb 00 20', 00DH	'xb 00 20', 00DH	RCA Composite Video/S-Video
8	A/V 2	'xb 00 21', 00DH	'xb 00 21', 00DH	RCA Composite Video/S-Video
9	DVI-D PC	'xb 00 70', 00DH	'xb 00 70', 00DH	DVI-D PC
A	HDMI 1	**'xb 00 90', 00DH**	**'xb 00 70', 00DH**	HDMI 1
B	HDMI 2	**'xb 00 91', 00DH**	**'xb 00 80', 00DH**	HDMI 2
C	HDMI 3	**'xb 00 92', 00DH**	**'xb 00 90', 00DH**	HDMI 3
D	HDMI 4	**'xb 00 93', 00DH**	**'xb 00 A0', 00DH**	HDMI 4
E	DispPt.DTV	**'xb 00 C0', 00DH**	**'xb 00 C0', 00DH**	DisplayPort DTV
F	DTV	'xb 00 00', 00DH	'xb 00 00', 00DH	Digital TV
	TVChannelUp	'mc 00 00', 00DH	'mc 00 00', 00DH	Key for Channel Up
	TVChannelDown	'mc 00 01', 00DH	'mc 00 01', 00DH	Key for Channel Down

- **BlankOn/BlankOff,** and **SoundMuteOn/SoundMuteOff** are supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;

- No **Freeze** is available;
- An **AlignPixels** function is available if an appropriate button is allocated;
- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to LG LCD, LG Plasma and Zenith flat screens

These use a 9-pin-D9 male on the panel, female on cable. Coms is at 9600, 8N1

Function/Direction	**T470 serial Connection**	**LG screenRS232 Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Some have clamp diodes on signal lines so voltages may be limited to -0.7 volts and plus 5v signal pulses.

Some might use reverse 2/3.

LG TV via IR

Also some Akai TVs eg AKxx21S6WOS

Code 7015 uses power toggle, Code 7016 uses discrete Power On/Off

Both use NEC repeat IR. Typical model 55UM7600 (Require an IR emitter connected to the T470 RES pin (+) and GND)

On	Source	Volume up
Off	Mute	Volume Down

This is keyboard KB0615, an 0815 can be used with Ch up/down.

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Mute function.

Source	Label/Connector	IR Command Code sent	Comments
0	Input	0Bh	Can scrolls thru inputs
1	Up Arrow	40h	
2	Down Arrow	41h	
3	Enter	83h	
4	Right Arrow	06h	
5	Left Arrow	07h	
6	OK	44h	
7	AV1	5Ah	
8	HDMI 1	CEh	
9	HDMI 2	CCh	
10	HDMI 3	E9h	
11	TV	D6h	
	TVChannelUp	00h	
	TVChannelDown	01h	
	Power toggle	08h	Code 7015
	Power On	C4h	Code 7016
	Power Off	C5h	Code 7016

- **A Mute button** is supported but freeze is not
- A keyboard with separate On and Off keys must be used to keep the T470 in step with power state of the television

Mitsubishi LCD

Code 7400

Mitsubishi MDT321S (no HDMI) and many more … codes seem consistent across models.

Mitsubishi LCD: LDT462V, LDT551V, MDT652S has HDMI as Video 2

Source	Label/Connector	Code sent	Comments
0	RGB1	'00_r1',00DH	HDMI on LDT551
1	RGB2	'00_r2',00DH	DVI-D on LDT551
2	RGB3	'00_r3',00DH	VGA on LDT551
3	RGB4	'00_r4',00DH	DVD-BNC on LDT551
4	Option	'00_r5',00DH	
5	RGB6	'00_r6',00DH	DP on LDT551
7	Video	'00_v1',00DH	
8	DVD/HD	'00_v2',00DH	
9	S-Video	'00_v3',00DH	
A	HDMI 1	'00_d1',00DH	
B	HDMI 2	'00_d2',00DH	
C	HDMI 3	'00_d3',00DH	
E	NET	'00_n1',00DH	
F	USB-A	'00_s1',00DH	

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state;

RS232 connections to Mitsubishi LCD

Comms is at 9600 baud, 8 bits, Odd parity, 1 stop.

NEC Multeos

Code 7800

Multeos and Multisync models LCD3210, LCD3215, LCD4215, LCD4615 LCD5710, LCD8205, MDT652S, M401/M461/M521, P401, P402, P461, P462, P521, P552, P702, S401,
S461, S521, V321, V422, V461, V462, V551, V651, V3212, X431BT, X461HB, X461S, X461UN, X463UN, X551S, X551UN,

In the back of each user's manual is a list of typical channel selection messages, and manuals of NEC LCD panels are available athttp://www.nec-display-solutions.com/p/uk/en/products/choice.xhtml?cat=PublicDisplays

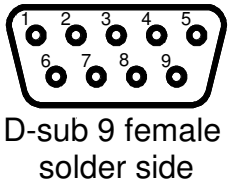
Source	Label/Connector	Code sent	Comments
0	RGB-PC (new)	01H,'0A0E0A',02H,'00600001',03H,073H,00DH	DB15
3	RGB/HV	01H,'0A0E0A',02H,'00600002',03H,070H,00DH	RGB/HV
6	DVI	01H,'0A0E0A',02H,'00600003',03H,071H,00DH	DVI
7	Video 1	01H,'0A0E0A',02H,'00600005',03H,077H,00DH	RCA Composite Video 1
8	Video 2	01H,'0A0E0A',02H,'00600006',03H,074H,00DH	RCA Composite Video 2
9	DVD/HD1	01H,'0A0E0A',02H,'0060000C',03H,001H,00DH	
A	HDMI	01H,'0A0E0A',02H,'00600011',03H,072H,00DH	HDMI
B	HDMI(set)	01H,'0A0E0A',02H,'00600004',03H,076H,00DH	HDMI set
C	DisplayPort	01H,'0A0E0A',02H,'0060000F',03H,004H,00DH	DisplayPort
D	DVD/HD2	01H,'0A0E0A',02H,'0060000E',03H,007H,00DH	
F	DTV	01H,'0A0E0A',02H,'0060000A',03H,003H,00DH	Digital TV
	TVChannelUp	01H,'0A0E0A',02H,'008B0001',03H,00FH,00DH	Key for Channel Up
	TVChannelDown	01H,'0A0E0A',02H,'008B0002',03H,00CH,00DH	Key for Channel Down

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state;
- No **Freeze** is available;
- Turn off ECO mode of the panel to enable On/Off control (some only);
- Switch "INPUT DETECT" to "NONE" to prevent channel changing when non-selected signals come and go;
- "DVI MODE" may need to be setup to control type of input signal expected on that input;
- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;

- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to NEC LCD with D9

These use a 9-pin-D9 male on the plasma, female on cable. Comms is at 9600 baud, 8 bits, Odd parity, 1 stop.

Function/Direction	**T470 serial Connection**	**Screen RS232 Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

NEC E-series LCD

Code 7810

E-series: NEC: E324, E424, E464, E554

A code manual is available from:

http://au.nec.com/en_AU/media/docs/products/displays/ExternalControlManual-E-Series_en.pdf

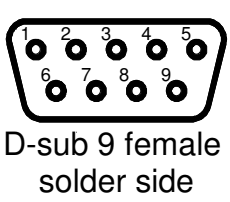
Beware, a US NEC site also pretends to offer codes for this family, but they are incorrect.

Source	Label/Connector	Code sent	Comments
0	RGB-PC (new)	01H,'0A0E0A',02H,'00600001',03H,073H,00DH	DB15
4	Component	01H,'0A0E0A',02H,'0060000C',03H,001H,00DH	3 x RCA
7	Video	01H,'0A0E0A',02H,'00600005',03H,077H,00DH	RCA Composite Video 1
8	Video 2	01H,'0A0E0A',02H,'00600006',03H,074H,00DH	RCA Composite Video 2
9	DVD/HD1	01H,'0A0E0A',02H,'0060000C',03H,001H,00DH	
A	HDMI 1	01H,'0A0E0A',02H,'00600011',03H,072H,00DH	HDMI 1
B	HDMI 2	01H,'0A0E0A',02H,'00600012',03H,071H,00DH	HDMI 2
C	HDMI 3	01H,'0A0E0A',02H,'00600013',03H,070H,00DH	HDMI 3
D	USB-A	01H,'0A0E0A',02H,'00600014',03H,077H,00DH	USB-A
F	DTV	01H,'0A0E0A',02H,'0060000A',03H,003H,00DH	Digital TV (some only)
	TVChannelUp	01H,'0A0E0A',02H,'008B0001',03H,00FH,00DH	Key for Channel Up
	TVChannelDown	01H,'0A0E0A',02H,'008B0002',03H,00CH,00DH	Key for Channel Down

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state. No **Blank** or **Freeze** is available;
- Volume in incremental only, and advances 5 counts each manual or auto-repeat step;
- Turn off ECO mode of the panel to enable On/Off control (some only);
- Switch “INPUT DETECT” to “NONE” to prevent channel changing when non-selected signals come and go;
- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK is NOT supported;

RS232 connections to NEC LCD with D9

These use a 9-pin-D9 male on the plasma, female on cable. Comms is at 9600 baud, 8 bits, Odd parity, 1 stop.

Function/Direction	T470 serial Connection	Screen RS232 Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Newline I Series LCD

Code 7850 baud 38400

Newline NT Series **Code 7851** Baud 19200

Source	Label	Code sent	Comments
0	VGA	07Fh, 008h, 099h, 0A2h, 0B3h, 0C4h, 002h, 0FFh, 001h, 00Dh, 0CFh	DB15
1	YPbPr	07Fh, 008h, 099h, 0A2h, 0B3h, 0C4h, 002h, 0FFh, 001h, 010h, 0CFh	Component
6	Internal PC	07Fh, 008h, 099h, 0A2h, 0B3h, 0C4h, 002h, 0FFh, 001h, 038h, 0CFh	Internal PC
7	Video	07Fh, 008h, 099h, 0A2h, 0B3h, 0C4h, 002h, 0FFh, 001h, 011h, 0CFh	RCA Video
A	HDMI 1	07Fh, 008h, 099h, 0A2h, 0B3h, 0C4h, 002h, 0FFh, 001h, 00Ah, 0CFh	HDMI 1
B	HDMI 2	07Fh, 008h, 099h, 0A2h, 0B3h, 0C4h, 002h, 0FFh, 001h, 00Bh, 0CFh	HDMI 2
C	HDMI 3	07Fh, 008h, 099h, 0A2h, 0B3h, 0C4h, 002h, 0FFh, 001h, 00Ch, 0CFh	HDMI 3
F	DMP	07Fh, 008h, 099h, 0A2h, 0B3h, 0C4h, 002h, 0FFh, 001h, 03Ah, 0CFh	

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state;

RS232 connections to Newline LCD with D9

These use a 9-pin-D9 male on the plasma, female on cable. Comms is at 38400 baud, 8 bits, Odd parity, 1 stop.

Orion LCD

Code 7900

RS232 at 115200N81

No information on volume or mute commands or RS232 connection

Source	Label	Code sent	Comments
10	HDMI 1	002h, 0D2h, 003h, 001h, 001h, 001h, 003h	
11	HDMI 2	002h, 0D3h, 003h, 001h, 001h, 001h, 003h	

Panasonic LCD

Code 7C00, 7C01 (Vol: 0->100)

With AV1: TH-42LF6U, TH-47LF6U, TH-55LF6U, TH-42LF30U, TH-47LF30U, TH-70LF50W, TH-80LF50W, TH-42LF60U, TH-47LF60U, TH-55LF60U, TH-42LFP30, TH-47LFP30

Without AV1: TH-42LF5U, TH-47LF5U, TH-42LFE6E, TH-50LFE6E, TH-47LFT30, TH-47LFX6J

In the back of each user's manual is a list of typical channel selection messages, and manuals of NEC LCD panels are available at http://www.nec-display-solutions.com/p/uk/en/products/choice.xhtml?cat=PublicDisplays

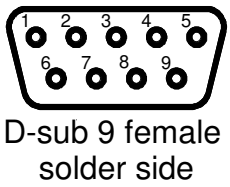
Source	Label/Connector	Code sent	Comments
0	PC	02H,'IMS:PC1',03H	DB15
1	DVIRGB	02H,'IMS:DV1RGB',03H	Via DVI
2	AV2RGB	02H,'IMS:AV2RGB',03H	Via AV2
3	SL1RGB	02H,'IMS:SL1RGB',03H	Via Slot SL1
4	DVIYUV	02H,'IMS:DV1YUV',03H	Via DVI
5	AV2YBR	02H,'IMS:AV2YBR',03H	Via AV2
6	SL1YUV	02H,'IMS:SL1YUV',03H	Via Slot SL1
7	Video: AV1	02H,'IMS:AV1',03H	RCA Composite Video 1
8	Video: AV2	02H,'IMS:AV2',03H	RCA Composite Video 2
	Video	*02H,'IMS:VD1',03H*	*Video Code 7C01*
9	DVI	02H,'IMS:DV1',03H	DVI
A	HDMI 1	02H,'IMS:HM1',03H	HDMI 1
B	HDMI 2	02H,'IMS:HM2',03H	HDMI 2
C	DL1	02H,'IMS:DL1',03H	Digital Link
D	SL1	02H,'IMS:SL1',03H	Slot SL1
E	SL1A	02H,'IMS:SL1A',03H	Via Slot SL1
	UD1	*02H,'IMS:UD1',03H*	*USB Display 7C01*
F	SL1B	02H,'IMS:SL1B',03H	Via Slot SL1
	MV1	*02H,'IMS:MV1',03H*	*Memory Viewer 7C01*

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state;

- On panel connection blink codes supported and OPT7 handshake mode is supported;
- Enable the RS-232 control access by going to “Setup” then to “Network Setup” then “Control I/F Select” and set “RS-232”;
- Audio control 0->100 (Volume up/down keyboards, codes 2, 9, B, and E) is available;
- Freeze is not supported at all;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to Panasonic LCD with D9

These use a 9-pin-D9 male on the plasma, female on cable. Comms is at 9600 baud, 8 bits, Odd parity, 1 stop.

Function/Direction	**T470 serial Connection**	**Screen RS232 Port Connector**	
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Philips BDL series

Codes 8000 -> 8100

Philips have (currently) four (sorry ... five!) different serial protocols in current use and for sale in LCD/LED panels, and there is no central record or listing of which panels use which protocol. It seems that when a panel's software is updated (which can be done via a USB stick) the protocol of that panel can change, as well. (Note: the software revision numbers in the panels bear no relation to the protocol version numbers.) The four supported here all run at 9600 8N1, and also use two different connector systems, some a 4-sleeve miniature audio-type jack (supplied by Philips, cabled to a DB9), and some a DB9 male on the panel. (A fifth system protocol, called SerialXpress for HotelTV uses a 10-pin RJ50 connector, and runs at 38400 baud 8N1, and takes 66 pages to describe.Not supported yet.)

Protocol 1.6 (code 8000h) and 2.0 (code 8100h) are "non-addressed" protocol strings. If you don't know what protocol a particular panel uses, try 8000 and 8100 first. If it is a "non-addressed" protocol it will show Comms OK (one red LED blink) when connected and selected for this. If it shows three blinks, try the other ones (below) --- it may be an "addressed" protocol that is being used. If it is correctly a "non-addressed" protocol, and several source commands do not work, try other "non-addressed" one. Similarly, if you have identified the panel as "addressed" (longer messages), and e.g. the HDMI2 command selects VGA, then try the other "addressed" one.

Philips BDL series LCD 1.6 Protocol (non-addressed): Code 8000

Some models we know of matching this driver are: **BDL4230E/BDL4230ET, BDL4651VH, BDL4675XU, BDL4681XU, BDL4785SL, BDL5530EL, BDL5585XL, BDL6450AT, BDL6531E, BDL6551V.**

One (unofficial!) link we have is: http://www.remotecentral.com/cgi-bin/mboard/rs232-ip/thread.cgi?13

Philips BDL series LCD 1.6:

Source	Label/Connector	Code sent	Comments
0	PC	008H,001H,0ACH,005H,000H,001H,000H,0A1H	DB15
4	Component	008H,001H,0ACH,003H,000H,001H,000H,0A7H	3 x RCA
7	Video	008H,001H,0ACH,001H,000H,001H,000H,0A5H	RCA Composite Video 1
9	DVI-D	008H,001H,0ACH,009H,001H,001H,000H,0ACH	DVI-D
A	HDMI	008H,001H,0ACH,009H,000H,001H,000H,0ADH	HDMI
B	DisplayPort	008H,001H,0ACH,007H,001H,001H,000H,0A2H	DisplayPort
D	S-Video	008H,001H,0ACH,001H,001H,001H,000H,0A4H	
F	USB-A	008H,001H,0ACH,008H,001H,001H,000H,0ACH	USB-A

Philips BDL series LCD 2.0 Protocol (non-addressed): Code 8100

Very similar to V1.6 above except for some changes to source commands.

Some models we know of matching this driver are: **BDL3245E, BDL4245E, BDL4645E,** maybe **BDL4231.**

Source	Label/Connector	Code sent	Comments
0	PC	008H,001H,0ACH,005H,000H,000H,000H,0A0H	DB15
4	Component 1	008H,001H,0ACH,003H,000H,000H,000H,0A6H	
5	Component 2	008H,001H,0ACH,003H,001H,000H,000H,0A7H	
7	Video	008H,001H,0ACH,001H,000H,000H,000H,0A4H	RCA Composite Video 1
9	DVI-D	008H,001H,0ACH,009H,001H,001H,000H,0ACH	
A	HDMI 1	008H,001H,0ACH,009H,000H,000H,000H,0ACH	HDMI 1
B	HDMI2	008H,001H,0ACH,009H,001H,000H,000H,0ADH	HDMI 2
D	S-Video	008H,001H,0ACH,001H,001H,001H,000H,0A4H	

Philips BDL series LCD 1.86 Protocol (addressed): Code 8020

Source	Label/Connector	Code sent	Comments
0	PC	009H,001H,001H,0ACH,005H,000H,001H,000H,0A1H	DB15
4	Component	009H,001H,001H,0ACH,003H,000H,001H,000H,0A7H	3 x RCA
7	Video	009H,001H,001H,0ACH,001H,000H,001H,000H,0A5H	RCA Comp. Video 1
9	DVI-D	009H,001H,001H,0ACH,009H,001H,001H,000H,0ACH	DVI-D
A	HDMI 1	009H,001H,001H,0ACH,009H,000H,001H,000H,0ADH	HDMI 1
B	HDMI 2	009H,001H,001H,0ACH,005H,001H,001H,000H,0A0H	HDMI 2
C	DisplayPort 1	009H,001H,001H,0ACH,007H,001H,001H,000H,0A2H	DisplayPort 1
D	DisplayPort2	009H,001H,001H,0ACH,006H,001H,001H,000H,0A3H	DisplayPort2
D	S-Video	009H,001H,001H,0ACH,001H,001H,001H,000H,0A4H	S-Video
F	USB-A	009H,001H,001H,0ACH,008H,001H,001H,000H,0ADH	USB-A

Philips BDL series LCD 1.87 Protocol (addressed): Code 8028

Models include: BDL6520QL, BDL6526QT, BDL5588XH, BDL5588XL, BDL4677XH, BDL4678XL, BDL4776XL, BDL4777XL, BDL5586XL, BDL5588XH

Source	Label/Connector	Code sent	Comments
0	PC	009H,001H,000H,0ACH,005H,000H,001H,000H,0A0H	DB15
3	USB-B	009H,001H,000H,0ACH,006H,000H,001H,000H,0A3H	USB-B
4	Component	009H,001H,000H,0ACH,003H,000H,001H,000H,0A6H	3 x RCA
7	Video	009H,001H,000H,0ACH,001H,000H,001H,000H,0A4H	RCA Comp. Video
9	DVI-D	009H,001H,000H,0ACH,009H,001H,001H,000H,0ADH	DVI-D
A	HDMI 1	009H,001H,000H,0ACH,009H,000H,001H,000H,0ACH	HDMI 1
B	HDMI 2	009H,001H,000H,0ACH,005H,001H,001H,000H,0A1H	HDMI 2
C	DisplayPort 1	009H,001H,000H,0ACH,007H,001H,001H,000H,0A3H	DisplayPort 1
D	DisplayPort 2	009H,001H,000H,0ACH,006H,001H,001H,000H,0A2H	DisplayPort 2
D	S-Video	009H,001H,000H,0ACH,001H,001H,001H,000H,0A5H	S-Video
F	USB-A	009H,001H,000H,0ACH,008H,001H,001H,000H,0ACH	USB-A

Philips BDL series LCD 1.88 Protocol (addressed): Code 8030

Very similar to V1.86 above except for some changes to source commands.

Models include:BDL3260EL, BDL4260EL, BDL4660EL, BDL4765EL, BDL5560EL, BDL4280VL, BDL4680VL, BDL5580VL, BDL3230QL, BDL4330QL, BDL4830QL, BDL5530QL

Source	Label/Connector	Code sent	Comments
0	PC	009H,001H,001H,0ACH,005H,000H,001H,000H,0A1H	DB15
4	Component	009H,001H,001H,0ACH,003H,000H,001H,000H,0A7H	3 x RCA
7	Video	009H,001H,001H,0ACH,001H,000H,001H,000H,0A5H	RCA Comp. Video 1
9	DVI-D	009H,001H,001H,0ACH,00EH,000H,001H,000H,0AAH	DVI-D
A	HDMI 1	009H,001H,001H,0ACH,00DH,000H,001H,000H,0A9H	HDMI 1
B	HDMI 2	009H,001H,001H,0ACH,006H,000H,001H,000H,0A2H	HDMI 2
C	DisplayPort 1	009H,001H,001H,0ACH,00AH,000H,001H,000H,0AEH	DisplayPort 1

D	DisplayPort 2	009H,001H,001H,0ACH,007H,000H,001H,000H,0A3H	DisplayPort 2
D	S-Video	009H,001H,001H,0ACH,002H,000H,001H,000H,0A6H	S-Video
F	USB-A	009H,001H,001H,0ACH,00CH,000H,001H,000H,0A8H	USB-A

- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- No Picture and Sound Mute is available, nor any Freeze ;
- Aspect ratio control is not supported.

Philips BDL series LCD 1.92 Protocol (addressed): Code 8040

Very similar to V1.86 above except for some changes to source commands. Volume message has two fields for volume, one for internal speakers, one for output channel.

Source	**Label/Connector**	**Code sent**	**Comments**
0	PC	009H,001H,001H,0ACH,005H,005H,001H,000H,0A4H	DB15
1	Card OPS	009H,001H,001H,0ACH,00BH,00BH,001H,000H,0A4H	
2	Browser	009H,001H,001H,0ACH,010H,010H,001H,000H,0A4H	Internal
3	Media Play	009H,001H,001H,0ACH,017H,017H,001H,000H,0A4H	
4	Component	009H,001H,001H,0ACH,003H,003H,001H,000H,0A4H	3 x RCA
5	USB-1	009H,001H,001H,0ACH,00CH,00CH,001H,000H,0A4H	USB
6	USB-2	009H,001H,001H,0ACH,008H,008H,001H,000H,0A4H	USB
7	Video	009H,001H,001H,0ACH,001H,001H,001H,000H,0A4H	RCA Comp. Video 1
8	Card DVI-D	009H,001H,001H,0ACH,009H,009H,001H,000H,0A4H	DVI-D
9	DVI-D	009H,001H,001H,0ACH,00EH,00EH,001H,000H,0A4H	DVI-D
A	HDMI 1	009H,001H,001H,0ACH,00DH,00DH,001H,000H,0A4H	HDMI 1
B	HDMI 2	009H,001H,001H,0ACH,006H,006H,001H,000H,0A4H	HDMI 2
C	HDMI 3	009H,001H,001H,0ACH,00FH,00FH,001H,000H,0A4H	HDMI 3
D	DisplayPort 1	009H,001H,001H,0ACH,00AH,00AH,001H,000H,0A4H	DisplayPort 1
E	DisplayPort 2	009H,001H,001H,0ACH,007H,007H,001H,000H,0A4H	DisplayPort 2
F	S-Video	009H,001H,001H,0ACH,002H,002H,001H,000H,0A4H	S-Video
	Custom	009H,001H,001H,0ACH,018H,018H,001H,000H,0A4H	Added at V135 to replace S-Video

- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- No Picture and Sound Mute is available, nor any Freeze ;
- Aspect ratio control is not supported.

Philips BDL Videowall: Code 8041

This uses Global commands and only supports HDMI 1 input to the first display.

Commands are (hex);

PowerOn; 06 00 00 18 02 1C

PowerOff; 06 00 00 18 01 1F

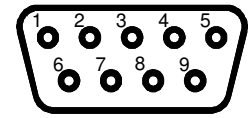
HDMI1: 09 01 00 AC 0D 00 01 00 A8

Vol+: 07 01 00 41 01 01 47

Vol-: 07 01 00 41 00 00 47

Above RS232 connections to Philips LCD/LED with D9

Some use a 9-pin-D9 male on the LCD, female on cable. Others use a 4-sleeve miniature audio-type jack (supplied by Philips, cabled to a DB9). Comms is at 9600 baud, 8 bits, no parity, 1 stop.

Function/Direction	**T470 serial Connection**	**Screen RS232 Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to panel	Tx	9-pin D-sub pin 3	
Reply data from panel to T470	Rx	9-pin D-sub pin 2	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Philips SerialXpress LCD

Code 8120h, 8130

This fifth system protocol, called Serial Xpress for Hotel TV uses a 10-pin RJ50 connector, and runs at 38400 baud 8N1, and takes 66 pages to describe. A protocol document is available from Philips distributors.

Two codes support this series, code 8120 does volume control using simple Increment and Decrement commands going one step at a time. Code 8130 uses the Absolute Volume commands and each press or step increments by 5 steps.

Source	Label/Connector	Code sent	Comments
0	PC	00EH, 00EH, 000H, 000H, 005H, 005H, 000H, 00CH, 020H, 0ACH, 007H, 08BH, 0A5H, 0A5H	DB15
4	Component	00EH, 00EH, 000H, 000H, 005H, 005H, 000H, 00CH, 020H, 0ACH, 005H, 089H, 0A5H, 0A5H	3 x RCA
7	A/V	00EH, 00EH, 000H, 000H, 005H, 005H, 000H, 00CH, 020H, 0ACH, 003H, 08FH, 0A5H, 0A5H	RCA Comp.A/V back
9	Side AV	00EH, 00EH, 000H, 000H, 005H, 005H, 000H, 00CH, 020H, 0ACH, 00DH, 081H, 0A5H, 0A5H	RCA Comp.A/V side
A	HDMI 1	00EH, 00EH, 000H, 000H, 005H, 005H, 000H, 00CH, 020H, 0ACH, 008H, 084H, 0A5H, 0A5H	HDMI 1
B	HDMI 2	00EH, 00EH, 000H, 000H, 005H, 005H, 000H, 00CH, 020H, 0ACH, 009H, 085H, 0A5H, 0A5H	HDMI 2
C	Side HDMI	00EH, 00EH, 000H, 000H, 005H, 005H, 000H, 00CH, 020H, 0ACH, 00CH, 080H, 0A5H, 0A5H	Side HDMI
D	USB	00EH, 00EH, 000H, 000H, 005H, 005H, 000H, 00CH, 020H, 0ACH, 00BH, 087H, 0A5H, 0A5H	USB-A
F	DTV	00EH, 00EH, 000H, 000H, 005H, 005H, 000H, 00CH, 020H, 0ACH, 001H, 08DH, 0A5H, 0A5H	Digital TV Tuner

- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Because of the fact that the panel will exit control mode to a default source (usually HDMI 1), it is necessary to keep communicating at least every 10 seconds. The T470 “reply” mode will do this so you MUST enable “Reply” mode always. The controller senses the state of projector and closes down if projector has timed out or been turned off manually or via IR control);
- Picture and Sound Mute is available, but not Freeze ;
- TV channel up/down is supported with the appropriate keyboard;
- Aspect ratio control is not supported.

Notes on Philips Serialxpress
Low Power ECO mode needs to be disabled from within the Professional Menu on the TV;
Enter Professional code (3, 1, 9, 7, 5, 3, MUTE)
Enter Professional Settings Menu
Professional settings -> Professional mode -> ON
Power Settings -> Low Power Standby -> FAST
Control settings -> SXP BaudRate -> 38400

RS232 connections to Philips LCD/LED with D9

These usea 10-way RJ45 type connector. Comms is at 38400 baud, 8 bits, no parity, 1 stop.

Function/Direction	T470 "projector" Connection	"Serial" Port Connector (see table below)
Ground	Ground	Pins 2 & 10
Data from T440 to panel	Tx	Pin 6
Reply data from panel to T440	Rx	Pin 5

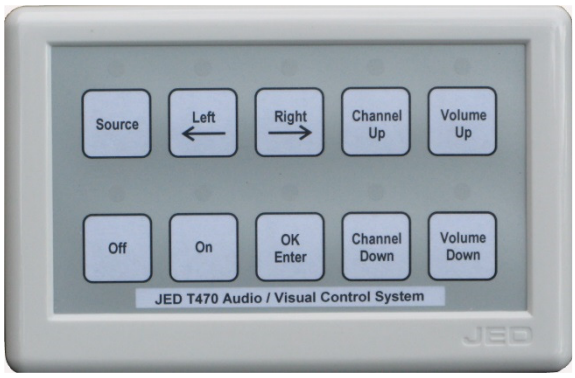
Pinout for the serial connector on the Hotel TV is below:

PIN NO	SIGNAL NAME	SIGNAL NAME EXPLANATION	I/O
1	Status_TV	Power status of TV	O
2	Gnd	Ground	
3	RxD_UART	UART receiver signal to TV (3V3)	I
4	TxD_UART	UART transmitter signal from TV (3V3)	O
5	TxD_RS232	RS232 transmitter signal from TV	O
6	RxD_RS232	RS232 receiver signal to TV	I
7	IRout	IR signal output from TV	O
8	IR_CNTRL	Switch cntl IRin and IRout signals	I
9	IRin	IR signal input to TV	I
10	Gnd	Ground	

Philips LCD TV via IR 1, Common Power On/Off: Code 8200

Philips LCD TV via IR 3, sending commands 3 times: Code 8210

These panels are controlled either via an IR transmitter “bug” or LED IR transmitter.They use the RC6 protocol.



IR codes are provided to access the “Source” menu and then use the arrows to select anentry on the source table, and then use the OK button to activate the selected source.

The source table on some Philips units is **horizontally scrolling**, so left/right arrow keys are needed (see picture):

This is neatly done with the KB1022A 10-key layout:

Source	Left arrow	Right arrow	Channel Up	Volume up
Off	On	OK / Enter	Channel Down	Volume Down

On others, it is a **vertical list**, so Up/Down arrows are needed. After the “Source” key is pressed and the menu appears, use the Up and Down arrows to select a line on the source table, and then use the OK button to activate the selected source. This is neatly done with the KB1019 10-key layout:

Source	Up arrow	Down arrow	OK	Volume up
Off	On	Channel Down	Channel Up	Volume Down

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Mute function.

Source	**Label/Connector**	**IR Command Code sent**	**Comments**
0	Source	38H	Shows “Source” table
1	Up arrow	58H	Select source Up
2	Down arrow	59H	Select source Down
3	OK Enter	5CH	Activate the function
4	Right arrow	5BH	Select source Right
5	Left arrow	5AH	Select source Left
	TVChannelUp	51H	
	TVChannelDown	4DH	

- **AMute button**is supported but freeze is not;

- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports;

- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic “Power” code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time**.

  This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state. This nicely keeps everything is step.

Promethean - ActivPanel – A2T - Touch 2 APT70 LCD panels

Codes 8400 - early Promethean

Code 8410 – Promethean, Activ2Touch, ActivePanel, Touch 2

Code 8411 – Promethean LX 115200baud

Data for serial RS232 control is available from Promethean's Knowledge Base, by entering "11178" in the search field. This gives the basic hex codes for commands (three or four bytes long). The complicating fact here is that "Open LAN" and "Close LAN" commands have to be wrapped around each command (except "Power On") with a 1 second space between the Open LAN and the Command, and between the Command and the Close LAN. This is illustrated at the end of the code page.

Code 8400: To add to the confusion, the "Open LAN" and "Close LAN" are unfortunately the same. This has the possibility that the controller and the panel can get out of step, where an Open command is interpreted as a Close and so it fails. One can recover from this situation by turning the LCD panel Off with the power button (at the lower left of the panel, so the LED alongside turns RED. Turn off the T470 by pressing Off there too, and then both the controller and the panel with be in sync, and pressing "On" on the T470 will start up both systems in step correctly. Please make sure the end customer understands that this might occasionally be needed.

Code 8410: It would appear Promethean have listened to the problems of system integrators and more recent units shipped have a variation on the above, requiring the LAN command to be sent only once at the end of the warmup time, and removing the requirement to send that wrapping each command. 8410h uses the same channel, on/off and freeze commands as below, but LAN is only sent once. (Older units may accept a download of the new protocol.)

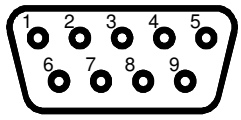
Channel codes (without the Open LAN and Close Lan parts) are:

Source	Label/Connector	Code sent	Comments	Code 8411
0	DSUB PC	089H,065H,003H,00EH	DB15	VGA
4	Component	089H,055H,004H,01DH	RCA Component	--
7	AV	089H,055H,00DH,014H	RCA Composite Video 1	USB-C
A	HDMI 1	089H,065H,005H,00CH	HDMI 1	HDMI 1
B	HDMI 2	089H,065H,007H,00AH	HDMI 2	HDMI 2
C	HDMI 3	089H,065H,009H,008H	HDMI 3	HDMI 3
D	HDMI 4	089H,065H,00BH,006H	HDMI 4	OPS

- Freeze toggle is supported if a key is allocated, but no mute or blank functions are available
- Mute Toggle available on Active2Touch
- Volume keys are supported, including autorepeat. Autorepeat time is just over one second
- No power on panel connection blink codes are provided, and reply mode is not supported
- An **AlignPixels** function is available if an appropriate button is allocated

RS232 connections to a Promethean panel

These use a 9-pin-D9 male on the LCD, female on cable. Comms is at 38400 baud, 8 bits, no parity, 1 stop.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T440 to panel	Tx	9-pin D-sub pin 3	
Reply data from panel to T440	Rx	9-pin D-sub pin 2	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Samsung LCD and Plasma panels, AA series commands: Code 8800

Plasma:42”: P42H(n), P42H-2, PS-42P3ST, SPD-42P3SM, PPM42S2, PPM42S3, PS-42P2ST,
50”:P50H(n), P50FP, P50HP, PPM50H3, PS-50P2HT, PPM50H2, P50F(n), SPD-50P3HM,
63”: P63F(n), P63FP(x), PPM63H3, SPD-63P3HM,
Various: PPMxxM5x, PPMxxM7x.
LCD:23”: 230MXn , 230TSn,
32”:320DX, 320MP(n), 320MX(n), 320P(N), 320PX , 323TSn,
40”: 400CX(n), 400DX , 400DX(n), 400FP(n), 400FX(n), 400MP(n), 400MX(n), 400P(n), 400PX(n), 400TSn, 400TX(n), 400UX(n), 403T, CT40CS(N),
46”: 460CX(n), 460DMn, 460DR(n), 460DX(n), 460FP(n), 460MP(n), 460MX(n), 460P(n), 460PX(n), 460Rn , 460TX(n), 460TS(n), 460UT(n), 460UX(n),
52”: 520DX(n),
55”: 550DX(n),
65”: ME65B(n)
70”: 700DX , 700DX(n), 700DRn, 700TSn
75”: ME75B(n)
82”: 820DX, 820DX(n), 820TSn.

and newer series: DB, DE, DH, DM, EDxxC, EDxxD, H, LE, ME, PE, UD and UE.

The protocol is at http://www.samsung.com/us/pdf/MDC_400DXn460DXn570DXn700DXn820DXn460TXn_v1.pdf

LFD LCD series: DE40A/B/C, DE46A/B/C, DE55A/B/C, ED32C, ED40C, ED46C, ED55C, ED65C, ED75C, H32, H40, LE32C, LE46C, LE55C, MD32B/C, MD40B/C, MD46B/C, MD55B/C, MD65C, ME32B/C, ME40A/B/C, ME46A/B/C, ME55A/B/C, ME65B, ME75B/C, NL22B, PE40C, PE46C, PE55C, SL46B, UD22A, UD55A, UD46C, UD55C, UE46A/C, UE55A/C

Samsung Australia can also supply protocol data by model.

Source	Label/Connector	Code sent	Comments
0	DSUB PC	0AAH,014H,0FEH,001H,014H,027H	DB15
2	PlugIn Mod	0AAH,014H,0FEH,001H,050H,063H	Plug in Module
3	BNC	0AAH,014H,0FEH,001H,01EH,031H	BNC
4	Component	0AAH,014H,0FEH,001H,008H,01BH	RCA Component
5	MagInfoLte	0AAH,014H,0FEH,001H,060H,073H	MagicInfo Lite (USB port)
6	DVI	0AAH,014H,0FEH,001H,018H,02BH	DVI
7	AV/AV1	0AAH,014H,0FEH,001H,00CH,01FH	RCA Composite Video 1
8	AV2	0AAH,014H,0FEH,001H,00DH,020H	AV2
9	S-Video	0AAH,014H,0FEH,001H,004H,017H	S-Video
A	HDMI 1	0AAH,014H,0FEH,001H,021H,034H	HDMI 1

B	HDMI 2	0AAH,014H,0FEH,001H,023H,036H	HDMI 2
C	HDMI3	0AAH,014H,0FEH,001H,031H,044H	HDMI 3
D	Disp.Port	0AAH,014H,0FEH,001H,025H,038H	DisplayPort
E	MagInfoNet	0AAH,014H,0FEH,001H,020H,033H	MagicInfo/Net
F	DTV	0AAH,014H,0FEH,001H,040H,053H	Digital TV
	TVChannelUp	0AAH,061H,0FEH,001H,000H,060H	Key for Channel Up
	TVChannelDown	0AAH,061H,0FEH,001H,001H,061H	Key for Channel Down

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state. (No **Freeze** is available;)
- Switch “INPUT DETECT” to “NONE” to prevent channel changing when non-selected signals come and go;
- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Turn “Energy Saving” to “Off” (to enable RS232 control);
- Make sure to use the correct “In” RS232 port (there are two, an “In”, and an “Out”, for cascading);
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported (subject to test);
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.) (subject to test).

Samsung LCD, 68 series commands: Code 8840

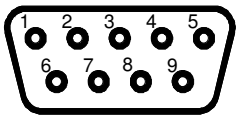
Source	Label/Connector	Code sent	Comments
0	DSUB PC	068H,008H,004H,001H,004H,079H	DB15
3	Scart	068H,008H,004H,001H,001H,076H	Scart
4	Component 1	068H,008H,004H,001H,005H,07AH	RCA Component
5	Component 2	068H,008H,004H,001H,00AH,07FH	RCA Component
6	ISP	068H,008H,004H,001H,000H,075H	Network
7	AV1	068H,008H,004H,001H,002H,077H	RCA
8	AV2	068H,008H,004H,001H,008H,07DH	RCA
9	S-Video 1	068H,008H,004H,001H,003H,078H	DIN4
A	HDMI 1	068H,008H,004H,001H,006H,07BH	HDMI 1

B	HDMI 2	068H,008H,004H,001H,00BH,080H	HDMI 2
C	HDMI3	068H,008H,004H,001H,00CH,081H	HDMI 3
D	HDMI4	068H,008H,004H,001H,00DH,082H	HDMI 4
E	S-Video 2	068H,008H,004H,001H,009H,07EH	DIN4
F	DTV	068H,008H,004H,001H,007H,07CH	Digital TV
	TVChannelUp	068H,080H,002H,002H,007H,012H,005H	Key for Channel Up
	TVChannelDown	068H,080H,002H,002H,007H,010H,003H	Key for Channel Down

- **SoundMuteToggle** is supported if an appropriate button is allocated. This is NOT an absolute function and a LED flashes. (No **Freeze** is available;)
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported (subject to test);
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.) (subject to test)

RS232 connections to Samsung panel

These use a 9-pin-D9 male on the panel, female on cable. Comms is at 9600 baud, 8 N1. (Some use a 3.5mm stereo jack to D9 adaptor.)

Function/Direction	**T470 serial Connection**	**Screen "Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

LCD panels via IR control: (Codes 8900 … 8930)

This is a generic driver, but codes are reputed to be universal.
Models tested at this stage: **UA 24/28/32 J4100AW**

Codes are listed for Samsung Generic on these two sites, and seem to be in agreement with this panel's receiver:

http://www.remotecentral.com/cgi-bin/codes/samsung/tv_functions/

http://www.remotecentral.com/cgi-bin/mboard/rc-discrete/thread.cgi?5780

These are domestic panels, without RS232 control, but these codes allow control via IR from a T470 either choosing sources directly, or providing keys for accessing the "Source" and other menus in the panel, and then using the arrow keys to move between presented (active) sources.

"Absolute" source selection is provided by codes 8900 and 8910. (This operation is the same as if RS232 channel commands are used in the traditional way. When a source is selected, the LED above the key remains On.)

"Source key" followed by arrow key selection is provided by codes 8920 and 8930. Multiple presses of the "Source" key move through the selection options. The Arrow keys and Enter and Return etc. keys are needed if using USB-held video or photographic files, to select and play them. The absolute codes above cannot access these files. With these codes, the LEDs above the keys blinks when pressed and goes Off.

Some panels use a common "Power toggle" command for both On and Off (Codes 8900 and 8920): **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic "Power" code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time**.

Some panels support separate Power on and Power Off (Codes 8910 and 8930). The**UA 24/28/32 J4100AW respond to discrete power On and Off codes, giving unambiguous control. A keyboard without a separate On key can be used for these.**

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided for all, as is the Mute function.

These all assume an IR address code of 0707hex.

"Absolute" source selection is provided by Codes 8900 and 8910

Source	Label/Connector	IR Command Code sent	Comments
0	PC/VGA1	69H	Some only
1	VGA2	D8H	Some only
2	DVI1	8AH	
3	DVI2	EAH	
4	Component1	86H	3 x RCA
5	Component2	88H	3 x RCA Some only
6	Component3	E8H	3 x RCA Some only

7	AV1/Video1	84H	RCA
8	AV2	EBH	RCA Some only
9	AV3	ECH	RCA Some only
10	HDMI 1	E9H	HDMI
11	HDMI 2	BEH	HDMI Some only
12	HDMI 3	C2H	HDMI Some only
13	HDMI 4	C5H	HDMI Some only
15	DTV	67H	RF Socket
	TVChannelUp	12H	
	TVChannelDown	10H	

"Source key" followed by arrow key selection is provided by codes 8920 and 8930.

Source	Label/Connector	IR Command Code sent	Comments
0	Up arrow	60H	Moves up a menu
1	Down arrow	61H	Moves down a menu
2	Right arrow	62H	Moves right in a menu
3	Left arrow	65H	Moves left in a menu
4	Enter key	68H	Select a menu item
5	Return key	58H	Also used for selection
6	Exit	2DH	Exit menu
8	Play	47H	Used for video
9	Pause	4AH	Used for video
10	HDMI 1	E9H	Direct select HDMI 1
11	HDMI 2	BEH	Direct select HDMI 2
12	Back	45H	Used for video
13	Forward	48H	Used for video
14	Source	01H	Source rotate
15	DTV	67H	Direct select RF Socket

No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports.

Sharp LCD Vol 0-100 (HDMI=1-4, PC=8): Code 8C00

LC-70LE951X/ LC-70LE950X/LC-60LE951X/LC-60LE950X
LC-80LE857U/LC-70LE857U/LC-60LE857U, LC-80LE757U/LC-70LE757U/LC-60LE757U,
LC-70LE755U/LC-60LE755U, LC-90LE657U/LC-80LE657U/LC-70LE657U/LC-60LE657U,
LC-70LE655U/LC-60LE655U, LC-80LE650U/LC-70LE650U/LC-60LE650U,
LC-70LE7500U/ LC-60LE7500U , LC-80LE6500U/LC-70LE6500U/LC-60LE6500U
(These use the channel allocations in the table below.)

Sharp LCD Vol 0-100 (HDMI=1-4, PC=7): Code 8C10

LC-80LE940X/ LC-60LE940X/LC-52LE840X/LC-46LE840X.LC-90LE740X, LC-LE640X,. These use IAVD1-4 codes in the table below for HDMI1-4, IAVD5-6 for Component and Video, and IAVD7 for VGA-PC.
(These use the channel allocations in the table below.)

Sharp LCD Vol 0-100 (HDMI=1-3, PC=6): Code 8C20

LC-32LE355X/LC-40LE355X. These use IAVD1-3 codes in the table below for HDMI1-3, IAVD4-5 for Vid/Component and Video, and IAVD6 for VGA-PC.
(These use the channel allocations in the table below.)

RS232 codes are usually in a Sharp User Manual and can be found by searching in Google for a PDF file with the LCD model number.**NOTE: Sharp panels need "Hotel Mode" set. Contact Sharp for how to do this, to enable RS232.**

Source	Label/Connector	Code sent 8C00h	Code sent 8C10h	Code sent 8C20h	Comments
0	VGA PC	'IAVD8 ', 0DH	'IAVD7 ', 0DH	'IAVD7 ', 0DH	DB15
4	Component	'IAVD5 ', 0DH			RCA
7	Video In 1	'IAVD6 ', 0DH			RCA Composite Video
7	AV1/Comp		'IAVD5 ', 0DH*	'IAVD5 ', 0DH*	RCA Composite Video /*Component
8	Video In 2/AV2	'IAVD7 ', 0DH	'IAVD6 ', 0DH	'IAVD6 ', 0DH	RCA Composite Video
A	HDMI 1	'IAVD1 ', 0DH	'IAVD1 ', 0DH	'IAVD1 ', 0DH	HDMI 1
B	HDMI 2	'IAVD2 ', 0DH	'IAVD2 ', 0DH	'IAVD2 ', 0DH	HDMI 2
C	HDMI 3	'IAVD3 ', 0DH	'IAVD3 ', 0DH	'IAVD3 ', 0DH	HDMI 3
D	HDMI 4	'IAVD4 ', 0DH	'IAVD4 ', 0DH	'IAVD4 ', 0DH	HDMI 4
F	DTV	'IDTV ', 0DH	'IDTV ', 0DH	'IDTV ', 0DH	Digital TV
	TVChannelUp	'DTUP ', 0DH	'DTUP ', 0DH	'DTUP ', 0DH	Key for Channel Up
	TVChannelDown	'DTDW ', 0DH	'DTDW ', 0DH	'DTDW ', 0DH	Key for Channel Down

Sharp LCD Vol 0-60 (HDMI=4-7, PC=8): Code 8D00

LC-60LE835X/LC-52LE835X/LC-46LC835/LC-40LE835X,
LC-60LE635E/LC-60LE635RU/LC-60LE636E/LC-60LE636S, LC-70LE735X,
LC-60LE830X/LC-52LE830X/LC-46LE830X/LC-40LE830X
(These use the channel allocations in the table below.)

Sharp LCD Vol 0-60 (HDMI=1-3, PC=7): Code 8C10

LC-40LE530X/LC-46LE530X/LC60LE630X, LC-60LE631X, LC-46LE700X/LC-52LE700X,LC-40M500X,
LC32D77X/LC-42D77X/LC46D77X/LC52D77X, LC-32L450X/LC-40L550X/LC40L650X
These use IAVD1-3 codes in the table below for HDMI1-4, IAVD4,5&6 for Video and Component, and IAVD7 for VGA-PC. (These use the channel allocations in the table below.)

Sharp LCD Vol 0-60 (HDMI=4-6, PC=7): Code 8C20

LC-65RX1X. These use IAVD4-6 codes in the table below for HDMI1-3, IAVD1-3 for Vid/Component and Video, and IAVD7 for VGA-PC. (These use the channel allocations in the table below.)

RS232 codes are usually in a Sharp User Manual and can be found by searching in Google for a PDF file with the LCD model number.

Source	Label/Connector	Code sent 8D00h	Code sent 8D10h	Code sent 8C20h	Comments
0	VGA PC	'IAVD8 ', 0DH	'IAVD7 ', 0DH	'IAVD7 ', 0DH	DB15
4	Component	'IAVD3 ', 0DH			RCA Comp
4	Vid/Comp1		'IAVD6 ', 0DH	'IAVD1 ', 0DH	RCA Comp / Video
7	Video In 1	'IAVD1 ', 0DH	'IAVD4 ', 0DH*	'IAVD2 ', 0DH	RCA Composite Video *&S-Vid
8	Video In 2	'IAVD2 ', 0DH	'IAVD5 ', 0DH	'IAVD3 ', 0DH*	RCA Composite Video *&S-Vid
A	HDMI 1	'IAVD4 ', 0DH	'IAVD1 ', 0DH	'IAVD4 ', 0DH	HDMI 1
B	HDMI 2	'IAVD5 ', 0DH	'IAVD2 ', 0DH	'IAVD5 ', 0DH	HDMI 2
C	HDMI 3	'IAVD6 ', 0DH	'IAVD3 ', 0DH	'IAVD6 ', 0DH	HDMI 3
D	HDMI 4	'IAVD7 ', 0DH			HDMI 4
F	DTV	'IDTV ', 0DH	'IDTV ', 0DH	'IDTV ', 0DH	Digital TV
	TVChannelUp	'DTUP ', 0DH	'DTUP ', 0DH	'DTUP ', 0DH	Key for Channel Up
	TVChannelDown	'DTDW ', 0DH	'DTDW ', 0DH	'DTDW ', 0DH	Key for Channel Down

Sharp LCD Vol 0-60 (HDMI=4-6, PC=3): Code 8D30

LC-60LE925X, LC-40LE820X/LC-46LE820X/LC-52LE820X
(These use the channel allocations in the table below.)

Sharp LCD Vol 60 (HDMI=4, No PC): Code 8D40

LC-32BD6X/LC37BD6X (These use the channel allocations in the table below.)

RS232 codes are usually in a Sharp User Manual and can be found by searching in Google for a PDF file with the LCD model number.

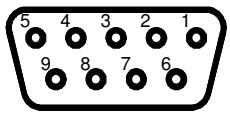
Source	Label/Connector	Code sent 8D30h	Code sent 8D40h	Comments
0	VGA PC	'IAVD3 ', 0DH		DB15
4	Component	'IAVD1 ', 0DH		RCA Comp
7	Video In 1	'IAVD2 ', 0DH		RCA Comp
7	Video/Com1		'IAVD1 ', 0DH	RCA Composite Video /Component
8	Video/Com2		'IAVD2 ', 0DH	RCA Composite Video /Component
9	Video/S-Vd		'IAVD3 ', 0DH	RCA Composite Video &S-Vid
A	HDMI 1	'IAVD4 ', 0DH	'IAVD4 ', 0DH	HDMI 1
B	HDMI 2	'IAVD5 ', 0DH		HDMI 2
C	HDMI 3	'IAVD6 ', 0DH		HDMI 3
D	HDMI 4	'IAVD7 ', 0DH		HDMI 4
F	DTV	'IDTV ', 0DH	'IDTV ', 0DH	Digital TV
	TVChannelUp	'DTUP ', 0DH	'DTUP ', 0DH	Key for Channel Up
	TVChannelDown	'DTDW ', 0DH	'DTDW ', 0DH	Key for Channel Down

BlankOn/BlankOff is supported with a keyboard option. These is an absolute function and a LED indicates the current state;

- No **Freeze** is available;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported.

RS232 connections to Sharp LCD

These use a 9-pin-D9 male on the projector, male on cable. Communications is at 9600 baud 8N1.

Function/Direction	T470 serial Connection	"Serial" Port Connector	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to screen	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from screen to T470	Rx	9-pin D-sub pin 2 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Sharp LCD Vol 0-31(Via RS232 Coms at 38400): Code 8E10

PN-60TA3, PN-70TA3, PN-70TB3, PN-70TB3, PN-80TC3

Device manuals are:
http://support.sharp.net.au/downloads/opmanuals/PN60TA3-PN70TA3_om.pdf,
http://support.sharp.net.au/downloads/opmanuals/PN70TB3-60TB3_manual_English.pdf,
http://support.sharp.net.au/downloads/opmanuals/PN80TC3_Operation_Manual.pdf

Source	Label/Connector	Code sent	Comments
0	DSUB1(RGB)	'INPS 2', 0DH	DB15
1	DSUB2(RGB)	'INPS 16', 0DH	DB15
2	HDMI1(PC)	'INPS 10', 0DH	HDMI 1
3	HDMI2(PC)	'INPS 13', 0DH	HDMI 2
4	HDMI3(PC)	'INPS 18', 0DH	HDMI 3
5	DSUB1(Cmp)	'INPS 3', 0DH	DB15
7	DSUB1(Vid)	'INPS 4', 0DH	DB15
A	HDMI1(AV)	'INPS 9', 0DH	HDMI 1
B	HDMI2(AV)	'INPS 12', 0DH	HDMI 2
C	HDMI3(AV)	'INPS 17', 0DH	HDMI 3
D	Disp.Port	'INPS 14', 0DH	DisplayPort

BlankOn/BlankOff is supported with a keyboard option. These is an absolute function and a LED indicates the current state;

- No **Freeze** is available;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported.

RS232 interfacing is via a 3.5mm ring-tip socket. This is covered by a service plate. A document is available from Sharp: http://support.sharp.net.au/downloads/faqattach/RS232C_control_guide.pdf

This shows the protocol and the connections and panels may need to have a software update to support RS232:http://support.sharp.net.au/downloads/faqattach/PNx0Tx3_Monitor_Firmware_upgrade_guide.pdf

19200 Vol 0-100(Via RS232 Coms at 19200): Code 9200

Source	Label/Connector	Code sent	Comments
0	VGA	‘set input=VGA',00DH	DB15
1	RGB/HV	‘set input=RGB/HV',00DH	DB15
7	Video1 RCA	'set input=Video1',00DH	RCA
8	Video2 RCA	'set input=Video2',00DH	RCA
9	DVI	'set input=DVI',00DH	DVI
A	HDMI1	'set input=HDMI1',00DH	HDMI 1
B	HDMI2	'set input=HDMI2',00DH	HDMI 2
D	S-Video	'set input=S_Video',00DH	Din4
E	DVD/HD1	'set input=DVD/HD1',00DH	
F	DVD/HD2	'set input=DVD/HD2',00DH	

- **BlankOn/BlankOff, SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported.

No connection information is available.

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Soniq LCD TV

Common Power On/Off: Code 9000

These panels are controlled either via an IR transmitter "bug" or LED IR transmitter.

IR codes are provided to access the "Source" menu and use the Up and Down arrows to select a line on the source table, and then use the OK button to activate the selected source. This is neatly done with the KB1019 10-key layout:

Source	Up arrow	Down arrow	OK	Volume up
Off	On	Channel Down	Channel Up	Volume Down

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Mute function.

Source	Label/Connector	IR Command Code sent	Comments
0	Source	1EH	Shows "Source" table
1	Up arrow	44H	Select source Up
2	Down arrow	1DH	Select source Down
3	OK Enter	5CH	Activate the function
4	Right arrow	48H	
5	Left arrow	1CH	
	TVChannelUp	51H	
	TVChannelDown	4DH	

- **AV Mute button** is supported but freeze is not;
- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports;
- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic "Power" code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time**.

  This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state.
- Soniq is also included in the "AuxIR" code family (see Part C T470 manual), allowing an RS232 controlled projector in an installation to be teamed with an IR controlled LCD in a single T470. A single button on the T470 can just send the toggling "Power" command to an LCD while the rest of the T470 buttons controls the main projector via RS232.

Soniq LCD RS232 1, Common Power On/Off: Code 9040

These panels are controlled via RS232 at 38400 baud 8N1. A male RS232 DB9 socket is on the panel.

Keyboard KB1012F has a sound key allocated. As it has a common power on and power off command, a keyboard with separate Off and On button must be used.

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Sound Mute function.

Source	Label/Connector	RS232 Command Code sent	Comments
0	VGA 1	055h,000h,080h,005h,0dah	DB15
1	VGA 2	055h,000h,080h,006h,0dbh	DB15
2	VGA 3	055h,000h,080h,007h,0dch	DB15
3	USB	055h,000h,080h,00fh,0e4h	USB
4	Component1	055h,000h,080h,004h,0d9h	RCA
5	Component2	055h,000h,080h,010h,0e5h	RCA
6	Scart	055h,000h,080h,003h,0d8h	RCA
7	AV1 1	055h,000h,080h,00ch,0e1h	RCA
8	AV1 2	055h,000h,080h,00dh,0e2h	RCA
9	OPS	055h,000h,080h,00bh,0e0h	
A	HDMI 1	055h,000h,080h,008h,0ddh	HDMI 1
B	HDMI 2	055h,000h,080h,009h,0deh	HDMI 2
C	HDMI 3	055h,000h,080h,011h,0e6h	HDMI 3
D	HDMI Front	055h,000h,080h,00ah,0ddh	HDMI Front
E	Disp.Port	055h,000h,080h,015h,0eah	Display Port
F	DTV	055h,000h,080h,001h,0d6h	Antenna
	TVChannelUp	055h, 000h, 010h, 000h,065h	
	TVChannelDown	055h, 000h, 012h, 000h,067h	

- **Audio Mute button** is supported. Freeze and Blank is not;
- No Off-press connection report and no Run-time On-state ReplyMode are available,;
- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic “Power” code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time**.

This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state. This nicely keeps everything is step.

Sony Bravia LCD

Code 9400

LCD-TVs KDL-HX92x/82x/72x, NX72x, EX72x/62x/52x/46x/42x/32x, CX52x/400

These are commercial panels which, while they don't have RS232 ports, do allow RS232 control via an interface box feeding commands into the HDMI **C**onsumer **E**lectronics **C**ontrol system. The interface boxes from Sony are called CBX-H10/1 and CBX-H11/1 and have their own power supply.

Notes for enabling RS232 on Sony Pro Bravia 2018 onwards;

The Sony panels as shipped have the RS232 function disabled. Perform the following to enable the RS232;

1. Connect T470 to the panel.
2. With T470 in Off state, turn the panel on manually with IR remote control;
3. Once panel has warmed up, push T470 ON button – this will send the Sony "Standby Enable command"
4. Check T470 commands all work, then turn OFF the system using the T470 OFF button.

RS232 codes are usually in a Sony Protocol Manual and can be found by searching in Google for a PDF file with the LCD model number.

Source	Label/Connector	Code sent	Comments
0	PC	08CH,000H,002H,003H,005H,001H,097H	DB15
7	Video 1	08CH,000H,002H,003H,002H,001H,094H	RCA Composite Video
8	Video 2& Component	08CH,000H,002H,003H,003H,001H,095H	RCA
A	HDMI 1	08CH,000H,002H,003H,004H,001H,096H	HDMI 1
B	HDMI 2	08CH,000H,002H,003H,004H,002H,097H	HDMI 2
C	HDMI 3	08CH,000H,002H,003H,004H,003H,098H	HDMI 3
D	HDMI 4	08CH,000H,002H,003H,004H,004H,099H	HDMI 4
F	DTV	08CH,000H,002H,002H,001H,091H	Digital TV
	TVChannelUp	08CH,000H,004H,003H,000H,000H,093H	Key for Channel Up
	TVChannelDown	08CH,000H,004H,003H,000H,001H,094H	Key for Channel Down

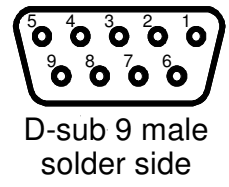
- **BlankOn/BlankOff,** and **SoundMuteOn/SoundMuteOff** are supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- No **Freeze** is available;

- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- As of V037, the ON command is sent twice to turn on latest panels with deep sleep mode, and warm-up time has been increased to 22 seconds to allow panel boot up. Sony advise: For **all** RS232 commands to function on the Android TV models the set must be upgraded to the latest available software which is currently pkg2.465, available to download from sony.com.au /support, or an auto update can be done if the TV is connected to the WWW. One difference is that if the TV has been off for more than 15 minutes it will then be in deep standby which will require the ON command to be sent twice.
- Run-time On-state ReplyMode is not supported.

RS232 connections to Sony LCD flat panel

These all use a D-sub 9-pin connector, male on cable.

LCD panels, 9600 BAUD, No parity, 1 stop.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

TCL panels

Code 9450 Power toggle, Code 9451 separate On/Off

TCL Consumer Televisions are supported via an IR emitter and with an ID address of 0F hex, RCA.

Source	Label/Connector	IR Command Code sent	Comments
0	Source	A3h	
1	Up arrow	59h	
2	Down arrow	58h	
3	Ok/Enter	F4h	
4	Right arrow	57h	
5	Left arrow	56h	
6	VGA	B2h	
7	HDMI 1	B7h	
8	HDMI 2	B6h	
9	HDMI 3	B5h	
A	HDMI 4	B4h	
B	AV1	F3h	

- Volume Up 2Fh
- Volume Down 2Eh
- Channel Up 2Dh
- Channel Down 2Ch
- Mute toggle 3Fh
- Power On B9h
- Power Off B8h

Touchboard/HDi

Code 9500

Possibly HDi branded panels with Android.

Source	Label/Connector	RS232 Command Code sent	Comments
0	VGA 1	099h, 023h, 00Bh, 001h, 0F4h, 0AAh	DB15
1	VGA 2	099h, 023h, 00Ch, 001h, 0F3h, 0AAh	DB15
2	VGA 3	099h, 023h, 00Dh, 001h, 0F2h, 0AAh	DB15
6	OPS	099h, 023h, 011h, 001h, 0EEh, 0AAh	
7	AV1	099h, 023h, 008h, 001h, 0F7h, 0AAh	RCA
A	HDMI 1	099h, 023h, 00Eh, 001h, 0F1h, 0AAh	HDMI 1
B	HDMI 2	099h, 023h, 00Fh, 001h, 0F0h, 0AAh	HDMI 2
C	HDMI 3	099h, 023h, 010h, 001h, 0EFh, 0AAh	HDMI 3
D			
E			
F	USB	099h, 023h, 027h, 001h, 0D8h, 0AAh	

- **SoundMute Toggle is** supported if an appropriate button is allocated. These are toggle functions;
- Power On and Power Off are absolute function (not toggle);
- No Off LED Comms-OK or reply mode are supported at this stage.

Touchboard Pro V3

Code 9505

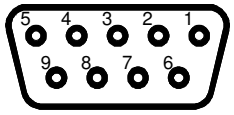
Operates at 38400Baud

Source	Label/Connector	RS232 Command Code sent	Comments
0	VGA 1	k01sB006<0D>	DB15
1	YPbPr	k01sB003<0D>	
2	ATV	k01sB000<0D>	
3	DTV	k01sB010<0D>	

6	OPS	k01sB007<0D>	
7	Video	k01sB001<0D>	
B	HDMI	k01sB004<0D>	
C	HDMI 1	k01sB014<0D>	
D	HDMI 2	k01sB024<0D>	
E	Android	k01sB00A<0D>	
F	DP	k01sB009<0D>	

RS232 connections to Touchboard panels:

D-SUB 9 Female on panel male on cable. Comms at 115,200 baud 8N1

Function/Direction	**T470 serial Connection**	**Serial Port Connector**	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to panel	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from panel to T470	Rx	9-pin D-sub pin 2 (TXD)	

2-Touch / CTOUCH LCD touch panel

Code 9800

These are an LG-style panel with touchscreen add-on on the front, in sizes of 46”, 55”, 65”, 70”, 82” and 84”.

Protocol document is at:

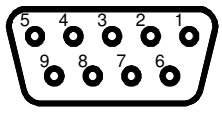
http://www.c-tools.nl/Files/Producten/CTOUCH/CTOUCH%20RS232C_Protocol_MODEL%20B%2046_55_65_70_82_3%20HDMI.pdf

Source	Label/Connector	Code sent	Comments
0	PC	'kb 00 07',00DH	DB15
0	Component	'kb 00 04',00DH	RCA
7	AV	'kb 00 02',00DH	RCA Composite Video
8	S-Video	'kb 00 03',00DH	DIN 4
A	HDMI 1	'kb 00 09',00DH	HDMI 1
B	HDMI 2	'kb 00 0a',00DH	HDMI 2
C	HDMI 3	'kb 00 0b',00DH	HDMI 3
F	DTV	'kb 00 00',00DH	Digital TV

RS232 connections to 2-Touch / CTOUCH LCD projectors:

D-SUB 9 Female on panel, male on cable. Comms at 9600 8N1.

Note: Connector wiring on 2-Touch and CTOUCH documentation is totally incorrect, (e.g. Gnd on pin 1, links on 8->9) Following has been tested and works correctly. Don’t link pins 8 & 9.

Function/Direction	T470 serial Connection	“Serial” Port Connector	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 2 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Viewsonic LCD

Code A000, A010, A020 & A030

These codes use global address field "99":
Code A000: CDE5561T/CDE6561T/CDE7061T/ CDE8452T/SWB5561B/SWB6561B/ SWB7061B/SWB8452B (and possibly VT2755LED, VT3200-L, VT3205LED, VT4200-L and VT4236LED (may also be code A010h))
Code A010: VT2405LED-1 andVT3205LED (these do not use device ID field in power on/off commands)

We have been advised that some units do not interpret the "99" global address correctly, so an additional pair of drivers have been added with fixed default Panel ID of "01";
Set/Confirm Panel ID to 01

- **Code A020**
- **Code A030:** (this does not use device ID field in power on/off commands).
  These put "01" instead of "99" in the code sent below.

RS232 codes are usually in the device user's manual. The "99" field below addresses all devices in a multi-device setup.

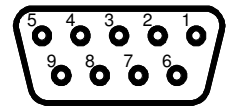
Source	Label/Connector	Code sent	Comments
0	VGA 1	'899s"006',00DH	DB15
1	VGA 2	'899s"016',00DH	DB15
2	VGA 3	'899s"026',00DH	DB15
3	OPS	'899s"007',00DH	OPS
4	YPbPr	'899s"003',00DH	3 x RCA
5	Player	'899s"017',00DH	
6	DVI	'899s"005',00DH	DVI
7	AV	'899s"001',00DH	RCA Composite Video
8	Int.Memry	'899s"008',00DH	Internal memory
9	S-Video	'899s"002',00DH	DIN4
A	HDMI 1	'899s"004',00DH	HDMI 1
B	HDMI 2	'899s"014',00DH	HDMI 2
C	HDMI 3	'899s"024',00DH	HDMI 3
D	HDMI 4	'899s"034',00DH	HDMI 4
E	Display Port	'899s"009',00DH	
F	DTV	'899s"000',00DH	Digital TV

- **SoundMuteOn/SoundMuteOff** are supported if appropriate buttons are allocated. This is an absolute function and a LED indicates the current state;
- No **Freeze** is available;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is not supported.
- DTV channel inc/dec keys are not supported as the RS232 protocol needs absolute channel data.

RS232 connections to Viewsonic LCD flat panel

Some use a D-sub 9-pin connector, male on cable.

LCD panels, 9600 BAUD, No parity, 1 stop.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

Some use a 3.5mm barrel connector:

Pin	**Signal**	**Remark**
Tip	TXD	Output from panel
Ring	RXD	Input to panel
Sleeve	GND	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Switchers/Amplifiers

Altronics

Dynalink A3082 4 way HDMI switcher Code: C790

This operates at 115200baud

Source	Label/Connector	Code sent	Comments
0	HDMI 1	IN1!	
1	HDMI 2	IN2!	
2	HDMI 3	IN3!	
3	HDMI 4	IN4!	
		ONAUTO!	Power On command
		ONAUTO!	Power Off command

Atlona

Atlona_SW Code: C800

This operates at 115200baud

Source	Label/Connector	Code sent	Comments
0	HDMI 1	x1AVx1',00DH	
1	HDMI 2	x2AVx1',00DH	
2	HDMI 3	x3AVx1',00DH	
3	HDMI 4	x4AVx1',00DH	
4	HDMI 5	x5AVx1',00DH	
		PWON,0Dh	Power On command
		PWOFF,0Dh	Power Off command

AVGear matrix

AVGear -8C Code: C805

This operates at 115200baud

Source	Label/Connector	Code sent	Comments
0	Scene 1	>R1,00DH	
1	Scene 2	>R2,00DH	
2	Scene 3	>R3,00DH	
3	Scene 4	>R4,00DH	

Bluestream

Bluestream_CMX42 Code: C810

This operates at 57600baud

Bluestream

Bluestream_MFP72 Code: C811

This operates at 57600baud

Bluestream_IR Code: C812

Clean Digital

Clean Digital WUH4A switcher Code: C815

MUH44E Code C816

This operates at 9600baud

HuddleCam/Atlona HDVS Cam

HuddleCam PTZ camera with RS232 at 9600 baud Code: C850

Atlona AT-HDVS-CAM-HDMI is the same

Kramer

Kramer_VP778_SW Code: C900 Baud 115k

Kramer_VP440H2 Code: C901 Baud 9600

Kramer_VP440X Code:C902 Baud 115k

Protocol 3000

Yamaha YNCA

Numerous Yamaha amplifiers/receivers with RS232 at 9600 baud Code: C950

On/Off and main volume only