

DPX-1200 RS-232C Protocol

12/6/2004

Yamaha Electronics Corporation

The modification history of this document

Page	Section	Description	Update
		First released.	12/6/2004

General Notes

- The protocol in this document is valid for the latest firmware version of the DPX-1200.
- The firmware version may not be the latest if you experience some problems as below,
 - The client does not send a report regarding "Input Source" responding to the command from the host.
 - The Control Status Report Interval doesn't seem to be changed even when you send the command to change the interval.
- Only a Yamaha technical service person can verify what the firmware version is. (It may not be checked by others than Yamaha person because of confidential matters). When you need to know if the version is the newest one, please consult with an authorized Yamaha representative.

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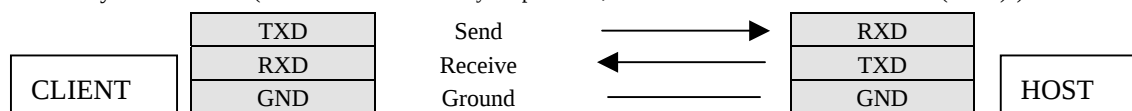
1. Introduction

This document covers serial communication specifications related to the DPX-1200 Projector.

2. Overview

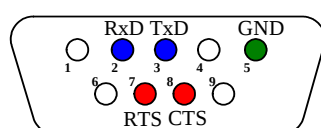
(a) Wiring

Three-wire system interface (but RTS or CTS necessary for power on, see the “Conditions on the DPX-1200 (Client)”)



(b) Terminal

Client side: D-SUB 9-pin male



D-sub 9-pin arrangement

(c) Communication format

RS-232C compatible. Full duplex, start-stop synchronization communication

Baud rate: 9600 bps to 115200 bps

Default = 115200 bps

Baud rate can be changed using a command after checking the supported rates using the start control protocol.

Data length: 8 bits

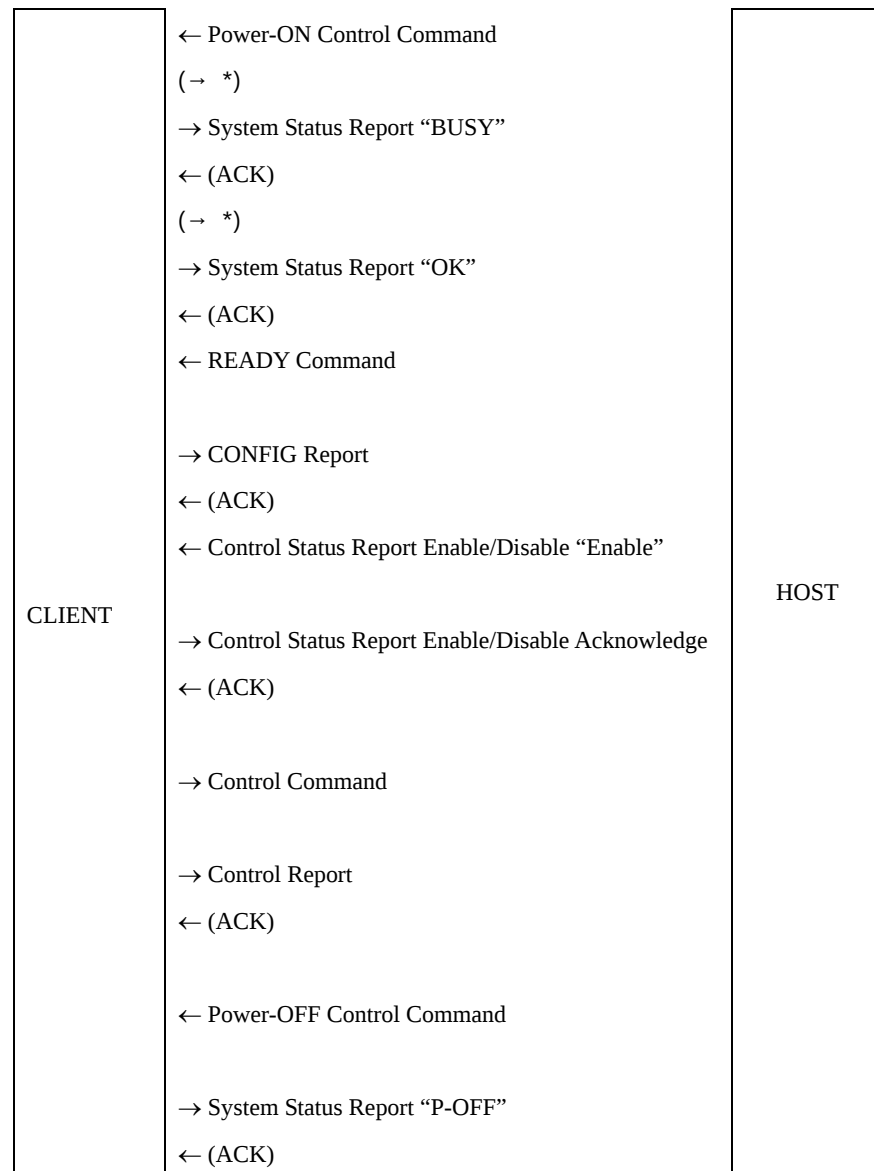
Parity: NONE

Stop bit: 1 bit

Flow control: No hardware control. Software flow control available.

(d) Conditions on the DPX-1200 (client)

1. The client saves the information concerning the communication format (baud rate, parity) even when the power is turned OFF. The client powers up with the saved communication format when the power is turned ON next time. If the baud rate needs to be changed, see “Supplementary Information on Control” described later.
2. The client is able to receive the power-on command even when the power is turned OFF (in a standby condition), but **the client cannot be polled when it is turning OFF (idling) and completely OFF (standby)**. After powered up by the command, the client normally sends system status reports “BUSY”, “OK” and **some meaningless characters, which should be ignored**.
3. All reports sent from the client occur within the time interval defined by “Control Status Report Interval.”
4. The client allows being enabled and disabled all reports to the host except the system status report and CONFIG report using “Control Status Report Enable/Disable.”
5. The client does not wait for ACK responses. The host can send ACK messages, but the client discards them.
6. If the client is able to respond to a command from the host, the client omits the ACK message.
7. The client is unable to return an ACK message in response to the power-on command. Control procedure
8. No flow control with ACK responses
9. The client communicates with the host using just 3 lines (TxD, RxD and GND) though, **it is needed to have RTS or CTS pin pulled up to high level (minimum; DC +3V) in order to utilize the Power ON Command when the client is turned off**. Using a null modem cable is recommended. Once powered up, the client doesn’t care the status of RTS and CTS lines.



* Some meaningless characters will be sent, but they should be discarded.

(e) Error handling

1. If a length error, checksum error, or timeout error occurs

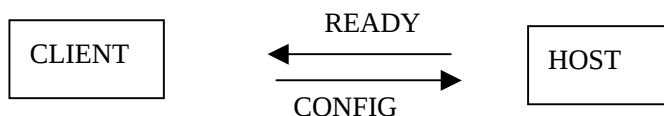
The client sends NAK. Then, the client discards the received data, cancel the rest of the procedure, and move to the next procedure.

2. If a command parameter is outside the range

If a basic command is received, the client sends ACK. Then, the client discards the received data and waits for the reception of the next command.

3. Start Control Protocol

(a) Description



1) READY: Specify the communication timeout time to the client as a start command (check its presence).

2) CONFIG: Provide model ID, software version, and configuration data to the host.

- If CONFIG is not returned within 1 second after issuing READY, the host shall issue the command again.
- The number of retransmissions is 5. If CONFIG is not returned after 5 times, abort all data transmissions.

(b) Command protocol

Ready =

DC2	TOUT0	TOUT1	TOUT2	ETX
-----	-------	-------	-------	-----

Function Name	Function	Data Contents (ASCII)	Range (Hex)
TOUT0 to 2	Comm. timeout	0 - 9, A - F	0 to 0xFFFF

* Specify the timeout time (ms) for the reception from the header to the footer.

* Timeout = 0: Reserve at least 100 ms on the client side.

* The timeout can be set in the range of 000 to FFF (100 ms to 4195 ms).
(a value offset by 100 ms)

Config =

DC2	TYP0	TYP1	TYP2	TYP3	TYP4	VER
-----	------	------	------	------	------	-----

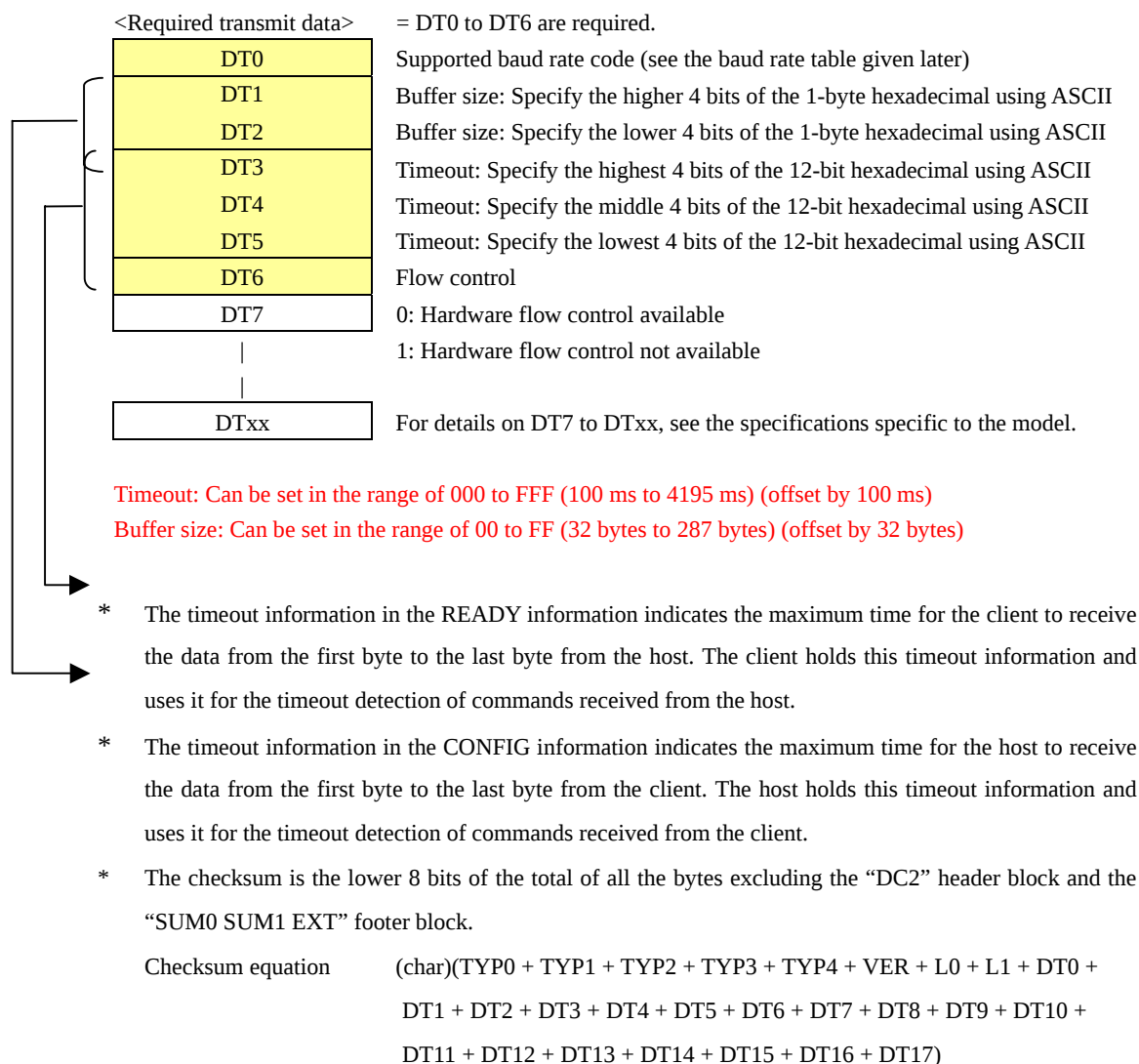
L0	L1	DT0 -	DT63	SUM0	SUM1	ETX
----	----	-------	------	------	------	-----

* TYPx is a five-digit representative development number specific to the model.

* VER is the RS-232C protocol version.

* L0/L1 is the data byte length excluding the checksum (64 bytes maximum). Since hexadecimal notation is used, the maximum is 64 = 0x40. Expressing this value using ASCII code, we get "0x34", "0x30".

Function Name	Function	Data Contents (ASCII)	Range (Hex)	DPX-1200 data
TYP0-4	Model ID	0 - 9, A - F	Any	"Y0035"
VER	Version	A - Z	Any	"A"
L0-1	Data length	0 - 9, A - F	1 to 0xFF	Any
DT0-63	Data	0 - 9, A - F	0 to 0xF	Any
SUM0	Checksum higher 4 bits	0 - 9, A - F	0 to 0xF	Any
SUM1	Checksum lower 4 bits	0 - 9, A - F	0 to 0xF	Any



(c) CONFIG data specific to the projector

Below is the definition of the DT7 and subsequent data specific to the projector.

DT7	Control Status Report Enable/Disable: 0 = Enable, 1 = Disable
DT8	Control Status Report Interval (see Client-to-Host Communication for the values)
DT9	Power status: 0 = power ON, 1 = power OFF
DT10	HIDE status: 0 = HIDE ON, 1 = HIDE OFF
DT11	INPUT (see Client-to-Host Communication for the values)
DT12	ASPECT (see Client-to-Host Communication for the values)
DT13	MEMORY status 0 to 5 = MEMORY 1 to 6
DT14	Lamp usage time (specify bits 12 to 15 of the 16-bit hexadecimal using ASCII)
DT15	Lamp usage time (specify bits 8 to 11 of the 16-bit hexadecimal using ASCII)
DT16	Lamp usage time (specify bits 4 to 7 of the 16-bit hexadecimal using ASCII)
DT17	Lamp usage time (specify bits 0 to 3 of the 16-bit hexadecimal using ASCII)

- * For Control Status Report Interval, INPUT, ASPECT, and MEMORY, specify the lowest 1 byte (DAT2) of the 3 bytes (DAT0, 1, and 2).
- * Specify the lamp usage time in the range of 0x0000 to 0xFFFF (0 to 65535) one byte at a time using ASCII codes.
- * The DT0 to DT17 values on the client are as follows:

Item	Data	Remarks
DT0	"0"	See the baud rate code table.
DT1,2	"E0"	256 bytes
DT3,4,5	"190"	500 ms
DT6	"1"	No hardware flow control.
DT7 – DT17	Any	Varies depending on the projector status.

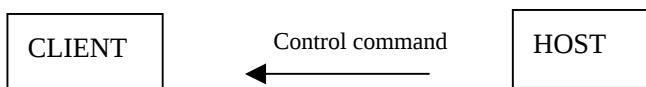
(d) Baud rate code table

Code	Communication Baud Rate Type	Parity
'@'=0x40	Supports 9600 bps only	Fixed to NONE parity
'A'=0x41	Supports 19200 bps	Fixed to NONE parity
'B'=0x42	Supports 38400 bps	Fixed to NONE parity
'C'=0x43	Supports 19200 bps and 38400 bps	Fixed to NONE parity
'D'=0x44	Supports 57600 bps	Fixed to NONE parity
'E'=0x45	Supports 19200 bps and 57600 bps	Fixed to NONE parity
'F'=0x46	Supports 38400 bps and 57600 bps	Fixed to NONE parity
'G'=0x47	Supports 19200 bps, 38400 bps, and 57600 bps	Fixed to NONE parity
'H'=0x48	Supports 115200 bps	Fixed to NONE parity
'I'=0x49	Supports 19200 bps and 115200 bps	Fixed to NONE parity
'J'=0x4A	Supports 38400 bps and 115200 bps	Fixed to NONE parity
'K'=0x4B	Supports 19200 bps, 38400 bps, and 115200 bps	Fixed to NONE parity
'L'=0x4C	Supports 57600 bps and 115200 bps	Fixed to NONE parity
'M'=0x4D	Supports 19200 bps, 57600 bps, and 115200 bps	Fixed to NONE parity
'N'=0x4E	Supports 38400 bps, 57600 bps, and 115200 bps	Fixed to NONE parity
'O'=0x4F	Supports 19200 bps, 38400 bps, 57600 bps, and 115200 bps	Fixed to NONE parity
'='=0x60	Support 9600 bps only	Parity changeable
'a'=0x61	Supports 19200 bps	Parity changeable
'b'=0x62	Supports 38400 bps	Parity changeable
'c'=0x63	Supports 19200 bps and 38400 bps	Parity changeable
'd'=0x64	Supports 57600 bps	Parity changeable
'e'=0x65	Supports 19200 bps and 57600 bps	Parity changeable
'f'=0x66	Supports 38400 bps and 57600 bps	Parity changeable
'g'=0x67	Supports 19200 bps, 38400 bps, and 57600 bps	Parity changeable
'h'=0x68	Supports 115200 bps	Parity changeable
'i'=0x69	Supports 19200 bps and 115200 bps	Parity changeable
'j'=0x6A	Supports 38400 bps and 115200 bps	Parity changeable
'k'=0x6B	Supports 19200 bps, 38400 bps, and 115200 bps	Parity changeable
'l'=0x6C	Supports 57600 bps and 115200 bps	Parity changeable
'm'=0x6D	Supports 19200 bps, 57600 bps, and 115200 bps	Parity changeable
'n'=0x6E	Supports 38400 bps, 57600 bps, and 115200 bps	Parity changeable
'o'=0x6F	Supports 19200 bps, 38400 bps, 57600 bps, and 115200 bps	Parity changeable

4. Host-to-Client Communication

(a) Basic commands

(1) Description



- Issue control commands excluding the Power-ON Control command only when the power to the client is ON
- Do not issue control commands during the system wait period (System Status Report BUSY). After System Control Report OK, control commands can be issued.
- A control command cannot be canceled. If you wish to do so, the host shall send another command with data that will produce the same effect as canceling the previous command.
- If a Control Status Report is not returned within 1 second after issuing a control command, the host shall issue the control command again. The number of retransmissions is five. If a Control Status Report is not returned after five times, cancel the transmission and restart communications from start control.
- If the control category (SW) is remote control code, the same display and action as normal remote control operation are performed.

(2) Command protocol

STX	SW	CMD0	CMD1	CMD2	CMD3	ETX
-----	----	------	------	------	------	-----

Function Name	Function	Data Contents (ASCII)	Range (Hex)
SW	Category	0 - 9	0 to 9
CMDT0 to 3	Command & data	0 - 9, A - F	Variable (table)

SW	CMDT0	CMDT1	CMDT2	CMDT3
0	Remote control code			
1	Command	Data		
2	Command		Data	
3	Data			

Remote control code 4 bytes
Command 1 byte, data 3 bytes
Command 2 byte, data 2 bytes
For data transmission during burst transfer

- * The command data position of the following 4 bytes can be changed using SW (remaining: data area)
- * The mode is switched exclusively by SW. After switching, the previous mode is automatically cancelled.
- * In burst transfer mode, the mode is automatically terminated after receiving the specified number of bytes.

- SW: Category

SW0: ASCII string of 4-digit NEC remote control command

SW1: Common system command (see the table below)

SW2-SW6: Depends on the device. Not used by the projector.

SW7: Dedicated commands for the projector.

(3) Command description

- Common system commands An asterisk denotes the default value on the client in the case of a projector.

SW	CMD0	Command Type	CMD1,2,3	Function
1	0	Control Status Report Enable/Disable	000	Enable
			001	Disable*
1	1	Control Status Report Interval	000	Real-time*
			001	50 ms
			002	100 ms
			003	150 ms
			004	200 ms
			005	250 ms
			006	300 ms
			007	350 ms
			008	400 ms
1	2	Baud Rate Setting (bps)	000	9600 Parity: NONE
			001	19200 Parity: NONE
			002	38400 Parity: NONE
			003	57600 Parity: NONE
			004	115200* Parity: NONE
1	3	Host Buffer Size Setting	x x x	000 to FFF: Can be set in the range of 32 to 4127 bytes
1	4	Data initialization & reset	000	Reset all RS-232C control data to factory default

- * Control Status Report Enable/Disable is an instruction used to enable or disable control reports sent by the client in response to commands received from the host or status reports sent by the client when its internal status changes.
- * Control Status Report Interval specifies the interval at which a client sends control status reports. This is provided to support hosts that have slow processing power (changing the host screen display, for example) after a control status report is received. The load on the host can be reduced by decreasing the number of control report packets of the same type that occur within a given time on the client (report only the last status).
- * Host buffer size notifies the client the size of the communication buffer on the host. The client must issue commands by limiting the number of bytes sent to the host based on this information.
- * The client does not support host buffer setting.
- * The data initialization & reset command resets all RS-232C control data to factory default.
Initialization of the stored data is a last resort.
After sending this command, the host shall wait approximately 500 ms and check the status again using CONFIG.

- Dedicated commands for the projector

An asterisk denotes the default value on the client in the case of a projector.

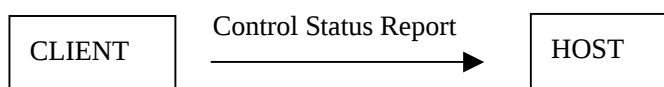
SW	CMD0,1	Command Type	CMD2,3	Function
7	B1	Trigger Out Setting	00	Trigger OFF*
			01	Trigger ON

5. Client-to-Host Communication

(a) Basic commands

(1) Description

These commands are issued when the internal status changes due to an external change.



- Control Status Reports can be divided into three types.
 - 1) System status report: Makes a report when there is a change in the system status such as reset and system busy periods.
 - 2) Operation status report: Makes a report when the signal source changes or when the internal status changes due to a system command.
 - 3) Command complete report: Reports the response information of a functional operation through remote control, panel keys, or control commands.
- In the Power-OFF status, only Power-ON Control is accepted. After executing the command, system status reports are issued according to the changes in the internal status.
- After receiving a Power-OFF Status Report, the host shall handle all previous control status reports to be invalid. At the next power-on, the host must collect status reports from the beginning using start control commands, etc.
- If a command control is received during the system wait period (BUSY status), the client shall not execute the command and shall not return a response.
- All control status reports are sent at intervals specified by Control Status Report Interval. The client shall obtain the last status of the same type within the interval and send it as a single piece of information. In other words, the client shall send only the last status of the same type of information. For example, if the host issues a command for setting the input to 1 and the user changes the input to 2 on the panel, the control complete report returns the control result of input 2. The host shall consider the command response to the same type of instructions to be final.

(2) Command protocol

STX	TYP	STAT	SW	DAT0	DAT1	DAT2	ETX
-----	-----	------	----	------	------	------	-----

Function Name	Function	Data Contents (ASCII)	Range
TYP	Control type	0 - 9	0 to 9
STAT	Status	0 - 9	0 to 2
SW	Category	0 - 9, A - F	0 to 0xF
DAT0,1,2	Command & data	0 - 9, A - F	0 to 0xFFFF

- Control type

Indicates which control the control complete response pertains to.

TYP	Control type
0	RS-232C control
1	Remote control
2	Key control
3	System control

- Status

STAT	Status
0	Complete
1	Reject or discard

- Category

SW0: System status report

SW7: Dedicated to the projector

(3) Command description

- System status report: Reported when there is a change in the system status such as reset and system busy periods.

TYP	STAT	SW	Command Type	DAT0,1,2	Function
3	0	0	System status	000	OK Normal operation
				001	BUSY System wait
				002	P-OFF Power-OFF

* Function description

OK: Normal status = control commands can be accepted (end of system busy period)

BUSY: Starts command issuance prohibit period (system busy period)

P-OFF: Control report notifying that no more command will be accepted when turning OFF the power

* This information must be sent during reset and power ON/OFF. It can be used as a trigger for system recovery.

* After the "BUSY" report, send an "OK" report.

* After power on, send an "OK" system status report.

- Operation status report: Reported when a status change occurs due to a signal source change or when a change in the internal status occurs due to a system command.

TYP	STAT	SW	Command Type	DAT0, 1, 2	Function
3	0	0	Error report	100	Overcurrent error
				101	Lamp error
				102	Power error
				103	Temperature error
				104	Fan error
				105	Cover error (lamp/filter)
*	*	0	Control Status Report Enable/Disable	200	Enable
				201	Disable
*	*	0	Control Status Report Interval	300	Real-time
				301	50 ms
				302	100 ms
				303	150 ms
				304	200 ms
				305	250 ms
				306	300 ms
				307	350 ms
				308	400 ms
*	*	0	Baud Rate Report	400	9600 Parity: NONE
				401	19200 Parity: NONE
				402	38400 Parity: NONE
				403	57600 Parity: NONE
				404	115200 Parity: NONE
*	*	0	Host Buffer Setting Acknowledge	500	ACK
				501	NAK

* The client does not support host buffer setting.

The client always returns NAK when a host buffer setting is received.

- Command complete report: Reported when a control is completed when a function operation is performed through remote control, panel keys, or control commands.

TYP	STAT	SW	Command Type	DAT0, 1, 2	Function
		7	Hide Status	100	Hide ON
				101	Hide OFF
			INPUT Selection Status	201	S Video
				202	Video
				203	Input A Component
				204	Input A RGB-TV
				205	Input A RGB-PC
				206	Input B Component
				207	Input B RGB-TV
				208	Input B RGB-PC
				209	HDMI YUV
				20A	HDMI RGB-TV
				20C	D4
				20D	HDMI AUTO
			Aspect Selection Status	300	Aspect Auto
				301	Aspect Normal
				302	Aspect Squeeze
				303	Aspect Zoom
				304	Aspect Subtitle Zoom
				305	Aspect Smart Zoom
				306	Aspect Through
				307	Aspect Through Squeeze
				308	Aspect Cinema Zoom
				309	Aspect Cinema Squeeze
				30A	Aspect Zoom 14:9
			Memory Selection Status	400	Memory 1
				401	Memory 2
				402	Memory 3
				403	Memory 4
				404	Memory 5
				405	Memory 6
			Trigger Out Setting Status	500	Trigger OFF
				501	Trigger ON

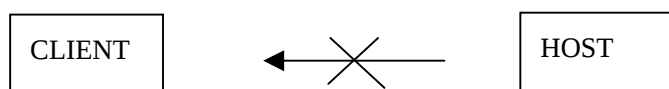
* Returned only when Control Status Report is enabled.

6. Supplementary Information on Control

The control details below mainly describe the handling on the host against changes in the slave (client).

1. Host handling when the power plug is unplugged or when the RS-232C cable is not connected

At the start of communications, the host checks the connection (using READY and CONFIG). However, the host will not receive CONFIG after five retransmissions at 1-second intervals. The host decides that the client is not connected, clears all the data in the transmit buffer, and reports the problem.



2. If the power plug on the client is removed after start control has been established

In the case of a projector, the power plug is normally not unplugged while the lamp is on, because such act can damage the lamp or device. However, if the power is cut off (such as when the plug is unplugged inadvertently), a control command timeout occurs on the host. Since the host will not receive a response after five retransmissions, the host decides that a problem occurred, cancels all subsequent control commands, and clears the transmit buffer. Then, the host restarts from the READY command (start control), and the handling of [1.] is performed.

3. If the RS-232C cable is removed after start control has been established

On the host, a control command timeout occurs. Since the host will not receive a response after five retransmissions, the host decides that a problem occurred, cancels all subsequent control commands, and clears the transmit buffer. Then, the host restarts from the READY command (start control), and the handling of [1.] is performed.

On the client, if Control Status Report is enabled, the client returns control status reports to the host.

4. If the power plug is plugged in

In the case of the projector, it normally enters the standby status, but nothing is issued to the host. The host shall start the normal procedure with the Power-ON command.

5. If the RS-232C cable is inserted

If the client is powered up and the RS-232C cable is inserted later, the following two cases are possible.

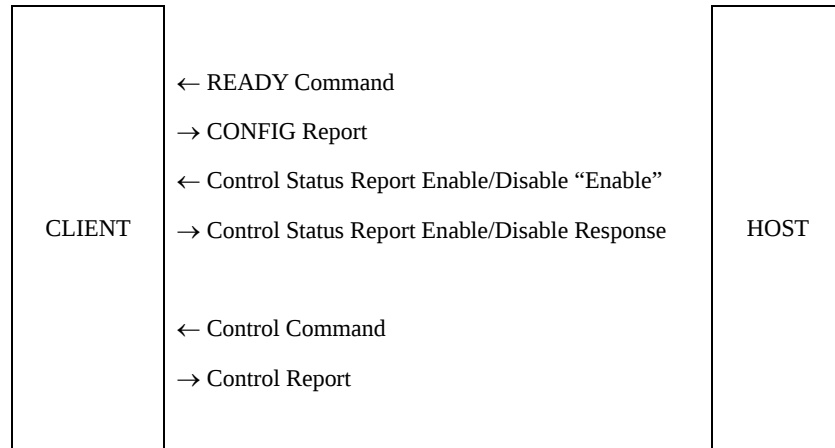
- (1) The client was not connected to the host
- (2) The client was already connected but the cable was disconnected and inserted again

Case (1) is the same as the start of a normal connection. The host shall carry out start control.

In case (2), the previous condition is maintained if Control Status Report was enabled originally when the cable was disconnected. However, just in case, issue the start command (READY and CONFIG) to check the presence of the client and then set Control Status Report Enable/Disable to enable. The alternative is to send the command to enable the Control Status Report Enable/Disable setting and check the response.

6. If the client powers up first and then the host

The host shall use the start control command (READY and CONFIG) to check the presence of the client and then issue control commands. If an error occurs when the start control command is issued, the handling is similar to [1].



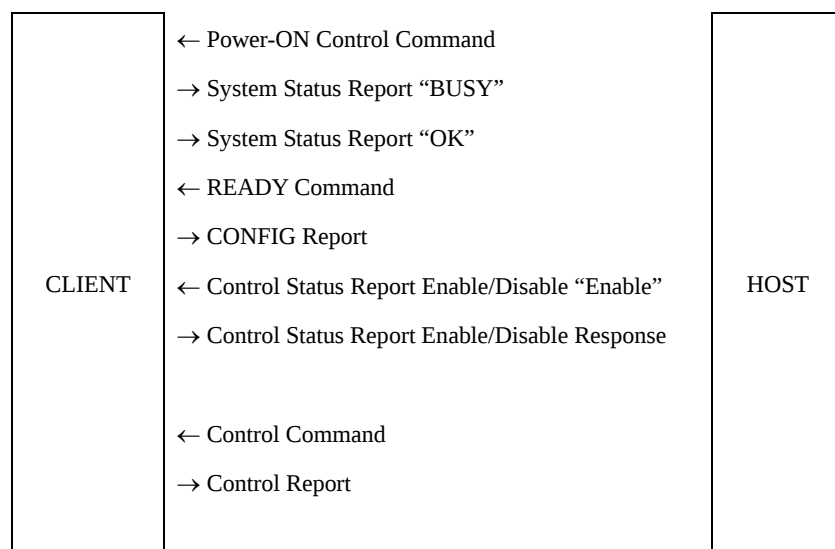
7. If the host powers up first and then the client

Power up the client using the Power-ON command from the host. Then, system status reports are sent from the client according to its internal status.

When System Status Report OK is received, it indicates that the client has powered up correctly.

Then, the host shall use the start control command (READY and CONFIG) to check the presence of the client and then issue control commands.

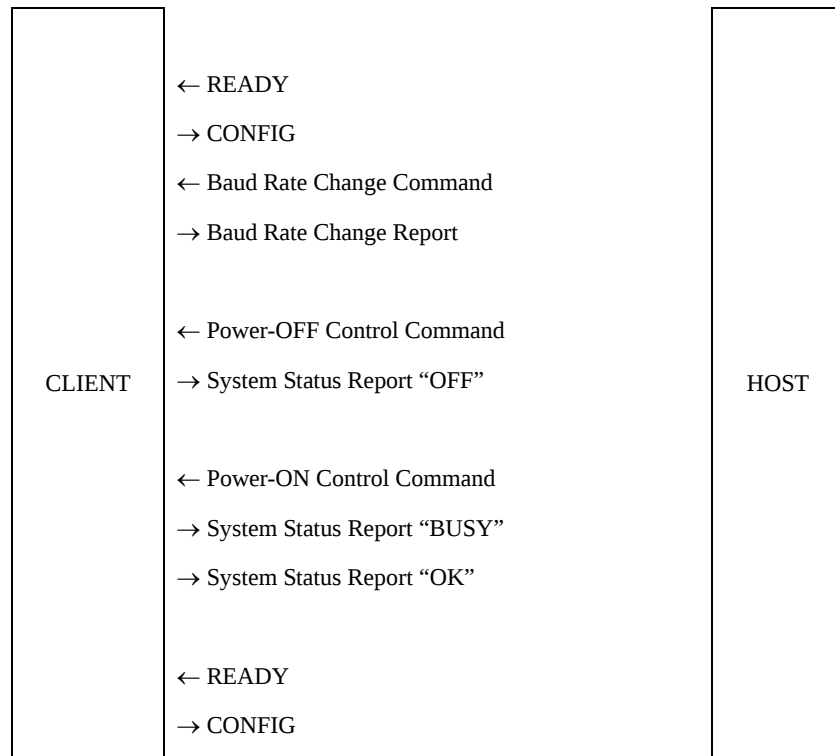
If an error occurs when the start control command is issued, the handling is similar to [1].



8. Procedure of Changing the Baud Rate

When changing the baud rate, the client changes the baud rate after sending the report. However, to make the change take effect, the client must be powered off once and then powered back on.

The host changes the baud rate after receiving this report.



7. List of Commands

Below is a list of command examples described earlier used for the projector.

(a) Commands

Command	Command Detail	As a Client
Ready	Timeout = 200 ms (200 ms => 0x64) due to 100-ms offset DC2 0x30 0x36 0x34 ETX	Rx
Config	Model ID=Y0020, version=A, number of bytes=7, baud rate=0 buffer=256 bytes, timeout=200 ms, hardware flow control DC2 0x59 0x30 0x30 0x32 0x30 0x41 0x30 0x37 0x4F 0x45 0x30 0x30 0x36 0x34 0x30 0x35 0x32 ETX	Tx
Extended Remote Control Command	STX 0x30 [Remote Control Code 4 bytes] ETX	Rx
Baud Rate Change	STX 0x31 0x32 0x30 0x30 [Baud Rate Code 1 byte] ETX	Rx
Complete Report Enable Setting	STX 0x31 0x30 0x30 0x30 0x30 ETX	Rx
Complete Report Disable Setting	STX 0x31 0x30 0x30 0x30 0x31 ETX	Rx
System Status OK	STX 0x33 0x30 0x30 0x30 0x30 0x30 ETX	Tx
System Status BUSY	STX 0x33 0x30 0x30 0x30 0x30 0x31 ETX	Tx
System Status Power OFF	STX 0x33 0x30 0x30 0x30 0x30 0x32 ETX	Tx
Command Completion Report Complete	STX 0x30 0x30 0x37 [Response Code 3 bytes] ETX (in the case from RS-232C)	Tx
Command Completion Report Reject	STX 0x30 0x31 0x37 [Response Code 3 bytes] ETX (in the case from RS-232C)	Tx

(b) Extended Remote Control Command

- Custom code
0xD1
- Type
 - Direct: Specifies the function directly to be executed. If the function is already implemented, no change occurs.
 - Toggle: The ON/OFF status is toggled each time the command is received.
 - Increment: The internal status is incremented by 1 each time a command is sent.
- Command example
The extended remote control code for POWER ON is 0xD1 0xC1. Thus, the command is as follows:
STX 0x30 0x44 0x31 0x43 0x31 ETX
- Receive and response
 - Receive: Y = Receive as an extended remote control code. N = Discard.
 - Response: Y = Returns the current status as a response. N = Does not return a response.
- Remote Control ID
DPX-1200 has two remote control IDs, ID1 and ID2. If you set the remote control ID setting in the menu to ID1 and ID2, the DPX-1200 receives ID1 and ID2 commands, respectively.

(c) List of Remote Control Codes

- Normal remote control codes and extended IR codes (direct commands)

Normal remote control codes

Indicated in green in the table.

Extended IR codes (direct commands)

Indicated in white in the table.

- Remote control ID1

Command	Receive		Report		Type	Description
	Code	Y/N	Code	Resp.		
V.POS	0xA0	Y		N	Toggle	Lens shift up/down direction
V.POS UP	0xA1	Y		N	Direct	
V.POS DOWN	0xA2	Y		N	Direct	
ZOOM	0xA3	Y		N	Toggle	Lens zoom
ZOOM UP	0xA4	Y		N	Direct	
ZOOM DOWN	0xA5	Y		N	Direct	
FOCUS	0xA6	Y		N	Toggle	Lens focus
FOCUS UP	0xA7	Y		N	Direct	
FOCUS DOWN	0xA8	Y		N	Direct	
IRIS	0xA9	Y		N	Toggle	Iris Aperture
IRIS UP	0xAA	Y		N	Direct	
IRIS DOWN	0xAB	Y		N	Direct	
ASPECT CINEMA ZOOM	0xB0	Y	0x30*	Y	Direct	
ASPECT CINEMA SQUEEZE	0xB1	Y	0x30*	Y	Direct	
ASPECT 14:9 ZOOM	0xB2	Y	0x30*	Y	Direct	
POWER OFF	0xC0	Y	0x00*	Y	Direct	
POWER ON	0xC1	Y	0x00*	Y	Direct	
POWER ON/OFF	0xC2	Y	0x00*	Y	Toggle	Same as STANDBY/ON
AUTO	0xC3	Y		N	Direct	
HIDE OFF	0xC4	Y	0x10*	Y	Direct	Clear hide
HIDE ON	0xC5	Y	0x10*	Y	Direct	Hide all displays (blackout)
HIDE ON/OFF	0xC6	Y	0x10*	Y	Toggle	
PATTERN OFF	0xC7	Y		N	Direct	Revert to normal video display
PATTERN ON	0xC8	Y		N	Direct	Display test pattern
PATTERN ON/OFF	0xC9	Y		N	Toggle	
RESET	0xCA	Y		N	Direct	
UP	0xCC	Y		N	Direct	
DOWN	0xCD	Y		N	Direct	
LEFT	0xCE	Y		N	Direct	
RIGHT	0xCF	Y		N	Direct	
SELECT	0xD0	Y		N	Direct	Same as ENTER
MENU OFF	0xD1	Y		N	Direct	
MENU ON	0xD2	Y		N	Direct	
MENU ON/OFF	0xD3	Y		N	Toggle	Display the menu
ESCAPE	0xD5	Y		N	Direct	Exits from the menu
INPUT ON/OFF	0xD6	Y		N	Toggle	Display the INPUT menu
INPUT 1	0xD8	Y	0x20*	Y	Direct	S VIDEO
INPUT 2	0xD9	Y	0x20*	Y	Direct	VIDEO
INPUT 3	0xDA	Y	0x20*	Y	Direct	INPUT A (dependent on the menu)
INPUT 4	0xDB	Y	0x20*	Y	Direct	INPUT B (dependent on the menu)
INPUT 5	0xDC	Y	0x20*	Y	Direct	DVI (dependent on the menu)
INPUT 6	0xDD	Y	0x20*	Y	Direct	D4 VIDEO
STILL OFF	0xDE	Y		N	Direct	
STILL ON/OFF	0xDF	Y		N	Toggle	
STILL ON	0xE0	Y		N	Direct	
MEMORY 1	0xE1	Y	0x40*	Y	Direct	

MEMORY 2	0xE2	Y	0x40*	Y	Direct	
MEMORY 3	0xE3	Y	0x40*	Y	Direct	
MEMORY 4	0xE4	Y	0x40*	Y	Direct	
MEMORY 5	0xE5	Y	0x40*	Y	Direct	
MEMORY 6	0xE6	Y	0x40*	Y	Direct	
ASPECT ON/OFF	0xEA	Y		N	Toggle	Display the ASPECT menu
ASPECT NORMAL	0xEB	Y	0x30*	Y	Direct	
ASPECT ZOOM	0xEC	Y	0x30*	Y	Direct	
ASPECT ZOOM TITLE	0xED	Y	0x30*	Y	Direct	
ASPECT SQUEEZE	0xEE	Y	0x30*	Y	Direct	
ASPECT THROUGH	0xEF	Y	0x30*	Y	Direct	
ASPECT AUTO	0xF0	Y	0x30*	Y	Direct	
ASPECT THRU SQUEEZE	0xF1	Y	0x30*	Y	Direct	
ASPECT SMART ZOOM	0xF2	Y	0x30*	Y	Direct	
INPUT A COMPONENT	0xF3	Y	0x20*	Y	Direct	
INPUT A RGB PC	0xF4	Y	0x20*	Y	Direct	
INPUT A RGB TV	0xF5	Y	0x20*	Y	Direct	
INPUT B COMPONENT	0xF6	Y	0x20*	Y	Direct	
INPUT B RGB PC	0xF7	Y	0x20*	Y	Direct	
INPUT B RGB TV	0xF8	Y	0x20*	Y	Direct	
HDMI COMPONENT	0xF9	Y	0x20*	Y	Direct	Select HDMI COMPONENT signal
HDMI RGB TV	0xFB	Y	0x20*	Y	Direct	Select HDMI RGB TV signal
HDMI AUTO	0xFC	Y	0x20*	Y	Direct	HDMI auto

- Remote control ID2

Command	Receive		Report		Type	Description
	Code	Y/N	Code	Resp.		
V.POS	0x20	Y		N	Toggle	Lens shift up/down direction
V.POS UP	0x21	Y		N	Direct	
V.POS DOWN	0x22	Y		N	Direct	
ZOOM	0x23	Y		N	Toggle	Lens zoom
ZOOM UP	0x24	Y		N	Direct	
ZOOM DOWN	0x25	Y		N	Direct	
FOCUS	0x26	Y		N	Toggle	Lens focus
FOCUS UP	0x27	Y		N	Direct	
FOCUS DOWN	0x28	Y		N	Direct	
IRIS	0x29	Y		N	Toggle	Iris Aperture
IRIS UP	0x2A	Y		N	Direct	
IRIS DOWN	0x2B	Y		N	Direct	
ASPECT CINEMA ZOOM	0x30	Y	0x30*	Y	Direct	
ASPECT CINEMA SQUEEZE	0x31	Y	0x30*	Y	Direct	
ASPECT 14:9 ZOOM	0x32	Y	0x30*	Y	Direct	
POWER OFF	0x60	Y	0x00*	Y	Direct	
POWER ON	0x61	Y	0x00*	Y	Direct	
POWER ON/OFF	0x62	Y	0x00*	Y	Toggle	Same as STANDBY/ON
AUTO	0x63	Y		N	Direct	
HIDE OFF	0x64	Y	0x10*	Y	Direct	Clear hide
HIDE ON	0x65	Y	0x10*	Y	Direct	Hide all displays (blackout)
HIDE ON/OFF	0x66	Y	0x10*	Y	Toggle	
PATTERN OFF	0x67	Y		N	Direct	Revert to normal video display
PATTERN ON	0x68	Y		N	Direct	Display test pattern
PATTERN ON/OFF	0x69	Y		N	Toggle	
RESET	0x6A	Y		N	Direct	
UP	0x6C	Y		N	Direct	
DOWN	0x6D	Y		N	Direct	
LEFT	0x6E	Y		N	Direct	

RIGHT	0x6F	Y		N	Direct	
SELECT	0x70	Y		N	Direct	Same as ENTER
MENU OFF	0x71	Y		N	Direct	
MENU ON	0x72	Y		N	Direct	
MENU ON/OFF	0x73	Y		N	Toggle	Display the menu
ESCAPE	0x75	Y		N	Direct	Exits from the menu
INPUT ON/OFF	0x76	Y		N	Toggle	Display the INPUT menu
INPUT 1	0x78	Y	0x20*	Y	Direct	S VIDEO
INPUT 2	0x79	Y	0x20*	Y	Direct	VIDEO
INPUT 3	0x7A	Y	0x20*	Y	Direct	INPUT A (dependent on the menu)
INPUT 4	0x7B	Y	0x20*	Y	Direct	INPUT B (dependent on the menu)
INPUT 5	0x7C	Y	0x20*	Y	Direct	HDMI (dependent on the menu)
INPUT 6	0x7D	Y	0x20*	Y	Direct	D4 VIDEO
STILL OFF	0x7E	Y		N	Direct	
STILL ON/OFF	0x7F	Y		N	Toggle	
STILL ON	0x80	Y		N	Direct	
MEMORY 1	0x81	Y	0x40*	Y	Direct	
MEMORY 2	0x82	Y	0x40*	Y	Direct	
MEMORY 3	0x83	Y	0x40*	Y	Direct	
MEMORY 4	0x84	Y	0x40*	Y	Direct	
MEMORY 5	0x85	Y	0x40*	Y	Direct	
MEMORY 6	0x86	Y	0x40*	Y	Direct	
ASPECT ON/OFF	0x8A	Y		N	Toggle	Display the ASPECT menu
ASPECT NORMAL	0x8B	Y	0x30*	Y	Direct	
ASPECT ZOOM	0x8C	Y	0x30*	Y	Direct	
ASPECT ZOOM TITLE	0x8D	Y	0x30*	Y	Direct	
ASPECT SQUEEZE	0x8E	Y	0x30*	Y	Direct	
ASPECT THROUGH	0x8F	Y	0x30*	Y	Direct	
ASPECT AUTO	0x90	Y	0x30*	Y	Direct	
ASPECT THRU SQUEEZE	0x91	Y	0x30*	Y	Direct	
ASPECT SMART ZOOM	0x92	Y	0x30*	Y	Direct	
INPUT A COMPONENT	0x93	Y	0x20*	Y	Direct	
INPUT A RGB PC	0x94	Y	0x20*	Y	Direct	
INPUT A RGB TV	0x95	Y	0x20*	Y	Direct	
INPUT B COMPONENT	0x96	Y	0x20*	Y	Direct	
INPUT B RGB PC	0x97	Y	0x20*	Y	Direct	
INPUT B RGB TV	0x98	Y	0x20*	Y	Direct	
HDMI COMPONENT	0x99	Y	0x20*	Y	Direct	Select HDMI COMPONENT signal
HDMI RGB TV	0x9B	Y	0x20*	Y	Direct	Select HDMI RGB TV signal
HDMI AUTO	0x9C	Y	0x20*	Y	Direct	HDMI auto

8. Appendix ASCII Chart

	0	1	2	3	4	5	6	7
0	NUL	DLE	SP	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	I	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	EXC	+	;	K	[	k	{
C	FF	FS	,	<	L	¥	l	
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

* the column number = the first hexadecimal digit
the row number = the second hexadecimal digit

* The characters in the gray sells are available in the RS-232C communications.