MITSUBISHI ELECTRIC

DLP™ Projector

EX320U/EW330U/EX320U-ST

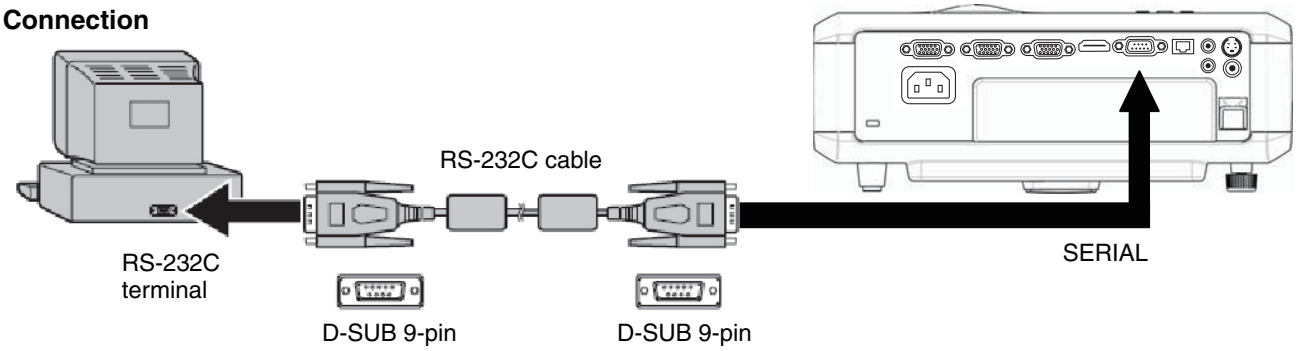
Controlling the projector using a personal computer

This projector can be controlled by connecting a personal computer with RS-232C terminal.

PC-controllable functions:

- Turning the power ON or OFF
- Changing input signals
- Inputting commands by pressing the buttons on the control panel and remote control
- Menu setting

Connection



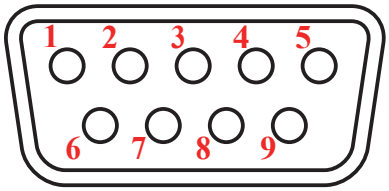
Important:

- Connect the computer with the projector on a one-to-one basis.
- Make sure that your computer and projector are turned off before connection.
- Boot up the computer first, and then plug the power cord of the projector.
  (If you do not follow this instruction, the Com port may not function.)
- Adapters may be necessary depending on the PC connected to this projector. Contact your dealer for details.

1. Interface

1.1 Pin assignment of SERIAL terminal (D-SUB 9-pin)

Pin	Description	Pin	Description
1	NC	2	RXD
3	TXD	4	NC
5	GND	6	NC
7	RTS	8	CTS
9	NC		



1.2 Communications format

PROTOCOL	RS-232C
BAUD RATE	9600 [bps]
DATA LENGTH	8 [bits]
PARITY BIT	NONE
STOP BIT	1 [bit]
FLOW CONTROL	NONE

This projector uses RXD, TXD and GND lines for RS-232C control.

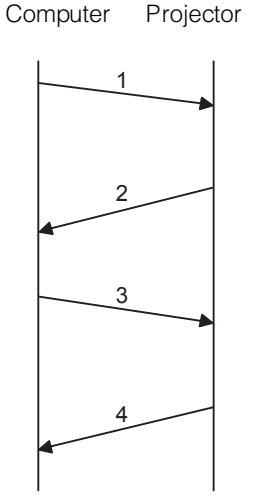
2. Control command configuration

The command consists of the address code, function code, data code, ACK/NAK, and end code. The length of the command varies among the functions.

	Address code	Function code	Data code	ACK/NAK	End code
ASCII	'30h' '30h'	Function	Data	'3Ah' '4Eh'	'0Dh'
Character	00	Function	Data	:N	↵

[Address code] Fixed to 00. ('30h' '30h' in the ASCII code)
[Function code] Code unique to each control operation.
[Data code] Data (value) unique to each control operation (Not always indicated.)
[ACK/NAK] Code indicating the NAK return as described below
Fixed to :N ('3Ah' '3Eh' in the ASCII code. Not added to ACK.)
[End code] Fixed to↵ .('0Dh' in the ASCII code)

3. Control sequence



	Sequence	Note
1	Send the command from the personal computer to the projector.	
2	The projector will send a return command after it receives an end code.	If the projector does not receive commands normally, that is, if the projector is not connected physically or unable to receive commands, it does not send out a return command. The projector sends out a return command within one second at the latest. When the received command cannot be executed, NAK is returned (as described below).
3	The personal computer checks the command and confirms if the sent command has been received or not.	
4	Use the check command to see if the projector has executed the command.	This projector sends various codes other than the return code. When having a control sequence by RS-232C, reject other codes from the personal computer.

- NAK return
  In the following cases, the projector returns the command with ":N" added.
  (1) Though the command sent from the computer is received by the projector successfully, it cannot be executed because the projector is in the operation prohibition state.
  (2) The data length of the sent command is incorrect or the command is invalid.
- When a command is sent out during the following operations, it may not be executed.
  (1) During signal switching
  (2) In the process of the auto position
  (3) After the power is turned on.
  The projector receives no commands for about 20 seconds (or for 2 minutes at the longest if the lamp does not light up promptly as the life is expiring). In this case, the projector returns the received command with NAK added.
- The return command is sent out within 1 second at the latest.
- When sending commands successively, wait to receive the return command of the current command before sending a next command.
- The projector may not receive a command when the splash screen is being displayed immediately after turning on the power.
- While using the LAN terminals, the LAN functions take precedence.

[Example 1] Turning ON the power. (Values enclosed in quotation marks are ASCII codes.):

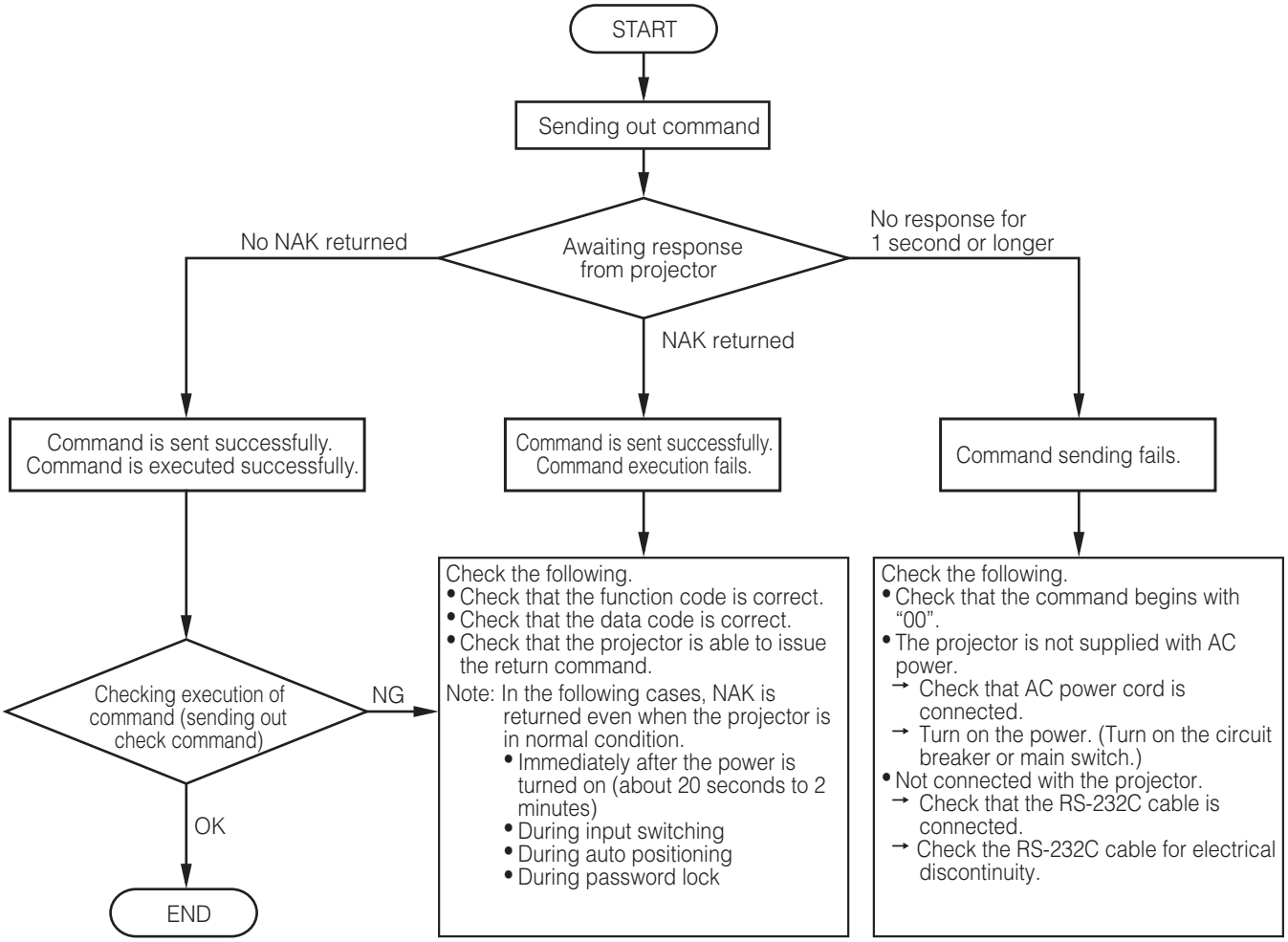
Command sent from the PC	Status code returned from the projector	Description
'30' '30' '21' '0D' 00! ↵		Command for POWER ON
	'30' '30' '21' '0D' 00! ↵	Command receipt confirmation (Command echo back)

[Example 2] Selecting VIDEO as the input signal during auto positioning (Values enclosed in quotation marks are ASCII codes.):

Command sent from the PC	Status code returned from the projector	Description
'30' '30' '5F' '76' '31' 00_v1 ↵		(During auto positioning) Command for selecting VIDEO as the input signal is sent out.
	'30' '30' '5F' '76' '31' '3A' '4E' 00_v1:N ↵	The command is received by the projector but cannot be executed. (NAK return)

- The flowchart on the next page shows the recommended operating sequence for your reference to create a program.

[RS-232C control flowchart]



4. Command list

4.1 Operation commands

The operation commands are used for the basic operation setting of this projector. They may not be executed while the signals are changed. The operation commands have no data codes.

ITEM	Function		Note
	Character	ASCII	
POWER ON	!	21h	This command is invalid during cooling after the power is turned off.
POWER OFF	"	22h	This command is invalid during splash screen displaying after the power is turned on.
INPUT COMPUTER 1	_r1	5Fh 72h 31h	This command will not be executed in Stand-by mode.
INPUT COMPUTER 2	_r2	5Fh 72h 32h	This command will not be executed in Stand-by mode.
INPUT VIDEO	_v1	5Fh 76h 31h	This command will not be executed in Stand-by mode.
INPUT S-VIDEO	_v2	5Fh 76h 32h	This command will not be executed in Stand-by mode.
INPUT HDMI	_d1	5Fh 64h 31h	This command will not be executed in Stand-by mode.

[Example] When setting the input signal to COMPUTER 1. (Values enclosed in quotation marks are ASCII codes.):

Command sent from the PC, etc.	Status code returned from the projector	Description
'30' '30' '5F' '72' '31' '0D' 00_r1 ↵		Command for setting the input signal to COMPUTER 1
	'30' '30' '5F' '72' '31' '0D' 00_r1 ↵	Command receipt confirmation (Command echo back)

4.2 Reading command diagram

The projectors operating status, such as POWER-ON/OFF and the currently selected input terminal, etc. can be monitored. Input terminal is not available during no signal.

ITEM	Character		ASCII	
	Function	Data (Receive)	Function	Data (Receive)
POWER ON	vP	1	76h 50h	31h
POWER OFF	vP	0	76h 50h	30h
INPUT COMPUTER 1	vI	r1	76h 49h	72h 31h
INPUT COMPUTER 2	vI	r2	76h 49h	72h 32h
INPUT VIDEO	vI	v1	76h 49h	76h 31h
INPUT S-VIDEO	vI	v2	76h 49h	76h 32h
INPUT HDMI	vI	d1	76h 49h	64h 31h

Use the following commands to obtain the values of the lamp time.

ITEM	Function		Data (Receive)
	Character	ASCII	
LAMP TIME (LOW)	vLE	76h 4Ch 45	hhhhhmm

"hhhh" and "mm" represent hours and minutes respectively.

Use the following commands to obtain other information.

ITEM	Function		Data (Receive)
	Character	ASCII	
VOLUME	VL	56h 4Ch	00-10

The PC sends the command without attaching the data code to it. On the other hand, the projector attaches to the received command its current operating status as the data code and send it back to the PC.

[Example] When checking the currently selected input terminal (when the INPUT VIDEO is being selected). (Values enclosed in quotation marks are ASCII codes.):

Command sent from the PC, etc.	Status code returned from the projector	Description
'30' '30' '76' '49' '0D' 00vI ↵		Command for checking the input terminal
	'30' '30' '76' '49' '76' '31' '0D' 00vIv1 ↵	Check result (VIDEO)

4.3 Remote commands (Not executable in stand-by mode.)

The remote commands allow the computer to control the projector in the same way as by the remote control. (Some operations cannot be controlled.) The remote commands have no data codes.

Button's name on remote	Function	
	Character	ASCII
+/VOLUME	r06	72h 30h 36h
-/VOLUME	r07	72h 30h 37h
▲	r53	72h 35h 33h
▼	r2b	72h 32h 62h
←	r4f	72h 34h 66h
→	r59	72h 35h 39h
MENU	r54	72h 35h 34h
ENTER	r10	72h 31h 30h
AUTO POSITION	r09	72h 30h 39h
FREEZE	ra4	72h 61h 34h

[Example] When displaying the MENU selection bar. (Values enclosed in quotation marks are ASCII codes.):

Command sent from the PC, etc.	Status code returned from the projector	Description
'30' '30' '72' '35' '34' '0D' 00r54 ↵		Command operating the same as the MENU button
	'30' '30' '72' '35' '34' '0D' 00r54 ↵	Command receipt confirmation (Command echo back)

4.4 Function commands (Not executable in stand-by mode.)

The mute commands are used for the mute setting of this projector with the 0 (HEX: 30h) and 1 (HEX: 31h).

ITEM	Function		Data
	Character	ASCII	
AV MUTE	MUTE	4Dh 55h 54h 45h	0 (OFF), 1 (ON)

4.5 Menu setting commands (Not executable in stand-by mode. Possible only to read during muting.)

The menu setting commands are used for the menu setting of this projector. If the personal computer sends the command without attaching the data code, the projector attaches to the received command its current setting value as the data code and send it back to the PC.

ITEM	Function		Data
	Character	ASCII	
PICTURE SETTING	CE	43h 45h	0 (BRIGHTEST), 1 (PRESENTATION), 2 (NORMAL), 3 (THEATER), 4 (USER1), 5 (USER2)
CONTRAST	PP	50h 50h	±50
BRIGHTNESS	QQ	51h 51h	000 -100
LAMP MODE	LM	4Ch 4Dh	0 (STANDARD), 1 (LOW)
ASPECT	SC	53h 43h	0 (auto), 1 (real), 2 (4:3), 3 (16:9) (EX320U/EX320U-ST) 0 (auto), 1 (real), 2 (full), 3 (4:3), 4 (16:9) (EW330U)

- Some commands are not executed depending on the input signal. The operational restrictions same as those on the menu setting are applied. Refer to "Menu operation" in the User Manual for more details.

How to set the value

Use the character or ASCII code as shown below to set the value.

Character	+	-	0	1	2	3	4	5	6	7	8	9
ASCII	'2Bh'	'2Dh'	'30h'	'31h'	'32h'	'33h'	'34h'	'35h'	'36h'	'37h'	'38h'	'39h'

[Example] When setting the CONTRAST to +17. (Values enclosed in quotation marks are ASCII codes.):

Command sent from the PC, etc.	Status code returned from the projector	Description
'30' '30' '51' '51' '2B' '31' '37' '0D' 00PP+17 ↵		Command for setting the CONTRAST to +17
	'30' '30' '51' '51' '2B' '31' '37' '0D' 00PP+17 ↵	Command receipt confirmation (Command echo back)