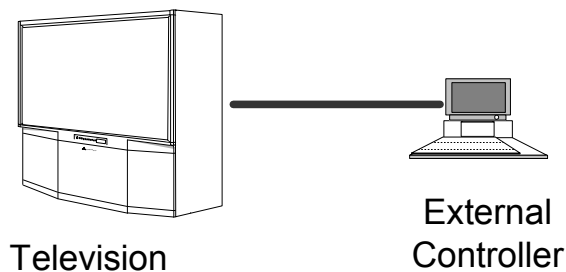


Mitsubishi Television 2003 – 2009 With VUDU Controls RS-232C Communication Specification

This specification will detail the external RS-232C control communication with Mitsubishi rear projection and LCD direct view televisions introduced in 2003 and later except for LCD direct view models that include a separate media center controller. This specification does not apply to Mitsubishi Plasma Display Panels (PDP); refer to the Owner's Guide for the PDP for RS-232C information.

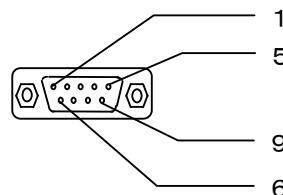
Connection



1) Terminal:

- The specification of terminal : D-SUB 9 Pin male

NO.	Pin name	NO.	Pin name
1	N.C.	6	N.C.
2	RXD (Receive data)	7	N.C.
3	TXD (Transmit data)	8	N.C.
4	N.C.	9	N.C.
5	GND		



2) Connector on the external equipment side:

Serial port (RS-232C) connector.

See the specifications of the equipment that is to be connected for the type of connector and pin assignment.

3) Wiring:

Wire the cable so that transmit and receive data lines connect correctly, eg.: TXD (Transmit data) on the external controller connects to RXD (Receive data) on the TV. TXD on the TV connects to RXD on the controller.

Communication Format

Communication System	Asynchronous
Interface	RS-232C
Baud rate	9600bps
Data Length	8bit
Parity	Odd
Stop Bit	1bit
Flow Control	N/A

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Header 1 and 2:

Header 1 : DFH (Command Packet)
7FH (Ack Packet)

Header 2 : F8H

◆ Command:

In the case of ACK, it will return receiving command.

◆ Command Length:

Number of command + data bytes

◆ Unit ID 1 and Unit ID 2:

Numbers use to identify the equipment that is connected

80H : Commander

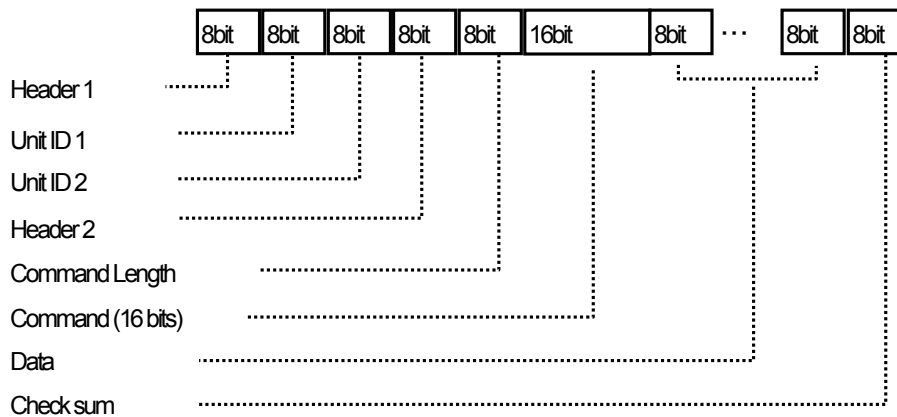
70H : Television

Unit ID 1: Indicates the equipment sending the signal.

Unit ID 2: Indicates the equipment receiving the signal.

Packet Format:

1) This format is extended command:



Command Packet Format:

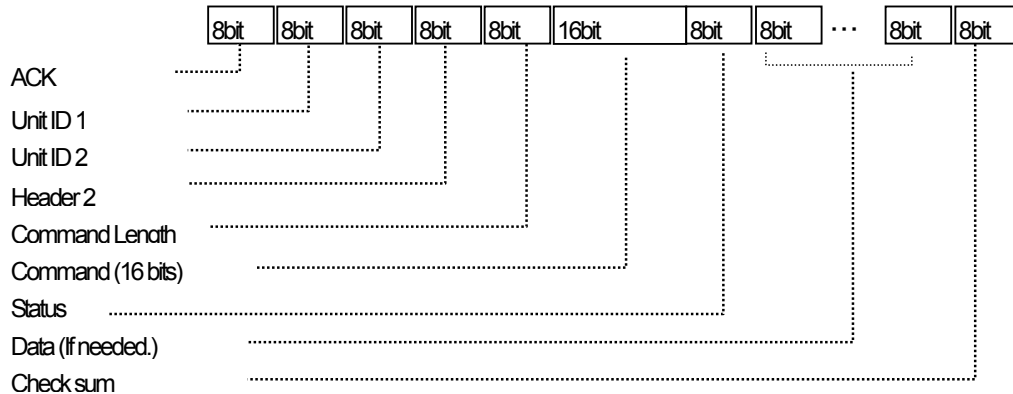
Byte	Function Name	Function Operation
Byte 0	Header 1	0xDF for Command packet to Television
Byte 1	Unit ID 1	Sender ID for Command packet to Television
Byte 2	Unit ID 2	PTV ID (0x70) for Command packet to Television
Byte 3	Header 2	0xF8 for all packet types
Byte 4	Command Length	Number of data bytes (n) + 2
Byte 5	Command Byte 0	See Command Table
Byte 6	Command Byte 1	See Command Table
Byte 7 + i	Data Byte i, i=0,1,2,3,..., n	Data Byte 1,2,...,n for Command packet to Television if any
Byte 7 + n	Check Sum Byte	Checksum byte for Command packet.

Sample Command – Power Status Request:

HEAD1 80H 70H HEAD2 02H 00H 80H CKS

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2) This Format is ACK for Command:



Ack Packet Format:

Byte	Function Name	Function Operation
Byte 0	Header 1	0x7F for Ack Packet from Television
Byte 1	Unit ID 1	PTV ID (0x70) for Ack packet from
Byte 2	Unit ID 2	Sender ID for Ack packet from Television
Byte 3	Header 2	0xF8 for all packet types
Byte 4	Command Length	Number of data bytes (n) + 3
Byte 5	Command Byte 0	See Command Table
Byte 6	Command Byte 1	See Command Table
Byte 7	Ack Status	Status Byte for Ack packet sent from Television
Byte 7 + i	Data Byte i, i=0,1,2,3,..., n	Data Byte 1,2,...,n for Ack packet from Television if any
Byte 7 + n	Check Sum Byte	

Sample ACK Response signal – Power Status Request:

ACK 70H 80H HEAD2 03H 00H 80H STATUS DATA00 CKS

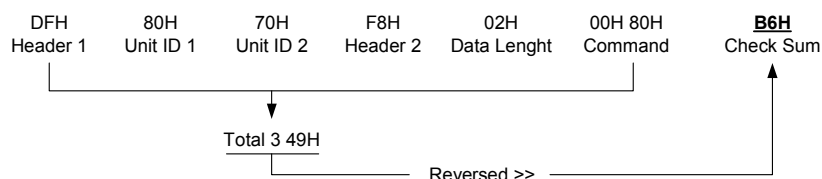
Status of ACK:

0x00	Command Successful
0x80	Busy processing last Command
0x81	Error, data range, Checksum, Unrecognized Command

Check sum calculation:

- 1) The check sum described below and RS-232C odd parity are used together for a check of the received data. The check sum is the lower order 8 bits of one frame of send or received data comprising the sum of total of Header 1 and 2, Unit ID 1 and 2, Command 1 and 2, Data Length and Data, then 1' complement.

Check sum example (Power Status Command):



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2) Error Processing:

When the communication interval is vacant for more than 4ms, thereafter a received Command 1 will be recognized. If, at the time, meaningful data can not be recognized, that data will not be recognized. (as valid data)

An Ack will not be returned unless the receive data error, the check sum error, and the receive data are all taken in.

Device Control Command reference

	Data length	Command1	Command2
Power ON	0x02	0x00	0x00
Power OFF	0x02	0x00	0x01
Input Change	0x03	0x01	0x00
Power Status Request	0x02	0x00	0x80
Volume-UP	0x02	0x08	0x01
Volume-DN	0x02	0x08	0x02
Channel-UP	0x02	0x02	0x01
Channel-DN	0x02	0x02	0x02
Audio-Mute	0x02	0x08	0x00
Input Up	0x02	0x01	0x01
Input Down	0x02	0x01	0x02
Channel Direct	0x08	0x02	0x00
Format change	0x03	0x03	0x00
INPUT MODE Request	0x02	0x01	0x80

◆ **0000H. Power ON:**

The external control equipment switches on the power of the TV.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 00H 00H CKS

Ack:

ACK 70H 80H HEAD2 03H 00H 00H
STATUS CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

◆ **0001H. Power OFF:**

The external control equipment switches off the power of the TV.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 00H 01H CKS

Ack:

ACK 70H 80H HEAD2 03H 00H 01H
STATUS CKS

STATUS:

0: The command was successful

80H: Device busy

81H: Command error

◆ **0080H. POWER STATUS Request:**

The external control equipment gets the status of the TV and confirms RS-232C connection.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 00H 80H CKS

Ack:

ACK 70H 80H HEAD2 03H 00H 80H
STATUS DATA0 CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

DATA00: Power state

0x01 = Power is on

0x02 = Power is off.

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◆ **0100H. Input Switch Change:**

The external control equipment switches the input of the TV. Not all inputs supported by all models.

Transmission Data:

HEAD1 80H 70H HEAD2 03H 01H 00H
DATA00 CKS

Ack:

ACK 70H 80H HEAD2 04H 01H 00H
STATUS DATA00 CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

DATA00 : Input Select

01H : Input 1
02H : Input 2
03H : Input 3
04H : Input 4
05H : Input 5
06H : Ant-A
07H : Ant-B
08H : Ant-DTV (Ant-C)
09H : Component 1
0AH : Component 2
0BH : Component 3
0CH : Component 4 / HDMI 3
0DH : Component 5 / HDMI 4
0FH : Input-DTV
20H : VGA 1 / RGB1 / PC1
21H : VGA 2 / RGB2 / PC2 / HDMI 2
22H : VGA 3 / RGB3 / PC3
23H : MonitorLink™ / DVI / HDMI 1
30H : VUDU / Ethernet Input

◆ **0101H. Input Up:**

The external control equipment switches the input of the TV. The changing order is fundamentally equivalent to INPUT UP operation of a remote control key.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 01H 01H CKS

Ack:

ACK 70H 80H HEAD2 03H 01H 01H
STATUS CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

◆ **0102H. Input Down:**

The external control equipment switches the input of the TV. The changing order is fundamentally equivalent to INPUT DOWN operation of a remote control key.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 01H 02H CKS

Ack:

ACK 70H 80H HEAD2 03H 01H 02H
STATUS CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error



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◆ **0200H. Channel Change Direct:**

The external control equipment switches the channel of the TV.

Transmission Data:

HEAD1 80H 70H HEAD2 08H 02H 00H
DATA00 DATA01 DATA02 DATA03 DATA04
DATA05 CKS

Where: DATA00 ~DATA03 Major channel
DATA04~DATA05 Sub channel

Major and sub channel must be written in hex format.

Example: major channel is let's say 330 (decimal) this is 14AH and DATA00~DATA03 should be written like this: 00 00 01 4A.

This is the same for the sub channel.

If the channel is analog one, then the sub channel field should be set to FF FE (DATA04~DATA05).

Example: for channel 2 (analog) use –
DF 80 70 F8 08 02 00 00 00 00 02 FF FE

For channel 11 (analog) use –
DF 80 70 F8 08 02 00 00 00 00 0B FF FE

For channel 11-1 (digital) use –
DF 80 70 F8 08 02 00 00 00 00 0B 00 01

Ack:

ACK 70H 80H HEAD2 09H 02H 00H STATUS
DATA00 DATA01 DATA02 DATA03 DATA04
DATA05 CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

◆ **0201H. Channel Change Up:**

The external control equipment switches the channel of the TV. The changing order is fundamentally equivalent to CH UP operation of a remote control key.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 02H 01H CKS

Ack:

ACK 70H 80H HEAD2 03H 02H 01H
STATUS CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

◆ **0202H. Channel Change Down:**

The external control equipment switches the channel of the TV. The changing order is fundamentally equivalent to CH DOWN operation of a remote control key.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 02H 02H CKS

Ack:

ACK 70H 80H HEAD2 03H 02H 02H
STATUS CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

◆ **0800H. Mute Toggle:**

The external control equipment enables/disables the audio mute of the TV.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 08H 00H CKS

Ack:

ACK 70H 80H HEAD2 03H 08H 00H
STATUS CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

◆ **0801H Volume-Up:**

The external control equipment enables the audio volume-up of the TV.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 08H 01H CKS

Ack:

ACK 70H 80H HEAD2 03H 08H 01H
STATUS CKS

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(Volume up continued)

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

◆ **0801H Volume-Down:**

The external control equipment enables the audio volume-down of the TV.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 08H 02H CKS

Ack:

ACK 70H 80H HEAD2 03H 08H 02H
STATUS CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

◆ **0300H Format:**

The external control equipment selects the format (picture aspect ratio).

Transmission Data:

HEAD1 80H 70H HEAD2 03H 03H 00H
DATA00 CKS

DATA00

01H : Standard
02H : Expand
03H : Zoom
04H : Stretch
05H : Stretch Plus
06H : Narrow
07H : Full Native

Ack:

ACK 70H 80H HEAD2 04H 03H 00H
STATUS DATA00 CKS

STATUS:

0: The command was successful
80H: Device busy
81H: Command error

(Format change is not available in PC mode)

◆ **INPUT MODE Request:**

Get current INPUT selected on TV.

Transmission Data:

HEAD1 80H 70H HEAD2 02H 01H 80H CKS

Ack:

ACK 70H 80H HEAD2 04H 01H 80H
STATUS DATA00 CKS

DATA00 :

01H : Input 1
02H : Input 2
03H : Input 3
04H : Input 4
05H : Input 5
06H : Ant-A
07H : Ant-B
08H : Ant-DTV (Ant-C)
09H : Component 1
0AH : Component 2
0BH : Component 3
0CH : Component 4 / HDMI 3
0DH : Component 5 / HDMI 4
0FH : Input-DTV
20H : VGA 1 / RGB 1 / PC 1
21H : VGA 2 / RGB 2 / PC 2 / HDMI 2
22H : VGA 3 / RGB 3 / PC 3
23H : MonitorLink™ / DVI / HDMI 1
39H : VUDU / Ethernet Input



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◆ VUDU Operations

To Control VUDU Operations on TV models LT-46249 and LT-52249 TV must have software version of 11.01 or higher. Software version is found on the lower right corner of the first screen of the Main TV Menu

Transmission Data:

HEAD1 80H 70H HEAD2 03H 04H 00H

DATA00 CKS

DATA00

0CH : VUDU HOME SCREEN

01H : UP

02H : DOWN

03H : LEFT

04H : RIGHT

05H : ENTER

06H : BACK

07H : PLAY

08H : PAUSE

09H : STOP

0AH : FFW

0BH : RRWD

Ack:

ACK 70H 80H HEAD2 04H 04H 00H STATUS

DATA00 CKS

STATUS:

0: The command was successful

80H: Device busy

81H: Command error