

**HT200**  
**HT200 SWA**  
**HT200 DM**  
**HT250**  
DLP VIDEO PROJECTOR



**RS-232C**  
**CONTROL**  
**SPECIFICATIONS**

Document Revision 1.4 (10 December 2001)



## Table of Contents

1. INTRODUCTION	3
2. RS-232C INTERFACE	3
3. COMMUNICATION PROTOCOL	4
HEADER	4
PAYLOAD	4
4. COMMANDS	5
REMOTE CONTROL KEYCODES	5
OPERATION CODES	6
5. RETURN CODES	7
6. EXAMPLES	7
7. WARNINGS	8

### Revision History:

Revision	Date	Software Version	Description of Change
1.4	10 December 2001	1.17 S or higher (HT 200) 1.17 DM or higher (HT 200 DM) 1.17 SW or higher (HT 200 SWA) 1.18 X or higher (HT 250)	Typographical errors removed. Prefix 0x removed from hexadecimal numbers notation.
1.3	18 September 2001	1.17 S or higher (HT 200) 1.17 DM or higher (HT 200 DM) 1.17 SW or higher (HT 200 SWA) 1.18 X or higher (HT 250)	New commands added (Operations Codes)
1.2	30 May 2001	1.16 S or higher (HT 200) 1.16 DM or higher (HT 200 DM) 1.16 X or higher (HT 250)	New commands added (Remote Control Codes   Mode; Operation Codes   Mode).
1.1	19 February 2001	1.15 S or higher (HT 200) 1.15 X or higher (HT 250)	New commands added (Operation Codes   Aspect). Packet Types Table amended.
1.0	06 December 2000	1.14 S or higher (HT 200) 1.14 X or higher (HT 250)	Initial Version.

## 1. Introduction

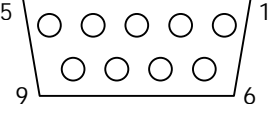
This document describes the communication and data formats used to control SIM2 HT200 / 200DM / 200SWA / 250 projectors via RS-232C port.

## 2. RS-232C Interface

Please follow the warnings below.

- Switch off your Personal Computer and Projector before connecting RS 232C cable. SIM2 HT200 / 200DM / 200SWA / 250 RS-232C Interface is described as follows.

### **RS-232C Control Port:**

D-SUB 9-pin (female)		Pin No	Signal	Definition
		1	N/A	Not used
		2	TD	Transmit data
		3	RD	Receive data
		4	N/A	Not used
		5	GND	Ground
		6	N/A	Not used
		7	N/A	Not used
		8	N/A	Not used
		9	N/A	Not used

- Switch on the Personal Computer and, after start up, switch on the Projector.
- Load a suitable communication software onto your Personal Computer, and set the Serial Port Parameters Parameters as shown below.

### **Communication Parameters:**

Parameter	Value
Transfer Rate	19200 bps
Data Length	8 bits
Parity Bit	None
Stop Bit	1 bit
Flow Control	None

- Set Send Mode and Read Mode to HEX.

### 3. Communication Protocol

The communication protocol is packet oriented. Packets consists of Header and Payload.

The Packet Header is consistent for all packets.

The Packet Payload type and content varies based on the type of packet sent.

The entire packet size is variable, being the sum of the fixed-size Packet Header and variable-sized Packet Payload.

Each packet received by the projector must be acknowledged with a return code.

#### Header

The Packet Header size is fixed at seven bytes.

0	1	2	3	4	5	6
BE	EF	Packet Type	Packet Payload Size		Packet Checksum	

- The **Packet Type** is a number (a byte in length) that defines the type of data in the packet.
- The **Packet Payload Size** is a number (two bytes) that defines the size of the Payload portion of the packet.  
For a given Packet Type, Packet Size is fixed.

#### Packet types:

Name	Description	Packet Type	Packet Payload Size
Keycode	Used to send simulated user input commands (IR, keypad) to the projector	02	0400
Operation	Used to control operations (such as Brightness, Position, Orientation, Language, etc) on the projector	03	0600

- The **Packet Checksum** (two bytes) is the CRC value for the entire packet (Header and Payload).

#### Payload

The Packet Payload format depends on the Packet Type.

The Keycode Packet payload size is 4 bytes, while the Operation Packet payload size is 6 bytes.

#### Keycode Packet Format:

0	1	2	3
Input Type		Input Action	

#### Operation Packet Format:

0	1	2	3	4	5
Operation Action		Operation Type		Operation Value	

## 4. Commands

### *Remote Control Keycodes*

The following commands send simulated Remote Control input to SIM2 HT200 / 200DM / 200SWA / 250 projector.

#### *Remote Control Keycodes:*

Key	Command
STAND BY	BE EF 02 04 00 F7 4E 01 00 0B 00
O/AV	BE EF 02 04 00 57 48 01 00 01 00
1	BE EF 02 04 00 A7 48 01 00 02 00
2	BE EF 02 04 00 37 49 01 00 03 00
3	BE EF 02 04 00 07 4B 01 00 04 00
4	BE EF 02 04 00 97 4A 01 00 05 00
5	BE EF 02 04 00 67 4A 01 00 06 00
6	BE EF 02 04 00 F7 4B 01 00 07 00
7	BE EF 02 04 00 07 4E 01 00 08 00
8	BE EF 02 04 00 97 4F 01 00 09 00
9	BE EF 02 04 00 67 4F 01 00 0A 00
MUTE	BE EF 02 04 00 C7 4C 01 00 0C 00
ESC	BE EF 02 04 00 57 4D 01 00 0D 00
CURSOR UP (P+)	BE EF 02 04 00 A7 4D 01 00 0E 00
CURSOR LEFT (V-)	BE EF 02 04 00 37 4C 01 00 0F 00
CURSOR RIGHT (V+)	BE EF 02 04 00 07 44 01 00 10 00
CURSOR DOWN (P-)	BE EF 02 04 00 97 45 01 00 11 00
MENU LEFT (-)	BE EF 02 04 00 67 45 01 00 12 00
MENU RIGHT (+)	BE EF 02 04 00 F7 44 01 00 13 00
MODE *	BE EF 02 04 00 C7 46 01 00 14 00
FREEZE	BE EF 02 04 00 57 47 01 00 15 00
ZOOM	BE EF 02 04 00 A7 47 01 00 16 00
INFO	BE EF 02 04 00 37 46 01 00 17 00
FOCUS	BE EF 02 04 00 C7 43 01 00 18 00
AUTO	BE EF 02 04 00 57 42 01 00 19 00
ASPECT	BE EF 02 04 00 A7 42 01 00 1A 00
VCR	BE EF 02 04 00 37 43 01 00 1B 00

\* HT 200 DM only.

## Operation Codes

The following codes provide direct access to SIM2 HT200 / 200DM / 200SWA / 250 User Interface operations not accessible via a single Remote Control command.

### Operation Codes:

Operation	Action	Command
MODE <sup>(1)</sup>	SET 4:3 (800x600)	BE EF 03 06 00 F8 67 01 00 45 02 00 00
	SET 16:9 (848x480)	BE EF 03 06 00 68 66 01 00 45 02 01 00
ASPECT	SET NORMAL	BE EF 03 06 00 DC 74 01 00 1E 02 00 00
	SET ANAMORPHIC	BE EF 03 06 00 2C 74 01 00 1E 02 03 00
	SET LETTERBOX	BE EF 03 06 00 BC 75 01 00 1E 02 02 00
	SET USER 1	BE EF 03 06 00 1C 76 01 00 1E 02 04 00
	SET USER 2	BE EF 03 06 00 8C 77 01 00 1E 02 05 00
	SET USER 3	BE EF 03 06 00 7C 77 01 00 1E 02 06 00
VIDEO MODE	SET NORMAL	BE EF 03 06 00 2C C5 01 00 4A 00 00 00
	SET VCR	BE EF 03 06 00 BC C4 01 00 4A 00 01 00
BRIGHTNESS	INCREMENT	BE EF 03 06 00 9D D2 04 00 01 00 00 00
	DECREMENT	BE EF 03 06 00 4C D3 05 00 01 00 00 00
CONTRAST	INCREMENT	BE EF 03 06 00 D9 D2 04 00 02 00 00 00
	DECREMENT	BE EF 03 06 00 08 D3 05 00 02 00 00 00
COLOR	INCREMENT	BE EF 03 06 00 51 D2 04 00 04 00 00 00
	DECREMENT	BE EF 03 06 00 80 D3 05 00 04 00 00 00
TINT <sup>(2)</sup>	INCREMENT	BE EF 03 06 00 25 D3 04 00 03 00 00 00
	DECREMENT	BE EF 03 06 00 F4 D2 05 00 03 00 00 00
SHARPNESS	INCREMENT	BE EF 03 06 00 CD DE 04 00 3D 00 00 00
	DECREMENT	BE EF 03 06 00 1C DF 05 00 3D 00 00 00
Y/C DELAY	INCREMENT	BE EF 03 06 00 B5 B2 04 00 FF 01 00 00
	DECREMENT	BE EF 03 06 00 64 B3 05 00 FF 01 00 00
FREQUENCY	INCREMENT	BE EF 03 06 00 FD D0 04 00 09 00 00 00
	DECREMENT	BE EF 03 06 00 2C D1 05 00 09 00 00 00
PHASE	INCREMENT	BE EF 03 06 00 B9 D0 04 00 0A 00 00 00
	DECREMENT	BE EF 03 06 00 68 D1 05 00 0A 00 00 00
POSITION HORIZONTAL	INCREMENT	BE EF 03 06 00 AD D3 04 00 05 00 00 00
	DECREMENT	BE EF 03 06 00 7C D2 05 00 05 00 00 00
POSITION VERTICAL	INCREMENT	BE EF 03 06 00 E9 D3 04 00 06 00 00 00
	DECREMENT	BE EF 03 06 00 38 D2 05 00 06 00 00 00
COLOR TEMPERATURE	SET HIGH	BE EF 03 06 00 A4 D4 01 00 1C 00 00 00
	SET MEDIUM	BE EF 03 06 00 C4 D5 01 00 1C 00 02 00
	SET LOW	BE EF 03 06 00 54 D4 01 00 1C 00 03 00
	SET USER <sup>(3)</sup>	BE EF 03 06 00 34 D5 01 00 1C 00 01 00

COLOR TEMP USER/RED <sup>(3)</sup>	INCREMENT	BE EF 03 06 00 0D D5 04 00 1D 00 00 00
	DECREMENT	BE EF 03 06 00 DC D4 05 00 1D 00 00 00
COLOR TEMP USER/GREEN <sup>(3)</sup>	INCREMENT	BE EF 03 06 00 49 D5 04 00 1E 00 00 00
	DECREMENT	BE EF 03 06 00 98 D4 05 00 1E 00 00 00
COLOR TEMP USER/BLUE <sup>(3)</sup>	INCREMENT	BE EF 03 06 00 B5 D4 04 00 1F 00 00 00
	DECREMENT	BE EF 03 06 00 64 D5 05 00 1F 00 00 00
MAGNIFICATION	INCREMENT	BE EF 03 06 00 3D D4 04 00 19 00 00 00
	DECREMENT	BE EF 03 06 00 EC D5 05 00 19 00 00 00
PAN HORIZONTAL	INCREMENT	BE EF 03 06 00 79 D4 04 00 1A 00 00 00
	DECREMENT	BE EF 03 06 00 A8 D5 05 00 1A 00 00 00
PAN VERTICAL	INCREMENT	BE EF 03 06 00 85 D5 04 00 1B 00 00 00
	DECREMENT	BE EF 03 06 00 54 D4 05 00 1B 00 00 00
OSD POSITION HORIZONTAL	INCREMENT	BE EF 03 06 00 29 D8 04 00 26 00 00 00
	DECREMENT	BE EF 03 06 00 F8 D9 05 00 26 00 00 00
OSD POSITION VERTICAL	INCREMENT	BE EF 03 06 00 D5 D9 04 00 27 00 00 00
	DECREMENT	BE EF 03 06 00 04 D8 05 00 27 00 00 00

- (1) HT 200 DM only  
 (2) Video NTSC only  
 (3) HT 200 DM / HT 250 only.

## 5. Return Codes

The Communication Protocol requires an acknowledgement ("Return Code") for every packet sent. The Return Codes can be either one or three bytes and are detailed in the table below.

### *Return Codes:*

Name	Value	Description
ACK	06	Packet acknowledged - no errors. Normal response when receiving a packet.
NAK	15	Packet not acknowledged - some error occurred in receiving this packet. Usually indicates a CRC error.
ERR	1C XXXX	Packet was received Ok, but an error occurred when executing the command contained in the packet. The two bytes following the 1C (XXXX) are the error code.

## 6. Examples

- Send the simulated "SWITCH ON FROM STAND-BY" Remote Control keycode.**  
 Remote Control allows Switching on from Stand-by via one of the keys "1"..."9".  
 Send, for instance, the Code relative to Key "1": BEEF020400A74801000200 .  
 The Projector switches on.  
 The Projector returns the response code: 06 (Acknowledged with no error).
- Send the simulated "MENU RIGHT" Remote Control keycode.**  
 Send the Packet: BEEF020400F74401001300 .

The OnScreen Display appears on the screen.

The Projector returns the response code: 06 (Acknowledged with no error).

**3. Send the "SET ASPECT ANAMORPHIC" Operation Code.**

Send the Packet: BEEF0306002C7401001E020300 .

The Aspect Ratio changes to Anamorphic.

The Projector returns the response code: 06 (Acknowledged with no error).

## 7. Warnings

When the command sent to the Projector cannot be understood, the error command 15 is returned by the Projector.

When the command sent to the Projector is received, but an error occurred while executing the command, the Error Code 1C is returned, followed by a two bytes Error Code.

When the number of bytes sent to the Projector is greater than indicated for the Command (13 bytes for Operation Packets and 11 bytes for Keycode Packets), excess data will be ignored. Conversely, if number of bytes sent to the Projector is smaller than required by the Communication Protocol, an Error Code will be returned.

Allow a time interval of at least 40 ms between the Return Code and the following Command.