

HTL40 LINK

RS-232C CONTROL SPECIFICATIONS

Document Revision 1.0 (27 December 2004)





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Revision History:

Revision	Date	Software Version	Description of Change
1.0	27 December 2004	2.42.04 L or higher	Initial version.

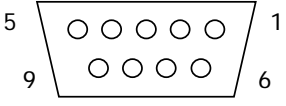
1. Introduction

This document describes the communication and data formats used to control SIM2 HTL40 LINK via RS-232C port.

2. Connection

Switch off your Personal Computer and HTL40 LINK before connecting RS 232C cable. Use a standard serial cable with 9 pin female to the Personal Computer and 9 pin male to the HTL40 LINK: pin 2 connects to pin2, pin 3 to pin 3 and pin 5 to pin 5. SIM2 HTL40 LINK RS-232C Port is described as follows.

SIM 2 HTL40 LINK RS-232C Control Port:

D-SUB 9-pin (female)	Pin No	Signal	Definition
		1	N/A
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 HTL40 LINK.

Load a suitable communication software onto your Personal Computer, and set the Serial Port Parameters as shown below.

Communication Parameters:

Parameter	Value
Transfer Rate	19200 bps
Data Bits	8
Parity Bit	None
Stop Bit	1
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.

There are two types of packets: Event and Operation.

The packet header size is fixed (7 bytes), while the packet payload type and content varies based on the type of packet: Event payload size is 6 bytes, while Operation payload size is 25 bytes.

The entire packet size is variable, being the sum of the fixed-size packet header and variable-sized packet payload: Event packet size is 13 bytes and Operation packet size is 32 bytes.

Header

All Packets use the same Packet Header format.

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 (CRC)	

0xEFBE is a fixed value that is used to insure packet alignment if there are partial packets received or byte lost. The least-significant byte of the word (BE) is sent first, then the most-significant-byte (EF).

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.

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 Event packet payload size is 6 bytes, while the Operation packet payload size is 25 bytes.

Event Packet Format:

0	1	2	3	4	5
Event		00	00	00	00

Operation Packet Format:

0	1	2	3	4	5	6	7	8	9	10	11	12
Op Type	Op ID		00	00	Op Target		00	00	Op Value		00	00
13	14	15	16	17	18	19	20	21	22	23	24	
00	00	00	00	00	00	00	00	00	00	00	00	00

4. Commands

Remote Control Key Codes

The following commands send simulated Remote Control input to SIM2 HTL40 LINK.

Remote Control Keycodes:

Key	Command
STAND BY	BE EF 02 06 00 51 E4 48 01 00 00 00 00
0 ⁽¹⁾	BE EF 02 06 00 6B E6 52 01 00 00 00 00
1 ⁽²⁾	BE EF 02 06 00 80 E5 49 01 00 00 00 00
2 ⁽²⁾	BE EF 02 06 00 B3 E5 4A 01 00 00 00 00
3 ⁽²⁾	BE EF 02 06 00 62 E4 4B 01 00 00 00 00
4 ⁽²⁾	BE EF 02 06 00 D5 E5 4C 01 00 00 00 00
5 ⁽²⁾	BE EF 02 06 00 04 E4 4D 01 00 00 00 00
6 ⁽²⁾	BE EF 02 06 00 37 E4 4E 01 00 00 00 00
7 ⁽²⁾	BE EF 02 06 00 E6 E5 4F 01 00 00 00 00
8 ⁽²⁾	BE EF 02 06 00 89 E7 50 01 00 00 00 00
9 ⁽²⁾	BE EF 02 06 00 58 E6 51 01 00 00 00 00
10 ⁽²⁾	BE EF 02 06 00 BC E0 75 01 00 00 00 00
11 ⁽²⁾	BE EF 02 06 00 8F E0 76 01 00 00 00 00
12 ⁽²⁾	BE EF 02 06 00 5E E1 77 01 00 00 00 00
ESC	BE EF 02 06 00 0D E6 54 01 00 00 00 00
CURSOR UP	BE EF 02 06 00 DC E7 55 01 00 00 00 00
CURSOR LEFT	BE EF 02 06 00 EF E7 56 01 00 00 00 00
CURSOR RIGHT	BE EF 02 06 00 3E E6 57 01 00 00 00 00
CURSOR DOWN	BE EF 02 06 00 C1 E6 58 01 00 00 00 00
MENU LEFT (-)	BE EF 02 06 00 10 E7 59 01 00 00 00 00
MENU RIGHT (+)	BE EF 02 06 00 23 E7 5A 01 00 00 00 00
FREEZE	BE EF 02 06 00 F2 E6 5B 01 00 00 00 00
MEMORY	BE EF 02 06 00 45 E7 5C 01 00 00 00 00
F1 (ZOOM)	BE EF 02 06 00 94 E6 5D 01 00 00 00 00
F2 (FOCUS)	BE EF 02 06 00 76 E7 5F 01 00 00 00 00
INFO	BE EF 02 06 00 A7 E6 5E 01 00 00 00 00
AUTO	BE EF 02 06 00 79 E2 60 01 00 00 00 00
ASPECT NORMAL	BE EF 02 06 00 2A F4 83 01 00 00 00 00
ASPECT ANAMORPHIC	BE EF 02 06 00 9D F5 84 01 00 00 00 00
ASPECT LETTERBOX	BE EF 02 06 00 4C F4 85 01 00 00 00 00
ASPECT PANORAMIC	BE EF 02 06 00 7F F4 86 01 00 00 00 00
ASPECT PIXEL TO PIXEL	BE EF 02 06 00 AE F5 87 01 00 00 00 00
ASPECT USER 1	BE EF 02 06 00 51 F5 88 01 00 00 00 00



ASPECT USER 2	BE EF 02 06 00 80 F4 89 01 00 00 00 00
ASPECT USER 3	BE EF 02 06 00 B3 F4 8A 01 00 00 00 00
VCR	BE EF 02 06 00 9B E3 62 01 00 00 00 00

Direct access codes

Goto Brightness	BE EF 02 06 00 C7 E1 7E 01 00 00 00 00
Goto Contrast	BE EF 02 06 00 16 E0 7F 01 00 00 00 00
Goto Color	BE EF 02 06 00 19 F4 80 01 00 00 00 00
Goto Tint	BE EF 02 06 00 C8 F5 81 01 00 00 00 00

- (1) When the unit is in Stand-by state, this command switches on the unit and the last source memorised prior to switch off is automatically selected.
- (2) When the unit is in Stand-by state, this command switches on the unit and selects the corresponding Source.

The response of the unit to a correct Remote Control Key Code consists of a single byte: 06.



OSD POSITION VERTICAL	INCREMENT	BE EF 03 19 00 7D 6C 03 62 08 00 00 00 00 00 00 00
	DECREMENT	BE EF 03 19 00 13 C6 04 62 08 00 00 00 00 00 00 00

INPUT 5 (COMP RGB 1) / SIGNAL TYPE	SET YCrCb AutoSync	BE EF 03 19 00 92 04 01 82 08 00 00 00 00 00 00 00
	SET YCrCb 15kHz	BE EF 03 19 00 5B 0C 01 82 08 00 00 00 00 00 00 00
	SET YCrCb 32kHz	BE EF 03 19 00 51 06 01 82 08 00 00 00 00 00 00 00
	SET RGB AutoSync	BE EF 03 19 00 97 01 01 82 08 00 00 00 00 00 00 00
	SET RGB 15kHz	BE EF 03 19 00 5E 09 01 82 08 00 00 00 00 00 00 00
	SET RGB 32kHz	BE EF 03 19 00 98 0E 01 82 08 00 00 00 00 00 00 00
INPUT 6 (COMP RGB 2) / SIGNAL TYPE	SET YCrCb AutoSync	BE EF 03 19 00 97 98 01 83 08 00 00 00 00 00 00 00
	SET YCrCb 15kHz	BE EF 03 19 00 5E 90 01 83 08 00 00 00 00 00 00 00
	SET YCrCb 32kHz	BE EF 03 19 00 54 9A 01 83 08 00 00 00 00 00 00 00
	SET RGB AutoSync	BE EF 03 19 00 92 9D 01 83 08 00 00 00 00 00 00 00
	SET RGB 15kHz	BE EF 03 19 00 5B 95 01 83 08 00 00 00 00 00 00 00
	SET RGB 32kHz	BE EF 03 19 00 9D 92 01 83 08 00 00 00 00 00 00 00
INPUT 7 (COMP RGB 3) / SIGNAL TYPE	SET YCrCb AutoSync	BE EF 03 19 00 4C 4E 01 84 08 00 00 00 00 00 00 00
	SET YCrCb 15kHz	BE EF 03 19 00 85 46 01 84 08 00 00 00 00 00 00 00
	SET YCrCb 32kHz	BE EF 03 19 00 8F 4C 01 84 08 00 00 00 00 00 00 00
	SET RGB AutoSync	BE EF 03 19 00 49 4B 01 84 08 00 00 00 00 00 00 00
	SET RGB 15kHz	BE EF 03 19 00 80 43 01 84 08 00 00 00 00 00 00 00
	SET RGB 32kHz	BE EF 03 19 00 46 44 01 84 08 00 00 00 00 00 00 00
INPUT 8 (COMP RGB 4) / SIGNAL TYPE	SET YCrCb AutoSync	BE EF 03 19 00 49 D2 01 85 08 00 00 00 00 00 00 00
	SET YCrCb 15kHz	BE EF 03 19 00 80 DA 01 85 08 00 00 00 00 00 00 00
	SET YCrCb 32kHz	BE EF 03 19 00 8A D0 01 85 08 00 00 00 00 00 00 00
	SET RGB AutoSync	BE EF 03 19 00 4C D7 01 85 08 00 00 00 00 00 00 00
	SET RGB 15kHz	BE EF 03 19 00 85 DF 01 85 08 00 00 00 00 00 00 00
	SET RGB 32kHz	BE EF 03 19 00 43 D8 01 85 08 00 00 00 00 00 00 00



MEMORY 1	RECALL	BE EF 03 19 00 85 EB 01 27 09 00 00 01 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	SAVE CURRENT SETTINGS	BE EF 03 19 00 54 D6 01 27 09 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	SAVE INITIAL SETTINGS	BE EF 03 19 00 45 9A 01 28 09 00 00 01 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00
MEMORY 2	RECALL	BE EF 03 19 00 74 AB 01 27 09 00 00 01 00 00 00 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	SAVE CURRENT SETTINGS	BE EF 03 19 00 A5 96 01 27 09 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	SAVE INITIAL SETTINGS	BE EF 03 19 00 76 DE 01 28 09 00 00 02 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00
MEMORY 3	RECALL	BE EF 03 19 00 E4 6A 01 27 09 00 00 01 00 00 00 03 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	SAVE CURRENT SETTINGS	BE EF 03 19 00 35 57 01 27 09 00 00 00 00 00 00 03 00 00 00 00 00 00 00 00 00 00 00 00 00 00
	SAVE INITIAL SETTINGS	BE EF 03 19 00 A7 E3 01 28 09 00 00 03 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00

The response of the unit to a correct Operation Code consists of the byte 1E followed by a copy of the packet that has been sent to the unit, where, however:

- byte number 11 is set at 01,
- CRC (bytes number 6 and 7) has been altered accordingly.

0	1	2	3	4	5	6	7
1E	BE	EF	Packet Type	Packet Payload Size		Packet Checksum (CRC)	

8	9	10	11	12	13	14	15	16	17	18	19	20
Op Type	Op ID		01	00	Op Target		00	00	Value		00	00

21	22	23	24	25	26	27	28	29	30	31	32
00	00	00	00	00	00	00	00	00	00	00	00

Get Codes

Get Commands may be used to get the current value of HTL40 LINK parameters.

The response to a correct Get Command consists of 33 byte packet, where Byte Number 11 contains the Validation Code (01) and bytes Number 17 and Number 18 the requested value (the least-significant byte of the value being sent first). Of course CRC (bytes number 6 and 7) has been altered accordingly.

0	1	2	3	4	5	6	7
1E	BE	EF	Packet Type	Packet Payload Size		Packet Checksum (CRC)	

8	9	10	11	12	13	14	15	16	17	18	19	20
Op Type	Op ID		01	00	Op Target		00	00	Req Value		00	00

21	22	23	24	25	26	27	28	29	30	31	32
00	00	00	00	00	00	00	00	00	00	00	00

Get Codes:

BRIGHTNESS	BE EF 03 19 00 52 2A 02 00 08 00	(1)
CONTRAST	BE EF 03 19 00 C7 77 02 01 08 00	(1)
COLOR	BE EF 03 19 00 38 93 02 02 08 00	(2)
TINT	BE EF 03 19 00 AD CE 02 03 08 00	(3)
COLOR TEMPERATURE	BE EF 03 19 00 9D 0B 02 C2 09 00	(4)
GAMMA	BE EF 03 19 00 13 25 02 27 08 00	(5)
MEMORY	BE EF 03 19 00 5E D5 02 27 09 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	(6)

(1) Returned value is indeterminate when the unit is in No Signal state. Returned value may be different from the value displayed on the OSD, as in the latter, the values have been normalized to the 0-100 range.

(2) Returned value is valid only when Video, S-Video, RGBS 15 kHz, YCrCb 15 kHz or YcrCb 32 kHz signals are displayed. Returned value is indeterminate when other signals are displayed and when the unit is in No Signal state.

(3) Returned value is valid only when Video (NTSC), S-Video (NTSC), RGBS 15 kHz, YCrCb 15 kHz signals are displayed. Returned value is indeterminate when other signals are displayed and when the unit is in No Signal state.

(4) Table below associates OSD labels with returned values:

Color Temperature

OSD Label	Returned value
High	00
Medium	01
Low	02
User	04



6. Warnings

When the number of bytes sent to HTL40 LINK is greater than indicated for the Command (32 bytes for Operation Packets and 13 bytes for Event Packets), excess data will be ignored. Conversely, if number of bytes sent to HTL40 LINK is smaller than required by the Communication Protocol, the command may be ignored.

Command execution time may vary from few milliseconds to 500 milliseconds, depending on the operation that have been requested.

If the unit is busy when a command is sent, the unit may not accept the command. If several commands are to be sent one after the other, sufficient time between them should be allowed.