



**New Products Division**

*HHB Communications Ltd  
RS232 Control Protocol  
UDP-89 Pro Universal Player*

Revision 1.3 (WIP)  
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## **O. REVISION LOG**

### ***Revision 1.3***

Capability to lock/unlock the front panel whilst RS232 control is on added.

### ***Revision 1.2***

Touchscreen control protocol removed.

Minor spelling and format corrections done.

### ***Revision 1.1***

Re-release with a lot of commands added, some of the previous commands changed and with the touchscreen control revised to include two major vendors' controllers.

### ***Revision 1.0***

Original release.

# 1. SPECIFICATIONS

The HHB UDP-89 functions can be controlled using a serial RS-232C connection from an external device, such as a computer.

## 1.1. *Electrical Specifications*

- Conforms to standard: JIS X-5101 (equivalent to former JIS-C-6361 and EIA RS-232C standards) Note that this is not compatible with the RS-422 used in professional VTR units.
- Impedance at receiver: When measured with an applied voltage of between +/-3 V and +/-15 V, the DC resistance is between 3kΩ and 7kΩ. Total load capacitance of < 2500 pF
- Open circuit voltage at transmitter: <25V
- Open circuit voltage at receiver: <2V
- Signal voltage: When the open circuit voltage at the receiver is 0 V, the signal voltage is between +/-5 V and +/-15 V against a load impedance of between 3kΩv and 7kvΩ
- Signal discrimination: Logical "1" / OFF = -15V to 0.8V  
Logical "0" / ON = 2.4V to 15V

## 1.2. *Controller format*

- Circuit type: 3-wire, half-duplex
- Transmission type: Digital binary serial
- Data Speed (baud rate): 9600
- Word Length: 8-bit
- Parity bit: None
- Stop bit: 1-bit

## 1.3. *Pointing device format*

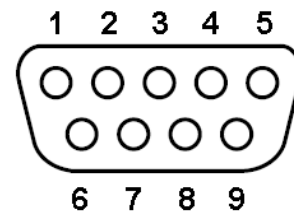
Communications signals follow the RS-232-C specifications. For details of this see the EIA RS-232- C standard.

- Data Speed (baud rate): 1200 baud
- Word Length: 7 data bits, LSB first
- Parity bit: None
- Start bit: 1-bit
- Stop bit: 2-bits

For pointing devices only two signal lines carry data. The first is RTS, which is always an output from the player. The second is RXD, which is always an input to the player.

#### 1.4. Connector pin-out

<i>Pin</i>	<i>Name</i>	<i>I/O</i>
1	Open	-
2	RXD	Input
3	TXD	Output
4	+5V	c. 200mA
5	Ground	-
6	Open	-
7	RTS	Output
8	CTS	Input
9	Open	-



This interface allows for pointing devices and accessories which are powered from the player using logic circuits operating on 5V only.

## 2. COMMUNICATION PACKET FORMAT

Packets used in communication between UDP-89 and PC are detailed in this section.

### 2.1. Packet structure

Each message is of variable length and made up of the following parts:

<i>Header</i>	<i>Packet length</i>	<i>Format type</i>	<i>Category</i>	<i>Data</i>	<i>Terminator</i>
1 Byte	1 Byte	1 Byte	1 Byte	1-27 Bytes	1 Byte

#### 2.1.1. Header

This states the direction of the communication as follows:

- **0x7E:** PC → UDP-89
- **0x6F:** UDP-89 → PC

#### 2.1.2. Packet length

This specifies the length of the whole command.

#### 2.1.3. Format type

The value of this byte is always 0x05.

#### 2.1.4. Category

This byte value identifies the model (UDP-89, in this case). The value is 0x62.

#### 2.1.5. Data

Contains the actual message and can vary in length from a single byte up to 27 bytes in length. Please refer to section 4 for more information.

#### 2.1.6. Terminator

The message is concluded with this byte, value 0xFF. The message length should be checked against the packet length byte after reception of this terminator byte.

## **3. REMOTE MODE**

### **3.1. *What is the remote mode?***

To control the UDP-89 via RS-232C, the remote mode must first be enabled, otherwise it will not respond to any command via RS232C, with the exception of the commands listed below.

After connecting the RS-232C cable between the UDP-89 and controller, the remote mode on command must be the first to be transmitted. Similarly, the last command transmitted before disconnecting should be the remote mode off command, otherwise control from the front panel of remote control will be locked out.

### **3.2. *When remote mode is on***

When the remote mode is on, the UDP-89 accepts commands via RS-232C only and does not accept input from either of the following:

- Front panel keys of main unit
- Infra-red remote control

### **3.3. *When remote mode is off***

When the remote mode is off, it does not accept any commands via RS-232C except for the following:

- *REMOTE MODE ON* command
- *TRACK TIME DATA REQ* command
- *STATUS DATA REQ* command
- *DISC DATA REQ* command
- *MODEL NAME REQ* command
- *TOC DATA REQ* command

## 4. TRANSMISSION DATA (SEND)

Details for each command from controller to the UDP-89 are listed in this section.

### 4.1. Structure of this section

Commands are detailed in terms of their "Function", "Data length", "Data", "Details" and "Example" in the following tables.

Function	General functions of commands are shown.
Data length	Data length of commands is shown.
Data	Fixed or variable data is shown in hexadecimal notation.
Details	The function of The command is explained in detail.
Example	Concrete examples of transmission packet are shown.

### 4.2. Remote mode

Function	To set the <i>REMOTE MODE</i> .
Data length	3 Bytes
Data	<i>0x01, 0x01, ModeR</i> ◆ <i>ModeR: 0x00=Off, 0x01=On</i>
Details	This command changes <i>REMOTE MODE</i> of UDP-89. When UDP-89 receives this command, it forcibly enters <i>STOP</i> mode, <i>AUTO-CUE/PAUSE OFF</i> , and <i>CONTINUE PLAY</i> mode. In this condition, UDP-89 accepts controls from RS-232C until it enters <i>REMOTE MODE OFF</i> . In <i>REMOTE MODE ON</i> , UDP-89 does not accept keys of main unit or wireless remote control.
Example	Set <i>REMOTE MODE</i> to <i>ON</i> : <i>0x 7E 08 05 62 01 01 01 FF</i>

### 4.3. Standby mode

Function	To set <i>STANDBY MODE</i> .
Data length	3 Bytes
Data	<i>0x01, 0x02, ModeR</i> ◆ <i>ModeR: 0x00=Off, 0x01=On</i>
Details	This command changes <i>STANDBY MODE</i> of UDP-89.
Example	Set <i>STANDBY MODE</i> to <i>ON</i> : <i>0x 7E 08 05 62 01 02 01 FF</i>

### 4.4. Panel lock

Function	To set <i>PANEL LOCK</i> .
Data length	3 Bytes
Data	<i>0x01, 0x03, ModeR</i> ◆ <i>ModeR: 0x00=Off, 0x01=On</i>
Details	This command changes <i>PANEL LOCK</i> of UDP-89.
Example	Set <i>PANEL LOCK</i> to <i>ON</i> : <i>0x 7E 08 05 62 01 03 01 FF</i>

### 4.5. Play/Pause

Function	To start/pause playback.
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Data length	2 Bytes
Data	<b><i>0x02, 0x01</i></b>
Details	This command has the same function as the <i>PLAY/PAUSE</i> button on the front panel. This command starts playback. When this command is sent in <i>STOP</i> mode, UDP-89 starts playback from top of the disc or selected track. When this command is sent in <i>PLAY/PAUSE</i> mode, UDP-89 starts playback again from the paused location. When this command is sent in <i>PLAY</i> mode UDP-89 enters <i>PAUSE</i> mode.
Example	Start/pause playback: <b><i>0x 7E 07 05 62 02 01 FF</i></b>

#### 4.6. Stop

Function	To stop playback.
Data length	2 Bytes
Data	<b><i>0x02, 0x02</i></b>
Details	This command cancels playback and returns the UDP-89 to <i>STOP</i> mode.
Example	Stop playback: <b><i>0x 7E 07 05 62 02 02 FF</i></b>

#### 4.7. FREW

Function	To start fast reverse search.
Data length	2 Bytes
Data	<b><i>0x02, 0x03</i></b>
Details	This command starts/stops reverse search. It emulates the <i>FREW</i> key on the front panel of the unit. From <i>PAUSE</i> mode, no sound will be heard during the search. From <i>PLAY</i> mode, audio will be heard at a reduced level.
Example	Press <i>FREW</i> : <b><i>0x 7E 07 05 62 02 03 FF</i></b>

#### 4.8. FFWD

Function	To start fast forward search.
Data length	2 Bytes
Data	<b><i>0x02, 0x04</i></b>
Details	This command starts/stops forward search. It emulates the <i>FFWD</i> key on the front panel of the unit. From <i>PAUSE</i> mode, no sound will be heard during the search. From <i>PLAY</i> mode, audio will be heard at a reduced level.
Example	Press <i>FFWD</i> : <b><i>0x 7E 07 05 62 02 04 FF</i></b>

#### 4.9. Slow

Function	To start <i>SLOW</i> search.
Data length	2 Bytes
Data	<b><i>0x02, 0x05</i></b>
Details	This command starts/stops slow search (both reverse and forward searches). It emulates the <i>SLOW</i> key on the IR remote control. From <i>PAUSE</i> mode, no sound will be heard during the search. From <i>PLAY</i> mode, audio will be heard at a reduced level.

Example	Pres <i>SLOW</i> : <b>0x 7E 07 05 62 02 05 FF</b>
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#### 4.10. *Prev track*

Function	To skip back to a previous track.
Data length	2 Bytes
Data	<b>0x02, 0x06</b>
Details	This command has the same function as the <i>PREV TRACK</i> key on the front panel. When this command is sent at the top of a track in <i>PAUSE</i> mode, the playback start point goes back to the top of the previous track, and <i>PAUSE</i> mode is maintained. When this command is sent in the middle of a track in <i>PAUSE</i> mode, start point goes back to the top of the current track, and <i>PAUSE</i> mode is maintained. When this command is sent during playback, playback starts from the top of the current track. This command can also be used to select the track to play whilst in <i>STOP</i> mode.
Example	Start playback from the top of the current track: <b>0x 7E 07 05 62 02 06 FF</b>

#### 4.11. *Next track*

Function	To skip forward to the next track.
Data length	2 Bytes
Data	<b>0x02, 0x07</b>
Details	This command has the same function as the <i>NEXT TRACK</i> key on the front panel. When this command is sent in the top or in the middle of a track in <i>PAUSE</i> mode, the playback start point goes to the top of the next track, and <i>PAUSE</i> mode is maintained. When this command is sent during playback, playback starts from the top of the next track. As with <i>PREV TRACK</i> , this command can also be used to select the track to play whilst in <i>STOP</i> mode.
Example	Start playback from the top of the next track: <b>0x 7E 07 05 62 02 07 FF</b>

#### 4.12. *Eject*

Function	To open/close the disc tray.
Data length	2 Bytes
Data	<b>0x02, 0x08</b>
Details	This command has the same function as the <i>EJECT</i> key on the front panel and on the remote control. When this command is sent the tray is be ejected.
Example	Open/close the disc tray: <b>0x 7E 07 05 62 02 08 FF</b>

#### 4.13. *Cue*

Function	To mark a point or locate to a marked point
Data length	2 Bytes
Data	<b>0x03, 0x01</b>

Details	This command emulates the <i>CUE</i> button on the front panel and on the IR remote.
Example	Press <i>CUE</i> button: <b><i>0x 7E 07 05 62 03 01 FF</i></b>

#### 4.14. Search

Function	To start playback from a specified point.
Data length	2 Bytes
Data	<b><i>0x03, 0x02</i></b>
Details	This is the command to start playback from a specific point. Its functionality emulates that of the <i>SEARCH</i> button on the IR remote control.
Example	Press <i>SEARCH</i> button: <b><i>0x 7E 07 05 62 03 02 FF</i></b>

#### 4.15. Program

Function	To define and play tracks in a specified order.
Data length	2 Bytes
Data	<b><i>0x03, 0x03</i></b>
Details	This command emulates the program button on the IR remote.
Example	Press <i>PROGRAM</i> button: <b><i>0x 7E 07 05 62 03 03 FF</i></b>

#### 4.16. Lock

Function	To lock eject in playback.
Data length	2 Bytes
Data	<b><i>0x03, 0x04</i></b>
Details	This command emulates the <i>LOCK</i> button on the IR remote.
Example	Press <i>LOCK</i> button: <b><i>0x 7E 0C 05 62 03 04 FF</i></b>

#### 4.17. Elapsed time

Function	To specify whether elapsed time will be output.
Data length	3 Bytes
Data	<b><i>0x10, 0x01, ModeR</i></b> ♦ <i>ModeR: 0x00=Off, 0x01=On</i>
Details	This is the command to set whether elapsed time displayed on UDP-89 will be output or not. UDP-89 can output the new time data whenever the time updates. UDP-89 outputs only the elapsed times. To display remain time, first check the time of whole chapter by <i>CHAPTER TIM EDATA REQ</i> command and then subtract the elapsed time from the time of whole chapter.
Example	Output the elapsed time: <b><i>0x 7E 08 05 62 07 10 FF</i></b>

#### 4.18. Auto-pause

Function	To set <i>AUTO-PAUSE</i> mode.
Data length	3 Bytes
Data	<b><i>0x11, 0x01, ModeR</i></b>

	<ul style="list-style-type: none"> <li>▪ <b>ModeR:</b> <i>0x00</i>=Off, <i>0x01</i>=On</li> </ul>
Details	This command sets <i>AUTO- PAUSE</i> mode.
Example	Set <i>AUTO- PAUSE</i> to <i>OFF</i> : <b><i>0x 7E 08 05 62 11 01 00 FF</i></b>

#### 4.19. Repeat

Function	To set <i>REPEAT</i> mode.
Data length	2 Bytes
Data	<b><i>0x12, 0x01</i></b>
Details	This command emulates the repeat key on the IR remote control, setting the <i>REPEAT</i> mode.
Example	Press <i>REPEAT</i> : <b><i>0x 7E 07 05 62 12 01 FF</i></b>

#### 4.20. A-B

Function	To set <i>A-B</i> mode.
Data length	2 Bytes
Data	<b><i>0x12, 0x02</i></b>
Details	This command emulates the <i>A-B</i> key on the IR remote control.
Example	Press <i>A-B</i> : <b><i>0x 7E 07 05 62 12 02 FF</i></b>

#### 4.21. Shuffle

Function	To set <i>SHUFFLE MODE</i> .
Data length	2 Bytes
Data	<b><i>0x12, 0x03</i></b>
Details	This command emulates the <i>SHUFFLE</i> key on the IR remote control, setting the <i>SHUFFLE</i> mode.
Example	Press <i>SHUFFLE</i> : <b><i>0x 7E 07 05 62 12 03 FF</i></b>

#### 4.22. Volume

Function	To set the overall volume level.
Data length	3 Bytes
Data	<b><i>0x13, 0x01, Level</i></b> ♦ <i>Level</i> : <ul style="list-style-type: none"> <li>▪ <i>0x00</i>: Off</li> <li>▪ <i>0x01-0x5B</i>: -90 dB to 0 dB (step +1 dB)</li> </ul>
Details	This command sets the overall volume level.
Example	Set level to 0 dB: <b><i>0x 7E 08 05 62 13 01 5B FF</i></b>

#### 4.23. Channels

Function	To set channel levels individually.
Data length	8 Bytes
Data	<b><i>0x13, 0x02, FC, SW, FL, FR, SL, SR</i></b> ♦ <i>FC, SW, FL, FR, SL, SR</i> : <ul style="list-style-type: none"> <li>▪ <i>0x00</i>: No change</li> <li>▪ <i>0x01-0x15</i>: -10 dB to +10 dB (step +1 dB)</li> </ul>

Details	This command sets the level of the selected channels: FC (Front centre), SW (Subwoofer), FL (Front left), FR (Front right), SL (Sorround left), SR (Sorround right).
Example	Set subwoofer to -10 dB: <i>0x 7E 0D 05 62 13 02 00 01 00 00 00 00 FF</i>

#### 4.24. Cursor

Function	To move using the cursors.
Data length	6 Bytes
Data	<i>0x14, 0x01, UP, RI, DN, LE</i> ♦ <i>UP, RI, DN, LE:</i> <ul style="list-style-type: none"> <li>▪ <i>0x00:</i> No change</li> <li>▪ <i>0x01:</i> Pressed</li> </ul>
Details	This command emulates the functionality of the cursors on the IR remote control.
Example	Move right: <i>0x 7E 0B 05 62 14 01 00 01 00 00 FF</i>

#### 4.25. Mark/Enter

Function	To mark the point and enter when navigating.
Data length	2 Bytes
Data	<i>0x14, 0x02</i>
Details	This command emulates the <i>MARK/ENTER</i> button on the front panel and remote control.
Example	Press <i>MARK/ENTER</i> button: <i>0x 7E 07 05 62 14 02 FF</i>

#### 4.26. Menu

Function	To open/close a menu.
Data length	3 Bytes
Data	<i>0x14, 0x03, Menu</i> ♦ <i>Menu:</i> <ul style="list-style-type: none"> <li>▪ <i>0x00:</i> Menu</li> <li>▪ <i>0x01:</i> Top menu/PBC</li> <li>▪ <i>0x02:</i> Setup</li> </ul>
Details	This command emulates one of the buttons <i>MENU, TOP MENU/PBC</i> or <i>SETUP</i> on the remote control.
Example	Press <i>MENU</i> button: <i>0x 7E 08 05 62 14 03 00 FF</i>

#### 4.27. Number

Function	To send a number.
Data length	3 Bytes
Data	<i>0x14, 0x03, Number</i> ♦ <i>Number:</i> <ul style="list-style-type: none"> <li>▪ <i>0x00-0x09:</i> 0 to 9</li> <li>▪ <i>0x0A:</i> 10+</li> <li>▪ <i>0x0B:</i> CLR</li> </ul>

Details	This command emulates the number buttons.
Example	Press <i>CLR</i> button: <b><i>0x 7E 08 05 62 14 03 0B FF</i></b>

#### 4.28. *HI-DEF*

Function	To change the video configuration.
Data length	2 Bytes
Data	<b><i>0x15, 0x01</i></b>
Details	This command emulates the <i>HI-DEF</i> button on the remote control.
Example	Press <i>HI-DEF</i> button: <b><i>0x 7E 07 05 62 15 01 FF</i></b>

#### 4.29. *Zoom*

Function	To zoom.
Data length	2 Bytes
Data	<b><i>0x15, 0x02</i></b>
Details	This command emulates the <i>ZOOM</i> button on the remote control.
Example	Press <i>ZOOM</i> button: <b><i>0x 7E 07 05 62 15 02 FF</i></b>

#### 4.30. *Display*

Function	To change the video configuration.
Data length	2 Bytes
Data	<b><i>0x15, 0x03</i></b>
Details	This command emulates the <i>DISPLAY</i> button on the remote control.
Example	Press <i>DISPLAY</i> button: <b><i>0x 7E 07 05 62 15 03 FF</i></b>

#### 4.31. *Timer*

Function	To automatically play a disc back on power on.
Data length	2 Bytes
Data	<b><i>0x15, 0x04</i></b>
Details	This command emulates the <i>TIMER</i> button on the remote control.
Example	Press <i>TIMER</i> button: <b><i>0x 7E 07 05 62 15 04 FF</i></b>

#### 4.32. *Angle*

Function	To change the visualization angle.
Data length	2 Bytes
Data	<b><i>0x15, 0x05</i></b>
Details	This command emulates the <i>ANGLE</i> button on the remote control.
Example	Press <i>ANGLE</i> button: <b><i>0x 7E 07 05 62 15 05 FF</i></b>

#### 4.33. *Audio*

Function	To change the audio configuration.
Data length	2 Bytes
Data	<b><i>0x16, 0x01</i></b>
Details	This command emulates the <i>AUDIO</i> button on the remote control.
Example	Press <i>AUDIO</i> button: <b><i>0x 7E 07 05 62 16 04 FF</i></b>

**4.34. Subtitle**

Function	To change the subtitle configuration.
Data length	2 Bytes
Data	<b><i>0x16, 0x02</i></b>
Details	This command emulates the <i>SUBTITLE</i> button on the remote control.
Example	Press <i>SUBTITLE</i> button: <b><i>0x 7E 07 05 62 16 05 FF</i></b>

**4.35. Model name REQ**

Function	To check model name.
Data length	2 Bytes
Data	<b><i>0x20, 0x01</i></b>
Details	This is the command to ask for the <i>MODEL NAME</i> of UDP-89. When this command is sent, UDP-89 outputs "HHB UDP-89" as ASCII data.
Example	Make UDP-89 output <i>MODEL NAME</i> : <b><i>0x 7E 07 05 62 20 01 FF</i></b>

**4.36. Software version REQ**

Function	To check software version.
Data length	2 Bytes
Data	<b><i>0x20, 0x02</i></b>
Details	This is the command to ask for the software version installed in the UDP-89. When this command is sent, UDP-89 outputs the version as ASCII data.
Example	Make UDP-89 output <i>SOFTWARE VERSION</i> : <b><i>0x 7E 07 05 62 20 02 FF</i></b>

**4.37. Status data REQ**

Function	To check the status.
Data length	2 Bytes
Data	<b><i>0x21, 0x01</i></b>
Details	This is the command to make UDP-89 output <i>STATUS DATA</i> indicating current unit condition such as <i>EXIST/NO DISC</i> , the value of <i>AUTO-CUE/PAUSE</i> , <i>PLAY MODE</i> and so on.
Example	Make UDP-89 output <i>STATUS DATA</i> : <b><i>0x 7E 07 05 62 21 01 FF</i></b>

**4.38. Disc data REQ**

Function	To check the information of disc.
Data length	2 Bytes
Data	<b><i>◆ 0x22, 0x01</i></b>
Details	This is the command to make UDP-89 output <i>DISC DATA</i> indicating disc information.
Example	Make UDP-89 output 1 <sup>st</sup> disc data: <b><i>0x 7E 07 05 62 22 01 FF</i></b>

**4.39. TOC data REQ**

Function	To check the information in the TOC.
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Data length	2 Bytes
Data	◆ <b><i>0x22, 0x02</i></b>
Details	This is the command to output <i>TOC DATA</i> information of total track number and total time recorded to the discs. When this command is sent, UDP-89 outputs <i>TOC DATA</i> .
Example	Make UDP-89 output 1 <sup>st</sup> disc <i>TOC DATA</i> : <b><i>0x 7E 07 05 62 22 02 FF</i></b>

#### 4.40. Chapter time data REQ

Function	To check the time length of the specified chapter.
Data length	4 Bytes
Data	<b><i>0x22, 0x03, Title, Chapter</i></b> ◆ <i>Title</i> : 1 ( <i>0x00</i> ) to 254 ( <i>0xFE</i> ) ◆ <i>Chapter</i> : 1 ( <i>0x00</i> ) to 255 ( <i>0xFE</i> )
Details	This is the command to output <i>CHAPTER TIME DATA</i> information of chapter time recorded to the disc in UDP-89. When this command is sent, UDP-89 outputs <i>CHAPTER TIME DATA</i> of the selected chapter.
Example	Make UDP-89 output the time of the 3 <sup>rd</sup> chapter of the 2 <sup>nd</sup> title: <b><i>0x 7E 09 05 62 22 03 01 02 FF</i></b>

#### 4.41. Volume REQ

Function	To check the overall volume level.
Data length	2 Bytes
Data	◆ <b><i>0x30, 0x01</i></b>
Details	This command sets the overall volume level.
Example	Request overall volume: <b><i>0x 7E 07 05 62 30 01 FF</i></b>

#### 4.42. Channels REQ

Function	To check the level for all channels.
Data length	2 Bytes
Data	◆ <b><i>0x30, 0x02</i></b>
Details	This command requests the level of all channels.
Example	Request channels' levels: <b><i>0x 7E 07 05 62 30 02 FF</i></b>

## 5. TRANSMISSION DATA (RECEIVE)

Details of each command received from UDP-89 are mentioned in this section.

### 5.1. Structure of this section

Commands are detailed in terms of their "Function", "Data length", "Data", "Details" and "Example" in the following tables.

Function	General function of received data.
Data length	Data length of received data.
Data	Fixed data uses hexadecimal notation. For the varying values, description of their meaning and range they vary will be provided. If variables have significance every bit, LSB and MSB are described as b0, b7, respectively.
Details	Detail explanation on the received data and precautions to use it.
Example	Give concrete examples of received packet

### 5.2. Acknowledge

Function	To acknowledge commands sent to UDP-89.
Data length	6 Bytes
Data	<p><b><i>0x01, 0x01, Cmd1, Cmd2, Info</i></b></p> <ul style="list-style-type: none"> <li>◆ <b><i>Cmd1</i></b>: First byte of the command acknowledged</li> <li>◆ <b><i>Cmd2</i></b>: Second byte of the command acknowledged</li> <li>◆ <b><i>Info</i></b>: <ul style="list-style-type: none"> <li>▪ <b><i>0x00</i></b>: Executed without problem</li> <li>▪ <b><i>0x01</i></b>: Not executed. Undefined command</li> <li>▪ <b><i>0x02</i></b>: Not executed. No disc</li> <li>▪ <b><i>0x03</i></b>: Not executed. Impossible</li> </ul> </li> </ul>
Details	Indicates if a command has been received and processed correctly.
Example	Command <b><i>PLAY</i></b> executed without problem: <b><i>0x 6F 0A 05 62 01 01 02 01 00 FF</i></b>

### 5.3. Volume

Function	Overall volume level information.
Data length	3 Bytes
Data	<p><b><i>0x10, 0x01, Level</i></b></p> <ul style="list-style-type: none"> <li>◆ <b><i>Level</i></b>: <ul style="list-style-type: none"> <li>▪ <b><i>0x00</i></b>: Off</li> <li>▪ <b><i>0x01-0x33</i></b>: -50 dB to 0 dB (step +1 dB)</li> </ul> </li> </ul>
Details	This command outputs the overall volume level.
Example	Overall volume of 0 dB: <b><i>0x 6F 08 05 62 10 01 33 FF</i></b>

### 5.4. Channels

Function	Channels level information.
Data length	8 Bytes

Data	<i>0x10, 0x02, FC, SW, FL, FR, SL, SR</i> ♦ <i>FC, SW, FL, FR, SL, SR:</i> ▪ <i>0x00:</i> No change ▪ <i>0x01-0x15:</i> -10 dB to +10 dB (step +1 dB)
Details	This command outputs the level of all channels: FC (Front centre), SW (Subwoofer), FL (Front left), FR (Front right), SL (Sorround left), SR (Sorround right).
Example	Ouput configuration with SW=-10dB and the rest of them OdB: <i>0x 7E 0D 05 62 10 02 0B 01 0B 0B 0B 0B FF</i>

### 5.5. Model name

Function	Model name information.
Data length	12 Bytes
Data	<i>0x20, 0x01, ModelName</i>
Details	Outputs model name using ASCII character string. When UDP-89 receives <i>MODEL NAME REQ</i> command in the <i>STOP</i> mode, it outputs this data.
Example	Model name UDP-89: <i>0x 6F 11 05 62 20 01 48 48 42 20 55 44 50 2D 38 39 FF</i>

### 5.6. Software version

Function	Software version information.
Data length	Up to 27 Bytes
Data	<i>0x20, 0x02, S/W</i>
Details	Outputs software version using ASCII character string. When UDP-89 receives <i>SOFTWARE VERSION REQ</i> command in the <i>STOP</i> mode, it outputs this data.
Example	Software version 1.3: <i>0x 6F 0A 05 62 20 02 31 46 33 FF</i>

### 5.7. Status data

Function	Internal status information.
Data length	5 Bytes
Data	<i>0x21, 0x01, DataS, Title, Chapter</i> ♦ <i>DataS:</i> ▪ <i>b7:</i> □ <i>0:</i> Auto-pause Off □ <i>1:</i> Auto-pause On ▪ <i>b6-b5:</i> □ <i>00:</i> Repeat Off □ <i>01:</i> Repeat one □ <i>10:</i> Repeat all ▪ <i>b4-b3:</i> □ <i>00:</i> Rpt A-B Off □ <i>01:</i> Rpt A □ <i>10:</i> Rpt A-B ▪ <i>b2:</i>

	<ul style="list-style-type: none"> <li>▫ <b>0</b>: Shuffle Off</li> <li>▫ <b>1</b>: Shuffle On</li> <li>▪ <b>b1-b0</b>:             <ul style="list-style-type: none"> <li>▫ <b>00</b>: Stop</li> <li>▫ <b>01</b>: Resume</li> <li>▫ <b>10</b>: Pause</li> <li>▫ <b>11</b>: Play</li> </ul> </li> <li>◆ <b>Title</b>: 1 (<b>0x00</b>) to 254 (<b>0xFE</b>)</li> <li>◆ <b>Chapter</b>: 1 (<b>0x00</b>) to 255 (<b>0xFE</b>)</li> </ul>
Details	Indicates UDP-89's internal state. When UDP-89 receives <b>STATUS DATA REQ</b> command, it outputs this data. If no disc, chapter number 0x00 is output. If UDP-89 in <b>STOP</b> mode it will output the first chapter it would play if a <b>PLAY</b> command was sent.
Example	UDP-89 is playing 3 <sup>rd</sup> chapter of 1 <sup>st</sup> title, with <b>AUTO-PAUSE ON</b> , and all the other things set to off: <b>0x 6F 0A 05 62 21 01 81 00 02 FF</b>

### 5.8. Disc data

Function	Disc information.
Data length	3 Bytes
Data	<b>0x22, 0x01, DataD</b> ◆ <b>DataD</b> : <ul style="list-style-type: none"> <li>▪ <b>b7</b>: 0 (Reserved)</li> <li>▪ <b>b6</b>:               <ul style="list-style-type: none"> <li>▫ <b>0</b>: No disc</li> <li>▫ <b>1</b>: Disc exists</li> </ul> </li> <li>▪ <b>b5-b3</b>:               <ul style="list-style-type: none"> <li>▫ <b>000</b>: Unknown</li> <li>▫ <b>001</b>: Dolby</li> <li>▫ <b>010</b>: DTS</li> <li>▫ <b>011</b>: PCM</li> <li>▫ <b>100</b>: MP3</li> <li>▫ <b>101</b>: WMA</li> <li>▫ <b>110</b>: Other</li> </ul> </li> <li>▪ <b>b2-b0</b>:               <ul style="list-style-type: none"> <li>▫ <b>000</b>: Unknown</li> <li>▫ <b>001</b>: CD</li> <li>▫ <b>010</b>: SACD</li> <li>▫ <b>011</b>: VCD</li> <li>▫ <b>100</b>: DVD</li> <li>▫ <b>101</b>: DVD-A</li> <li>▫ <b>110</b>: Other</li> </ul> </li> </ul>
Details	Indicates various disc information. When UDP-89 receives <b>DISC DATA REQ</b> command, it outputs this data.
Example	The disc is a DTS CD: <b>0x 6F 08 05 62 22 01 51 FF</b>

### 5.9. TOC data

Function	Information on TOC.
----------	---------------------

Data length	6 Bytes
Data	<i>0x22, 0x02, Chapters, Hour, Min, Sec</i> <ul style="list-style-type: none"> <li>◆ <i>Chapters:</i> 0(<i>0x00</i>) to 254(<i>0xFE</i>)</li> <li>◆ <i>Hour:</i> 0(<i>0x00</i>) to 23(<i>0x17</i>)</li> <li>◆ <i>Min:</i> 0(<i>0x00</i>) to 59(<i>0x3B</i>)</li> <li>◆ <i>Sec:</i> 0(<i>0x00</i>) to 59(<i>0x3B</i>)</li> </ul>
Details	When UDP-89 receives <i>TOC DATA REQ</i> command, it outputs this data. When it finishes reading the TOC of a new disc it also outputs this data.
Example	25 chapters and total play time of 2h 31min and 13sec: <i>0x 6F 0B 05 62 22 02 19 02 1F 0D FF</i>

### 5.10. Chapter time data

Function	Chapter time information.
Data length	7 Bytes
Data	<i>0x22, 0x03, Title, Chapter, Hour, Min, Sec</i> <ul style="list-style-type: none"> <li>◆ <i>Title:</i> 1 (<i>0x00</i>) to 254(<i>0xFE</i>)</li> <li>◆ <i>Chapter:</i> 1 (<i>0x00</i>) to 255(<i>0xFE</i>)</li> <li>◆ <i>Hour:</i> 0(<i>0x00</i>) to 23(<i>0x17</i>)</li> <li>◆ <i>Min:</i> 0(<i>0x00</i>) to 59(<i>0x3B</i>)</li> <li>◆ <i>Sec:</i> 0(<i>0x00</i>) to 59(<i>0x3B</i>)</li> </ul>
Details	Information on Chapter time. When UDP-89 receives <i>CHAPTER TIME REQ</i> command, it outputs this data.
Example	1 <sup>st</sup> chapter of 1 <sup>st</sup> title has 20m8s: <i>0x 6F 0C 05 62 22 03 00 00 00 14 08 FF</i>

### 5.11. Elapsed time

Function	Elapsed time in playback.
Data length	7 Bytes
Data	<i>0x23, 0x01, Title, Chapter, Hour, Min, Sec</i> <ul style="list-style-type: none"> <li>◆ <i>Title:</i> 1 (<i>0x00</i>) to 254(<i>0xFE</i>)</li> <li>◆ <i>Chapter:</i> 1 (<i>0x00</i>) to 255(<i>0xFE</i>)</li> <li>◆ <i>Hour:</i> 0(<i>0x00</i>) to 23(<i>0x17</i>)</li> <li>◆ <i>Min:</i> 0(<i>0x00</i>) to 59(<i>0x3B</i>)</li> <li>◆ <i>Sec:</i> 0(<i>0x00</i>) to 59(<i>0x3B</i>)</li> </ul>
Details	When UDP-89 is set to output elapsed time, it outputs this data each time the elapsed time changes.
Example	2 <sup>nd</sup> title, 1 <sup>st</sup> chapter playback 23min and 2sec: <i>0x 6F 0C 05 62 23 01 01 00 00 17 02 FF</i>

### 5.12. Chapter change

Function	Chapter has changed.
Data length	7 Bytes
Data	<i>0x23, 0x02, Title, Chapter, Hour, Min, Sec</i> <ul style="list-style-type: none"> <li>◆ <i>Title:</i> 1 (<i>0x00</i>) to 254(<i>0xFE</i>)</li> <li>◆ <i>Chapter:</i> 1 (<i>0x00</i>) to 255(<i>0xFE</i>)</li> <li>◆ <i>Hour:</i> 0(<i>0x00</i>) to 23(<i>0x17</i>)</li> </ul>

	<ul style="list-style-type: none"> <li>◆ <i>Min:</i> 0(<i>0x00</i>) to 59(<i>0x3B</i>)</li> <li>◆ <i>Sec:</i> 0(<i>0x00</i>) to 59(<i>0x3B</i>)</li> </ul>
Details	Information on changed chapter. When UDP-89 completes to search or has chapter changed in <i>PLAY</i> or <i>PAUSE</i> mode, it outputs this data. This data includes the time data of new chapter.
Example	Disc has changed to 2 <sup>nd</sup> chapter of 1 <sup>st</sup> title (chapter time 3m10s): <i>0x 6F 0C 05 62 23 02 00 01 00 03 0A FF</i>

### 5.13. *Mark position*

Function	Information on marked position.
Data length	7 Bytes
Data	<i>0x23, 0x03, Title, Chapter, Hour, Min, Sec</i> <ul style="list-style-type: none"> <li>◆ <i>Title:</i> 1 (<i>0x00</i>) to 254 (<i>0xFE</i>)</li> <li>◆ <i>Chapter:</i> 1 (<i>0x00</i>) to 255 (<i>0xFE</i>)</li> <li>◆ <i>Hour:</i> 0 (<i>0x00</i>) to 23 (<i>0x17</i>)</li> <li>◆ <i>Min:</i> 0 (<i>0x00</i>) to 59 (<i>0x3B</i>)</li> <li>◆ <i>Sec:</i> 0 (<i>0x00</i>) to 59 (<i>0x3B</i>)</li> </ul>
Details	Information on marked points. When UDP-89 receives <i>MARK</i> command or <i>CUE</i> command to open the Cue window it outputs this data.
Example	Marker is 1 <sup>st</sup> title, 2 <sup>nd</sup> chapter, 3Min and 45Sec: <i>0x 6F 0C 05 62 23 03 00 01 03 2D FF</i>

### 5.14. *No disc*

Function	No disc indication.
Data length	2 Bytes
Data	<i>0x23, 0x04</i>
Details	Indicates it has no disc. UDP-89 outputs this data if it does not find any disc after having close the drive.
Example	No disc: <i>0x 6F 07 05 62 23 04 FF</i>

### 5.15. *Disc exists*

Function	Disc exists indication.
Data length	2 Bytes
Data	<i>0x23, 0x05</i>
Details	Indicates that UDP-89 has found a disc in the drive. When the tray is closed and a CD is found, UDP-89 outputs this data.
Example	Disc detected in drive: <i>0x 6F 07 05 62 23 05 FF</i>

## 6. COMMAND QUICK REFERENCE

### 6.1. *Transmission format*

- Transmission format: 9600 bps
- Character length: 8 bit
- Parity check: No parity
- Stop bit number: 1 bit
- Variable length byte communication data: (First Byte: header to last Byte: terminator)
- Contents of data: **0x00** to **0xFF** (0 to 255)

### 6.2. *Packet*

- Header: 1 Byte
- Packet length: 1 Byte
- Format type: 1 Byte
- Category: 1 Byte
- Data: 1-27 Byte
- Terminator: 1 Byte

#### 6.2.1. *Header*

1st byte header (communication direction):

- **0x7E**: PC → UDP-89
- **0x6F**: UDP-89 → PC

#### 6.2.2. *Packet length*

2nd byte data length: 0x05 to 0x20 the number of data bytes from header to terminator.

#### 6.2.3. *Format type*

3rd byte format type: 0x05

#### 6.2.4. *Category*

4th byte category: 0x62

#### 6.2.5. *Terminator*

Data from header is completed at the terminator (0xFF). In case of decode, be sure to check data length against the terminator.

**6.3. PC → UDP-89**

Family	Function	Parameters
<b>0x00</b>	RESERVED (HANDSHAKE)	
<b>0x01</b>	REMOTE & STANDBY	
	<b>0x01</b>	REMOTE MODE + ModeR
	<b>0x02</b>	STANDBY MODE + ModeR
	<b>0x03</b>	PANEL LOCK + ModeR
<b>0x02</b>	TRANSPORT	
	<b>0x01</b>	PLAY/PAUSE
	<b>0x02</b>	STOP
	<b>0x03</b>	FREW
	<b>0x04</b>	FFWD
	<b>0x05</b>	SLOW
	<b>0x06</b>	PREV TRACK
	<b>0x07</b>	NEXT TRACK
	<b>0x08</b>	EJECT
<b>0x03</b>	TRANSPORT RELATED	
	<b>0x01</b>	CUE
	<b>0x02</b>	SEARCH
	<b>0x03</b>	PROGRAM
<b>0x10</b>	ELAPSED TIME	
	<b>0x01</b>	ELAPSED TIME + ModeR
<b>0x11</b>	AUTO-PAUSE	
	<b>0x01</b>	AUTO- PAUSE + ModeR
<b>0x12</b>	PLAY MODES	
	<b>0x01</b>	REPEAT
	<b>0x02</b>	A-B
<b>0x13</b>	LEVELS	
	<b>0x01</b>	VOLUME + Level
	<b>0x02</b>	CHANNELS + FC + SW + FL + FR + SL + SR
<b>0x14</b>	NAVIGATION	
	<b>0x01</b>	CURSOR + UP + RI + DN + LE
	<b>0x02</b>	MARK/ENTER
	<b>0x03</b>	MENU + Menu
<b>0x15</b>	VISUALIZATION	
	<b>0x01</b>	HI-DEF
	<b>0x02</b>	ZOOM
	<b>0x03</b>	DISPLAY
	<b>0x04</b>	TIMER
<b>0x16</b>	LANGUAGE	
	<b>0x01</b>	AUDIO
	<b>0x02</b>	SUBTITLE
<b>0x20</b>	MACHINE INFORMATION REQ	

	<i>0x01</i>	MODEL NAME REQ
	<i>0x02</i>	SOFTWARE VERSION REQ
<i>0x21</i>	STATUS INFORMATION REQ	
	<i>0x01</i>	STATUS DATA REQ
<i>0x22</i>	DISC INFORMATION REQ	
	<i>0x01</i>	DISC DATA REQ
	<i>0x02</i>	TOC DATA REQ
	<i>0x03</i>	CHAPTER TIME DATA REQ + Chapter
<i>0x30</i>	LEVELS REQ	
	<i>0x01</i>	VOLUME REQ
	<i>0x02</i>	CHANNELS REQ

**6.4. UDP-89 → PC**

5 <sup>th</sup> Byte	6 <sup>th</sup> Byte	After 7 <sup>th</sup> Byte
<b>0x00</b>		RESERVED (HANDSHAKE)
<b>0x01</b>		ACKNOWLEDGE
	<b>0x01</b>	ACKNOWLEDGE + Cmd1 + Cmd2 + Info
<b>0x10</b>		LEVELS INFORMATION
	<b>0x01</b>	VOLUME + Level
	<b>0x02</b>	CHANNELS + FC + SW + FL + FR + SL + SR
<b>0x20</b>		MACHINE INFORMATION
	<b>0x01</b>	MODEL NAME + ModelName
	<b>0x02</b>	SOFTWARE VERSION + S/W
<b>0x21</b>		STATUS INFORMATION
	<b>0x01</b>	STATUS DATA + DataS + Title + Chapter
<b>0x22</b>		DISC INFORMATION
	<b>0x01</b>	DISC DATA + DataD
	<b>0x02</b>	TOC DATA + Chapters + Hour + Min + Sec
	<b>0x03</b>	CHAPTER TIME DATA + Chapter + Hour + Min + Sec
<b>0x23</b>		OTHER INFORMATION
	<b>0x01</b>	ELAPSED TIME + Title + Chapter + Hour + Min + Sec
	<b>0x02</b>	CHAPTER CHANGE + Title + Chapter + Hour + Min + Sec
	<b>0x03</b>	MARK POSITION + Title + Chapter + Hour + Min + Sec
	<b>0x04</b>	NO DISC
	<b>0x05</b>	DISC EXISTS

## 6.5. Parameters

### 6.5.1. Mode

Parameter	Codes	Equivalent values
ModeR	0x00	OFF
	0x01	ON

### 6.5.2. Transport

Parameter	Codes	Equivalent values
Title	0x00-0xFE	1-254
Chapter	0x00-0xFE	1-255
Chapters	0x00-0xFE	0-254
Hour	0x00-0x17	0-23
Min	0x00-0x3B	0-59
Sec	0x00-0x3B	0-59

### 6.5.3. Levels, Navigation & Menu

Parameter	Codes	Equivalent values
Level	0x00	OFF
	0x01-0x5B	-90 dB – 0 dB
FC, SW, FL, FR, SL, SR	0x00	No change
	0x01-0x0B	-10 dB – 0 dB
UP, RI, DN, LE	0x00	No change
	0x01	Pressed
Number	0x00-0x09	0-9
	0x0A	+10
	0x0B	CLR
Menu	0x00	Menu
	0x01	Top menu/PBC
	0x02	Setup

### 6.5.4. Acknowledge and Ascii

Parameter	Codes	Equivalent values
Cmd1	First byte of the command acknowledged	
Cmd2	Second byte of the command acknowledged	
ModelName	"HHB UDP-89" as Ascii	
S/W	S/w version as Ascii	
Info	0x00	Executed w/o problem
	0x01	Not executed. Undefined.
	0x02	Not executed. No disc.
	0x03	Not executed. Impossible.

### 6.5.5. Data

Parameter	Codes	Equivalent values
DataS	b7                      0	Auto-pause OFF

		<b>1</b>	Auto-pause ON	
	<b>b6-b5</b>	<b>00</b>	Repeat OFF	
		<b>01</b>	Repeat one	
		<b>10</b>	Repeat all	
		<b>11</b>	Repeat all	
	<b>b4-b3</b>	<b>00</b>	Rpt A-B OFF	
		<b>01</b>	Rpt A	
		<b>10</b>	Rpt A-B	
	<b>b2</b>	<b>0</b>	Shuffle OFF	
		<b>1</b>	Shuffle ON	
	<b>b1-b0</b>	<b>00</b>	Stop	
		<b>01</b>	Resume	
		<b>10</b>	Pause	
		<b>11</b>	Play	
	DataD	<b>b7</b>	<b>0</b>	Reserved
		<b>b6</b>	<b>0</b>	No disc
<b>1</b>			Disc exists	
<b>b5-b3</b>		<b>000</b>	Unknown	
		<b>001</b>	Dolby	
		<b>010</b>	DTS	
		<b>011</b>	PCM	
		<b>100</b>	MP3	
		<b>101</b>	WMA	
		<b>110</b>	Other	
<b>b2-b0</b>		<b>000</b>	Unknown	
		<b>001</b>	CD	
		<b>010</b>	SACD	
		<b>011</b>	VCD	
		<b>100</b>	DVD	
		<b>101</b>	DVD-A	
	<b>110</b>	Other		