ARCAM

Custom Installation Notes:

Serial programming interface and IR remote commands for Arcam BDP100/300 BD Players

Contents

Applicability

Publication Reference

This is Arcam technical publication SH231E Issue 1 (November 2010).

BDP100 software version

This document applies to BDP100 RS232 protocol version 1.0.

BDP300 software version

This document applies to BDP300 RS232 protocol version 1.0.

The latest version of this document is available on the Arcam Dealer extranet accessed via http://www.arcam.co.uk/extranet. If you cannot yet access the Dealer extranet, please apply by email to *scottc@arcam.co.uk*.

Changelog

Issue 1.0: First release

Issue 2.0: BDP300 added

Controlling the BDP100/300 via RS232

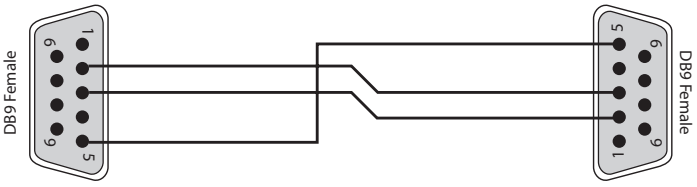
Introduction

This document describes the remote control protocol for controlling the BDP100/BDP300 via the RS232 interface. The BDP100/300 implements virtual IR commands in order to simplify the protocol. Any operation that can be invoked using the IR remote control can be achieved over RS232 using the Simulate RC5 IR command (0x08). See page 6 for details of this command. The RC5 IR code set is listed from page 9.

Conventions

- All hexadecimal numbers begin 0x.
- Any character in single quotes gives the ASCII equivalent of a hex value.
- <n> represents an unknown or variable number.

Serial Cable Specification



The cable is wired as a null modem:

Connector 1 pin	Connector 2 pin	Function
2	3	Rx ← Tx
3	2	Tx → Rx
5	5	RS232 Ground

Data transfer format

- Transfer rate: 38,400bps.
- 1 start bit, 8 data bits, 1 stop bit, no parity, no flow control.

Command and response formats

Communication between the remote controller (RC) and the BDP100/BDP300 takes the form of sequences of bytes, with all commands and responses having the same basic format. The BDP100/BDP300 shall always respond to a received command, but may also send messages at other times.

Each transmission by the RC is the following format:

<St> <Zn> <Cc> <Dl> <Data> <Et>

- St (Start transmission): 0x21 '!'
- Zn (0x01): see below.
- Cc (Command code): the code for the command
- Dl (Data length): the number of data items following this item,excluding the ETR
- Data: the parameters for the command
- Et (End transmission): 0x0D

Each response by the BDP100/BDP300 is the following format::

<St> <Zn> <Cc> <Ac> <Dl> <Data> <Et>

- St (Start transmission): 0x21 '!'
- Zn (0x01): see below.
- Cc (Command code): the code for the command
- Ac (Answer code): see below.
- Dl (Data Length): the number of data items following this item, excluding the ETR
- Data: the parameters for the response of length n. n is limited to 255.
- Et (End transmission): 0x0D

The BDP100/BDP300 responds to each command from the RC within three seconds. The RC may send further commands before a previous command response has been received.

Zones

The following Zones are defined:

- 0x01 – Zone 1.

Answer codes

The following answer codes are defined:

- 0x00 – Status update.
- 0x82 – Zone Invalid.
- 0x83 – Command not recognised.
- 0x84 – Parameter not recognised.
- 0x85 – Command invalid at this time.
- 0x86 – Invalid data length.

State changes as a result of other inputs

It is possible that the state of the BDP100/BDP300 may be changed as a result of user input via the front panel buttons or via the IR remote control. Any change resulting from these inputs is relayed to the RC using the appropriate message type.

For example, if the user advanced to the next chapter using the ⏭ button on the front panel, a Title/Chapter status message (defined below) would be sent to the RC. A similar action would be taken for all other state changes (including elapsed time).

Reserved Commands

Commands 0xF0 to 0xFF (inclusive) are reserved for test functions and should never be used.

Example command and response sequence

As an example, the command to simulate the RC5 command "25–53", **PLAY**:

STR	ZONE	CC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x02	0x19	0x35	0x0D

Assuming that the command was accepted by the Blu-ray player and is being processed, the BDP100/BDP300 responds to this command with the following sequence:

STR	ZONE	CC	AC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x00	0x02	0x19	0x35	0x0D

System Command Specifications

Power (0x00)

Request the stand-by state of the BDP100/BDP300.

Example

Command/response sequence to request the power state where power is on:

Command:	0x21 0x01 0x00 0x01 0xF0 0x0D
Response:	0x21 0x01 0x00 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x00
Dl	0x01
Data	0xF0 – Request power state
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x00
Ac	Answer code
Dl	0x01
Data	0x00 – BDP100 is in stand-by 0x01 – BDP100 is powered on
Et	0x0D

Display Brightness (0x01)

Request the brightness of the display of the BDP100/BDP300.

Example

Command/response sequence for requesting the brightness of the display where the display is off:

Command:	0x21 0x01 0x01 0x01 0xF0 0x0D
Response:	0x21 0x01 0x01 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x01
Dl	0x01
Data	0xF0 – Request brightness
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x01
Ac	Answer code
Dl	0x01
Data	0x00 – Front panel is off 0x01 – Front panel L1 0x02 – Front panel L2
Et	0x0D

Software version (0x04)

Request the version number of the various pieces of software on the BDP100/BDP300.

Example

Command/response sequence to request the RS232 protocol version (1.0):

Command: 0x21 0x01 0x04 0x01 0xF0 0x0D

Response: 0x21 0x01 0x04 0x00 0x03 0xF0 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x04
Dl	0x01
Data	0xF0 – Request version RS232 Protocol 0xF1 – Request version main software 0xF5 – Request version microcontroller
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x04
Ac	Answer code
Dl	0x03
Data1	Echo data from command
Data2	Major version number
Data3	Minor version number
Et	0x0D

Simulate RC5 IR Command (0x08)

Simulate an RC5 command via the RS232 port. An additional status message will be sent in most cases as a result of the IR command.

Example

Command/response sequence to RC5 25-53 (**PLAY**):

Command:	0x21 0x01 0x08 0x02 0x19 0x35 0x0D
Response:	0x21 0x01 0x08 0x00 0x02 0x19 0x35 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x08
Dl	0x02
Data1	RC5 System code
Data2	RC5 Command code
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x08
Ac	Answer code
Dl	0x02
Data1	RC5 System code
Data2	RC5 Command code
Et	0x0D

Playback elapsed time (command code 0x28)

Requests the current playback time, track time (CD, MP3, etc) or title time (DVD, BD)

Example

Command/response sequence to request the current playback time where the playback time is 0h03m24s:

Command:	0x21 0x01 0x28 0x01 0xF0 0x0D
Response:	0x21 0x01 0x28 0x00 0x03 0x00 0x03 0x18 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x28
Dl	0x01
Data	0xF0 – Request elapsed time
Et	0x0D
RESPONSE:	
St	0x21
Zn	0x01
Cc	0x28
Ac	Answer Code
Dl	0x03
Data1	Hours
Data2	Minutes
Data3	Seconds
Et	0x0D

Playback state/mode (command code 0x29)

Request unit playback state and mode

Example

Command/response sequence to request the playback state, where the playback state is tray closed, playing in repeat all random mode:

Command:	0x21 0x01 0x29 0x01 0xF0 0x0D
Response:	0x21 0x01 0x29 0x00 0x04 0x01 0x01 0x00 0x21 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x29
Dl	0x01
Data	0xF0 – Request playback state
Et	0x0D
RESPONSE:	
St	0x21
Zn	0x01
Cc	0x29
Ac	Answer Code
Dl	0x04
Data1	Tray Status: 0x00 – Tray open 0x01 – Tray closed
Data2	Playback state: 0x00 – Stopped 0x01 – Playing 0x02 – Paused 0x03 – Resume-stop 0x04 – Scanning 0x05 – Slow play 0x0A – other state
Data3	Scanning/Slow play direction: 0x81 – Back 0x01 – Forward
Data4	Playback mode: 0x1x – Repeat one 0x2x – Repeat all 0xx1 – Random Note it is possible for random and repeat modes to be on together, hence the use of upper and lower nibbles to be used for the status of each.
Et	0x0D

Source Type (command code 0x2C)

Request the current source type

Example

Command/response sequence to request the source type where the source is a Blu-ray Disc:

Command:	0x21 0x01 0x2C 0x01 0xF0 0x0D
Response:	0x21 0x01 0x2C 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x2C
Dl	0x01
Data	0xF0 – Request source type
Et	0x0D
RESPONSE:	
St	0x21
Zn	0x01
Cc	0x2C
Ac	Answer Code
Dl	0x01
Data	0x00 – Blu-ray 0x01 – DVD-video 0x02 – CD 0x03 – Data disc 0x04 – USB media 0x20 – No Media
Et	0x0D

Title/Chapter information (command code 0x2D)

Request the current title/track/chapter information.

Example

Command/response sequence for requesting current title/track/chapter information where the title is 3 and the chapter is 14:

Command:	0x21 0x01 0x2D 0x01 0xF0 0x0D
Response:	0x21 0x01 0x2D 0x00 0x03 0x03 0x0E 0x00 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x2D
Dl	0x01
Data	0xF0 – Request current title/track/chapter
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x2D
Ac	Answer Code
Dl	0x03
Data1	DVD-Video : Current Title Number Blu-ray: Current Title Number Else: 0x00
Data2	MSB: DVD-Video : Current Chapter Blu-ray: Current Chapter Else: Current Track
Data3	LSB: DVD-Video : Current Chapter Blu-ray: Current Chapter Else: Current Track
Et	0x0D

BDP100/BDP300 RC5 command codes

These codes are recognised as infra-red signals received by the front panel, RC5 electrical signals received by the remote in jacks and as RS232 data using the 'Simulate RC5 IR Command' (0x 08).

Function	RC5 code [system-command]	RC5 code (Data1 - Data2)
	Decimal	Hexadecimal
Standby	25-12	0x19 - 0x0C
1	25-1	0x19 - 0x01
2	25-2	0x19 - 0x02
3	25-3	0x19 - 0x03
4	25-4	0x19 - 0x04
5	25-5	0x19 - 0x05
6	25-6	0x19 - 0x06
7	25-7	0x19 - 0x07
8	25-8	0x19 - 0x08
9	25-9	0x19 - 0x09
0	25-0	0x19 - 0x00
HOME	25-11	0x19 - 0x0B
RND	25-64	0x19 - 0x40
OPEN	25-45	0x19 - 0x2D
SRCH	25-76	0x19 - 0x4C
RPT	25-29	0x19 - 0x1D
<<	25-50	0x19 - 0x32
>>	25-52	0x19 - 0x34
|<	25-33	0x19 - 0x21
>|	25-32	0x19 - 0x20
POPUP MENU	25-67	0x19 - 0x43
CANCEL	25-58	0x19 - 0x3A
RETURN	25-72	0x19 - 0x48
TOP MENU	25-66	0x19 - 0x42
Nav UP	25-86	0x19 - 0x56
Nav LEFT	25-81	0x19 - 0x51
OK	25-87	0x19 - 0x57
Nav RIGHT	25-80	0x19 - 0x50
Nav DOWN	25-85	0x19 - 0x55
DISP	25-18	0x19 - 0x12
Play	25-53	0x19 - 0x35
STATUS	25-75	0x19 - 0x4B
Stop	25-54	0x19 - 0x36
Pause	25-48	0x19 - 0x30
HDMI	25-88	0x19 - 0x58
TRIM	25-37	0x19 - 0x25
ANGLE	25-73	0x19 - 0x49
ZOOM	25-68	0x19 - 0x44
MODE	25-77	0x19 - 0x4D
AUDIO	25-69	0x19 - 0x45
SUBT	25-65	0x19 - 0x41
SETUP	25-74	0x19 - 0x4A
RED / A	25-107	0x19 - 0x6B
GREEN / B	25-108	0x19 - 0x6C
YELLOW / C	25-109	0x19 - 0x6D
BLUE / D	25-110	0x19 - 0x6E
Power ON	25-123	0x19 - 0x7B
Power OFF	25-124	0x19 - 0x7C

BDP300 only RC5 command codes

These codes are recognised as infra-red signals received by the front panel, RC5 electrical signals received by the remote in jacks and as RS232 data using the 'Simulate RC5 IR Command' (0x 08).

Function	RC5 code [system-command]	RC5 code (Data1 - Data2)
	Decimal	Hexadecimal
Zoom	25-68	0x19 - 0x44
A-B	25-105	0x19 - 0x69
PIP-Audio	25-106	0x19 - 0x6A

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