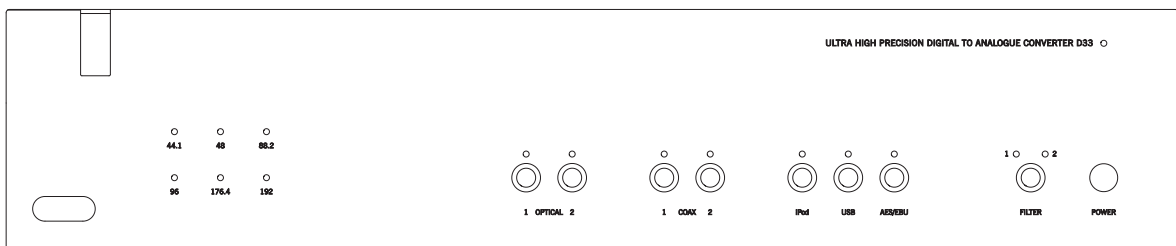


ARCAM

Custom Installation Notes: Serial programming interface and IR remote commands for Arcam D33 DAC



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Applicability

Publication Reference

This is Arcam technical publication SH236E Issue D (February 2012).

D33 software version

This document applies to D33 RS232 software version 1.1 and above.

The latest version of this document is available on the Arcam Table of resources accessed via <http://www.arcam.co.uk/extranethome/tor/>.

Changelog

Issue A.0: First draft

Issue B.0: Simulated IR commands added

Issue C.0: Correction to the reset response

Issue D.0: HID control IR commands added

Controlling the D33 via RS232

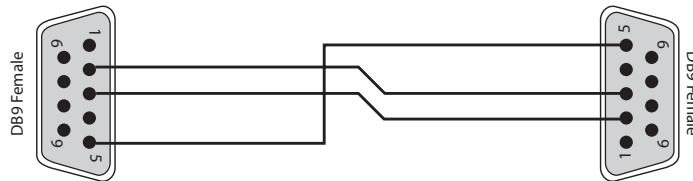
Introduction

This document describes the remote control protocol for controlling the D33 via the RS232 interface. The D33 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 7.

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 D33 takes the form of sequences of bytes, with all commands and responses having the same basic format. The D33 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 D33 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 D33 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 D33 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 changes the filter on the front panel, a filter status message (defined below) would be sent to the RC. A similar action would be taken for all other state changes.

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 “1B-29”, **SELECT FILTER 1**:

STR	ZONE	CC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x02	0x1B	0x29	0x0D

Assuming that the command was accepted by the DAC and is being processed, the D33 responds to this command with the following sequence:

STR	ZONE	CC	AC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x00	0x02	0x1B	0x29	0x0D

System Command Specifications

Power (0x00)

Request the stand-by state of the D33.

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 – D33 is in stand-by 0x01 – D33 is powered on
Et	0x0D

Current Filter (0x37)

Request the current filter of the D33.

Example

Command/response sequence for requesting the current filter, where the filter is filter 2:

Command: 0x21 0x01 0x37 0x01 0xF0 0x0D
 Response: 0x21 0x01 0x37 0x00 0x01 0x02 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x37
Dl	0x01
Data	0xF0 – Request filter number
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x37
Ac	Answer code
Dl	0x01
Data	0x00 – No filter 0x01 – Filter 1 0x02 – Filter 2
Et	0x0D

Incoming Sample Rate (0x44)

Request the incoming sample rate to the D33.

Example

Command/response sequence to request the incoming sampling rate where the incoming sample rate is 192kHz:

Command: 0x21 0x01 0x44 0x01 0xF0 0x0D
 Response: 0x21 0x01 0x44 0x00 0x01 0x02 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x44
Dl	0x01
Data	0xF0 – Request incoming sample rate
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x44
Ac	Answer code
Dl	0x01
Data1	0x00 - Unknown 0x01 - 44.1kHz 0x02 - 48kHz 0x03 - 88.2kHz 0x04 - 96kHz 0x05 - 176.4kHz 0x06 - 192kHz
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 27-41 (SELECT FILTER 1):

Command: 0x21 0x01 0x08 0x02 0x1B 0x29 0x0D
Response: 0x21 0x01 0x08 0x00 0x02 0x1B 0x29 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

Audio Lock State (command code 0x43)

Requests the audio lock state of the D33

Example

Command/response sequence to request the audio lock state where the response is locked:

Command: 0x21 0x01 0x43 0x01 0xF0 0x0D
Response: 0x21 0x01 0x43 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x43
Dl	0x01
Data	0xF0 - Request audio lock state
Et	0x0D

RESPONSE:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x43
Ac	Answer Code
Dl	0x01
Data1	0x00 - unlocked / no audio 0x01 - locked
Et	0x0D

Software Version Query (command code 0x04)

Query software version of the D33

Example

Command/response sequence to request the software version where the software version is 1.2.3:

Command: 0x21 0x01 0x04 0x01 0xF0 0x0D
Response: 0x21 0x01 0x04 0x00 0x03 0x01 0x02 0x03 0x0D

COMMAND:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x43
Dl	0x01
Data	0xF0 - Request software version
Et	0x0D

RESPONSE:	
Byte:	Description
St	0x21
Zn	0x01
Cc	0x04
Ac	Answer Code
Dl	0x03
Data1	Major version number
Data2	Minor version number
Data3	Sub minor software version
Et	0x0D

Reset to Factory Defaults (command code 0x05)

Reset the D33 to Factory Defaults

Example

Command/response sequence to reset the D33 to Factory Defaults - after the command is sent, the unit will need to be powered off/on to complete the command.

Command: 0x21 0x01 0x05 0x02 0xAA 0xAA 0x0D
Response: None - the unit will go into standby, power cycle is then required

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x05
Dl	0x02
Data1	0xAA
Data2	0xAA
Et	0x0D
RESPONSE:	
None	

D33 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' (0x08).

Function	RC5 code [system- command]	RC5 code (Data1 - Data2)
	Decimal	Hexadecimal
Standby	27-12	0x1B - 0x0C
FILTER	27-70	0x1B - 0x46
Select AES Input	27-6	0x1B - 0x06
Select USB Input	27-8	0x1B - 0x08
Select iPod Input	27-18	0x1B - 0x12
Select COAX1 input	27-4	0x1B - 0x04
Select COAX2 input	27-5	0x1B - 0x05
Select Optical1 input	27-0	0x1B - 0x00
Select Optical2 input	27-2	0x1B - 0x02
Go into Standby	27-124	0x1B - 0x7C
Come out of Standby	27-123	0x1B - 0x7B
Select Filter0	27-40	0x1B - 0x28
Select Filter1	27-41	0x1B - 0x29
Select Filter2	27-42	0x1B - 0x2A
HID Play	27-53	0x1B - 0x35
HID Pause	27-48	0x1B - 0x30
HID Stop	27-54	0x1B - 0x36
HID Track fwd	27-32	0x1B - 0x20
HID Track back	27-33	0x1B - 0x21

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