ARCAM

Custom Installation Notes:

Serial programming interface and
IR remote commands for
Arcam AVR380/450/750

Contents

Applicability

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 1.0: First public release.

Issue 2.0: USB VFD display data corrected in command 0x09

Issue 3.0: RS232 version number 2.0 to indicate new commands 0x20, 0x23, 0x24, 0x25, 0x26.

Controlling the AVR380/450/750 via RS232/NET

Introduction

This document describes the remote control protocol for controlling the AVR380/450/750 via the RS232/NET interface. The AVR380/450/750 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 a control link using the Simulate RC5 IR command (0x08). See page 7 for details of this command. The RC5 IR code set is listed from page 30.

Set-up

The AVR380/450/750 must be correctly configured for Control; by default, Control is disabled for minimum standby power consumption. RS232 control can be enabled using the front panel: press and hold the front panel **DIRECT** button for 4 seconds until "RS232 CONTROL ON" is displayed on the VFD. Pressing . Alternatively, Control for RS232 or IP can be enabled using the OSD menu. Press ⒜ followed by ⒨ on the CR450 remote control in order to access the setup menu. Use the cursor keys ⓵ ⓶ ⓷ ⓸ and ⓞⓚ to enter the General Setup menu and locate the option *Control*. Press ⓞⓚ, ⓷ then ⓞⓚ to change this parameter to 'On'. IP control is via port 50000 of the IP address of the unit (in the Network Settings menu).

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
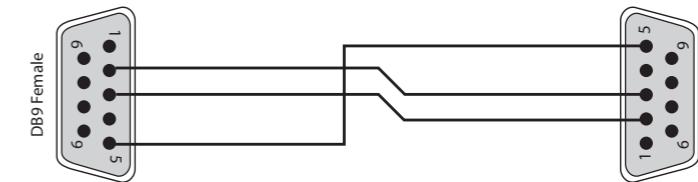
The cable is wired as a null modem:

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 AVR380/450/750 takes the form of sequences of bytes, with all commands and responses having the same basic format. The AVR380/450/750 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 (Zone number): 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 AVR400 is the following format::

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

- St (Start transmission): 0x21 '!'
- Zn (Zone number): 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 AVR380/450/750 responds to each command from the RC within three seconds. The RC may send further commands before a previous command response has been received.

Zone numbers

The following zone numbers are defined:
- 0x01 – Zone number 1. (Zone 1 is the master zone. Commands that appear zone-less refer to the master zone)
- 0x02 – Zone number 2.

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.[1]
- 0x86 – Invalid data length.

[1]Certain commands cannot be processed when the Setup Menu is being displayed. An answer code of 0x85 will be returned in these circumstances. Also, commands for tuner control cannot be processed when the tuner input is not selected, etc.

State changes as a result of other inputs

It is possible that the state of the AVR380/450/750 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 changed the front panel display brightness using the DISPLAY button on the front panel, a display message (defined below) would be sent to the RC. A similar action would be taken for all other state changes (including decode mode 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 "16-16", volume up:

STR	ZONE	CC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x02	0x10	0x10	0x0D

Assuming that the command was accepted by the AV Receiver and is being processed, the AVR380/450/750 responds to this command with the following sequence:

STR	ZONE	CC	AC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x00	0x02	0x10	0x10	0x0D

AMX Duet™ Support

The AVR380/450/750 shall be fully compatible with AMX Duet™ Dynamic Device Discovery Protocol (DDDP) The following description of Dynamic Device Discovery comes from the AMX website (www.amx.com). Dynamic Device Discovery is part of AMX's Duet™ platform, which combines the proven reliability and power of NetLinx with the extensive capabilities of the Java 2 Micro Edition (J2ME) platform. When integrating a serial or IP device from a manufacturer embedding the Dynamic Device Discovery Protocol (DDDP), Duet recognizes the device and loads the appropriate Duet module, which automatically installs the new device. AMX's NetLinx Master can then find and install the Duet device module either from a library on the master, from AMX's Web site, or from the manufacturer's Web site. Duet also allows for device swapping so that programming changes are not required when devices with DDDP are removed or replaced – a huge benefit for end users. The Duet platform is an extension AMX's InConcert® manufacturer partner program, which was developed to ensure seamless communication between partners' devices and the AMX control system.

Data is specified in the ASCII format. All ASCII characters between the quotes "" should be recognised/transmitted. "\r" is a carriage return (0x0D)

Command: "AMX\r"

AVR750 Response:
"AMXB<Device-SDKClass=Receiver><Device-Make=ARCAM><Device-Model=AVR750><Device-Revision=x.y.z>\r"

AVR450 Response:
"AMXB<Device-SDKClass=Receiver><Device-Make=ARCAM><Device-Model=AVR450><Device-Revision=x.y.z>\r"

AVR380 Response:
"AMXB<Device-SDKClass=Receiver><Device-Make=ARCAM><Device-Model=AVR380><Device-Revision=x.y.z>\r"

Where

x.y.z = RS232 protocol version number.

System Command Specifications

Power (0x00)

Request the stand-by state of a zone.

Example

Command/response sequence to request the power state of zone 1 where zone 1 has power on:

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x00
Dl	0x01
Data	0xF0 – Request power state
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x00
Ac	Answer code
Dl	0x01
Data	0x00 – Zone is in stand-by
	0x01 – Zone is powered on
Et	0x0D

Display Brightness (0x01)

Request the brightness of the front panel display.

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

Headphones (0x02)

Determine whether headphones are connected.

Example

Command/response sequence to request the headphone status where the headphones are not connected:

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x02
Dl	0x01
Data	0xF0 – Request current headphone connection status
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x02
Ac	Answer code
Dl	0x01 (Data length)
Data	0x00 – Headphones are not connected.
	0x01 – Headphones are connected
Et	0x0D

FM genre (0x03)

Request information on the current station programme type from FM source in a given zone. If FM is not selected on the given zone an error 0x85 is returned.

Example

Command/response sequence to request the programme type on zone 1 where the programme type is "POP MUSIC":

Command: 0x21 0x01 0x03 0x01 0xF0 0x0D

Response: 0x21 0x01 0x03 0x00 0x09 0x50 0x4F 0x50 0x20 0x4D
0x55 0x53 0x49 0x43 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x03
Dl	0x01
Data1	Request information source: 0xF0 – FM program type
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x03
Ac	Answer code
Dl	Data length <n>
Data1 – Data<n>	The radio programme type in ASCII characters
Et	0x0D

Software version (0x04)

Request the version number of the various pieces of software on the AVR.

Example

Command/response sequence to request the RS232 protocol version (1.4):

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

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x04
Dl	0x01
Data	0xF0 – Request RS232 version 0xF1 – Request Host version 0xF2 – Request OSD version 0xF3 – Request DSP version 0xF4 – Request NET version 0xF5 – Request IAP version
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

Restore factory default settings (0x05)

Force a restore of the factory default settings.

Example

Command/response sequence to restore factory defaults:

Command: 0x21 0x01 0x05 0x02 0xAA 0xAA 0x0D

Response: 0x21 0x01 0x05 0x00 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x05
Dl	0x02
Data1	0xAA (Confirmation data pattern to avoid accidental restore)
Data2	0xAA (Confirmation data pattern to avoid accidental restore)
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x05
Ac	Answer code
Dl	0x00
Et	0x0D

Save/Restore secure copy of settings (0x06)

Force a restore of the secure copy of the settings. Note: If no secure copy has been made, this command will return an answer code of 0x85.

If the system is currently doing a save and another save is requested. The second save will fail silently. If a command 0x1E is being processed this command will fail with a answer code 0x85

Example

Command/response sequence to restore secure backup:

Command: 0x21 0x01 0x06 0x07 0x01 0x55 0x55 0x01 0x02 0x03 0x040x0D

Response: 0x21 0x01 0x06 0x00 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0X06
Dl	0x07
Data1	0x00 – Save secure backup 0x01 – Restore secure backup
Data2	0x55 (Confirmation data pattern to avoid accidental save/restore)
Data3	0x55 (Confirmation data pattern to avoid accidental save/restore)
Data4	Pin digit 1
Data5	Pin Digit 2
Data5	Pin Digit 3
Data7	Pin Digit 4
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x06
Ac	Answer code
Dl	0x00
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 16-17 (AVR volume down in zone 1):

Command: 0x21 0x01 0x08 0x02 0x10 0x11 0x0D

Response: 0x21 0x01 0x08 0x00 0x02 0x10 0x11 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x08
Dl	0x02
Data1	RC5 System code
Data2	RC5 Command code
Et	0x0D

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

Display Information Type (0x09)

Set the VFD display information type (where applicable).

The return data echoes the data sent.

Example

Command/response sequence to set the display text to show the current FM radio text with FM playing in zone 2:

Command: 0x21 0x02 0x09 0x01 0x01 0x0D
Response: 0x21 0x02 0x09 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x09
Dl	0x01
Data	**For all sources:** 0x00 – Set the display to Processing mode 0xE0 – Cycle though all displayable information. 0xF0 – Request the current display type **If the current source is FM:** 0x01 – Set the display to Radio text 0x02 – Set the display to Programme type 0x03 – Set the display to Signal strength **If the current source is DAB (AVR450/750 only):** 0x01 – Set the display to Radio text 0x02 – Set the display to Genre 0x03 – Set the display to Signal quality 0x04 – Set the display to Bit rate **If the current source is NET/USB** 0x01 – Set the display to Track 0x02 – Set the display to Artist 0x03 - Set the display to Album 0x04 – Set the display to audio type 0x05 – Set the display to rate
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x09
Ac	Answer code
Dl	0x01
Data	The current display is returned, as for the command.
Et	0x0D

Request current source (0x1D)

Request the source currently selected for a given zone.

Example

Command/response sequence to request the current source for Zone 1 where the source is set to 'SAT':

Command: 0x21 0x01 0x1D 0x01 0xF0 0x0D
Response: 0x21 0x01 0x1D 0x00 0x01 0x04 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1D
Dl	0x01
Data	0xF0
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1D
Ac	Answer code
Dl	0x01
Data	The current source in the indicated zone: 0x00 – Follow Zone 1 0x01 – CD 0x02 – BD 0x03 – AV 0x04 – SAT 0x05 – PVR 0x06 – VCR 0x08 – AUX 0x09 – DISPLAY 0x0B – TUNER (FM) 0x0C – TUNER (DAB) **(AVR450/750 only)** 0x0E – NET 0x0F – USB 0x10 - STB 0x11 - GAME
Et	0x0D

Headphone Over-ride (0x1F)

Activate/deactivate the mute relays (does not zero the volume).

Example

Command/response sequence to activate the mute relays:

Command: 0x21 0x01 0x1F 0x01 0x01 0x0D
Response: 0x21 0x01 0x1F 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1F
Dl	0x01
Data	0x00 – Headphone/Over-ride Clear (speakers muted if headphones present) 0x01 – Headphone/Over-ride Set (speakers unmuted if headphones present)
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1F
Ac	Answer code
Dl	0x01
Data1	Relay state
Et	0x0D

Input Command Specifications

Video selection (0x0A)

Changes the video input. Returns invalid (0x85) if OSD is showing setup screen.

Example

Command/response sequence to change the video source for zone 1 to 'PVR':

Command:	0x21 0x01 0x0A 0x01 0x03 0x0D
Response:	0x21 0x01 0x0A 0x00 0x01 0x03 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x0A
Dl	0x01
Data	Source:
	0x00 – BD
	0x01 – SAT
	0x02 – AV
	0x03 – PVR
	0x04 – VCR
	0x05 - Game
	0x06 - STB
	0xF0 – Request current input
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x0A
Ac	Answer code
Dl	0x01
Data	Response:
	The current video source is returned, as for the command
Et	0x0D

Select analogue/digital (0x0B)

Select an analogue/digital audio input for the current source. Returns invalid (0x85) if OSD is showing setup screen.

Example

Command/response sequence to change the audio input to 'digital' in zone 1:

Command:	0x21 0x01 0x0B 0x01 0x01 0x0D
Response:	0x21 0x01 0x0B 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x0B
Dl	0x01
Data	0x00 – Use the analogue audio for the current source.
	0x01 – Use the digital audio for the current source (if available).
	0x02 – Use HDMI for the current source (if available).
	0xF0 – Request the audio type in use for the current source.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x0B
Ac	Answer code
Dl	0x01
Data	Response:
	0x00 – Analogue audio is in use for the current source.
	0x01 – Digital audio is in use for the current source.
	0x02 – HDMI audio is in use for the current source.
Et	0x0D

Set/Request video input type (0x0C)

Set/request the video input (CVBS/Component/HDMI) type in use for the current source.

This command is only valid for zone 1.

Example

Command/response sequence for requesting the input video source where it is CVBS

Command:	0x21 0x01 0x0C 0x01 0xF0 0x0D
Response:	0x21 0x01 0x0C 0x00 0x01 0x04 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x0C
Dl	0x01
Data	0x01 – HDMI.
	0x02 – Component.
	0x04 – CVBS.
	0xF0 – Request the video type in use for the current source.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x0C
Ac	Answer code
Dl	0x01
Data	0x01 – HDMI.
	0x02 – Component.
	0x04 – CVBS.
Et	0x0D

Output Command Specifications

Set/Request Volume (0x0D)

Set or request the volume of a zone.

This command returns the volume even if the zone requested is in mute. The "Request Mute status" command can be used to discover if the zone is muted.

Response data format:
e.g. for volume 42dB: Data1=0x2A (42)

Example

Command/response sequence for setting the volume in Zone 1 to 45dB:

Command:	0x21 0x01 0x0D 0x01 0x2D 0x0D
Response:	0x21 0x01 0x0D 0x00 0x01 0x2D 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x0D
Dl	0x01
Data	0x00 (0) – 0x63 (99) – Set the volume
	0xF0 – Request the current volume
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x0D
Ac	Answer code
Dl	0x01
Data1	Zone volume, integer value:
	0x00 (0) – 0x63 (99)
Et	0x0D

Request Mute status (0x0E)

Request the mute status of the audio in a zone.

Example

Command/response sequence to request the mute status of zone 1 where zone 1 is muted:

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x0E
Dl	0x01
Data	0xF0 – Request mute status
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x0E
Ac	Answer code
Dl	0x01
P2	0x00 – Zone is muted
	0x01 – Zone is not muted
Et	0x0D

Request direct mode status (0x0F)

Request the direct mode status on Zone 1.

Example

Command/response sequence to request the Direct mode status in zone 1 where the mode is direct:

Command:	0x21 0x01 0x0F 0x01 0xF0 0x0D
Response:	0x21 0x01 0x0F 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x0F
Dl	0x01
Data	0xF0 – Request mode setting
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x0F
Ac	Answer code
Dl	0x01
Data	0x00 – 'Direct mode' is off
	0x01 – 'Direct mode' is on
Et	0x0D

Request decode mode status — 2ch (0x10)

Request the decode mode for two-channel material in zone 1.

Example

Command/response sequence to request the decode mode in zone 1 where the mode is Pro Logic II / x Movie Mode:

Command: 0x21 0x01 0x10 0x01 0xF0 0x0D
Response: 0x21 0x01 0x10 0x00 0x01 0x02 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x10
Dl	0x01
Data	0xF0 – Request decode mode
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x10
Ac	Answer code
Dl	0x01
Data	0x01 – Stereo
	0x02 – Dolby PLII / x Movie Mode
	0x03 – Dolby PLII / x Music Mode
	0x05 – Dolby PLII / x Game
	0x06 – Dolby PL
	0x07 – Neo:6 Cinema
	0x08 – Neo:6 Music
	0x09 - 5/7 Ch Stereo
Et	0x0D

Request Decode mode status — MCH (0x11)

Request the decode mode for multi-channel material in zone 1.

Example

Command/response sequence to request the decode mode in zone 1 where the mode is Pro Logic IIx Movie Mode:

Command: 0x21 0x01 0x11 0x01 0xF0 0x0D
Response: 0x21 0x01 0x11 0x00 0x01 0x04 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x11
Dl	0x01
Data	0xF0 – Request decode mode
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x11
Ac	Answer code
Dl	0x01
Data	0x01 – Stereo down-mix
	0x02 – Multi-channel mode
	0x03 – Dolby D EX / DTS-ES mode
	0x04 – Dolby PL IIx movie mode
	0x05 – Dolby PL IIx music mode
Et	0x0D

Request RDS information (0x12)

Request RDS information from the current radio station in a given zone. If FM is not selected on the given zone an error 0x85 is returned.

Example

Command/response sequence to request the RDS information on FM in zone 1, where the response is "Playing your favourite music".

Command: 0x21 0x01 0x12 0x01 0xF0 0x0D
Response: 0x21 0x01 0x12 0x00 0x1C 0x00 0x50 0x6C 0x61 0x79
0x69 0x6E 0x67 0x20 0x79 0x6F 0x75 0x72 0x20 0x66
0x61 0x76 0x6F 0x75 0x72 0x69 0x74 0x65 0x20 0x6D
0x75 0x73 0x69 0x63 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x12
Dl	0x01
Data1	Request information source:
	0xF0 – FM
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x12
Ac	Answer code
Dl	Data length <n>
Data1 – Data<n>	The radio programme type in ASCII characters
Et	0x0D

Set/request Video Output Resolution (0x13)

Set/request the Video Output Resolution of zone 1.

Example

Command/response sequence to request the video output in zone 1 where the resolution is 1080p:

Command: 0x21 0x01 0x13 0x01 0xF0 0x0D
Response: 0x21 0x01 0x13 0x00 0x01 0x05 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x13
Dl	0x01
Data	0x02 – Set resolution to SD Progressive.
	0x03 – Set resolution to 720p.
	0x04 – Set resolution to 1080i.
	0x05 – Set resolution to 1080p.
	0x06 – Set resolution to 'Preferred'.
	0x07 – Set resolution to Bypass.
	0x08 - Set the resolution to 4k
	0xF0 – Request the video output.
	0xF1 – Increment the resolution setting.
	0xF2 – Decrement the resolution setting.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x13
Ac	Answer code
Dl	0x01
Data	0x02 – SD Progressive.
	0x03 – 720p.
	0x04 – 1080i.
	0x05 – 1080p
	0x06 – 'Preferred'
	0x07 – Bypass
	0x08 - 4k
Et	0x0D

Menu Command Specifications

Request menu status (0x14)

Request which (if any) menu is open in the unit.

Example

Command/response sequence to request which menu is open where the 'Trim' menu is open:

Command: 0x21 0x01 0x14 0x01 0xF0 0x0D

Response: 0x21 0x01 0x14 0x00 0x01 0x03 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x14
Dl	0x01
Data	0xF0 – Request the open menu state
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x14
Ac	Answer code
Dl	0x01
Data	0x00 – No menu is open
	0x02 – Set-up Menu Open
	0x03 – Trim Menu Open
	0x04 – Bass Menu Open
	0x05 – Treble Menu Open
	0x06 – Sync Menu Open
	0x07 – Sub Menu Open
	0x08 – Tuner Menu Open
	0x09 – Network menu Open
	0x0A – USB Menu Open
Et	0x0D

Request tuner preset (0x15)

Request the current tuner preset number. If the tuner is not selected on the given zone an error 0x85 is returned.

Example

Command/response sequence to request the preset number where the present number is 10 on zone 1:

Command: 0x21 0x01 0x15 0x01 0xF0 0x0D

Response: 0x21 0x01 0x15 0x00 0x01 0x0A 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x15
Dl	0x01
Data	0x01 – 0x32 (1-50) number of required preset.
	0xF0 – Request the current preset number.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x15
Ac	Answer code
Dl	0x01
Data	0xFF – Currently no preset selected
	0x01- 0x32: (1-50) the current preset number.
Et	0x0D

Tune (0x16)

Increment/Decrement the tuner frequency in 0.05MHz steps (FM).

The returned frequency is calculated as follows:

FM freq. (MHz) =   reported freq. (MHz)

FM freq. (kHz) =   reported freq. (kHz)

For these reasons, this command may return values that cannot be translated into ASCII characters.

If the tuner is not selected on the given zone an error 0x85 is returned.

Example

Command/response sequence to increment the FM tuning from 85.0MHz to 85.05MHz in zone 1:

Command: 0x21 0x01 0x16 0x01 0x01 0x0D

Response: 0x21 0x01 0x16 0x00 0x02 0x55 0x05 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x16
Dl	0x01
Data1	0x00 – Decrement tuner frequency by 1 step.
	0x01 – Increment tuner frequency by 1 step.
	0xF0 – Request the current tuner frequency.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x16
Ac	Answer code
Dl	0x02 (Data length)
Data1	FM: New frequency (MHz)
Data2	FM: New frequency (10's kHz)
Et	0x0D

Request DAB station (0x18) (AVR450/750 only)

Request the current DAB station selected. If DAB is not selected on the given zone an error 0x85 is returned.

Example

Command/response sequence to request the DAB station selection where the station is called "DAB STATION 2" in zone 1:

Command: 0x21 0x01 0x18 0x01 0xF0 0x0D

Response: 0x21 0x01 0x18 0x00 0x10 0x44 0x41 0x42 0x20 0x53 0x54 0x41
0x54 0x49 0x4F 0x4E 0x20 0x32 0x20 0x20 0x20 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x18
Dl	0x01
Data	0xF0 – Request the current DAB station
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x18
Ac	Answer code
Dl	Data length, fixed to 16 bytes (ASCII characters)
Data1 – Data128	The service label of the DAB station in ASCII characters. The data is padded to 16 bytes with the space character (0x20)
Et	0x0D

Prog. Type/Category (0x19) (AVR450/750 only)

Request information on the current station programme type from DAB source in a given zone. If DAB is not selected on the given zone an error 0x85 is returned.

Example

Command/response sequence to request the programme type on zone 1 where the programme type is "POP MUSIC":

Command: 0x21 0x01 0x19 0x01 0xF0 0x0D

Response: 0x21 0x01 0x19 0x00 0x10 0x50 0x4F 0x50 0x20 0x4D
0x55 0x53 0x49 0x43 0x20 0x20 0x20 0x20 0x20
0x20 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x19
Dl	0x01
Data1	Request information source:
	0xF0 – DAB program type
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x19
Ac	Answer code
Dl	Data length, fixed to 16 bytes (ASCII characters)
Data1 – Data128	The radio programme type in ASCII characters. The data is padded to 16 bytes with the space character (0x20)
Et	0x0D

DLS/PDT info. (0x1A) (AVR450/750 only)

Request DLS/PDT information (digital radio text) from the current radio station in a given zone. If DAB is not selected on the given zone an error 0x85 is returned.

Example

Command/response sequence to request the DLS information on DAB in zone 1, where the response is "Playing your favourite music".

Command: 0x21 0x01 0x1A 0xF0 0x0D

Response: 0x21 0x01 0x1A 0x00 0x80 0x00 0x50 0x6C 0x61 0x79
0x69 0x6E 0x67 0x20 0x79 0x6F 0x75 0x72 0x20 0x66
0x61 0x76 0x6F 0x75 0x72 0x69 0x74 0x65 0x20 0x6D
0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20
0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20
0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20
0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20
0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20
0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20
0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20
0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20
0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x20
0x20 0x20 0x20 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1A
Dl	0x01
Data1	Request information source:
	0xF0 – DAB
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1A
Ac	Answer code
Dl	Data length, fixed to 128 bytes (ASCII characters)
Data1 – Data<n>	The radio programme type in ASCII characters. The data is padded to 128 bytes with the space character (0x20)
Et	0x0D

Request preset details (0x1B)

Request details of tuner presets.

Example

Command/response sequence to request preset 1 where the response is a preset on DAB called "DAB STATION 2":

Command:	0x21 0x01 0x1B 0x01 0x01 0x0D
Response:	0x21 0x01 0x1B 0x00 0x0F 0x01 0x02 0x44 0x41 0x42
	0x20 0x53 0x54 0x41 0x54 0x49 0x4F 0x4E 0x20 0x32
	0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1B
Dl	0x01
Data	0x01- 0x32: (1-50) The number of the required preset
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1B
Ac	Answer code
Dl	Data length <n>
Data1	0x01- 0x32: (1-50) The number of the requested preset
Data2	0x01 : FM frequency
	0x02 : FM RDS name
	0x03 : DAB (AVR450/750 only)
Data3	FM: New frequency (MHz)
Data4	FM: New frequency (10'skHz)
Data<n>	The name (DAB, FM if RDS)
	in ASCII characters
Et	0x0D

Network Command Specifications

Network playback status (0x1C)

Network message format.

If the network is not selected on the given zone an error 0x85 is returned.

Example

Command/response sequence where the network module is playing a file "File. mp3" on zone 1:

Command:	0x21 0x01 0x1C 0x01 0xF0 0x0D
Response:	0x21 0x01 0x1C 0x00 0x09 0x01 0x46 0x69 0x6C 0x65
	0x2e 0x6d 0x70 0x33 0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1C
Dl	0x01
Data	0xF0 – Request Network playback status
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1C
Ac	Answer code
Dl	Data length <n>
Data1	0x00 – Navigating
	0x01 – Playing
	0x02 – Paused
	0xFF - Busy/Not Playing
Data2 –	name of folder in ASCII if navigating
Data<n>	name of file in ASCII if playing or paused
Et	0x0D

Setup Adjustment Command Specifications

Treble Equalisaton (0x35)

Adjust the amount of treble equalisation.

Example

Command/response sequence to set the treble to -2dB:

Command:	0x21 0x01 0x35 0x01 0x82 0x0D
Response:	0x21 0x01 0x35 0x00 0x01 0x82 0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x35
Dl	0x01
Data	0x00 — 0x0C – Set treble to 0dB — +12dB
	0x81 — 0x8C – Set treble to -1dB — -12dB
	0xF0 – Request current treble value
	0xF1 – Increment treble by 1dB
	0xF2 – Decrement treble by 1dB
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x35
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x0C – Treble is 0dB — +12dB
	0x81 — 0x8C – Treble is -1dB — -12dB
Et	0x0D

Bass Equalisation (0x36)

Adjust the amount of bass equalisation.

Example

Command/response sequence to increase the bass EQ by 1dB when it was 0dB:

Command:	0x21 0x01 0x36 0x01 0xF1 0x0D
Response:	0x21 0x01 0x36 0x00 0x01 0x01 0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x36
Dl	0x01
Data	0x00 — 0x0C – Set bass to 0dB — +12dB
	0x81 — 0x8C – Set bass to -1dB — -12dB
	0xF0 – Request current bass value
	0xF1 – Increment bass by 1dB
	0xF2 – Decrement bass by 1dB
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x36
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x0C – Bass is 0dB — +12dB
	0x81 — 0x8C – Bass is -1dB — -12dB
Et	0x0D

Room Equalisation (0x37)

Turn the room equalisation system on/off.

Example

Command/response sequence to turn the room equalisation system on:

Command:	0x21 0x01 0x37 0x01 0xF1 0x0D
Response:	0x21 0x01 0x37 0x00 0x01 0x01 0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x37
Dl	0x01
Data	0xF0 – Request current Room EQ state
	0xF1 – Room EQ on
	0xF2 – Room EQ off
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x37
Ac	Answer code
Dl	0x01
Data1	0x00 – Room EQ is off
	0x01 – Room EQ is on
	0x02 – Room EQ has not been calculated and is therefore off
Et	0x0D

Dolby Volume (0x38)

Control the status of the Dolby volume system.

Example

Command/response sequence to turn the Dolby Volume system on:

Command: 0x21 0x01 0x38 0x01 0x01 0x0D
Response: 0x21 0x01 0x38 0x00 0x01 0x02 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x38
Dl	0x01
Data	0x00 – Dolby Volume off
	0x01 – Dolby Volume on
	0xF0 – Request current Dolby Volume mode
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x38
Ac	Answer code
Dl	0x01
Data1	0x00 – Dolby Volume is off
	0x01 – Dolby Volume is on
Et	0x0D

Dolby Leveller (0x39)

Control the status of the leveller component of the Dolby volume system.

Example

Command/response sequence to set the Dolby Leveller to 5:

Command: 0x21 0x01 0x39 0x01 0x05 0x0D
Response: 0x21 0x01 0x39 0x00 0x01 0x05 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x39
Dl	0x01
Data	0x00 — 0x0A – Set Dolby Leveller to 0 — 10
	0xF0 – Request current Dolby Leveller setting
	0xF1 – Increment Dolby Leveller setting
	0xF2 – Decrement Dolby Leveller setting
	0xFF – Turn off Dolby Leveller
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x39
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x0A – Dolby Leveller setting is 0 — 10
	0xFF – Dolby Leveller is off
Et	0x0D

Dolby Volume Calibration Offset (0x3A)

Adjust the calibration offset of the Dolby volume system.

Example

Command/response sequence to set the calibration offset to -5dB:

Command: 0x21 0x01 0x3A 0x01 0x85 0x0D
Response: 0x21 0x01 0x3A 0x00 0x01 0x85 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3A
Dl	0x01
Data	0x00 — 0x0F – Set the calibration offset to 0 — 15dB
	0x80 — 0x8F – Set the calibration offset to -1 — -15dB
	0xF0 – Request current calibration offset
	0xF1 – Increment the calibration offset by 1dB
	0xF2 – Decrement the calibration offset by 1dB
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3A
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x0F – Calibration offset is 0 — 15dB
	0x80 — 0x8F – Calibration offset is -1 — -15dB
Et	0x0D

Balance (0x3B)

Adjust the balance control.

Example

Command/response sequence to set the balance to -3:

Command: 0x21 0x01 0x3B 0x01 0x83 0x0D
Response: 0x21 0x01 0x3B 0x00 0x01 0x83 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3B
Dl	0x01
Data	0x00 — 0x06 – Set the balance to 0 — 6
	0x81 — 0x86 – Set the balance to -1 — -6
	0xF0 – Request current balance
	0xF1 – Increment the balance by 1dB
	0xF2 – Decrement the balance by 1dB
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3B
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x06 – Balance is 0 — 6
	0x81 — 0x86 – Balance is -1 — -6
Et	0x0D

Dolby PLII/x Music Dimension (0x3C)

Adjust the 'Dimension' parameter of the Dolby PLII/x Music processor.

Example

Command/response sequence to set the dimension to -1:

Command: 0x21 0x01 0x3C 0x01 0x81 0x0D
Response: 0x21 0x01 0x3C 0x00 0x01 0x81 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3C
Dl	0x01
Data	0x00 — 0x03 – Set the Dolby PLII/x Music Dimension parameter to 0 — 3
	0x81 — 0x83 – Set the Dolby PLII/x Music Dimension parameter to -1 — -3
	0xF0 – Request current Dolby PLII/x Music Dimension setting
	0xF1 – Increment the Dolby PLII/x Music Dimension
	0xF2 – Decrement the Dolby PLII/x Music Dimension
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3C
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x03 – The Dolby PLII/x Music Dimension parameter is 0 — 3
	0x81 — 0x83 – The Dolby PLII/x Music Dimension parameter is -1 — -3
Et	0x0D

Dolby PLII/x Music Centre Width (0x3D)

Adjust the 'Centre Width' parameter of the Dolby PLII/x music processor.

Example

Command/response sequence to set the centre width to 3:

Command: 0x21 0x01 0x3D 0x01 0x03 0x0D
Response: 0x21 0x01 0x3D 0x00 0x01 0x03 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3D
Dl	0x01
Data	0x00 — 0x07 – Set the Dolby PLII/x Music Centre Width parameter to 0 — 7
	0xF0 – Request current Dolby PLII/x Music Centre Width setting
	0xF1 – Increment the Dolby PLII/x Music Centre Width
	0xF2 – Decrement the Dolby PLII/x Music Centre Width
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3D
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x07 – The Dolby PLII/x Music Centre Width parameter is 0 — 7
Et	0x0D

Dolby PLII/x Music Panorama (0x3E)

Turn on/off the Panorama setting of the Dolby PLII/x Music processor.

Example

Command/response sequence to turn Dolby PLII/x Music Panorama on:

Command:	0x21 0x01 0x3E 0x01 0xF1 0x0D
Response:	0x21 0x01 0x3E 0x00 0x01 0xF1 0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3E
Dl	0x01
Data	0xF0 – Request current Dolby PLII/x Music Panorama setting
	0xF1 – Set Dolby PLII/x Music Panorama on
	0xF2 – Set Dolby PLII/x Music Panorama off
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3E
Ac	Answer code
Dl	0x01
Data1	0x00 – Dolby PLII/x Music Panorama is off
	0x01 – Dolby PLII/x Music Panorama is on
Et	0x0D

Subwoofer Trim (0x3F)

Adjust the value of subwoofer trim.

Example

Command/response sequence to set the subwoofer trim to -1.5dB:

Command:	0x21 0x01 0x3F 0x01 0x85 0x0D
Response:	0x21 0x01 0x3F 0x00 0x01 0x85 0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3F
Dl	0x01
Data	0x00 — 0x14 – Set positive subwoofer trim in 0.5dB steps (e.g. 0x02 = +1.0dB)
	0x81 — 0x94 – Set negative sub. trim in 0.5dB steps (e.g. 0x82 = -1.0dB)
	0xF0 – Request current subwoofer trim value
	0xF1 – Increment the subwoofer trim by 1dB
	0xF2 – Decrement the subwoofer trim by 1dB
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3F
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x14 – Positive subwoofer trim in 0.5dB steps (e.g. 0x02 = +1.0dB)
	0x81 — 0x94 – Negative subwoofer trim in 0.5dB steps (e.g. 0x82 = -1.0dB)
Et	0x0D

Lipsync Delay (0x40)

Adjust the lipsync delay value.

Example

Command/response sequence to set the lipsync delay to 50ms:

Command:	0x21 0x01 0x40 0x01 0x0A 0x0D
Response:	0x21 0x01 0x40 0x00 0x01 0x0A 0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x40
Dl	0x01
Data	0x00 — 0x32 – set the lipsync delay in 5ms steps (e.g. 0x08 = 40ms)
	0xF0 – Request current lipsync delay value
	0xF1 – Increment the lipsync delay by 5ms
	0xF2 – Decrement the lipsync delay by 5ms
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x40
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x32 – the lipsync delay in 5ms steps (e.g. 0x10 = 80ms)
Et	0x0D

Compression (0x41)

Adjust the dynamic range compression setting.

Example

Command/response sequence to set compression to medium:

Command:	0x21 0x01 0x41 0x01 0x01 0x0D
Response:	0x21 0x01 0x41 0x00 0x01 0x01 0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x41
Dl	0x01
Data	0x00 – Compression off
	0x01 – Set compression to medium
	0x02 – Set compression to high
	0xF0 – Request current compression setting
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x41
Ac	Answer code
Dl	0x01
Data1	0x00 – Compression off
	0x01 – medium
	0x02 – high
Et	0x0D

Request incoming video parameters (0x42)

Request the incoming video resolution, refresh rate and aspect ratio.

Example

Command/response sequence to request video parameters, where the video is 1280x720 (720p) 50Hz 16:9:

Command: 0x21 0x01 0x42 0x01 0xF0 0x0D

Response: 0x21 0x01 0x42 0x00 0x07 0x05 0x00 0x02 0xD0 0x32 0x00 0x02 0x0D

COMMAND:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x42
Dl	0x01
Data	0xF0 – Request incoming video parameters
Et	0x0D

RESPONSE:

Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x42
Ac	Answer code
Dl	0x07
Data1	Horizontal resolution MSB (e.g. for 720p: 0x05 since 1280 = 0x0500)
Data2	Horizontal resolution LSB (e.g. for 720p: 0x00 since 1280 = 0x0500)
Data3	Vertical resolution MSB (e.g. for 720p: 0x02 since 720 = 0x02D0)
Data4	Vertical resolution LSB (e.g. for 720p: 0xD0 since 720 = 0x02D0)
Data5	Refresh rate for full image update (half the field rate for interlaced signals) (e.g. for 50Hz progressive: 0x32)
Data6	Interlaced flag:
	0x00 – Progressive
	0x01 – Interlaced
Data7	Aspect ratio:
	0x00 – Undefined
	0x01 – 4:3
	0x02 – 16:9
Et	0x0D

Request incoming audio format (0x43)

Request the incoming audio format.

Example

Command/response sequence to request the incoming audio format, where the format is Dolby Digital 5.1:

Command: 0x21 0x01 0x43 0x01 0xF0 0x0D
Response: 0x21 0x01 0x43 0x00 0x02 0x02 0x1A 0xD0

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x43
Dl	0x01
Data	0xF0 – Request incoming audio format
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x43
Ac	Answer code
Dl	0x02
Data1	Audio stream format:
	0x00 – PCM
	0x01 – Analogue Direct
	0x02 – Dolby Digital
	0x03 – Dolby Digital EX
	0x04 – Dolby Digital Surround
	0x05 – Dolby Digital Plus
	0x06 – Dolby Digital True HD
	0x07 – DTS
	0x08 – DTS 96/24
	0x09 – DTS ES Matrix
	0x0A – DTS ES Discrete
	0x0B – DTS ES Matrix 96/24
	0x0C – DTS ES Discrete 96/24
	0x0D – DTS HD Master Audio
	0x0E – DTS HD High Res Audio
	0x0F – DTS Low Bit Rate
	0x10 – DTS Core
	0x13 – PCM Zero
	0x14 – Unsupported
	0x15 – Undetected
Data2	Audio channel configuration:
	0x00 – Dual Mono
	0x01 – Centre only
	0x02 – Stereo only
	0x03 – Stereo + mono surround
	0x04 – Stereo + Surround L & R
	0x05 – Stereo + Surround L & R + mono Surround Back
	0x06 – Stereo + Surround L & R + Surround Back L & R
	0x07 – Stereo + Surround L & R containing matrix information for surround back L&R
	0x08 – Stereo + Centre
	0x09 – Stereo + Centre + mono surround
	0x0A – Stereo + Centre + Surround L & R
	0x0B – Stereo + Centre + Surround L & R + mono Surround Back
	0x0C – Stereo + Centre + Surround L & R + Surround Back L & R
	0x0D – Stereo + Centre + Surround L & R containing matrix information for surround back L&R
	0x0E – Stereo Downmix Lt Rt
	0x0F – Stereo Only (Lo Ro)
	0x10 – Dual Mono + LFE
	0x11 – Centre + LFE
	0x12 – Stereo + LFE
	0x13 – Stereo + single surround + LFE
	0x14 – Stereo + Surround L & R + LFE
	0x15 – Stereo + Surround L & R + mono Surround Back + LFE
	0x16 – Stereo + Surround L & R + Surround Back L & R + LFE
	0x17 – Stereo + Surround L & R + LFE
	0x18 – Stereo + Centre + LFE containing matrix information for surround back L&R
	0x19 – Stereo + Centre + single surround + LFE
	0x1A – Stereo + Surround L & R + LFE (Standard 5.1)
	0x1B – Stereo + Centre + Surround L & R + mono Surround Back + LFE (6.1, e.g. DTS ES Discrete)
	0x1C – Stereo + Centre + Surround L & R + Surround Back L & R + LFE (7.1)
	0x1D – Stereo + Centre + Surround L & R + LFE, containing matrix information for surround back L&R (6.1 e.g. Dolby Digital EX)
	0x1E – Stereo Downmix (Lt Rt) + LFE
	0x1F – Stereo Only (Lo Ro) + LFE
	0x20 – Unknown
	0x21 – Undetected
Et	0x0D

Request incoming audio sample rate (0x44)

Request the incoming audio sample rate.

Example

Command/response sequence to request the incoming audio sample rate, where the rate is 48kHz:

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 audio sample rate
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x44
Ac	Answer code
Dl	0x01
Data1	Incoming audio sample rate:
	0x00 – 32 KHz
	0x01 – 44.1 KHz
	0x02 – 48 KHz
	0x03 – 88.2 KHz
	0x04 – 96 KHz
	0x05 – 176.4 KHz
	0x06 – 192 KHz
	0x07 – Unknown
	0x08 – Undetected
Et	0x0D

Set/Request Sub Stereo Trim (0x45)

Set/Request the subwoofer trim value for stereo mode.

Example

Command/response sequence to set the sub stereo trim to -1.5dB:

Command: 0x21 0x01 0x45 0x01 0x83 0x0D
Response: 0x21 0x01 0x45 0x00 0x01 0x83 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x45
Dl	0x01
Data	0x00 – set the Sub Stereo Trim value to 0dB
	0x81 — 0x94 – set the Sub Stereo Trim value to -0.5dB — -10.00dB
	0xF0 – Request Sub Stereo Trim value
	0xF1 – Increment Sub Stereo Trim value by 0.5dB
	0xF2 – Decrement Sub Stereo Trim value by 0.5dB
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x45
Ac	Answer code
Dl	0x01
Data1	0x00, 0x81 — 0x94 – Sub Stereo Trim value in -0.5dB steps
Et	0x0D

Set/Request Brightness (0x46)

Set/Request the brightness control value.

Example

Command/response sequence to set the brightness to -4:

Command: 0x21 0x01 0x46 0x01 0x84 0x0D
Response: 0x21 0x01 0x46 0x00 0x01 0x84 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x46
Dl	0x01
Data	0x00 — 0x32 – set the Brightness value to 0 — 50.
	0x81 — 0xB2 – set the Brightness value to -1 — -50.
	0xF0 – Request the current Brightness value.
	0xF1 – Increment Brightness value by 1.
	0xF2 – Decrement Brightness value by 1.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x46
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x32 – Brightness value 0 — 50
	0x81 — 0xB2 – Brightness value -1 — -50
Et	0x0D

Set/Request Contrast (0x47)

Set/Request the contrast control value.

Example

Command/response sequence to set the contrast to 4:

Command: 0x21 0x01 0x47 0x01 0x04 0x0D

Response: 0x21 0x01 0x47 0x00 0x01 0x04 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x47
Dl	0x01
Data	0x00 — 0x32 – set the Contrast value to 0 — 50.
	0x81 — 0xB2 – set the Contrast value to -1 — -50.
	0xF0 – Request the current Contrast value.
	0xF1 – Increment Contrast value by 1.
	0xF2 – Decrement Contrast value by 1.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x47
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x32 – Contrast value 0 — 50
	0x81 — 0xB2 – Contrast value -1 — -50
Et	0x0D

Set/Request Colour (0x48)

Set/Request the colour control value.

Example

Command/response sequence to increment the colour value, where the value becomes +3:

Command: 0x21 0x01 0x48 0x01 0xF1 0x0D

Response: 0x21 0x01 0x48 0x00 0x01 0x03 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x48
Dl	0x01
Data	0x00 — 0x32 – set the Colour value to 0 — 50.
	0x81 — 0xB2 – set the Colour value to -1 — -50.
	0xF0 – Request the current Colour value.
	0xF1 – Increment Colour value by 1.
	0xF2 – Decrement Colour value by 1.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x48
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x32 – Colour value 0 — 50
	0x81 — 0xB2 – Colour value -1 — -50
Et	0x0D

Set/Request Film Mode (0x49)

Set/Request the Film Mode.

Example

Command/response sequence to request the current fim mode, where the mode is auto:

Command: 0x21 0x01 0x49 0x01 0xF0 0x0D

Response: 0x21 0x01 0x49 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x49
Dl	0x01
Data	0x00 – Set Film Mode to Auto.
	0x01 – Set Film Mode to Off.
	0xF0 – Request current FIlm Mode.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x49
Ac	Answer code
Dl	0x01
Data1	0x00 – Picture Film is Auto.
	0x01 – Picture Film is Off.
Et	0x0D

Set/Request Edge Enhancement (0x4A)

Set/Request the Edge Enhancement value.

Example

Command/response sequence to set the Edge Enhancement value to 10:

Command: 0x21 0x01 0x4A 0x01 0x0A 0x0D

Response: 0x21 0x01 0x4A 0x00 0x01 0x0A 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x4A
Dl	0x01
Data	0x00 — 0x32 – Set the Edge Enhancement value to 0 — 50.
	0xF0 – Request current Edge Enhancement value.
	0xF1 – Increment Edge Enhancement value by 1.
	0xF2 – Decrement Edge Enhancement value by 1.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x4A
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x32 – Edge Enhancement value to 0 — 50.
Et	0x0D

Set/Request Noise Reduction (0x4C)

Set/Request the Noise Reduction value.

Example

Command/response sequence to set the Noise Reduction value to 'Low':

Command: 0x21 0x01 0x4C 0x01 0x01 0x0D

Response: 0x21 0x01 0x4C 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x4C
Dl	0x01
Data	0x00 – Set Noise Reduction to Off.
	0x01 – Set to Noise Reduction to Low.
	0x02 – Set Noise Reduction to Medium.
	0x03 – Set Noise Reduction to High.
	0xF0 – Request current Noise Reduction value.
	0xF1 – Increment Noise Reduction value by 1.
	0xF2 – Decrement Noise Reduction value by 1.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x4C
Ac	Answer code
Dl	0x01
Data1	0x00 – Noise Reduction is Off.
	0x01 – Noise Reduction is Low.
	0x02 – Noise Reduction is Medium.
	0x03 - Noise Reduction is High.
Et	0x0D

Set/Request MPEG Noise Reduction (0x4D)

Set/Request the MPEG Noise Reduction value.

Example

Command/response sequence to set the MPEG Noise Reduction value to 'Off':

Command: 0x21 0x01 0x4A 0x01 0x00 0x0D
Response: 0x21 0x01 0x4A 0x00 0x00 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x4D
Dl	0x01
Data	0x00 – Set MPEG Noise Reduction to Off.
	0x01 – Set to MPEG Noise Reduction to Low.
	0x02 – Set MPEG Noise Reduction to Medium.
	0x03 – Set MPEG Noise Reduction to High.
	0xF0 – Request current MPEG Noise Reduction value.
	0xF1 – Increment MPEG Noise Reduction value by 1.
	0xF2 – Decrement MPEG Noise Reduction value by 1.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x4D
Ac	Answer code
Dl	0x01
Data1	0x00 – MPEG Noise Reduction is Off.
	0x01 – MPEG Noise Reduction is Low.
	0x02 – MPEG Noise Reduction is Medium.
	0x03 – MPEG Noise Reducton is High.
Et	0x0D

Set/Request Zone 1 OSD on/off (0x4E)

Set/Request whether the Zone 1 OSD is shown.

Example

Command/response sequence to set the Zone 1 OSD to 'Off':

Command: 0x21 0x01 0x4A 0x01 0xF2 0x0D
Response: 0x21 0x01 0x4A 0x00 0x00 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x4E
Dl	0x01
Data	0xF0 – Request current Zone 1 OSD on/off state.
	0xF1 – Set Zone 1 OSD to On.
	0xF2 – Set Zone 1 OSD to Off.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x4E
Ac	Answer code
Dl	0x01
Data1	0x00 – Zone 1 OSD is On.
	0x01 – Zone 1 OSD is Off.
Et	0x0D

Set/Request Video Output Switching (0x4F)

Set/Request the HDMI video output selection.

Example

Command/response sequence to set the video output to HDMI output 1:

Command: 0x21 0x01 0x4F 0x01 0x02 0x0D
Response: 0x21 0x01 0x4F 0x00 0x01 0x02 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x4F
Dl	0x01
Data	0x02 – Set HDMI Output 1.
	0x03 – Set HDMI Output 2.
	0x04 – Set HDMI Output 1 & 2.
	0xF0 – Request current video output switching setting.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x4F
Ac	Answer code
Dl	0x01
Data1	0x02 – HDMI Output 1.
	0x03 – HDMI Output 2.
	0x04 – HDMI Output 1 & 2.
Et	0x0D

Set/Request Output Frame Rate (0x50)

Set/Request the video output frame rate.

Example

Command/response sequence to set the frame rate to Auto:

Command: 0x21 0x01 0x50 0x01 0x00 0x0D
Response: 0x21 0x01 0x50 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x50
Dl	0x01
Data	0x00 – Set the frame rate to Auto.
	0x01 – Set the frame rate to follow the source.
	0x02 – Set the frame rate to 50Hz.
	0x03 – Set the frame rate to 60Hz.
	0xF0 – Request the current frame rate.
	0xF1 – Increment setting.
	0xF2 – Decrement setting.
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone Number
Cc	0x50
Ac	Answer code
Dl	0x01
Data1	0x00 – Auto.
	0x01 – Frame rate is set to follow the source.
	0x02 – 50Hz.
	0x03 – 60Hz.
Et	0x0D

RS232 v2.0 commands

Set/request input name (0x20)

This command returns the name of an input if renamed by the user. It can also be used to set the input name.

Example

Command/response sequence for setting the current input to "BDP300":

Command: 0x21 0x01 0x20 0x06 0x42 0x44 0x50 0x33 0x30 0x30 0x0D

Response: 0x20 0x01 0x20 0x00 0x06 0x42 0x44 0x50 0x33 0x30 0x30 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x20
Dl	0x01 (query) or <n> (limited to 10 characters) for setting name
Data	F0 - query
	1-<n>
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone Number
Cc	0x20
Ac	Answer code
Dl	Data length - <n> if setting, 0x0A if requesting the name
Data1 - Data <n>	Input name in ASCII characters
Et	0x0D

FM Scan up/down (0x23)

Initiates a FM scan up or down. Note: only valid if on FM input

Example

Command/response to starting a FM scan up:

Command: 0x21 0x01 0x23 0x01 0x01 0x0D

Response: 0x21 0x01 0x23 0x00 0x01 0xFF 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x23
Dl	0x01
Data	0x01 - Scan up
	0x02 - Scan down
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone Number
Cc	0x23
Ac	Answer code
Dl	0x01
Data1	0xFF - scanning
Et	0x0D

DAB Scan (0x24)

Initiates a DAB scan. Note: only valid if on DAB input

Example

Command/response to starting a DAB scan:

Command: 0x21 0x01 0x24 0x01 0xF0 0x0D

Response: 0x21 0x01 0x24 0x00 0x01 0xFF 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x24
Dl	0x01
Data	0xF0 - Start DAB scan
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone Number
Cc	0x24
Ac	Answer code
Dl	0x01
Data1	0xFF - scanning
Et	0x0D

Heartbeat (0x25)

Heartbeat command to check unit is still connected and communication - also resets the EuP standby timer.

Example

Command/response to sending a heartbeat command:

Command: 0x21 0x01 0x25 0x01 0xF0 0x0D

Response: 0x21 0x01 0x25 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x25
Dl	0x01
Data	0xF0 - Heartbeat
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone Number
Cc	0x25
Ac	Answer code
Dl	0x01
Data1	0x00 - response
Et	0x0D

Reboot (0x26)

Forces a reboot of the unit.

Example

Command/response to sending a reboot command:

Command: 0x21 0x01 0x26 0x06 0x52 0x45 0x42 0x4F 0x4F 0x54 0x0D

Response: 0x21 0x01 0x26 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x26
Dl	0x06
Data1	0x52
Data2	0x45
Data3	0x42
Data4	0x4F
Data5	0x4F
Data6	0x54
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone Number
Cc	0x26
Ac	Answer code
Dl	0x01
Data1	0x00 - response
Et	0x0D

AVR380/450/750 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 control data using the 'Simulate RC5 IR Command' (0x 08).

Basic Functions

These RC5 codes are present on the supplied IR remote control and provide control over basic amplifier and video processing functions.

Function	RC5 code [system-command] Decimal	RC5 code (Data1 - Data2) Hexadecimal
Standby	16-12*	0x10 - 0x0C*
Select STB	16-1	0x10 - 0x01
Select AV	16-2	0x10 - 0x02
Select Tuner	16-3	0x10 - 0x03
Select BD	16-4	0x10 - 0x04
Select Game	16-5	0x10 - 0x05
Select VCR	16-6	0x10 - 0x06
Select CD	16-7	0x10 - 0x07
Select Aux	16-8	0x10 - 0x08
Select Audio Return Channel (Display)	16-9	0x10 - 0x09
Select SAT	16-0	0x10 - 0x00
Select PVR	16-34	0x10 - 0x22
Select USB	16-18	0x10 - 0x12
Select NET	16-11	0x10 - 0x0B
Navigate Up	16-86	0x10 - 0x56
Navigate Left	16-81	0x10 - 0x51
OK	16-87	0x10 - 0x57
Navigate Right	16-80	0x10 - 0x50
Navigate Down	16-85	0x10 - 0x55
Cycle between decoding modes (MODE)	16-32	0x10 - 0x20
Enter system menu (MENU)	16-82	0x10 - 0x52
Mute	16-13	0x10 - 0x0D
Change VFD brightness (DISP)	16-59	0x10 - 0x3B
Decrease volume (-)	16-17	0x10 - 0x11
Increase volume (+)	16-16	0x10 - 0x10
Activate DIRECT mode	16-10	0x10 - 0x0A
Room EQ on/off / NET "Now Playing" screen / iPod Play/Pause	16-30	0x10 - 0x1E
Toggle Dolby Volume on/off / NET & iPod Play/Pause	16-70	0x10 - 0x46
Access Bass control	16-39	0x10 - 0x27
Access Speaker Trim controls	16-37	0x10 - 0x25
Access Lipsync Delay control / NET & iPod Stop	16-50	0x10 - 0x32
Access Subwoofer Trim control	16-51	0x10 - 0x33
Access Treble control	16-14	0x10 - 0x0E
FAV+	16-41	0x10 - 0x29
FAV-	16-42	0x10 - 0x2A
HOME	16-43	0x10 - 0x2B
Cycle between VFD information panels	16-55	0x10 - 0x37
Change control to next zone	16-95	0x10 - 0x5F
Set selected zone to Follow Zone 1	16-20	0x10 - 0x14
Cycle between output resolutons	16-47	0x10 - 0x2F
Power On	16-123*	0x10 - 0x7B*
Power Off	16-124*	0x10 - 0x7C*

* Note - commands not supported over IP control

Advanced Functions

These RC5 codes are not present on the supplied remote control but have been created for custom install use. In order for the AVR380/450/750 to respond to these codes they must be transmitted from a programmable IR remote control or over the control link using the 'Simulate RC5 IR Command' (0x08).

Function	RC5 Code [system-command] Decimal	RC5 Code (Data1 - Data2) Hexadecimal
Random	16 - 48	0x10 - 0x30
Repeat	16 - 49	0x10 - 0x31
Direct mode On	16-78	0x10 - 0x4E
Direct mode Off	16-79	0x10 - 0x4F
Dolby PL II / IIx Game	16-102	0x10 - 0x66
Dolby PL II / IIx Movie	16-103	0x10 - 0x67
Dolby PL II / IIx Music	16-104	0x10 - 0x68
Multi Channel	16-106	0x10 - 0x6A
Stereo	16-107	0x10 - 0x6B
Dolby PL	16-110	0x10 - 0x6E
DTS Neo:6 Cinema	16-111	0x10 - 0x6F
DTS Neo:6 Music	16-112	0x10 - 0x70
5/7 Ch Stereo	16-69	0x10 - 0x45
Dolby D EX	16-118	0x10 - 0x76
Mute On	16-119	0x10 - 0x77
Mute Off	16-120	0x10 - 0x78
NET	16-53	0x10 - 0x35
FM	16-54	0x10 - 0x36
DAB (AVR450/750 only)	16-72	0x10 - 0x48
Video STB-CVBS	16-58	0x10 - 0x3A
Video PVR-CVBS	16-60	0x10 - 0x3C
Video BD-CVBS	16-62	0x10 - 0x3E
Video Game-CVBS	16-71	0x10 - 0x47
Video AV-Component	16-83	0x10 - 0x53
Video SAT-Component	16-88	0x10 - 0x58
Video BD-Component	16-89	0x10 - 0x59
Video VCR-HDMI	16-90	0x10 - 0x5A
Video AV-HDMI	16-91	0x10 - 0x5B
Video PVR-HDMI	16-92	0x10 - 0x5C
Video SAT-HDMI	16-93	0x10 - 0x5D
Video BD-HDMI	16-94	0x10 - 0x5E
Video GAME-HDMI	16-67	0x10 - 0x43
Video STB- HDMI	16-68	0x10 - 0x44
Lip Sync +5ms	16-100	0x10 - 0x64
Lip sync -5ms	16-101	0x10 - 0x65
Sub trim +0.5dB	16-105	0x10 - 0x69
Sub trim -0.5dB	16-108	0x10 - 0x6C
Dolby PLII/x Music Centre +1	16-109	0x10 - 0x6D
Dolby PLII/x Music Centre -1	16-113	0x10 - 0x71
Dolby PLII/x Music Dim. +1	16-114	0x10 - 0x72
Dolby PLII/x Music Dim. -1	16-115	0x10 - 0x73
Dolby PLII/x Panorama On	16-116	0x10 - 0x74
Dolby PLII/x Panorama Off	16-117	0x10 - 0x75
Video out Preferred/Best	16-125	0x10 - 0x7D
Video out SD Prog	16-15	0x10 - 0x0F
Video out 720p	16-23	0x10 - 0x17
Video out 1080i	16-26	0x10 - 0x1A
Video out 1080p	16-27	0x10 - 0x1B
Video out 4k	16-76	0x10 - 4C
Video out Bypass	16-28	0x10 - 0x1C

Function	RC5 Code [system-command] Decimal	RC5 Code (Data1 - Data2) Hexadecimal
Frame Rate Auto	16-63	0x10 - 0x3F
Frame Rate 50	16-64	0x10 - 0x40
Frame Rate 60	16-65	0x10 - 0x41
Frame Rate 'Follow Input'	16-66	0x10 - 0x42
Display Off	16-31	0x10 - 0x1F
Display L1	16-33	0x10 - 0x21
Display L2	16-35	0x10 - 0x23
Balance left	16-38	0x10 - 0x26
Balance right	16-40	0x10 - 0x28
Bass +1	16-44	0x10 - 0x2C
Bass -1	16-45	0x10 - 0x2D
Treble +1	16-46	0x10 - 0x2E
Treble -1	16-98	0x10 - 0x62
Zone	16-95	0x10 - 0x5F
Zone 2 Power On	23-123	0X17 - 0x7B
Zone 2 Power Off	23-124	0x17 - 0x7C
Zone 2 Vol+	23-1	0x17 - 0x01
Zone 2 Vol-	23-2	0x17 - 0x02
Zone 2 Mute	23-3	0x17 - 0x03
Zone 2 Mute On	23-4	0x17 - 0x04
Zone 2 Mute Off	23-5	0x17 - 0x05
Zone 2 CD	23-6	0x17 - 0x06
Zone 2 BD	23-7	0x17 - 0x07
Zone 2 STB	23-8	0x17 - 0x08
Zone 2 AV	23-9	0x17 - 0x09
Zone 2 Game	23-11	0x17 - 0x0B
Zone 2 Aux	23-13	0x17 - 0x0D
Zone 2 PVR	23-15	0x17 - 0x0F
Zone 2 FM	23-14	0x17 - 0x0E
Zone 2 DAB (AVR450/750 only)	23-16	0x17 - 0x10
Zone 2 USB	23-18	0x17 - 0x12
Zone 2 NET	23-19	0x17 - 0x13
Select HDMI Out 1	16-73	0x10 - 0x49
Select HDMI Out 2	16-74	0x10 - 0x4A
Select HDMI Out 1 & 2	16-75	0x10 - 0x4B

ARCAM