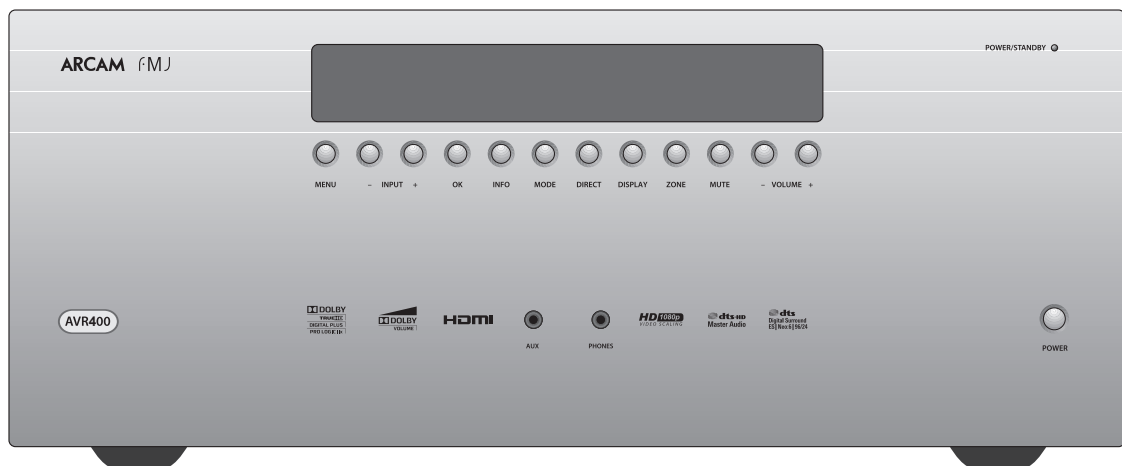


ARCAM

Custom Installation Notes: Serial programming interface and IR remote commands for Arcam AVR400



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Applicability

Publication Reference

This is Arcam technical publication SH235E Issue 1.2 (June 2011).

AVR400 software version

This document applies to AVR400 RS232 protocol version 1.0 as contained within main software version 2.24

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 A.0: First draft release

Issue B.0: Added video bypass, Frame Rate Auto & Frame Rate 'Follow Input' RC5 IR commands.

Issue C.0: Corrections to Software Version, clarification to several commands.

Issue D.0: Removed direct video select IR commands.

 Added press-and-hold DIRECT to enable RS232

 Various corrections according to Anam comments 06-12-2010

Issue E.0: Corrected response to command 0x50 Output Frame Rate.

Issue F.0: Added direct video select IR commands

Issue 1.0: Corrected version numbers. Production release.

Issue 1.1: Corrections to document errors for volume command

Issue 1.2: Updated commands 0x18, 0x19 & 0x1A following bugfixes in software version 2.24

Controlling the AVR400 via RS232

Introduction

This document describes the remote control protocol for controlling the AVR400 via the RS232 interface. The AVR400 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 7 for details of this command. The RC5 IR code set is listed from page 28.

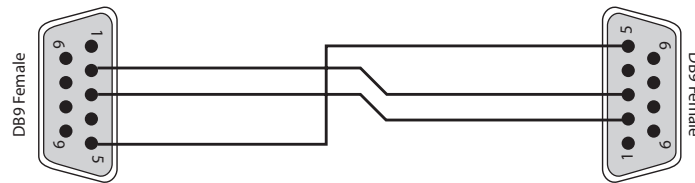
Set-up

The AVR400 must be correctly configured for RS232 remote control; by default, RS232 control is disabled for minimum standby power consumption. RS232 can be enabled using the front panel: press and hold the front panel **DIRECT** button for 4 seconds until "RS232 PORT ON" is displayed on the VFD. Alternatively, RS232 can be enabled using the OSD menu. Press **(AMP)** followed by **(MENU)** on the CR102 remote control in order to access the setup menu. Use the cursor keys **(←)**, **(→)**, **(↓)**, **(↑)** and **(OK)** to enter the General Setup menu and locate the option **RS232 Control**. Press **(OK)**, **(↓)** then **(OK)** to change this parameter to 'On'.

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 AVR400 takes the form of sequences of bytes, with all commands and responses having the same basic format. The AVR400 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 AVR400 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.

¹Certain 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 AVR400 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 AVR400 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 AVR400 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”

AVR400 Response:

“AMXB<Device-SDKClass=Receiver><Device-Make=ARCAM><Device-Model=AVR400><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 display of the AVR400.

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 0x03 – Front panel L3
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 AVR400.

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 MCU (main) version 0xF2 – Request Torino (video processor) version 0xF3 – Request DSP version 0xF4 – Request USB version 0xF5 – Request sub MCU 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 AM radio frequency with AM 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 through all displayable information. 0xF0 – Request the current display type If the current source is AM: 0x01 – Set the display to Signal strength 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: 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 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 If the current source is iPod 0x01 – Set the display to Track 0x02 – Set the display to Artist 0x03 - Set the display to Album
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 0x07 - 0x08 - AUX 0x09 - DISPLAY 0x0A - TUNER (AM) 0x0B - TUNER (FM) 0x0C - TUNER (DAB) 0x0D - MCH 0x0E - NET 0x0F - IPOD
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 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/S-video/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 S-video:

Command: 0x21 0x01 0x0C 0x01 0xF0 0x0D
 Response: 0x21 0x01 0x0C 0x00 0x01 0x03 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x0C
Dl	0x01
Data	0x01 – HDMI. 0x02 – Component. 0x03 – S-Video. 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. 0x03 – S-Video. 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 – Pro Logic II / x Movie Mode 0x03 – Pro Logic II / x Music Mode 0x04 – Pro Logic II Matrix 0x05 – Pro Logic II Game 0x06 – Dolby Pro Logic Emulation 0x07 – Neo:6 Cinema 0x08 – Neo:6 Music
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 EX / DTS-ES mode 0x04 – Pro Logic IIx movie mode 0x05 – Pro Logic 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	0x01 – Set resolution to SD Interlaced. 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. 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	0x01 – SD Interlaced. 0x02 – SD Progressive. 0x03 – 720p. 0x04 – 1080i. 0x05 – 1080p 0x06 – 'Preferred' 0x07 – Bypass
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 – iPod 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) or 9/10KHz steps (AM).

The returned frequency is calculated as follows:

AM freq. (kHz) = ((1000's & 100's) * 100) + (10's & 1's)

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	AM: New frequency (1000's & 100's kHz) FM: New frequency (MHz)
Data2	AM: New frequency (10's & 1's kHz) FM: New frequency (10's kHz)
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	0x00 : AM frequency 0x01 : FM frequency 0x02 : FM RDS name 0x03 : DAB
Data3	AM: New frequency (1000's & 100's kHz)
Data4	FM: New frequency (MHz)
Data4	AM: New frequency (10's & 1's kHz)
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 – Data<n>	name of folder in ASCII if navigating name of file in ASCII if playing or paused
Et	0x0D

Setup Adjustment Command Specifications

Treble Equalisation (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 Pro Logic II Dimension (0x3C)

Adjust the 'Dimension' parameter of the Dolby Pro Logic II 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 Pro Logic II Dimension parameter to 0 — 3 0x81 — 0x83 – Set the Pro Logic II Dimension parameter to -1 — -3 0xF0 – Request current Pro Logic II Dimension setting 0xF1 – Increment the Pro Logic II Dimension 0xF2 – Decrement the Pro Logic II Dimension
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3C
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x03 – The Pro Logic II Dimension parameter is 0 — 3 0x81 — 0x83 – The Pro Logic II Dimension parameter is -1 — -3
Et	0x0D

Dolby Pro Logic II Centre Width (0x3D)

Adjust the 'Centre Width' parameter of the Dolby Pro Logic II 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 Pro Logic II Centre Width parameter to 0 — 7 0xF0 – Request current Pro Logic II Centre Width setting 0xF1 – Increment the Pro Logic II Centre Width 0xF2 – Decrement the Pro Logic II Centre Width
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3D
Ac	Answer code
Dl	0x01
Data1	0x00 — 0x07 – The Pro Logic II Centre Width parameter is 0 — 7
Et	0x0D

Dolby Pro Logic II Panorama (0x3E)

Turn on/off the Panorama setting of the Dolby Pro Logic II processor.

Example

Command/response sequence to turn Dolby Pro Logic II 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 Pro Logic II Panorama setting 0xF1 – Set Dolby Pro Logic II Panorama on 0xF2 – Set Dolby Pro Logic II Panorama off
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x3E
Ac	Answer code
Dl	0x01
Data1	0x00 – Dolby Pro Logic II Panorama is off 0x01 – Dolby Pro Logic II 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 – 0x8A – 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 Picture Mode (0x49)

Set/Request the Picture Mode.

Example

Command/response sequence to request the current picture mode, where the picture mode is Video:

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

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x49
Dl	0x01
Data	0x00 – Set Picture Mode to Auto. 0x01 – Set Picture Mode to Video. 0x02 – Set Picture Mode to Film. 0xF0 – Request current Picture Mode. 0xF1 – Increment Picture Mode value by 1. 0xF2 – Decrement Picture Mode value by 1.
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x49
Ac	Answer code
Dl	0x01
Data1	0x00 – Picture Mode is Auto. 0x01 – Picture Mode is Video. 0x02 – Picture Mode is Film.
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.
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 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

AVR400 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).

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]	RC5 code (Data1 - Data2)
	Decimal	Hexadecimal
Standby	16-12	0x10 - 0x0C
Select Phono	16-1	0x10 - 0x01
Select AV	16-2	0x10 - 0x02
Select Tuner	16-3	0x10 - 0x03
Select BD	16-4	0x10 - 0x04
Select Display (Audio Return Channel)	16-5	0x10 - 0x05
Select VCR	16-6	0x10 - 0x06
Select CD	16-7	0x10 - 0x07
Select Aux	16-8	0x10 - 0x08
Select MCH	16-9	0x10 - 0x09
Select SAT	16-0	0x10 - 0x00
Select PVR	16-34	0x10 - 0x22
Random	16-48	0x10 - 0x30
Repeat	16-49	0x10 - 0x31
Select iPod	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
CH- (track back symbol)	16-57	0x10 - 0x39
CH+ (track fwd symbol)	16-56	0x10 - 0x38
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+ / red / Page Up	16-41	0x10 - 0x29
FAV- / green / Page Down	16-42	0x10 - 0x2A
HOME / yellow	16-43	0x10 - 0x2B
Cycle between VFD information panels / blue	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 resolutions	16-47	0x10 - 0x2F
Cycle between aspect ratios (Auto, 16:9, 4:3)	16-19	0x10 - 0x13
Power On	16-123	0x10 - 0x7B
Power Off	16-124	0x10 - 0x7C

Tuner Functions

These RC5 codes are present on the supplied IR remote control and provide control over the tuner sources within the AVR400 system.

Function	RC5 code [system- command]	RC5 code (Data1 - Data2)
	Decimal	Hexadecimal
Numeric entry - 1	17-1	0x11 - 0x01
Numeric entry - 2	17-2	0x11 - 0x02
Numeric entry - 3	17-3	0x11 - 0x03
Numeric entry - 4	17-4	0x11 - 0x04
Numeric entry - 5	17-5	0x11 - 0x05
Numeric entry - 6	17-6	0x11 - 0x06
Numeric entry - 7	17-7	0x11 - 0x07
Numeric entry - 8	17-8	0x11 - 0x08
Numeric entry - 9	17-9	0x11 - 0x09
Numeric entry - 0	17-0	0x11 - 0x00
Navigate Up / Increment Preset	17-86	0x11 - 0x56
Navigate Left / Decrease Tuning	17-78	0x11 - 0x4E
OK / SELECT	17-87	0x11 - 0x57
Navigate Right / Increase Tuning	17-77	0x11 - 0x4D
Navigate Down / Decrement Preset	17-85	0x11 - 0x55
BAND	17-50	0x11 - 0x32
MENU	17-125	0x11 - 0x7D
Change VFD Brightness (DISP)	17-18	0x11 - 0x12
Preset - (CH- / track back symbol)	17-33	0x11 - 0x21
Preset + (CH+ / track fwd symbol)	17-32	0x11 - 0x20
Select AM	17-53	0x11 - 0x35
Select FM	17-52	0x11 - 0x34
Select FM	17-127	0x11 - 0x7F
Select DAB	17-126	0x11 - 0x7E
Page Up (preset list)	17-38	0x11 - 0x26
Page Down (preset list)	17-37	0x11 - 0x25
Delete selected preset	17-41	0x11 - 0x29
Cycle between VFD information panels	17-15	0x11 - 0x0F

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 AVR400 to respond to these codes they must be transmitted from a programmable IR remote control or over RS232 using the 'Simulate RC5 IR Command' (0x08).

Function	RC5 Code [system-command]	RC5 Code (Data1 - Data2)
	Decimal	Hexadecimal
Direct mode On	16-78	0x10 - 0x4E
Direct mode Off	16-79	0x10 - 0x4F
PL II / IIx Game	16-102	0x10 - 0x66
PL II / IIx Movie	16-103	0x10 - 0x67
PL II / IIx Music	16-104	0x10 - 0x68
Multi Channel	16-106	0x10 - 0x6A
Stereo	16-107	0x10 - 0x6B
PL	16-110	0x10 - 0x6E
DTS Neo:6 Cinema	16-111	0x10 - 0x6F
DTS Neo:6 Music	16-112	0x10 - 0x70
Dolby 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
AM	16-52	0x10 - 0x34
DAB	16-72	0x10 - 0x48
Video VCR-CVBS	16-58	0x10 - 0x3A
Video AV-CVBS	16-60	0x10 - 0x3C
Video SAT-CVBS	16-62	0x10 - 0x3E
Video BD-CVBS	16-71	0x10 - 0x47
Video VCR-Svid	16-77	0x10 - 0x4D
Video AV-Svid	16-83	0x10 - 0x53
Video SAT-Svid	16-88	0x10 - 0x58
Video BD-Svid	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
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
PLII Music Centre +1	16-109	0x10 - 0x6D
PLII Music Centre -1	16-113	0x10 - 0x71
PLII Music Dimension +1	16-114	0x10 - 0x72
PLII Music Dimension -1	16-115	0x10 - 0x73
PLII Panorama On	16-116	0x10 - 0x74
PLII 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 Bypass	16-28	0x10 - 0x1C

Function	RC5 Code [system-command]	RC5 Code (Data1 - Data2)
	Decimal	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
Display L3	16-36	0x10 - 0x24
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 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 SAT	23-8	0x17 - 0x08
Zone 2 AV	23-9	0x17 - 0x09
Zone 2 VCR	23-11	0x17 - 0x0B
Zone 2 Aux	23-13	0x17 - 0x0D
Zone 2 FM	23-14	0x17 - 0x0E
Zone 2 AM	23-15	0x17 - 0x0F
Zone 2 DAB	23-16	0x17 - 0x10
Zone 2 iPod	23-18	0x17 - 0x12
Zone 2 NET	23-19	0x17 - 0x13

ARCAM