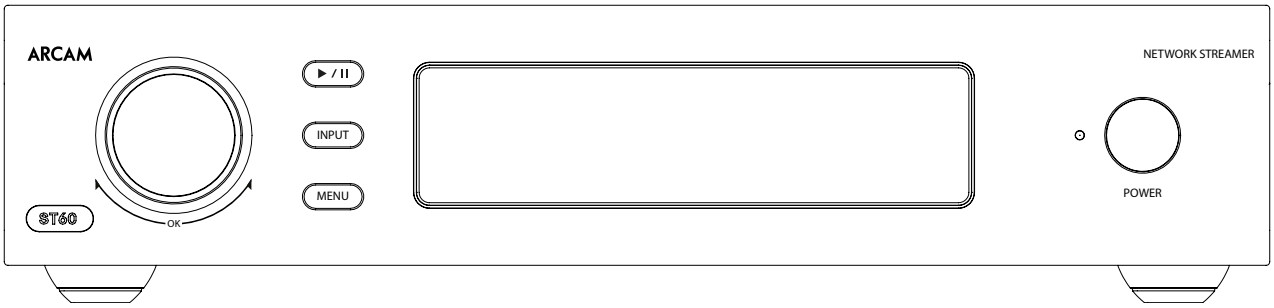
ARCAM

Custom Installation Notes

IP/Serial programming interface and IR remote control commands for the ST60 audio streamer



Contents

Applicability

This document applies to the Arcam ST60 audio streamer

Revision history

Issue A.0:	Initial revision
Issue B.0:	Correct Baud rate, remove unused commands.
Issue C.0:	Friendly name and now playing info encoding changed to UTF-8.

Controlling via RS232/NET

Introduction

This document describes the remote control protocol for controlling via the RS232/NET interface.

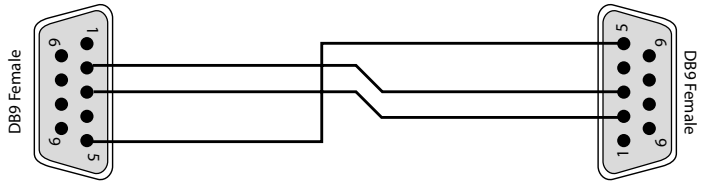
Set-up

IP control is via port 50000 of the IP address of the unit.

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: 115,200bps
- Data format: 8 data bits, 1 stop bit, no parity, no flow control.

Command and response formats

Communication between the remote controller (RC) and the ST60 takes the form of sequences of bytes, with all commands and responses having the same basic format. The ST60 shall always respond to a received command, but may also send messages at other times.

Each transmission by the RC hs 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 Et
- Data: the parameters for the command
- Et (End transmission): 0x0D

Each response by the ST60 has the following format:

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

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

The ST60 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 (see **NOTE** below)
- 0x86 – Invalid data length.

NOTE: 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 ST60 may be changed as a result of user input via front panel or remote. Any change resulting from these inputs is relayed to the RC using the appropriate message type.

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" (increase volume):

St	Zn	Cc	Dl	Data 1	Data 2	Et
0x21	0x01	0x08	0x02	0x10	0x10	0x0D

Assuming that the command was accepted by the ST60 and is being processed, the ST60 responds to this command with the following sequence:

St	Zn	Cc	Ac	Dl	Data 1	Data 2	Et
0x21	0x01	0x08	0x00	0x02	0x10	0x10	0x0D

AMX Duet™ support

The ST60 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"

Response: "AMXB<Device-SDKClass=Amplifier><Device-Make=ARCAM><Device-Model=ST60><Device-Revision=x.y.z>\r"

Where,

x.y.z = RS232 protocol version number.

System Command Specifications

Power (0x00)

Set/request the stand-by state of a zone.

Example

Command/response sequence to request the power state of the unit where the unit 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	0x00 – Power off 0x01 – Power on 0x02 – Power toggle 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 standby 0x01 – Zone is powered on
Et	0x0D

Display brightness (0x01)

Set/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	Zone number
Cc	0x01
Dl	0x01
Data	0x00 – Set brightness to off 0x01 – Set brightness to dim 0x02 – Set brightness to full 0xF0 – Request display brightness
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x01
Ac	Answer code
Dl	0x0
Data	For Display brightness: 0x00 – Display brightness is off 0x01 – Display brightness is dim 0x02 – Display brightness is full 0x03 – Dark mode is on
Et	0x0D

Software version (0x04)

Request the firmware version

Example

Command/response sequence, where the repsonse is HOST version 1.2:

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x04
Dl	0x01
Data	0xF0 – request software version
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x04
Ac	Answer code
Dl	0x02
Data1	Echo data from command
Data2	0x?? – major version number
Data3	0x?? – minor version number
Et	0x0D

Factory reset (0x05)

This command resets the unit to factory defaults.

Example

Command/response sequence for resetting the unit to factory defaults:

Command: 0x21 0x01 0x05 0x02 0xAA 0xAA 0x0D
Response: 0x21 0x01 0x05 0x00 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
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	Zone number
Cc	0x05
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 (volume down):

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

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 45: Data=0x2D (45)

Example

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

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 0xF1 – Increment volume by 1 step 0xF2 – Decrement volume by 1 step
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x0D
Ac	Answer code
Dl	0x01
Data	Zone volume, integer value: 0x00 (0) – 0x63 (99)
Et	0x0D

Mute/unmute (0x0E)

Set/Request the mute status of the output.

Example

Command/response sequence for requesting the mute status of output where the result is unmuted:

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

Response: 0x21 0x01 0x0E 0x00 0x01 0x02 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x0E
Dl	0x01
Data	0x00 – Mute 0x01 – Unmute 0x02 – Mute toggle 0xF0 – Request mute status
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x0E
Ac	Answer code
Dl	0x01
Data	0x00 – Muted 0x01 – Unmuted
Et	0x0D

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.

Command: 0x21 0x01 0x1C 0x01 0xF0 0x0D

Response: 0x21 0x01 0x1C 0x00 0x01 0x01 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	0x01
Data1	0x00 – Stopped 0x01 – Transitioning 0x02 – Playing 0x03 - Paused
Et	0x0D

Current input source (0x1D)

Set/request the current input source.

Example

Command/response sequence to request the current source for Zone 1 where the source is set to 'DIG2':

Command: 0x21 0x01 0x1D 0x01 0xF0 0x0D

Response: 0x21 0x01 0x1D 0x00 0x01 0x02 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1D
Dl	0x01
Data	0x01 – DIG1 0x02 – DIG2 0x03 – DIG3 0x04 – DIG4 0x05 - NET/USB 0xF0 - Request input
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x1D
Ac	Answer code
Dl	0x02
Data	The current source in the indicated zone: 0x01 – DIG1 0x02 – DIG2 0x03 – DIG3 0x04 – DIG4 0x05 - NET/USB
Et	0x0D

Heartbeat (0x25)

Heartbeat command to check unit is still connected and communicating - 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	Zone number
Cc	0x25
Dl	0x01
Data	0xF0 – Heartbeat
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone Number
Cc	0x25
Ac	Answer code
Dl	0x01
Data	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	Zone number
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
Data	0x00 – Response
Et	0x0D

Network (0x30)

Request network info.

Example

Command/response sequence for requesting the IP address, where the address is 192 168 1 1

Command:	0x21 0x01 0x30 0x01 0xF0 0x0D
Response:	0x21 0x01 0x30 0x00 0x04 0xC0 0xA8 0x01 0x010x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x30
Dl	0x01
Data1	0xF0 - Request IP address 0xF1 - Request Wired MAC address 0xF2 - Request WiFi MAC address 0xF3 - Request Friendly name 0xF4 - Request Host Name 0xF5 - Request SSID
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone Number
Cc	0x30
Ac	Answer code
Dl	0x04 (IP), 0x06 (MAC), <n> (Name)
	IP Address
Data1	0x?? First byte of IP address
Data2	0x?? Second byte of IP address
Data3	0x?? Third byte of IP address
Data4	0x?? Forth byte of IP address
	Wired/WiFi MAC Address
Data1	0x?? First byte of MAC address
Data2	0x?? Second byte of MAC address
Data3	0x?? Third byte of MAC address
Data4	0x?? Forth byte of MAC address
Data5	0x?? Fifth byte of MAC address
Data6	0x?? Sixth byte of MAC address
	Friendly/Host name
Data1 - Data <n-1>	Friendly name in UTF-8 characters
	SSID
Data1 - Data <n-1>	SSID in UTF-8 characters
Et	0x0D

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	Zone number
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
Data	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

Timeout counter (0x55)

This command requests the time left (in minutes) until unit enters auto standby.

Example

Command/response sequence for requesting the time left until timeout:

Command:	0x21 0x01 0x55 0x01 0xF0 0x0D
Response:	0x21 0x01 0x55 0x00 0x02 0x00 0xB4 0x0D

In this example, the timeout value is 0x00B4, which translates to 180 minutes (i.e. 3 hours). The range of the value returned is from 0x0000 - 0x00F0 (0 - 240 minutes)

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x55
Dl	0x01
Data	0xF0
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x55
Ac	Answer code
Dl	0x02
Data1	0x00 (First byte of timeout counter, value is fixed)
Data2	0x00 – 0xF0 (Second byte timeout counter)
Et	0x0D

Auto shutdown control (0x58)

Set time for when unit will go into standby state due to no signal being present

Example 1

Command/response sequence, the signal sense auto shutdown timeout has been set to 60 minutes:

Command: 0x21 0x01 0x58 0x01 0x03 0x0D
Response: 0x21 0x01 0x58 0x00 0x01 0x03 0x0D

Example 2

Command/response sequence, the signal sense auto shutdown has been disabled:

Command: 0x21 0x01 0x58 0x01 0x00 0x0D
Response: 0x21 0x01 0x58 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x58
Dl	0x01
Data	0x00 – Disable (Default) 0x01 – 20 min 0x02 – 30 min 0x03 – 1 hour 0x04 – 2 hours 0x05 – 4 hours 0xF0 – Request timeout status
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x58
Ac	Answer code
Dl	0x01
Data	0x00 – Disabled 0x01 – 20 min 0x02 – 30 min 0x03 – 1 hour 0x04 – 2 hours 0x05 – 4 hours
Et	0x0D

Input detect (0x5A)

Request the status of the active input.

Example

Command/response sequence where audio input is present.

Command: 0x21 0x01 0x5A 0x01 0xF0 0x0D
Response: 0x21 0x01 0x5A 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x5A
Dl	0x01
Data	0xF0 - Request input status
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x5A
Ac	Answer code
Dl	0x01
Data	0x00 - Input not present 0x01 - Input present
Et	0x0D

Fixed Volume (0x5C)

Set/request the status of the fixed volume mode.

Example

Command/response sequence where volume is fixed

Command: 0x21 0x01 0x5C 0x01 0xF0 0x0D
Response: 0x21 0x01 0x5C 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x5C
Dl	0x01
Data	0x00 - Variable volume mode 0x01 - Fixed volume mode 0xF0 - Request fixed volume mode
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x5C
Ac	Answer code
Dl	0x01
Data	0x00 - Variable volume mode 0x01 - Fixed volume mode
Et	0x0D

System status (0x5D)

Request the system status.

Example

Command/response sequence to request the system status.

Command: 0x21 0x01 0x5D 0x01 0xF0 0x0D
Response: 0x21 0x01 0x5D 0x00 0x01 0xF0 0x0D

Note:

This command will return the following information about the system:

- Power state
- Brightness level
- Software version
- Model Number
- Volume setting
- Mute status
- Current input source
- Sample rate
- IP address
- Wired MAC address
- Wireless MAC address
- Friendly Name
- Host Name
- SSID
- Timeout counter value
- Auto shutdown status
- Input detect status
- DAC Filter

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x5D
Dl	0x01
Data	0xF0 – Request the system
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x5D
Ac	Answer code
Dl	0x01
Data	0xF0 - System status sent
Et	0x0D

System model (0x5E)

Request the system model.

Example

Command/response sequence to request the system model, where the model is ST60.

Command: 0x21 0x01 0x5E 0x01 0xF0 0x0D

Response: 0x21 0x01 0x5E 0x00 0x04 0x53 0x41 0x33 0x30 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x5E
Dl	0x01
Data	0xF0 – Request the system model
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x5E
Ac	Answer code
Dl	0x04
Data	System model in ASCII characters
Et	0x0D

DAC Filter (0x61)

Sets or requests the DAC filter

Example

Command/response sequence to request the DAC filter where response is Linear Phase Fast Roll Off

Command: 0x21 0x01 0x61 0x01 0xF0 0x0D

Response: 0x21 0x01 0x61 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x61
Dl	0x01
Data	0x00 - Linear Phase Fast Roll Off 0x01 - Linear Phase Slow Roll Off 0x02 - Minimum Phase Fast Roll Off 0x03 - Minimum Phase Slow Roll Off 0x04 - Brick Wall 0x05 - Corrected Phase Fast Roll Off 0x06 - Apodizing 0xF0 - Request the current filter
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x61
Ac	Answer code
Dl	0x01
Data	0x00 - Linear Phase Fast Roll Off 0x01 - Linear Phase Slow Roll Off 0x02 - Minimum Phase Fast Roll Off 0x03 - Minimum Phase Slow Roll Off 0x04 - Brick Wall 0x05 - Corrected Phase Fast Roll Off 0x06 - Apodizing
Et	0x0D

Now Playing information (0x64)

Request the various now playing track details. If the unit is currently playing from a source other than a streaming input the track name etc will returned as NULL.

Example

Command/response sequence to request the currently playing artist where the response is A

Command:	0x21 0x01 0x64 0x01 0xF1 0x0D
Response:	0x21 0x01 0x64 0x00 0x02 0x41 0x0D

Note

Response length is limited to 100 characters

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x64
Dl	0x01
Data	0xF0 – Request the currently playing track title 0xF1 - Request the currently playing artist 0xF2 - Request the currently playing album 0xF3 - Request the currently playing application (GoogleCast only) 0xF4 - Request the currently playing sample rate 0xF5 - Request the currently playing track encoder
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x64
Ac	Answer code
Dl	<n>
Data	Track: Track title in UTF-8 characters Album: Album name in UTF-8 characters Artist: Artist name in UTF-8 characters Application: GoogleCast source application in UTF-8 characters 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 Audio encoder: 0x00 – Uknown 0x01 – MP3 0x02 – WMA 0x03 – Ogg Vorbis 0x04 - FLAC 0x05 – WAV 0x06 - AIFF 0x07 - RealAudio 0x08 - MPEG URL 0x09 - SCPLS 0x0A - WPL 0x0B - MP4 0x0C - DSD 0x0D - Opus 0x0E - Sirius 0x0F - MQA
Et	0x0D

Maximum Turn On Volume (0x65)

Set or request the maximum volume level at power up of the ST60.

Response data format:

e.g. for volume 45: Data=0x2D (45)

Example

Command/response sequence for setting the maximum turn on volume in Zone 1 to 45:

Command:	0x21 0x01 0x65 0x01 0x2D 0x0D
Response:	0x21 0x01 0x65 0x00 0x01 0x2D 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x65
Dl	0x01
Data	0x00 (0) – 0x63 (99) – Set the maximum turn on volume 0xF0 – Request the maximum turn on volume
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x65
Ac	Answer code
Dl	0x01
Data	Maximum turn on volume, integer value: 0x00 (0) – 0x63 (99)
Et	0x0D

Maximum Volume (0x66)

Set or request the maximum volume level of the ST60. Used to prevent volume being accidently set to full when using app volume sliders.

Response data format:

e.g. for volume 45: Data=0x2D (45)

Example

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

Command:	0x21 0x01 0x66 0x01 0x2D 0x0D
Response:	0x21 0x01 0x66 0x00 0x01 0x2D 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x66
Dl	0x01
Data	0x00 (0) – 0x63 (99) – Set the maximum volume 0xF0 – Request the maximum volume
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x66
Ac	Answer code
Dl	0x01
Data	Maximum volume, integer value: 0x00 (0) – 0x63 (99)
Et	0x0D

Maximum Streaming Volume (0x67)

Set or request the maximum volume level of the ST60 when playing back streamed content. Used to prevent volume being accidently set to full when using app volume sliders and increase the resolution of the app volume sliders

Response data format:

e.g. for volume 45: Data=0x2D (45)

Example

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

Command:	0x21 0x01 0x67 0x01 0x2D 0x0D
Response:	0x21 0x01 0x67 0x00 0x01 0x2D 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x67
Dl	0x01
Data	0x00 (0) – 0x63 (99) – Set the maximum volume 0xF0 – Request the maximum volume
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x67
Ac	Answer code
Dl	0x01
Data	Maximum volume, integer value: 0x00 (0) – 0x63 (99)
Et	0x0D

Dark mode (0x68)

Set or request the status of the dark mode function.

Example

Command/response sequence where dark mode is on.

Command:	0x21 0x01 0x68 0x01 0xF0 0x0D
Response:	0x21 0x01 0x5A 0x00 0x01 0x01 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x68
Dl	0x01
Data	0x00 - Dark mode off 0x01 - Dark mode on 0xF0 - Request dark mode status
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	Zone number
Cc	0x68
Ac	Answer code
Dl	0x01
Data	0x00 - Dark mode off 0x01 - Dark mode on
Et	0x0D

RC5 Command Codes

These codes are recognised as infra-red signals received by the front panel and as control data using the "Simulate RC5 IR command (0x08)" on page 7.

Basic Functions

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

Function	RC5 code [system-command]	RC5 code (Data1 - Data2)
	Decimal	Hexadecimal
Standby	21-12	0x15 - 0x0C
1	21-1	0x15 - 0x01
2	21-2	0x15 - 0x02
3	21-3	0x15 - 0x03
4	21-4	0x15 - 0x04
5	21-5	0x15 - 0x05
6	21-6	0x15 - 0x06
7	21-7	0x15 - 0x07
8	21-8	0x15 - 0x08
9	21-9	0x15 - 0x09
0	21-0	0x15 - 0x00
Mute	21-13	0x15 - 0x0D
Rewind	21-50	0x15 - 0x32
Fast Forward	21-52	0x15 - 0x34
Skip Back	21-33	0x15 - 0x21
Skip Forward	21-32	0x15 - 0x20
Play	21-53	0x15 - 0x35
Pause	21-48	0x15 - 0x30
Shuffle	21-64	0x15 - 0x40
Repeat	21-29	0x15 - 0x1D
Navigate Up	21-86	0x15 - 0x56
Navigate Left	21-81	0x15 - 0x51
OK	21-87	0x15 - 0x57
Navigate Right	21-80	0x15 - 0x50
Navigate Down	21-85	0x15 - 0x55
HOME	21-74	0x15 - 0x4A
Back	21-72	0x15 - 0x48
Menu	21-66	0x15 - 0x42
DISP	21-59	0x15 - 0x3B
Info	21-55	0x15 - 0x37
Digital Input 1	21-94	0x15 - 0x5E
Digital Input 2	21-98	0x15 - 0x62
Digital Input 3	21-27	0x15 - 0x1B
Digital Input 4	21-97	0x15 - 0x61
USB	21-93	0x15 - 0x5D
NET	21-92	0x15 - 0x5C

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 amp 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]	RC5 Code (Data1 - Data2)
	Decimal	Hexadecimal
Power On	21-123	0x15 - 0x7B
Power Off	21-124	0x15 - 0x7C
Mute On	21-26	0x15 - 0x1A
Mute Off	21-120	0x15 - 0x78
Display brightness off	21-31	0x15 - 0x1F
Display brightness dim	21-34	0x15 - 0x22
Display brightness full	21-35	0x15 - 0x23

ARCAM

www.arcam.co.uk

THE WEST WING, STIRLING HOUSE
WATERBEACH, CAMBRIDGE, CB25 9PB, ENGLAND
+44 (0)1223 203200

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