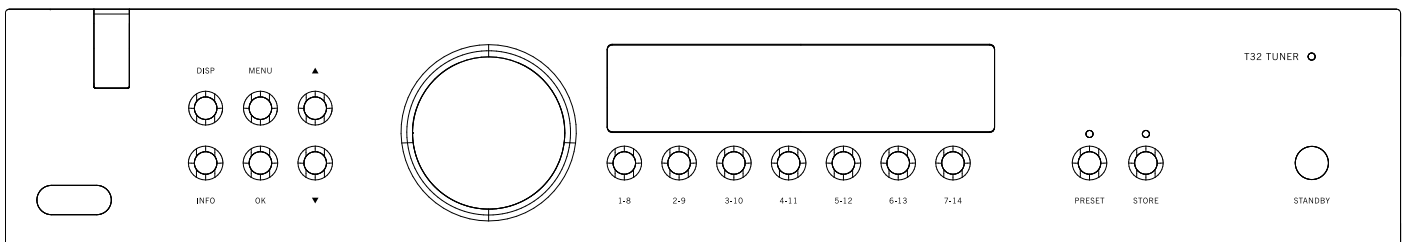


ARCAM

Custom Installation Notes: Serial programming interface and IR remote commands for Arcam T32 Tuner



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Applicability

Publication Reference

This is Arcam technical publication SH218E Issue 1.3 (October 2010).

T32 software version

This document applies to T32 software version 1.98.

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 mattf@arcam.co.uk.

Controlling the T32 via RS232

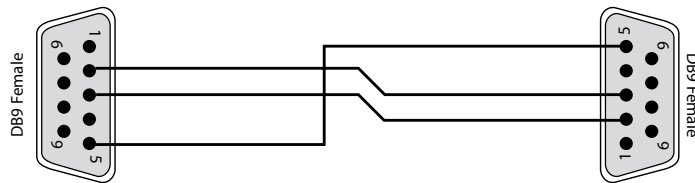
Introduction

This document describes the remote control protocol for controlling the T32 via the RS232 interface. The T32 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 14.

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 T32 takes the form of sequences of bytes, with all commands and responses having the same basic format. The T32 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 T32 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 T32 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.

Answer codes

The following answer codes are defined:

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

State changes as a result of other inputs

It is possible that the state of the T32 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 radio text changes).

Example command and response sequence

As an example, the command to simulate the RC5 command “17-12”, toggle standby:

STR	ZONE	CC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x02	0x11	0x0C	0x0D

Assuming that the command was accepted by the T32 and is being processed, the T32 responds to this command with the following sequence:

STR	ZONE	CC	AC	DL	Data 1	Data 2	ETR
0x21	0x01	0x08	0x00	0x02	0x11	0x0C	0x0D

AMX Duet™ Support

The T32 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=AudioTunerDevice><Device-Make=ARCAM><Device-Model=T32><Device-Revision=x.y.0>\r"

Where

x = rs232 protocol major version number

y = rs232 protocol minor version number

RS232 Commands

Power (0x00)

Request or change the stand-by state.

Example

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

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x00
Dl	0x01
Data	0x00 – Enter standby state 0x01 – Power-on 0x02 – Toggle power state 0xF0 – Request power state
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x00
Ac	Answer code
Dl	0x01
Data	0x00 – System is in stand-by 0x01 – System is powered on
Et	0x0D

Display Brightness (0x01)

Request the brightness of the display of the T32.

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	0x00 – Set display off 0x01 – Set display L1 0x02 – Set display L2 0x03 – Cycle display brightness 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

FM genre (0x03)

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

Example

Command/response sequence to request the programme type 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 T32.

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 version RS232 protocol 0xF1 - Request version main software 0xF3 - Request version DAB
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

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 send RC5 17-126 (Select DAB):

Command: 0x21 0x01 0x08 0x02 0x10 0x11 0x0D
 Response: 0x21 0x01 0x08 0x00 0x02 0x11 0x7E 0x0D

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

Display Information Type (0x09)

Set the display information type (where applicable).

Example

Command/response sequence to set the display text to show frequency information with FM playing:

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x09
Dl	0x01
Data	<p>For all sources: 0xE0 – Cycle through all displayable information. 0xF0 – Request the current display type</p> <p>If the current source is AM: There are no options, RS232 will return 0x85 not at this time.</p> <p>If the current source is FM: 0x01 – Set the display to frequency 0x02 – Set the display to Signal strength 0x03 – Set the display to Radio text 0x04 – Set the display to Programme type 0x05 – Set the display to Large Fonts</p> <p>If the current source is DAB: 0x01 – Set the display to Station name 0x03 – Set the display to Radio text 0x04 – Set the display to Bit rate 0x05 – Set the display to Signal quality 0x06 – Set the display to Programme type</p> <p>If the current source is Sirius: 0x01 – Set the display to Sirius Category Name 0x03 – Set the display to "PDT artist : PDT title" 0x04 – Set the display to "PDT artist / PDT composer" 0x05 – Set the display to PDT comments 0x06 – Set the display to PDT promotional text 0x07 – Set the display to Signal Strength</p>
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x09
Ac	Answer code
Dl	0x01
Data	The current display is returned, as for the command.
Et	0x0D

Request Mute status (0x0E)

Request the mute status of the audio. The audio is muted if not tuned to a station or if tuned to a locked Sirius channel. The audio output is attenuated whilst tuning.

Example

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

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x0E
Dl	0x01
Data	0xF0 – Request mute status
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x0E
Ac	Answer code
Dl	0x01
P2	0x00 – Output is muted 0x01 – Output is not muted or attenuated 0x02 – Output is attenuated
Et	0x0D

Request RDS information (0x12)

Request RDS information from the current radio station. If FM is not selected an error 0x85 is returned.

Example

Command/response sequence to request the RDS information on FM, where the response is “Playing your favourite music”.

Command: 0x21 0x01 0x12 0x01 0xF0 0x0D
 Response: 0x21 0x01 0x12 0x00 0x1E 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	0x01
Cc	0x12
Dl	0x01
Data1	Request information source: 0xF0 – FM
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x12
Ac	Answer code
Dl	Data length <n>
Data1 – Data<n>	The radio programme type in ASCII characters
Et	0x0D

Request menu status (0x14)

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

Example

Command/response sequence to request if the menu is open where the menu is open:

Command: 0x21 0x01 0x14 0x01 0xF0 0x0D
 Response: 0x21 0x01 0x14 0x00 0x01 0x01 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 0x01 – Menu Open
Et	0x0D

Request tuner preset (0x15)

Request the current tuner preset number. If iPod or Aux is selected an error 0x85 is returned.

Example

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

Command: 0x21 0x01 0x15 0x01 0xF0 0x0D
 Response: 0x21 0x01 0x15 0x00 0x01 0x0A 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x15
Dl	0x01
Data	0xF0 — Request the current preset number.
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x15
Ac	Answer code
Dl	0x01
Data	0x01 — 0x64: (1–100) 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:

$$\text{AM freq. (kHz)} = ((1000\text{'s} \ \& \ 100\text{'s}) * 100) + (10\text{'s} \ \& \ 1\text{'s})$$

$$\text{FM freq. (MHz)} = \text{reported freq. (MHz)}$$

$$\text{FM freq. (kHz)} = \text{reported freq. (kHz)}$$

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

If AM / FM is not selected an error 0x85 is returned.

Example

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

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

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
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	0x01
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 (kHz)
Et	0x0D

Preset selection (0x17)

Select a specific tuner preset. If iPod or Aux is selected an error 0x85 is returned.

Example

Command/response sequence to change the preset number to 10:

Command: 0x21 0x01 0x17 0x01 0x0A 0x0D
 Response: 0x21 0x01 0x17 0x00 0x01 0x0A 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x17
Dl	0x01
Data	0x01 — 0x64: (1–100) the number of the required preset
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x17
Ac	Answer code
Dl	0x01
Data	The preset number after the command has been processed
Et	0x0D

Request FM/DAB/Sirius station (0x18)

Request the current FM/DAB/Sirius station selected. If FM/DAB/Sirius is not selected an error 0x85 is returned. If FM RDS is not available, then a ASCII space character 0x20 should be returned for the data.

Example

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

Command: 0x21 0x01 0x18 0x01 0xF0 0x0D
 Response: 0x21 0x01 0x18 0x00 0x0D 0x44 0x41 0x42 0x20 0x53 0x54 0x41 0x54 0x49 0x4F 0x4E 0x20 0x32 0x0D

Note that this command response should be sent as a status update (Answer Code 0x00) whenever the radio station is changed, including when browsing DAB/SIRIUS stations. The data sent by RS232 should be the same as that shown by the VFD display.

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x18
Dl	0x01
Data	0xF0 – Request the current FM/DAB/Sirius station
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x18
Ac	Answer code
Dl	Data length <n>
Data1 — Data<n>	The service label of the FM/DAB/Sirius station in ASCII characters
Et	0x0D

Radio Programme Type/Category (0x19)

Request information on the current station programme type from DAB/Sirius source. If DAB/Sirius is not selected an error 0x85 is returned.

Example

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

Command: 0x21 0x01 0x19 0x01 0xF0 0x0D
 Response: 0x21 0x01 0x19 0x00 0x09 0x50 0x4F 0x50 0x20 0x4D 0x55 0x53 0x49 0x43 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x19
Dl	0x01
Data1	Request information source: 0xF0 – DAB/Sirius program type
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x19
Ac	Answer code
Dl	Data length <n>
Data1 — Data<n>	The radio programme type in ASCII characters
Et	0x0D

Request DLS/PDT information (0x1A)

Request DLS information from the current radio station. If DAB/Sirius is not selected, an error 0x85 is returned.

Example

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

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

Note:

For Sirius, the software should return the currently-displayed information, i.e. currently-displated PDT or category name.

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x1A
Dl	0x01
Data1	Request information source: 0xF0 – DAB/Sirius
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x1A
Ac	Answer code
Dl	Data length <n>
Data1 — Data<n>	The radio DLS/PDT text in ASCII characters
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	0x01
Cc	0x1B
Dl	0x01
Data	0x01 - 0x64: (1-100) The number of the required preset
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x1B
Ac	Answer code
Dl	Data length <n>
Data1	0x01 - 0x64: (1-100) The number of the required preset
Data2	0x00 : AM frequency 0x01 : FM frequency 0x02 : FM RDS name 0x03 : DAB 0x04 : Sirius
Data2 – Data<n>	The name (DAB, Sirius, FM if RDS) in ASCII characters or: AM: New frequency (1000's & 100's kHz) FM: New frequency (MHz) AM: New frequency (10's & 1's kHz) FM: New frequency (kHz)
Et	0x0D

DAB station scan/erase (0x20)

Scan for new DAB stations or erase the DAB station list.

Examples

Command/response sequence to scan for DAB stations:

Command: 0x21 0x01 0x20 0x01 0xF0 0x0D
Response: 0x21 0x01 0x20 0x00 0x01 0x01 0x0D

Command/response sequence to erase DAB station list:

Command: 0x21 0x01 0x20 0x01 0xF1 0x0D
Response: 0x21 0x01 0x20 0x00 0x01 0x02 0x0D

Note: when a scan or erase has finished, the T32 shall send the following status update:

0x21 0x01 0x20 0x00 0x01 0x00 0x0D – Not scanning for stations or erasing.

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x20
Dl	0x01
Data1	0xF0 – Scan for new DAB stations 0xF1 – Erase DAB station list
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x20
Ac	Answer code
Dl	0x01
Data1	0x00 – Not scanning for stations or erasing 0x01 – Scanning for stations 0x02 – Erasing station list
Et	0x0D

Set FM stereo / mono (0x21)

Set FM to mono or stereo mode.

Example

Command/response sequence to set FM mode to mono:

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

Note: The T32 will send this command as a status update if the FM mode is changed using IR or the system menu.

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x21
Dl	0x01
Data1	0x00 – Set FM Stereo 0x01 – Set FM Mono 0xF0 – Query FM mode
Et	0x0D
RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x21
Ac	Answer code
Dl	0x01
Data1	0x00 – FM mode is Stereo 0x01 – FM mode is Mono
Et	0x0D

Enable / disable FM RDS (0x22)

Enable or suppress FM RDS information.

Example

Command/response sequence to set FM mode to mono:

Command: 0x21 0x01 0x22 0x01 0xF0 0x0D

Response: 0x21 0x01 0x22 0x00 0x01 0x01 0x0D

Note: The T32 will send this command as a status update if the FM RDS state is changed using the system menu.

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x22
Dl	0x01
Data1	0x00 – Set FM RDS enabled 0x01 – Set FM RDS disabled 0xF0 – query FM RDS enabled/disabled
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x22
Ac	Answer code
Dl	0x01
Data1	0x00 – FM RDS is enabled 0x01 – FM RDS is disabled
Et	0x0D

Request radio signal information (0x23)

Request information about current signal strength or bitrate.

Example

Command/response sequence to request the current signal strength:

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

Response: 0x21 0x01 0x23 0x00 0x03 0x01 0x10 0x00 0x00 0x0D

Note: The T32 will respond with 0x85 – Command invalid at this time if the bitrate/MPEG mode is requested for a mode other than DAB or if the frequency is requested for a mode other than FM/AM.

Note: The T32 will send this response as a status update whenever the signal information changes, for example if the signal strength changes:

Status update: 0x21 0x01 0x23 0x00 0x03 0x01 0x05 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x23
Dl	0x01
Data1	0x00 – request frequency (AM/FM only) 0x01 – request signal strength 0x02 – request bitrate (DAB only) 0x03 – request MPEG mode (DAB only)
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x23
Ac	Answer code
Dl	0x03
Data1	0x00 – Message contains station freq. 0x01 – Message contains signal strength 0x02 – Message contains bitrate 0x03 – Message contains MPEG mode
Data2	Response to the FM frequency request: MHz of current frequency Response to the DAB MPEG mode request: 0x00 – Stereo 0x01 – Joint stereo 0x02 – Dual mono 0x03 – Mono Response to the DAB data rate request: 0x00 – 0xE0 (0 – 224kb/s) – data rate Response to the signal strength request: 0x00 – 0x10 – signal strength
Data3	Response to the FM frequency request: kHz (*10) of current frequency Response to the DAB MPEG mode request: 0x00 Response to the DAB data rate request: 0x00 Response to the signal strength request: 0x00
Et	0x0D

Source Selection (0x24)

Set or request the source mode.

Example

Command/response sequence to query the current source mode where the current source mode is DAB:

Command: 0x21 0x01 0x24 0x01 0xF3 0x0D
Response: 0x21 0x01 0x24 0x00 0x01 0x02 0x0D

Note: The T32 will send this response as a status update whenever the source mode changes, for example if FM is selected:

Status update: 0x21 0x01 0x24 0x00 0x01 0x00 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x24
Dl	0x01
Data1	0x00 – Set FM 0x01 – Set AM 0x02 – Set DAB 0x03 – Set SIRIUS 0x04 – Set AUX 0xF3 – query the current source mode
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x24
Ac	Answer code
Dl	0x01
Data1	0x00 – FM is selected 0x01 – AM is selected 0x02 – DAB is selected 0x03 – SIRIUS is selected 0x04 – AUX is selected
Et	0x0D

Store a preset (0x25)

Store the current frequency/station to a preset

Example

Command/response sequence to store the current radio station to preset 8:

Command: 0x21 0x01 0x25 0x01 0x08 0x0D
Response: 0x21 0x01 0x25 0x00 0x01 0x08 0x0D

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x25
Dl	0x01
Data1	0x01 – 0x65 – the selected preset
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x25
Ac	Answer code
Dl	0x01
Data1	The selected preset
Et	0x0D

FM/AM search (0x26)

Increment/decrement the current frequency until the next station is found.

Example

Command/response sequence to search for the next station with a higher frequency:

Command: 0x21 0x01 0x26 0x01 0xF0 0x0D
Response: 0x21 0x01 0x26 0x00 0x01 0xF0 0x0D

The T32 will respond with 0x85 – Command invalid at this time if the source is not FM or AM.

COMMAND:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x26
Dl	0x01
Data1	0xF0 – Search up from the current frequency 0xF1 – Search down from the current frequency
Et	0x0D

RESPONSE:	
Byte:	Description:
St	0x21
Zn	0x01
Cc	0x26
Ac	Answer code
Dl	0x01
Data1	Response: 0xF0 – Searching up. 0xF1 – Searching down.
Et	0x0D

IR commands

This section details all the IR commands that the unit responds to. These commands can be used for RS232 control via the 'Simulate RC5 IR command (0x08)' RS232 command described above.

CR90 system remote

The following RC5 commands are transmitted from the supplied CR90 IR remote control:

Button	Function	Decimal RC5 code System code – command code
STANDBY	Toggle standby mode	17-12
1	Numeric entry	17-1
2	Numeric entry	17-2
3	Numeric entry	17-3
4	Numeric entry	17-4
5	Numeric entry	17-5
6	Numeric entry	17-6
7	Numeric entry	17-7
8	Numeric entry	17-8
9	Numeric entry	17-9
0	Numeric entry	17-0
UP	Navigation key UP	17-86
LEFT	Navigation key L (same response as code 17-78)	17-81
OK	Confirm selection	17-87
RIGHT	Navigation key R (same response as code 17-77)	17-80
DOWN	Navigation key DOWN	17-85
BAND (MODE)	Increment tuner source FM/AM/DAB/SAT/IPOD	17-77
MENU	Enter/exit system menu	17-125
DISP	Change VFD brightness	17-18
PRESET -	Preset down / SIRIUS category down / iPod track back	17-33
PRESET +	Preset up / SIRIUS category up/ iPod track forward	17-32
PLAY	Play/pause iPod	17-53
STOP	Stop iPod	17-54
<<	Rewind iPod	17-50
>>	Fast Forward iPod	17-52
SHUFF	Step between different iPod shuffle modes	17-64
REPEAT	Step between different iPod repeat modes	17-29
FM/MONO	Toggle FM mode – mono/stereo	17-38
P/TUNE	Enter/exit preset recall mode	17-37
STORE	Enter/exit preset store mode	17-41
INFO	Cycle between different info displays	17-15
Power on (Shift + UP)	Exit standby mode and power on the unit	17-123
Power Off (Shift + DOWN)	Power off the unit and enter standby mode	17-124

Additional RC5 commands

Additional RC5 commands that the T32 responds to that are not present on the supplied remote:

Function	Decimal RC5 code System code – command code
Select FM mode	17-127
Select AM mode	17-120
Select DAB mode	17-126
Select SIRIUS mode	17-122
Select iPod mode	17-121

Note that these IR commands can be used over RS232 for direct source selection, using the RS232 command Simulate RC5 IR command, RS232 command code 0x08.

Example

Command/response sequence to RC5 17-126 (Select DAB):

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

Response: 0x21 0x01 0x08 0x00 0x02 0x11 0x7E 0x0D

ARCAM