

S T E I N W A Y   L Y N G D O R F

# SERIAL CONTROL MANUAL

Version 1.3

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# INTRODUCTION

*The purpose of this document is to describe how the serial control interface of the device works.*

## SERIAL SETTINGS

The port settings should always be 8 data bits, no parity and one stop bit. The baud rate can be changed from the user interface. Supported speeds are 9600 (default), 19200, 38400, 57600 and 115200 bits per second. Hardware handshake is optional and it can be enabled from the UI. All commands and responses are in ASCII form.

## SERIAL PROTOCOL

### Commands

Every command starts with '!' character and ends with carriage return (ascii 0x0d, referred in this document as <CR>). There are two types of commands, direct commands and status requests. Direct commands are used to emulate remote key presses or to set a certain volume etc. Status requests are used to query the current state of the controller (volume, current source etc.).

Commands with invalid format are simply ignored. For example, sending a command !VOL(100)garbageMUTEON<CR> will only result in volume being muted, because volume command is not terminated properly.

### Responses and feedback level

There are three levels of responsiveness and they are called feedback levels. Each level adds something new on top of the previous level.

Feedback level can be set from the UI or from serial interface with command "!VERB(X)<CR>" (X can be 0, 1 or 2). All responses start either with '!' (status messages) or '#' (echo messages) and end with <CR>.

Feedback level 0: Data is only sent when data is requested by status request command. For example command "!VOL?<CR>" would return "!VOL(XX)<CR>", where "XX" would be current volume.

Feedback level 1: Data is sent whenever any of the statuses listed in table 2.1 changes. The data format is same as with responses to status request command. For example volume status will be sent as long as volume is

changing (not every volume increment is sent, volume status is sent in 100ms intervals).

Feedback level 2: Each command is echoed back with the '#' in front of the command instead of '!' character. For example command "!VOL?<CR>" would return "#VOL?<CR>!VOL(XX)<CR>".

Status	Related status request command
Power	!POWER? <CR>
Volume	!VOL? <CR>
User mute	!MUTE? <CR>
Source	!SRC? <CR>
Zone volume	!ZVOL? <CR>
Zone user mute	!ZMUTE? <CR>
Zone source	!ZSRC? <CR>
Zone audio input	!ZAUDIN? <CR>
Zone video input	!ZVIDIN? <CR>
Audio input	!AUDIN? <CR>
Audio type	!AUDTYPE? <CR>
Audio processing mode	!AUDMODE? <CR>
Audio Mode *	!MODECAT? <CR>
RP Focus Position	!RPFOC? <CR>
RP Voicing	!RPVOI? <CR>
Video input	!VIDIN? <CR>
Video type	!VIDTYPE? <CR>

*Table 1 Automatic responses*

*(\*) If Audio Modes are enabled*

## DIRECT COMMANDS

This chapter introduces all the different serial protocol commands. A more detailed usage of the commands is described in chapter 4.

<i>Command string</i>	<i>Action</i>
!POWERONMAIN	Main zone power on
!POWEROFFMAIN	Main zone power off
!POWERONZONE2	Zone2 power on
!POWEROFFZONE2	Zone2 power off
!MUTEON	User mute on
!MUTEOFF	User mute off
!MUTE	Toggle user mute
!ZMUTEON	Zone user mute on
!ZMUTEOFF	Zone user mute off
!ZMUTE	Toggle zone user mute
!DIRU	Up arrow button
!DIRD	Down arrow button
!DIRL	Left arrow button
!DIRR	Right arrow button
!ENTER	Enter button
!BACK	Back button
!MENU	Menu button
!INFO	Info button
!ZONEMAINSHOW	Direct low-level command to select non-bypass output to main zone component output (=the same picture main zone shows). NOTE! Overrides UI. Component will not output anything when HDMI is selected.
!ZONEMAINCOMP1	Direct low-level command to route component input 1 to main zone component output in bypass mode. NOTE! Overrides UI.
!ZONEMAINCOMP2	Direct low-level command to route component input 2 to main zone component output in bypass mode. NOTE! Overrides UI.
!ZONEMAINCOMP3	Direct low-level command to route component input 3 to main zone component output in bypass mode. NOTE! Overrides UI.
!ZONEMAINCOMP4	Direct low-level command to route component input 4 to main zone component output in bypass mode. NOTE! Overrides UI.
!ZONEMAINCOMP5	Direct low-level command to route component input 5 to main zone component output in bypass mode. NOTE! Overrides UI.



<i>!ZONE2SHOW</i>	<i>Direct low-level command to select non-bypass output to zone 2 component output (same picture main zone shows). NOTE! Overrides UI. Component will not output anything when HDMI is selected.</i>
<i>!ZONE2COMP1</i>	<i>Direct low-level command to route component input 1 to zone 2 component output in bypass mode. NOTE! Overrides UI.</i>
<i>!ZONE2COMP2</i>	<i>Direct low-level command to route component input 2 to zone 2 component output in bypass mode. NOTE! Overrides UI.</i>
<i>!ZONE2COMP3</i>	<i>Direct low-level command to route component input 3 to zone 2 component output in bypass mode. NOTE! Overrides UI.</i>
<i>!ZONE2COMP4</i>	<i>Direct low-level command to route component input 4 to zone 2 component output in bypass mode. NOTE! Overrides UI.</i>
<i>!ZONE2COMP5</i>	<i>Direct low-level command to route component input 5 to zone 2 component output in bypass mode. NOTE! Overrides UI.</i>

<i>Command string</i>	<i>X</i>	<i>Action</i>
!NUM(X)	0..9	Number button
!VOL+		Volume up button
!VOL-		Volume down button
!VOL+(X)	0 – 999 (5 means 0.5dB)	Increase volume by given amount
!VOL-(X)	0 – 999 (5 means 0.5dB)	Decrease volume by given amount
!VOL(X)	-799 – 200 (-79.9dB – 20.0dB, 0.5dB intervals)	Set volume to given value
!AUDMODE+		Audio processing mode up button
!AUDMODE-		Audio processing mode down button
!AUDMODE(X)	See audio processing modes chapter 7, table 1	Set given audio processing mode.
!MODECAT(X)	See mode categories chapter7, table 2	Sets given mode category.
!SRC+		Source up button
!SRC-		Source down button
!SRC(X)	1 – max source	Set given source
!SRCOFF(X)	-100 – 100	Current source volume offset -100 – 100 (-10dB – 10dB)
!VERB(X)	0 - 2	Sets given verbosity level
!RPFOC(X)	0 - 9	Set room perfect focus point: 0 = Bybass 1 = Focus 1 ... 8 = Focus 8 9 = Global
!RPFOC+		Focus point up button.
!RPFOC-		Focus point down button.
!ZSRC+		Zone source up button
!ZSRC-		Zone source down button

!ZSRC(X)	1 – 5	Set given zone source
!ZVOL+		Zone volume up button
!ZVOL-		Zone volume down button
!ZVOL+(X)	0 – 1160 (5 means 0.5dB)	Increase zone volume by given amount
!ZVOL-(X)	0 – 1160 (5 means 0.5dB)	Decrease zone volume by given amount
!ZVOL(X)	-960 – 200 (-96.0dB – 20.0dB, 0.5dB intervals)	Set zone volume to given value
!RPVOI(X)	0..6	Set voicing. 0 = Neutral 1 = Music 2 = Music II 3 = Relaxed 4 = Tilt 5 = Action 6 = Action+Movie
!RPVOI+		Voicing up button

!RPVOI-		Voicing down button
!LIPSYNC(X)	MIN – MAX ms	Set lipsync trim. Get valid range with !LIPSYNCRANGE? status request.
!LIPSYNC+		Lipsync up button (+10ms)
!LIPSYNC-		Lipsync down button (-10ms)
!PLIICW(X)	0 - 7	Dolby PLII center width setting.
!PLIIPAN(X)	0 - 1	Dolby PLII Panorama control setting. 0 = Off 1 = On
!PLIIDIM(X)	-3 - 3	Dolby PLII diemnsion control setting.
!NEO6CGAIN(X)	0 - 10	DTS Neo6 center gain setting.
!NEO6WIDE(X)	0 - 1	DTS Neo6 wide setting. 0 = Off, 1 = On
!DDDYN(X)	0 - 3	Dolby Digital and Dolby Digital + dynamics. 0 = Max 1 = Nomral

		2 = Min
!DDHDDYN(X)	0 - 1	Dolby TrueHD dynamcis. 0 = Automatic 1 = Off 2 = Force On
!TROOFF(X)	1 - 4	Set trigger output to 0V
!TROON(X)	3- 4	Set trigger output to 6V. Works only trigger output 3 and 4.
!TROHI(X)	1 - 4	Set trigger output to 12V
!TROEN(X)	1 - 4	Set trigger output voltage to configured level
!TRODIS(X)	1 - 4	Disable trigger (same as !TROOFF(X))
!TRODO(X)	1 - 4	Virtually enable trigger outputs trigger condition

## STATUS REQUESTS

<i>Command string</i>	<i>Return string</i>	<i>Description</i>
!PING?	!PONG or nothing if device is off	This command can be used to determine whether the device is on or off
!POWER?	!POWER(X)	Current power status. 1 = main zone is on 2 = zone2 is on 3 = both main zone and zone2 are on
!MUTE?	!MUTEON or !MUTEOFF	User mute status
!ZMUTE?	!ZMUTEON or !ZMUTEOFF	Zone user mute status
!VOL?	!VOL(X)	Current volume level. -799 – 200 (-79.9dB – 20.0dB)
!ZVOL?	!ZVOL(X)	Current zone volume level. -960 – 200 (-96.0dB – 20.0dB)
!SRC?	!SRC(X)"Source name"	Current sources number and name, X is number of the source and source name is between double quotes
!SRC(X)?	!SRC(X)"Source name" or nothing if source does not exist	Given sources number and name, X is number of the source and source name is between double quotes
!SRCS?	!SRCCOUNT(X) followed by each source !SRCX"Source name"	Returns the count of all sources followed by the numbers and names of each source.
!TRO(X)?	!TRO(XY)	Current output voltage of given trigger output. Possible values for X: 1-6 Possible values for Y: 0 means 0V 1 means 6V 2 means 12V
!TROS?	Each trigger output	Returns the voltage of every

	!TRO(XY)	trigger. The format is the same as in previous command.
!VIDIN?	!VIDIN(X)	Currently active video input. Possible values for X: 100 – 10x, Composite video input 200 – 20x, S-Video input 300 – 30x, Component input 400 – 40x, HDMI input
!LIPSYNC?	!LIPSYNC(X)	Current lipsync trimX
!LIPSYNCRANGE?	!LIPSYNCRANGE(X,Y)	Current lipsync trim range X: Min Y: Max

!VIDTYPE?	!VIDTYPE(XYZ)	<p>Current video type.</p> <p>Possible values for X (resolution): 480, 576, 720, 1080 or monitor resolution (e.g. 800x600)</p> <p>Possible values for Y (interlaced or progressive): i means interlaced, p means progressive</p> <p>Possible values for Z (color space): 1 = RGB 4:4:4 2 = YcBcR 4:4:4 3 = YcBcR 4:2:2 4 = YcBcR 16-bit</p> <p>Examples: !VIDTYPE1080i2 !VIDTYPE640X480p1</p>
!AUDIN?	!AUDIN(X)	<p>Currently active audio input.</p> <p>Possible values for X: 101 – 1xx = Analog 2 channel input (5 is balanced input) 201 = Analog 8 channel input 301 – 3xx = Digital coaxial input 401 – 4xx = Digital optical input 501 = HDMI 701 = Digital AES/EBU input</p>
!AUDTYPE?	!AUDTYPE(XX,YYYY)	<p>Current audio type.</p> <p>XX is signal type Possible values are in chapter 6.</p> <p>Y is channel information. Values are: 3201 = 3/2.1</p>

		2000 = 2/0.0 000 = No audio <sup>1</sup> etc...
!AUDMODE?	!AUDMODE(X)	Current audio mode. See chapter 3.2.1.

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<sup>1</sup> Please note the missing digits for no audio (000)



!AUDMODEL?	!AUDMODEL(X1,X2...Xn)	List of available audio processing modes. See audio processing modes chapter 3.2.2.
!MODECAT?	!MODECAT(X)"Modecat name"	Current Mode Category. See chapter 3.2.2. Returns !MODECAT(0)"-" if Mode Categories are not used
!MODECATS?	!MODECATCOUNT(X) !MODECAT(1)"Modecat name" !MODECAT(2)"Modecat name"	Returns available mode categories. !MODECATCOUNT(0) is returned if categories are not used.
!PLIIDIM?	!PLIIDIM(X)	Dolby PLII dimension control setting. X = -7...+7
!PLIICW?	!PLIICW(X)	Dolby PLII center width setting. X = 0...7
!PLIIPAN?	!PLIIPAN(X)	Dolby PLII Panorama control setting. X = 0...1 (0=Off,1=On)
!NEO6CGAIN?	!NEO6CGAIN(X)	DTS Neo6 cgain setting. X = 0...10
!NEO6WIDE	!NEO6WIDE(X)	DTS Neo6 wide setting.
!DDDYN?	!DDDYN(X)	Dolby Digital and Dolby Digital + dynamics 0 = Max 1 = Normal 2 = Min
!DDHDDYN?	!DDHDDYN(X)	Dolby TrueHD dynamics 0 = Auto 1 = Off

		2 = Force Off
!RPFOC?	!RPFOC(X)"Focus name"	Current room perfect focus point. 0 = Bypass 1 = Focus 1 ... 8 = Focus 8 9 = Global
!RPFOCS?	!RPFOCCOUNT(X) !RPFOC(0)"Focus name" !RPFOC(1)"Focus name" ...	Returns count of available focus positions accompanied by a list of available focus points
!ZVIDIN?	!ZVIDIN(X)	Currently active zone video input. Possible values for X: 0 = No video input or zone off 1-5 = Component video input 1-5

!ZAUDIN?	!ZAUDIN(X)	Currently active zone audio input.  Possible values for X: 0 = No audio input or zone off 1-4 = Analog 2 channel input 1-4 5 = Analog 2 channel XLR input
!ZSRC?	!ZSRC(X)"Source name"	Current zone sources number and name, X is number of the source and source name is between double quotes
!ZSRC(X)?	!ZSRC(X)"Source name" or	Given zone sources

	nothing if source does not exist	number and name, X is number of the source and source name is between double quotes
!ZSRCS?	!ZSRCCOUNT(X) followed by each source !ZSRCX"Source name"	Returns the count of all zone sources (Always 5) followed by the numbers and names of each source.
!RPVOI?	!RPVOI(X)"Voicing name"	Returns current voicing number and name
!RPVOIS?	!RPVOICOUNT(X) !RPVOI(0)"Voicing name" ... !RPVOI(X-1)"Voicing name"	Returns all system voicings.
!DEVICE?	!DEVICE(<string>) where <string> could be "P1"	
!SWINFO?	Dumps SW versions of the system	

## AUDIO TYPES

<b>Audio type</b>	<b>Value</b>
<i>No signal</i>	<i>1</i>
<i>PCM</i>	<i>2</i>
<i>Dolby Digital</i>	<i>3</i>
<i>DTS</i>	<i>4</i>
<i>Dolby Digital (EX flagged)</i>	<i>5</i>
<i>Multichannel PCM</i>	<i>6</i>
<i>Multichannel analog</i>	<i>7</i>
<i>Analog stereo</i>	<i>8</i>
<i>Test noise</i>	<i>9</i>
<i>Silent PCM</i>	<i>10</i>
<i>DTS 96/24</i>	<i>11</i>
<i>DTS ES Matrix</i>	<i>12</i>
<i>DTS ES Discrete</i>	<i>13</i>
<i>DTS ES Discrete 96/24</i>	<i>14</i>
<i>DTS ES Matrix 96/24</i>	<i>15</i>
<i>Dolby Digital Plus</i>	<i>16</i>
<i>Dolby True HD</i>	<i>17</i>
<i>Multichannel PCM 7.1</i>	<i>18</i>
<i>Multichannel PCM 5.1</i>	<i>19</i>
<i>DTS Master Audio</i>	<i>20</i>
<i>DTS High Resolution</i>	<i>23</i>
<i>DTS HD ES</i>	<i>24</i>
<i>RoomPerfect Calibration Noise</i>	<i>25</i>
<i>RoomPerfec Distance Measurement</i>	<i>26</i>
<i>DTS Express</i>	<i>27</i>

*Table 1 Audio signal types*

## AUDIO PROCESSING MODES

Processing mode	Value (dec)
<i>No processing</i>	<i>1</i>
<i>Mono</i>	<i>2</i>
<i>Stereo</i>	<i>3</i>
<i>PLII Movie</i>	<i>4</i>
<i>PLII Music</i>	<i>5</i>
<i>PLIIX Movie</i>	<i>6</i>
<i>PLIIX Music</i>	<i>7</i>
<i>PLIIX Games</i>	<i>8</i>
<i>Dolby Digital EX</i>	<i>9</i>
<i>DTS Neo6 Cinema</i>	<i>10</i>
<i>DTS Neo6 Music</i>	<i>11</i>
<i>Party</i>	<i>25</i>
<i>Downmix to front</i>	<i>26</i>
<i>Dolby Pro <b>Logic II</b> Movie+Downmix to front</i>	<i>27</i>

*Table 1 Audio Processing Modes*

Mode Category	Value (dec)
<i>Not In Use</i>	<i>0</i>
<i>Movie</i>	<i>1</i>
<i>Music</i>	<i>2</i>
<i>Games</i>	<i>3</i>
<i>No Proc.</i>	<i>4</i>
<i>Custom 1 (Can be modified by user)</i>	<i>5</i>
<i>Custom 2 (Can be modified by user)</i>	<i>6</i>
<i>Custom 3 (Can be modified by user)</i>	<i>7</i>
<i>Custom 4 (Can be modified by user)</i>	<i>8</i>

*Table 2 Audio Modes*

# SERIAL PROTOCOL USAGE

## Controlling power

Main zone and zone 2 power can be controlled separately with commands **!POWERONMAIN<CR>**, **!POWEROFFMAIN<CR>**, **!POWERONZONE2<CR>** and **!POWEROFFZONE2<CR>**.

Please note that zone 2 setup has a power setting that can be set to "Follow Main" or "Independent". When this power setting is set to "Follow Main", zone 2 power commands control also main zone power and vice versa.

Command **!POWER?<CR>** is used to get the current power status of the system. The response for this command is **!POWER(X)<CR>**, where the **X** can be 0, 1, 2 or 3. This response will be sent automatically whenever power status changes if feedback level is 1 or higher. Response number **1** means that only main zone is turned on, number **2** means that only zone 2 is turned on and response number **3** means that both main zone and zone 2 are turned on.

Response number 0 means that the system is powered down. Please note that response **!POWER(0)<CR>** will only be received when the system is powering down and feedback level is 1 or higher. There will be no response for power query command when the system is powered down. It is still possible to turn the device on using commands **!POWERONMAIN<CR>** or **!POWERONZONE2<CR>**. When the system has booted up, there will eventually be a response about power status change if feedback level is 1 or higher.

## Controlling volume

Commands **!VOL+<CR>** and **!VOL-<CR>** have the same effect as pressing volume up/down buttons from the IR remote control.

Commands **!VOL+(X)<CR>** and **!VOL-(X)<CR>** are used to increase or decrease volume by certain amount. The **X** in the commands can be anything between 0 and 999 (0dB – 99.9dB).

Command **!VOL(X)<CR>** is used to set the volume to some specific value. The **X** in the command can be -799 – 200 (-79.9dB – 20.0dB).

Commands **!MUTEON<CR>**, **!MUTEOFF<CR>** and **!MUTE<CR>** are used to set mute, clear mute and toggle mute respectively.

Command **!VOL?<CR>** is used to get the current value of the main zone volume. The response for this command is **!VOL(X)<CR>**, where **X** can be -799 – 200 (-79.9dB – 20.0dB). Please note that if verbosity level 1 or higher is used, volume information will be updated to the serial interface automatically. There is always at least 100ms time period between the

volume status messages. This period is used not to flood the serial interface with too frequent volume updates every time volume is being adjusted.

Commands **!ZVOL+<CR>**, **!ZVOL-<CR>**, **!ZVOL+(X)<CR>**, **!ZVOL-(X)<CR>**, **!ZVOL(Y)<CR>**, **!ZVOL?<CR>**, **!ZMUTEON<CR>**, **!ZMUTEOFF<CR>** and **!ZMUTE<CR>** are used to control zone 2 volume the same way as main zone volume. Valid values for **X** in the previous commands are 0 – 1160 (0dB – 116.0dB) and for **Y** -960 – 200 (-96.0dB – 20.0dB).

Please note that the volume value in serial protocol commands is always in 0.1dB accuracy, meaning that 1.0dB is a value of 10 in the serial protocol. This is true for volume status messages and volume control commands.

**Warning:** Usage maximum volume setting is highly recommended to prevent damage to equipment because of too loud volume setting! It is never possible to set the volume above the maximum volume level setting with serial interface commands, but it is very easy to accidentally reach the maximum volume level. Please note that there is no maximum volume setting for zone 2.

## Controlling sources

### Main zone:

A source is a combination of video input and audio input that can be selected freely from the user interface. The number and names of sources can vary depending on how many sources have been created when setting-up the system. The installer can add, delete, re-order the sources at any time.

Command **!SRCS?<CR>** is used to find out how many sources there are and what are their names. For example a response for **!SRCS<CR>** could be:

**!SRCCOUNT(4)<CR>**

**!SRC(1)"DVD player"<CR>**

**!SRC(2)"Blu-ray player"<CR>**

**!SRC(3)"Game console"<CR>**

**!SRC(4)"PVR"<CR>**

It can be seen from the response that there are 4 sources, named "DVD player", "Blu-ray player", "Game console" and "PVR".

Command **!SRC?<CR>** is used to find out which source is currently selected. The response for this command is **!SRC(X)"NAME"<CR>** where **X** is the index of the currently selected source (1 is the first index) and **NAME** is the name of the currently selected source.

Commands **!SRC+<CR>** and **!SRC-<CR>** are used to select next or previous source. Command **!SRC(X)<CR>** is used to select a specific source. The **X** in the command can be anything between 1 and the count of sources. If main zone is off and zone 2 is on, the response will be **!SRC"- "<CR>**.

Please note that main zone source cannot be changed while in OSD menu. Source related commands will be ignored while in OSD menu.

#### **Zone 2:**

There is a fixed amount of 5 zone 2 sources. Command **!ZSRCS?<CR>** is used to find out the names of the zone sources. For example a response for **!ZSRCS?<CR>** could be:

```
!ZSRCCOUNT(5)  
!ZSRC(1)"CD player"<CR>  
!ZSRC(2)"SACD player"<CR>  
!ZSRC(3)"MP3 player"<CR>  
!ZSRC(4)" "<CR>  
!ZSRC(5)" "<CR>
```

It can be seen from the response that there are 5 zone 2 sources (the number of zone 2 sources is fixed), named "CD player", "SACD player", "MP3 player", " " and " ".

Command **!ZSRC?<CR>** is used to find out which zone 2 source is currently selected. The response for this command is

**!ZSRC(X)"NAME"<CR>** where **X** is the index of the currently selected source (1 is the first index) and **NAME** is the name of the currently selected source. If zone 2 is turned off, the response will be **!ZSRC(0)"Zone is off"<CR>**.

Commands **!ZSRC+<CR>** and **!ZSRC-<CR>** are used to select next or previous source. Command **!ZSRC(X)<CR>** is used to select a specific source. The **X** in the command can be anything between 1 and the count of sources.

## **Controlling processing modes**

The P1 processor has two possible operating modes for controlling audio processing mode. When special "Audio Modes" are not used ("Use Audio Modes" in "Audio Mode Setup" is set to "No"), all Dolby, DTS etc. processing modes can be selected directly. When "Audio Modes" are used ("Use Audio Modes" in "Audio Mode Setup" is set to "Yes"), user selects audio specially named "Audio Modes" that are used by the system to select appropriate lower level processing mode.



Please note that in this document "Audio Mode" refers to the special Audio Modes and "processing mode" refers to the traditional Dolby and DTS post-processing modes.

**Audio Modes not used** ("Use Audio Modes" in "Audio Mode Setup" is set to "No")

Command **!AUDMODEL?<CR>** can be used to get a list of currently selectable processing modes. The response for this command is a list of currently selectable processing modes. Since the selectable list of processing mode depends on the used speaker setup and incoming audio signal, the list should be updated every time the signal type changes (more on that later). The processing modes are identified with decimal numbers, separated by comma. For example a response for command **!AUDMODEL?<CR>** could be:

**!AUDMODEL(11,10,8,7,6,1)<CR>**

It can be seen from the response (using Table 1 from 3.2.2) that currently selectable audio processing modes are:

- 1 → No processing
- 6 → Dolby PLIIx Movie
- 7 → Dolby PLIIx Music
- 8 → Dolby PLIIx Games
- 10 → DTS NEO:6 Cinema
- 11 → DTS NEO:6 Music

**!AUDMODEL()<CR>** is a valid response and can be interpreted as "No processing".

Command **!AUDTYPE?<CR>** is used to get information about the current audio signal type. The response for that command is

**!AUDTYPE(XX,YYYY)<CR>**, where **XX** is the signal type as a decimal number (see Table 1 in 3.2.1) and **YYYY** is channel information. Channel information consists of 4 hexadecimal digits **ABCD**, where **A** is the number of main channel signals, **B** is the number of surround channel signals, **C** is the number of back channel signals and **D** is the number of LFE channel signals. For example 3221 would be 7.1 signal, 3211 would be a 6.1 signal and 2000 would be 2.0 stereo signal.

Audio signal information status response **!AUDTYPE(XX,YYYY)<CR>** is sent automatically whenever input signal changes if feedback level is 1 or higher. Table below consists of examples of different signal types.

Response	Actual signal
<b>!AUDTYPE(03,2000)&lt;CR&gt;</b>	Dolby Digital 2.0
<b>!AUDTYPE(18,3221)&lt;CR&gt;</b>	Multichannel PCM 7.1
<b>!AUDTYPE(4,3201)&lt;CR&gt;</b>	DTS 5.1
<b>!AUDTYPE(13,3211)&lt;CR&gt;</b>	DTS ES Discrete 6.1

*Table of audio signal information status responses*

Commands **!AUDMODE+<CR>** and **!AUDMODE-<CR>** are used to select next and previous processing mode from the list of currently available processing modes. Note: This is only true when Audio Modes are not used (see below "**Audio Modes used**").

Command **!AUDMODE(X)<CR>** is used to select a specific processing mode, where **X** is a processing mode number as seen from Table 1 from 3.2.2. Please note that if a processing mode is being selected that is currently not available, the command will simply be ignored and there will be no feedback of this in the serial interface or anywhere else. For that reason it is important to always offer the user processing modes that are actually selectable. To achieve this, the controlling device should always update the list of currently selectable modes using command **!AUDMODEL?<CR>** whenever signal type is changed (**!AUDTYPE(XX,YYYY)<CR>** is received).

Command **!AUDMODE?<CR>** is used to find out which processing mode is currently selected. The response for this command **!AUDMODE(X)<CR>**, where **X** is the processing mode as a decimal number (see Table 1 in 3.2.2). This response is sent automatically whenever processing mode changes if feedback level is 1 or higher. The recommended way of implementing a processing mode selection in a serial control device is:

1. Use feedback level 1 or higher to get notifications of changed signal type and changed processing mode (**!AUDTYPE(XX,YYYY)<CR>** and **!AUDMODE(X)<CR>**). Use these notifications to relay the information to the user.
2. Whenever this notification about new signal type is received, use command **!AUDMODEL?<CR>** to get the list of currently selectable processing modes and only let user to select processing modes from that list.

**Audio Modes used** ("Use Audio Modes" in "Audio Mode Setup" is set to "Yes")

In this mode the user selects between special Audio Modes that are not direct processing modes but a layer on top of that. By default these Audio Modes are named "Movie", "Music", "Games", "No Proc.", "Custom 1", "Custom 2", "Custom 3" and "Custom 4" (as seen from Table 2 from 3.2.2). The idea is that the user selects a mode from this list depending on what kind of content the user is listening. The processor then decides which processing mode from the currently available processing modes is the most suitable for the content. The installer can edit these Audio

Modes to give priority to the preferred processing modes (see Installers Manual for more information).

Command **!MODECATS?<CR>** can be used to get a list of Audio Modes configured for the system. For example a response for

**!MODECATS?<CR>** could be:

**!MODECATCOUNT(4)<CR>**

**!MODECAT(1)"Movie"<CR>**

**!MODECAT(2)"Music"<CR>**

**!MODECAT(4)"No Proc."<CR>**

**!MODECAT(5)"Opera"<CR>**

It can be seen from the response that there are 4 Audio Modes configured for the system. Please note that the Audio Mode index number is not consecutive since Audio Mode "Games" is not configured to be used. Also note that this list of Audio Modes is not dependent on the current incoming signal type. This list will only change when the installer edits the Audio Mode configuration. It is therefore not necessary to get the list of Audio Modes every time the signal type changes.

Commands **!AUDMODE+<CR>** and **!AUDMODE-<CR>** are used to select next and previous Audio Mode from the list of configured Audio Modes.

Note: This is only true when Audio Modes are set to be used, otherwise processing modes will be selected (see above "**Audio Modes not used**").

Command **!MODECAT(X)<CR>** is used to select a specific Audio Mode, where **X** is an Audio Mode number as seen from Table 2 from 3.2.2.

Please note that if an Audio Mode is selected that is not configured to the system, the command will simply be ignored and there will be no feedback of this in the serial interface or anywhere else. Please use command **!MODECATS?<CR>** on every device boot to find out the list of configured Audio Modes in the system.

Command **!MODECAT?<CR>** is used to find out which Audio Mode is currently selected. The response for this command

**!MODECAT(X)"NAME"<CR>**, where **X** is the processing mode as a decimal number (see Table 1 in 3.2.2). This response is sent automatically whenever Audio Mode is changed if feedback level is 1 or higher. Please note that response **!AUDMODE(X)<CR>** is also sent with information about the specific processing mode whenever Audio Mode is changed.

The recommended way of implementing Audio Mode selection in a serial control device is:

1. Use feedback level 1 or higher to get notifications of changed Audio Mode and the actual resulted processing mode (**!AUDMODE(X)<CR>** and **!MODECAT(X)<CR>**). Use these notifications to relay the information to the user.

2. Update the list of used Audio Modes at least on every boot-up. There is no separate notification delivered when the installer changes the configuration of Audio Modes.

Please note that direct processing mode selection is still possible through the serial protocol even if Audio Modes are being used. Selecting direct processing mode in this case is not recommended since the user interface might show mismatching Audio Mode and actual processing mode.

## Controlling focus positions

Command **!RPFOCS?<CR>** is used to find out the list of selectable focus positions along with their names. For example a response for

**!RPFOCS<CR>** could be:

**!RPFOCCOUNT(6) <CR>**

**!RPFOC(1)"Sofa" <CR>**

**!RPFOC(2)"Sofa left" <CR>**

**!RPFOC(3)"Sofa right" <CR>**

**!RPFOC(4)"Back" <CR>**

**!RPFOC(8)"Focus 8" <CR>**

**!RPFOC(9)"Global" <CR>**

It can be seen from the response that there are 6 focus positions, named "Sofa", "Sofa left", "Sofa right", "Back", "Focus 8" and "Global". Please note that the installer can change the names of "Focus 1" – "Focus 8" from their default names. Focus positions "Global" and "Bypass" cannot be renamed and the numbering of focus positions cannot be changed. Also note that the numbering of focus positions is not consecutive.

Command **!RPFOC?<CR>** is used to find out which focus position is currently selected. The response for this command is

**!RPFOC(X)"NAME" <CR>** where **X** is the index of the currently selected focus position (0 is the first index) and **NAME** is the name of the currently selected focus position. This response is sent automatically whenever Audio Mode is changed if feedback level is 1 or higher.

Commands **!RPFOC+<CR>** and **!RPFOC-<CR>** are used to select next or previous focus position. Command **!RPFOC(X)<CR>** is used to select a specific focus position. The **X** in the command can be any index from the list of measured focus positions got by using command **!RPFOCS?<CR>**. The installer might add or remove focus positions at any time so it is recommended to update the list of selectable focus positions at least in every boot-up.

## Controlling voicings

Command **!RPVOIS?<CR>** is used to find out the list of selectable voicings along with their names. For example a response for

**!RPVOIS<CR>** is:

**!RPVOICOUNT(7)<CR>**

**!RPVOI(0)"Neutral"<CR>**

**!RPVOI(1)"Music"<CR>**

**!RPVOI(2)"Music II"<CR>**

**!RPVOI(3)"Relaxed"<CR>**

**!RPVOI(4)"Tilt"<CR>**

**!RPVOI(5)"Action"<CR>**

**!RPVOI(6)"Action+Movie"<CR>**

It can be seen from the response that there are 7 voicings, named "Neutral", "Music", "Music II", "Relaxed", "Tilt", "Action" and "Action+Movie". The number and names of voicings is fixed and they cannot be changed.

Command **!RPVOI?<CR>** is used to find out which voicing is currently selected. The response for this command is **!RPVOI(X)"NAME"<CR>** where **X** is the index of the currently selected voicing (0 is the first index) and **NAME** is the name of the currently selected voicing. This response is sent automatically whenever Audio Mode is changed if feedback level is 1 or higher.

Commands **!RPVOI+<CR>** and **!RPVOI-<CR>** are used to select next or previous voicing. Command **!RPVOI(X)<CR>** is used to select a specific source. The **X** in the command can be anything between 0 and 7.

## Controlling lipsync

Command **!LIPSYNC?<CR>** is used to find out the current value of the lipsync trim. The response for this command is **!LIPSYNC(X)<CR>** where **X** is the current lipsync trim in milliseconds.

Commands **!LIPSYNC+<CR>** and **!LIPSYNC-<CR>** are used to select adjust the lipsync trim by 10ms or -10ms respectively. Command **!LIPSYNC(X)<CR>** is used to set the lipsync trim directly. The valid value range for this command depends on the "processor delay" setting (see below).

Please note that the valid range to adjust the lipsync delay is retrieved with the **!LIPSYNCRANGE?<CR>** command, returning range, min and max lipsync trim in ms. The total lipsync delay consists of so called "processor delay" which is installer settable permanent delay and lipsync trim delay which is user settable. The lipsync trim setting can have

negative values depending on the "processor delay" setting, the range can always be retrieved with the **!LIPSYNCRANGE?<CR>** command. For example if the "processor delay" is set to 200ms and the range is 250ms, the LIPSYNCRANGE command will return **!LIPSYNCRANGE(250,-200,50)<CR>**.

Please note that the lipsync trim setting is cleared on every source change, so it is recommended to read the current lipsync setting every time source is changed (**!SRC(X)"NAME"<CR>** is received).

## Getting main zone video and audio status

It is possible to find out currently selected source's video and audio input and current video and audio format in main zone.

Command **!VIDIN?<CR>** is used to find out the used video input of currently selected source. The response for this command is **!VIDIN(XXX)<CR>**, where **XXX** is the current video input in numeral form. See table below for the translation of the number to actual video input.

Video input in response	Actual video input
000	None
100	Composite 1
101	Composite 2
200	S-Video 1
201	S-Video 2
300	Component 1
301	Component 2
302	Component 3
303	Component 4
304	Component 5
400	HDMI 1
401	HDMI 2
402	HDMI 3
403	HDMI 4
404	HDMI 5

*Table of different video inputs*

Command **!AUDIN?<CR>** is used to find out the used audio input of currently selected source. The response for this command is **!AUDIN(XXX)<CR>**, where **XXX** is the current audio input in numeral form. See table below for the translation of the number to actual audio input.

Audio input in response	Actual video input
000	None
101	Stereo 1
102	Stereo 2
103	Stereo 3
104	Stereo 4
105	Balanced
201	Analog Multichannel
301	Coaxial 1
302	Coaxial 2
303	Coaxial 3
304	Coaxial 4
401	Optical 1
402	Optical 2
403	Optical 3
404	Optical 4
501	HDMI
701	Digital AES/EBU

*Table of different audio inputs*

Command **!VIDTYPE?<CR>** is used to find out the current video input format. The response for this command is **!VIDTYPE(XXXYZ)<CR>**, where **XXX** tells the current video resolution, **Y** tells whether the video is progressive or not and **Z** tells the color space of the video signal. Please note that the response if **!VIDTYPE(0)<CR>** when there is no video signal. See table below for more detailed information

Video resolutions in response	Actual video resolution
480	NTSC (720x480)
576	PAL (720x576)
720	1280x720
1080	1920x1080
800x600 (etc...)	Monitor resolutions

*Table of different video resolutions*

Progressive information in response	Actual status
p	Progressive
i	Interlaced

*Table of different progressive informations*

Color spaces in response	Actual color space
1	RGB 4:4:4
2	YCbCr 4:4:4
3	YCbCr 4:2:2
4	YCbCr 16bit

*Table of different video resolutions*

Command **!AUDTYPE?<CR>** is used to find out the current audio type. The response for this command is **!AUDTYPE(XX,YYY)<CR>**, where **XX** tells the signal type and **YYY** tells the channel configuration. See "Controlling processing modes" for more information about signal type and channel configuration.

## Getting zone 2 video and audio status

It is possible to find out currently selected zone source's video and audio input in zone 2.

Command **!ZVIDIN?<CR>** is used to find out the used video input of currently selected zone source. The response for this command is **!ZVIDIN(XX)<CR>**, where **XX** is the current video input in numeral form. See table below for the translation of the number to actual video input.

Zone 2 video input in response	Actual video input
00	None
01	Component 1



02	Component 2
03	Component 3
04	Component 4
05	Component 5

*Table Different video inputs for zone 2*

Command **!ZAUDIN?<CR>** is used to find out the used audio input of currently selected zone source. The response for this command is **!ZAUDIN(XX)<CR>**, where **XX** is the current zone 2 audio input in numeral form. See table below for the translation of the number to actual audio input.

Audio input in response	Actual video input
00	None
01	Stereo 1
02	Stereo 2
03	Stereo 3
04	Stereo 4
05	Balanced

*Table Different audio inputs for zone 2*

## Controlling feedback level

It is possible to set the feedback level from serial control interface with command **!VERB(X)<CR>**, where **X** is the wanted feedback level 0, 1 or 2.

## Controlling Dolby and DTS parameters

The P1 controller offers the direct controlling of Dolby and DTS processing parameters using the serial control interface. This enables the possibility for the advanced user to experiment the different settings without having to go deep in to the menu. Please note that the changes to the settings are saved during power down, so they are not temporary settings.

### Dolby parameters

Command **!PLIICW(X)<CR>** is used to change the value of Dolby Pro Logic Iix center width setting. The **X** in the command is a decimal number from 0 to 7. Command **!PLIICW?<CR>** is used to find out the current

value of the setting. The response for the command is **!PLIICW(X)<CR>** where **X** represents the current value of the setting.

Command **!PLIIDIM(X)<CR>** is used to change the value of Dolby Pro Logic IIx dimension setting. The **X** in the command is a decimal number from -3 to 3. Command **!PLIIDIM?<CR>** is used to find out the current value of the setting. The response for the command is **!PLIIDIM(X)<CR>** where **X** represents the current value of the setting.

Command **!PLIIPAN(X)<CR>** is used to turn Dolby Pro Logic IIx panorama mode on or off. The **X** in the command is a decimal number 0 or 1, where 0 means off and 1 means on. Command **!PLIIPAN?<CR>** is used to find out the current value of the setting. The response for the command is **!PLIIPAN(X)<CR>** where **X** represents the current value of the setting.

Command **!DDDYN(X)<CR>** is used to change the value of Dolby Digital and Dolby Digital + dynamics setting. The **X** in the command is a decimal number from 0 to 2, where 0 is Max, 1 is Normal and 2 is Min. Command **!DDDYN?<CR>** is used to find out the current value of the setting. The response for the command is **!DDDYN(X)<CR>** where **X** represents the current value of the setting.

Command **!DDHDDYN(X)<CR>** is used to change the value of DolbyTrueHD dynamics setting. The **X** in the command is a decimal number from 0 to 2, where 0 is Automatic, 1 is Off and 2 is Force On. Command **!DDHDDYN?<CR>** is used to find out the current value of the setting. The response for the command is **!DDHDDYN(X)<CR>** where **X** represents the current value of the setting.

#### **DTS parameters**

Command **!NEO6CGAIN(X)<CR>** is used to change the value of DTS Neo:6 Center Gain setting. The **X** in the command is a decimal number from 0 to 10. Command **!NEO6CGAIN?<CR>** is used to find out the current value of the setting. The response for the command is **!NEO6CGAIN(X)<CR>** where **X** represents the current value of the setting.

Command **!NEO6WIDE(X)<CR>** is used to set the DTS Neo:6 Wide setting on or off. The **X** in the command is a decimal number 0 or 1, where 0 means off and 1 means on. Command **!NEO6WIDE?<CR>** is used to find out the current value of the setting. The response for the command is **!NEO6WIDE(X)<CR>** where **X** represents the current value of the setting.

## Controlling OSD and OSD menu

There are two On Screen Display menus in the P1 controller. The Installer menu is intended to be used by the installer and that menu should not be offered to the end user. The user menu (titled "Menu") is intended for the daily use of the user. When using a well designed serial control interface, it should not be necessary for the user to access the OSD menu. It is, however, possible to access and use both of these menus by using the serial interface.

Command **!MENU<CR>** is used to enter the "Installer menu". This function should not be available for the user.

Command **!ENTER<CR>** is used to access the user menu (when not in menu) or to enter/modify a menu item (when inside the menu). In other words this command does the same as the "Ok" button in the installer IR remote.

Command **!INFO<CR>** bring the information screen to the OSD display (when not in menu). The command does the same as the INFO button on the installer IR remote.

Commands **!DIRU<CR>**, **!DIRD<CR>**, **!DIRL<CR>**, **!DIRR<CR>** and **!BACK<CR>** have the same effect as the similar buttons in the installer IR remote. Furthermore command **!NUM(X)<CR>** acts as a number keypad (only useful in the Network Setup menu page).

Please note that there is no way for the serial interface to know whether the system is in OSD menu or not. In normal operation there should be no need for the user to access the On Screen Menu when using a dedicated serial control interface.

## Direct controlling of component outputs

It is possible to control the component outputs of the P1 controller directly using special serial control interface commands. The controlling allows routing of any component input directly to either one of the component outputs in bypass mode. Bypass mode means that there is no On Screen Display possibility. It is also possible to route the main display with OSD to the outputs, but this is only possible when there is no HDMI display connected. It is possible to switch component inputs to components outputs in bypass mode when there is HDMI display connected.

**NOTE:** These commands completely bypass UI controls.

### Main zone component output

Command **!ZONEMAINSHOW<CR>** is used to directly switch the main display to main zone component output. Please note that there will only

be picture present if there is no HDMI display connected and the main display shows picture of component, S-video or component video input. Command **!ZONEMAINCOMPX<CR>** is used to directly switch one of the component inputs to main zone component output in bypass mode. Valid values for **X** are 1, 2, 3, 4 or 5. Please note that there will be no OSD present in bypass mode.

### **Zone 2 component output**

Please note that it is highly recommended to set "Zone Video Output" setting to "Independent" when using direct switching commands from serial interface. These commands completely bypass UI and when in "Independent" mode, UI will never change zone 2 video switching. Command **!ZONE2SHOW<CR>** is used to directly switch the main display to zone 2 component output. Please note that there will only be picture present if there is no HDMI display connected and the main display shows picture of component, S-video or component video input. Command **!ZONE2COMPX<CR>** is used to directly switch one of the component inputs to zone 2 component output in bypass mode. Valid values for **X** are 1, 2, 3, 4 or 5. Please note that there will be no OSD present in bypass mode.

## **Direct controlling of trigger outputs**

It is possible to control the state of trigger outputs with special serial control commands. Please note that the commands bypass UI completely. Commands **!TROFF(X)<CR>** and **!TRODIS(X)<CR>** are used to set the voltage of a trigger output to 0 Volts. Valid values for **X** are 1, 2, 3 or 4. This command bypasses UI.

Command **!TROON(X)<CR>** is used to set the voltage of a trigger output to 6 Volts. Valid values for **X** are 3 or 4 (trigger outputs 3 and 4 are the only dual-voltage trigger outputs). This command bypasses UI.

Command **!TROHI(X)<CR>** is used to set the voltage of a trigger output to 12 Volts. Valid values for **X** are 1, 2, 3 or 4. This command bypasses UI.

Command **!TROEN(X)<CR>** is used to set the voltage of a trigger output to configured level (voltage setting from Trigger Output setup). Valid values for **X** are 1, 2, 3 or 4. This command bypasses UI.

Command **!TRODO(X)<CR>** is used to execute the trigger function that is configured in the Trigger Output setup. This means that if some event triggers a 5 second pulse in trigger 1, command **!TRODO(1)<CR>** would cause the trigger output to do the pulse even if the actual event triggering the trigger never happens. Valid values for **X** are 1, 2, 3 or 4. This command bypasses UI.

## Getting trigger status

Command **!TROS?<CR>** is used to get information about current trigger voltage levels. For example the response for this command could be:

**!TRO(12)<CR>**

**!TRO(22)<CR>**

**!TRO(31)<CR>**

**!TRO(40)<CR>**

The response consists of status of each trigger in the form of

**!TRO(XY)<CR>**, where **X** is the number of the trigger and **Y** is the voltage of the trigger. Possible values for voltage are 0, 1 or 2, which mean 0V, 6V and 12V respectively.

Command **!TRO(X)?<CR>** is used to find out the voltage level of an individual trigger output. The response for this command is

**!TRO(XY)<CR>** where **X** is the number of the trigger and **Y** is the voltage of the trigger (see above).