

Perseus Command Reference

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Introduction

The Perseus Generation 3.0 features multiple communication connections. The Perseus controller and firmware allow serial RS-232 and wired Ethernet for communication with a client PC. The command syntax is universal regardless of which connection and communication method is being used to send the command and receive responses. A basic text string command structure is described herein.

The one exception to this protocol is the serial compatibility mode. Perseus has an internal jumper that allows the board to change from its normal serial speed of 115200 baud to 19200 baud. When this is switched the Perseus responds to serial commands with the old Generation 1 command protocol which is outlined in a separate document.

Optec offer a freely available serial terminal application that can be used to connect with and control the Perseus using the command syntax described below. The command processor included with the Perseus is designed to use a Start-Command character and an End-Command character. This allows for commands of varying lengths and the ability to start a new command or terminate a command at any time. The Start-Command and End-Command characters are '<', and '>' respectively.

Following the Start-Command character the next character designates whether the command is intended for Perseus 'P' or the hub 'H' (internal controller) followed by a Device ID placeholder of '1'. The next two characters define a Transaction ID used as a response check for multi-threading processes. The following six characters define the Command ID as defined within the pages below. Any remaining characters before the end character '>' will provide Boolean or Payload values of varying length.

Syntax Conventions

The individual commands are listed below and should follow the format below:

<DdiiCCCCCyx...> where,

'D' is the **Target Device** – valid values are "P" for Perseus or "H" for hub,

'd' is the **Device ID** – always "1" for the Perseus (*see note below*),

'ii' is the **Transaction ID** – a 2-digit numeric character string from 00 to 99,

'CCCCC' is the **Command ID**, always 6-characters, as detailed below,

'y' is a **Boolean** character used in certain commands as a Boolean operator,

'zz...' is the **Payload**, a variable length character string used in certain commands requiring additional parameters. The length and contents of this Payload string are dependent upon the preceding Command ID. Additional details are given below.

In the following syntax reference, all upper-case letters are constant for the given command; all lower-case letters are variable parameters for the command. For example, valid **Target Device** identifiers 'D' are exclusively "P" or "H".

The 'd' parameter is the **Device ID** placeholder and will always have a value of "1" for the Perseus.

The 'ii' parameter is the **Transaction ID** and can be any numeric text value from 00 to 99. The Transaction ID created and defined by the client PC and is always echoed by the Perseus preceded by the bang '!' character. Using a Transaction ID allows multi-threaded client level applications to maintain proper registration of commands and responses.

The 'CCCCC' **Command ID's** are individually details in this document. Command ID's fall into three classes, get style commands return configuration and device details. Set style commands push configuration details to the device. Do action commands perform various device movements or other actions.

The 'y' parameter is optionally included as a **Boolean** operator where the Command ID requires details about a feature that may be enabled or disabled. Valid values for 'y' are "0" and "1", with "1" generally meaning Enabled, True, or Yes. Likewise, "0" represents Disabled, False, or No.

The 'zzz...' **Payload** parameter is a variable length string and will follow certain Command ID's requiring additional details. For example, the Payload parameter may represents a target position, or a network IP address, or a Device nickname.

Perseus Responses

The Perseus will immediately respond to every command with a bang '!' character, followed by the Transaction ID 'ii', and a newline (ASCII 0x10) character to indicate that a command was successfully received. Often a multiline response will finish with an "END" string followed by the newline character. If a syntax error was detected or an unrecognized command was received, the controller will respond with a string of text indicating an error code and error message in place of the expected response.

See [Appendix E](#) for additional Error Code details.

GET Configuration Commands

Command: Perseus - GET Device Nickname

Syntax: <P*dii*GETDNN>

Parameters: d =Device ID [1]; ii = Transaction ID.

Description: This command requests the identification string or “Nickname”. Valid string lengths for “Nickname” are 1 to 16 ASCII characters. The controller will respond with the user-defined nickname.

Note: GETDNN is generally used to ping the device to check communication status.

Example Command: <P101GETDNN>

Example Response:

```
!01
Nickname = Perseus
END
```

Command: Perseus - GET Status

Syntax: <P*dii*GETSTA>

Parameters: d =Device ID [1]; ii = Transaction ID.

Description: This command will request the controller to report the current status. The first line of the status report is “!ii” and the last line is “END” to indicate that the output is complete. The status output contains the following fields:

<i>Current Step:</i>	The current position of the stepper
<i>Target Step:</i>	The target position of the stepper
<i>Current Port:</i>	The current port, 1 indexed
<i>Target Port:</i>	The target port, 1 indexed
<i>Is Moving:</i>	1 if the Perseus is changing ports, 0 otherwise
<i>Is Homing:</i>	1 if the Perseus is changing ports, 0 otherwise
<i>Is Homed:</i>	1 if the Perseus is changing ports, 0 otherwise
<i>Magnet 1 State:</i>	The state of Hall Effect sensor 1
<i>Magnet 2 State:</i>	The state of Hall Effect sensor 2
<i>Magnet Position:</i>	The magnetic state position (debug only)

Example Command: <P103GETSTA>

Example Response:

```
!03
Current Step = 0
Target Step = 0
Current Port = 3
Target Port = 0
Is Moving = 0
Is Homing = 0
Is Homed = 0
Magnet 1 State = 0
Magnet 2 State = 0
Magnet Position = 0
END
```

Command: Perseus - GET Configuration settings

Syntax: <P*di*iGETCFG>

Parameters: d =Device ID [1]; ii = Transaction ID.

Description: This command will request the controller to report the configuration. The first line of the configuration report is “!ii” and the last line is “END” to indicate that the output is complete. The configuration output contains the following fields:

!23

<i>Nickname:</i>	The nickname that has been set in the Perseus firmware.
<i>LED Brightness:</i>	The LED Brightness. For now 0 is off and any other value is on.
<i>Max Steps:</i>	The maximum (full circle) stepper resolution of the model.
<i>Device Type:</i>	The device type. For now the only valid value is P3
<i>Home On Start:</i>	For now this is always true (1).
<i>Max Speed:</i>	The maximum speed (in steps per second) that the Perseus will reach.

END

Example Command: <P105GETCFG>

Example Response:

```
!05
Nickname = Perseus Gen 3
LED Brightness = 75
Max Steps = 12800
Device Type = P3
Home On Start = 1
Max Speed = 2900
END
```

Command: Perseus Hub- GET Configuration settings

Syntax: <Hx*ii*iGETCFG>

Parameters: x =Device ID [1]; ii = Transaction ID.

Description: The Hub Get Configuration command tells the controller to report the current Perseus firmware configuration information. The first line of the configuration report is “!ii” and the last line is “END” to indicate that the output is complete. The Hub Configuration report contains the following fields.

!23

<i>Firmware Version</i>	The device Firmware Version
<i>Command Version</i>	The Command Version. This should match this document.
<i>Release Date</i>	The Firmware release date
<i>Serial Number</i>	The Serial Number.
<i>Wired IP</i>	The Wired IP Address.

END

Example Command: <H107GETCFG>

Example Response:

```
!23
Firmware Version = 3.0.1
Command Version = 1.0.0
Release Date = 2017/08/10
```

```
Serial Number = 297
Wired IP = 169.254.1.1
END
```

DO Action Commands

Command: Perseus - HALT

Syntax: <PdiidDOHALT>

Parameters: d =Device ID [1]; ii = Transaction ID.

Description: This command immediately halts the current movement. The Perseus will respond immediately with the “!ii” and “END” strings to acknowledge the command was received.

Note: Halt will almost instantly halt the motor. The Perseus will almost certainly need to be rehomed afterwards.

Example Command: <P110DOHALT>

Example Response:

```
!10
END
```

Command: Perseus- HOME

Syntax: <PdiidDOHOME>

Parameters: d =Device ID [1]; ii = Transaction ID.

Description: This command requests the Perseus to begin its homing routine. The controller will respond with “!ii” and “END” to indicate the Perseus has started homing.

Note: The IsMoving property will be set to true (1) and the IsHomed property will be set to false (0) until completion of the Home operation. PxiidDOHALT will immediately stop the homing operation.

Example Command: <P112DOHOME>

Example Response:

```
!12
END
```

Command: Perseus- Go to Port

Syntax: <PdiidGOPORTy>

Parameters: d =Device ID [1]; ii = Transaction ID, y = Port Number

Description: This command requests that the Perseus move to a 1 indexed port number. This requires that the Perseus is home. The IsMoving property will be true until the move is complete.

Example Command: <P115DGOPT1>

Example Response:

```
!15
END
```

SET Configuration Commands

The following commands are used to set device configuration settings. Unlike the Get commands which tend to be all-inclusive in the properties they report, the Set commands are separated to apply to only a single device property. In the syntax definitions lower-case letters still indicate a parameter. See the Parameters section under each command for more information.

Command: Perseus- Set Device Nickname

Syntax: <PdiiSETDNNzzz...>

Parameters: d =Device ID [1]; ii = Transaction ID; z = Device nickname (max of 16 characters).

Description: This command is used to set a custom nickname for the Perseus. The nickname is the string that is returned by the controller when the GETDNN command is executed and is also reported in the GETCFG command response.

The following example is used to set the nickname to “Castor”.

Example Command: <P130SETDNNCastor>

Example Response:

```
!30  
END
```

Command: Perseus - Set LED Brightness

Syntax: <PdiiSETLEDzz>

Parameters: d =Device ID [1]; ii = Transaction ID; z = brightness value (0 to 99).

Description: This command can be used to set the brightness of the port indication LEDs on the Perseus. A value of ‘0’ will turn the LED off. Any other value will turn them on full brightness.

Example Command: <P197SETLED75>

Example Response:

```
!97  
SET
```

Command: Perseus- Reset To Factory Defaults

Syntax: <PdiiRESETR>

Parameters: d =Device ID [1]; ii = Transaction ID.

Description: This command will reset all configuration and status information to the factory defaults.

See [Appendix B](#) for Factory Default settings.

Example Command: <P198RESETR>

Example Response:

The device might not respond to this command as the execution may cancel the response.

```
!98  
SET
```

Command: Perseus - Reboot

Syntax: <PdiiREBOOT>

Parameters: d =Device ID [1]; ii = Transaction ID.

Description: This command will perform a soft reboot of the Perseus for remote operations.

Example Command: <P199REBOOT>

Example Response:

The device might not respond to this command as the execution may cancel the response.

!99

SET

Appendix A – Device Types

P3: The Perseus Generation 3.

Appendix B – Factory Defaults

Listed below are the factory default settings for configuration and status responses.

Perseus Defaults:

Configuration

Nickname = Perseus Gen 3
LED Brightness = 75
Max Steps = 12800
Device Type = P3
Home On Start = 1
Max Speed = 2900

Status

Current Step = 0
Target Step = 0
Current Port = 1
Target Port = 0
Is Moving = 0
Is Homing = 0
Is Homed = 0
Magnet 1 State = 0
Magnet 2 State = 0
Magnet Position = 0

Hub: These will vary based on your model and firmware version

Firmware Version = 3.0.1
Command Version = 1.0.0
Release Date = 2017/08/10
Serial Number = 297
Wired IP = 169.254.1.1

Appendix C – Full Command List

Presented in this appendix is an abbreviated reference list for all valid commands. Full detailed descriptions are provided in the main document above.

<i>Command Syntax</i>	<i>Command Description</i>
<Pdi iGETDNN>	Gets the user set nickname.
<Pdi iGETSTA>	Gets the current Status.
<Pdi iGETCFG>	Gets the current device Configuration.
<Hxi iGETCFG>	Gets the current controller Configuration.
<Pdi iDOHALT>	Halts immediately. This will likely require the Perseus to rehome.
<Pdi iDOHOME>	Homes the Perseus.
<Pdi iGOPORTy>	Goes to a port.
<Pdi iSETDNNzzz...>	Sets the nickname.
<Pdi iSETLEDzz>	Sets the LED level (0 for off, any other value on).
<Pdi iRESETR>	Resets to factory defaults.
<Pdi iREBOOT>	Soft reboot the Perseus board.

Appendix D – Light status codes.

These will not display if the LED Brightness is set to off.

- A: Single solid light on a single port: current port that the mirror is at.
- B: All lights on: device is homing
- C: Lights 1 and 3 on: Home failed and in error state. Rehome through software or by pressing the top button.
- D. Flashing light on a single port: target port while moving.

Appendix E – Error Codes

The firmware performs various error checks on input commands. When an incorrectly formatted command is received the device will respond with an error code. A brief explanation of the various error codes is provided below.

ERROR ID = 0, Error Text = "The received command is formatted incorrectly"

This error occurs when the command is incorrectly formatted but is still able to be read by the Perseus. If a command is sufficiently mangled it may simply be dropped.

ERROR ID = 1, Error Text = "That device type does not exist."

This error occurs when the device type is incorrectly set. Currently you cannot change the Perseus device type so this is simply reserved.

ERROR ID = 2, Error Text = "The received command contained invalid parameters"

This error occurs when the command is correctly formatted but the payload cannot be processed. For example this would occur if you tried to move to port a.

ERROR ID = 3, Error Text = "The received identifier was not recognized"

This occurs when the command that was sent is unknown. If this occurs check that the command that was sent and the firmware/command version in the Perseus match this document.

ERROR ID = 4, Error Text = "The command received was for an invalid target device"

This occurs when the command device section is incorrectly set.

ERROR ID = 5, Error Text = "The command is invalid because the device is homing"

This occurs when the device cannot complete the command because the device is homing. For example the Perseus cannot move to a target port while homing.

ERROR ID = 6, Error Text = "The received command was too long"

This occurs when the command plus payload exceeds the maximum length of a command. In practice this should never happen.

ERROR ID = 7, Error Text = "The command failed because the Perseus is disconnected"

This occurs when the command fails because the Perseus control board is disconnected from the main body. A not homed error may occur instead.

ERROR ID = 8, Error Text = "The command failed because the Perseus is not homed"

This occurs when the device cannot complete the command because the device is not homed. For example the device must be homed to move.

ERROR ID = 9, Error Text = "This version of the Firmware does not support changing targets while moving"

Currently the firmware does not allow the changing of port targets while moving. This may change in a future release.