illunis Canon Lens Controller

illunis

illunis CLC-USB
Canon Lens Controller
Manual

INTRODUCTION

This document details the setup and operation of the illunis CLC-USB Canon Lens Controller.

Rev	Date	Modification
A	4/26/19	First Revision
B	5/17/19	Revised to simplify Programming Interface
C	10/16/19	Added .dll
D	1/24/2020	Updated
E	8/27/2020	Updated for release firmware
F	10/09/2020	Updated for firmware Version :3 Rev :6

Table of Contents

Important Note:

Older lenses require the lens switch to be in the Auto Focus (AF) position in order for the focus commands to function. Newer lenses will focus with the switch in either AF or Manual Focus (MF) positions.

General

The illunis CLC-USB Canon Lens Controller (CLC-USB) is a mechanical lens mount for a Canon EF lens with an integrated lens controller circuit board. The lens controller uses a virtual communication port to send and receive commands via a USB 2.0 connection to a computer.

USB Drivers

The lens controller USB 2.0 interface uses the FTDI FT231X USB to UART interface chip.
Drivers can be downloaded from this link:
https://www.ftdichip.com/Drivers/VCP.htm
Driver installation guides are available from this link:
https://www.ftdichip.com/Support/Documents/InstallGuides.htm

Comm Port Setup

The lens controller port settings are as follows:
Baud Rate: 57600
Parity: None
Data Bits: 8
Stop Bits: 1
Flow Control: None

Cables

The controller USB connector is USB C and any commercial USB cable may be used to connect the lens controller to the PC.

Lens Control using Software

To assist with writing lens control software, illunis provides a lens control program example for Visual Studio C# as well as an installable executable version. The project source code and executable are available by request to info@illunis.com. A .Net .dll is available simplifying the configuration and communication to the lens.

Lens Control using a Terminal Program

Any lens command may simply be typed into a Terminal program such as Tera Term which is available here:
https://osdn.net/projects/ttssh2/downloads/70691/teraterm-4.102.exe/

Lens Control using Software Continued

Lens Control Application and Source Code

Step 1 Install USB Drivers

The first step in communicating with the lens controller is to install the USB communication drivers.
The lens controller USB 2.0 interface uses the FTDI FT231X USB to UART interface chip.

Drivers can be downloaded from this link:
https://www.ftdichip.com/Drivers/VCP.htm

Driver installation guides are available from this link:
https://www.ftdichip.com/Support/Documents/InstallGuides.htm

Step 2 Download illunis Lens Control Software

To assist with writing lens control software, illunis provides a lens control program example for Visual Studio C# as well as an installable executable version and lend control SDK.

The sample Visual Studio Project may be opened directly in Visual Studio and compiled. It is provided to show examples of the software interface implemented in order to reduce the time spent on writing application software.

A directly executable version of the application may be found in the /bin/x64/Release folder as CanonController.exe.

Lens Control using a Terminal Emulator

Step 1 Obtain and install a Terminal Emulation Program

Tera Term is a free Terminal Emulator for windows available here:

https://osdn.net/projects/ttssh2/downloads/70691/teraterm-4.102.exe/

Drivers can be downloaded from this link:

https://www.ftdichip.com/Drivers/VCP.htm

Driver installation guides are available from this link:

https://www.ftdichip.com/Support/Documents/InstallGuides.htm

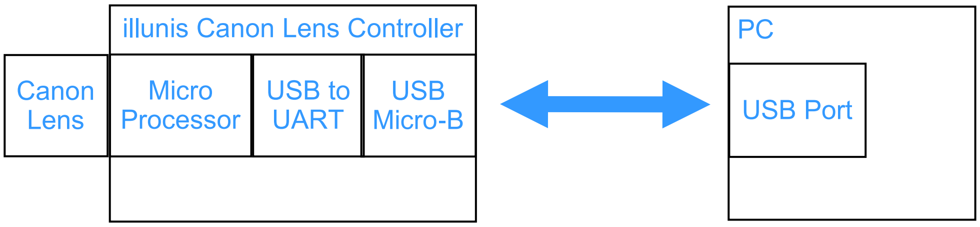
Step 2 Run the Terminal program and issue commands from this manual to control the lens

CLC-USB Command Overview

The CLC-USB is a mechanical lens mount for Canon EF lenses with an integrated controller. Please note the following important items:

The CLC-USB can be configured with USB or I2C interfaces.
The USB interface is controlled though a Windows Com Port at 57600 baud.
The USB 2.0 interface uses the FTDI FT231X USB to UART interface chip.
Drivers can be found here:
https://www.ftdichip.com/Products/ICs/FT231X.html
The USB connector powers the CLC-USB.
The I2C interface can be used with 1.5v, 1.8v, 2.5V, 3.3V and 5V busses.
UART COM 115,200 is not supported, 250,000 can be supported.

CLC-USB Port



CLC-USB Block Diagram

CLC-USB Command Overview Continued

The CLC-USB interfaces with the Canon EF mounted lens through a command protocol using a micro processor. The micro processor reads data from the EF lens, and commands the lens based on this information. The native lens data is described as follows:

> Attaching a lens is detected by the micro processor and causes the lens to be initialized by the CLC-USB. This initialization performs the following: 1) The zero and infinity positions are set and the encoder positions are measured. 2) The lens status, flags and aperture information are read. 3) The lens internal type code and protocol is read and decoded.
>
> Aperture data is measured in 1/8th F-Stop increments. The F-Stop data is accessed as 10x the value of the F-Stop; thus the value reported from the lens as F28 is actually F2.8. The aperture of the fully open and fully closed positions are provided by the lens.
>
> Focus data is measured in lens encoder units. Individual lens types will have different encoder ranges reported by the lens. The encoder counts for infinity focus and zero focus and is measured from the lens when it is attached.
>
> General purpose control signals are provide by the CLC-USB. There are two GPIO signals that can be set to an input or output at a TTL (5V) level. GPIO signals are accessed through an internal connector on the CLC-USB controller PCB.
>
> The internal EEPROM in the CLC-USB microprocessor can be accessed by the user. EEPROM data is read and written as bytes. An EEPROM dump command is provided. The first 64 bytes of EEPROM is reserved for CLC-USB use. DO NOT WRITE to these locations.

CLC-USB Command Overview Continued

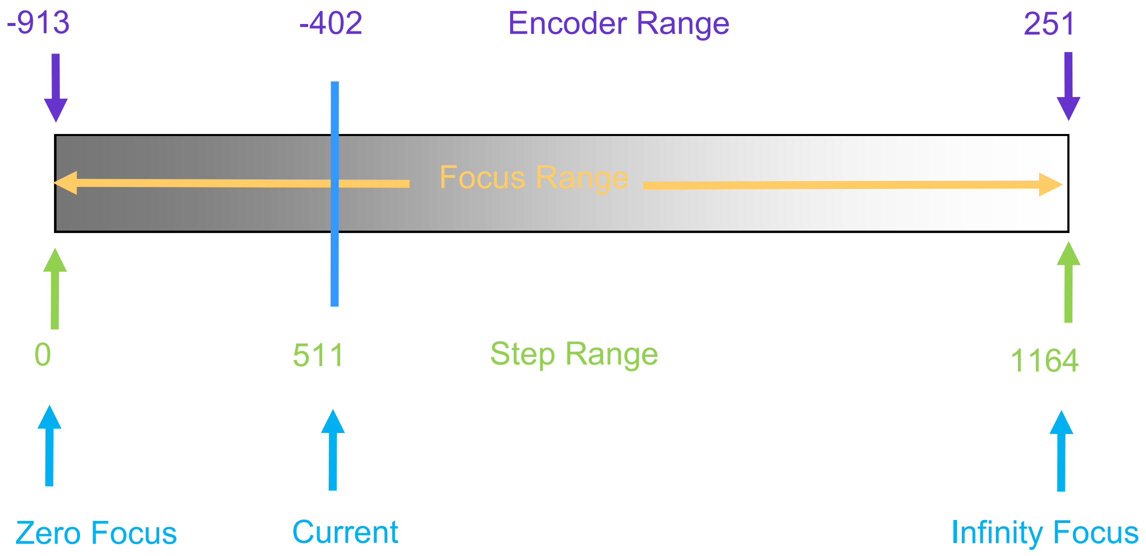
Focus Control:

The lens internal focus mechanism controls the focus position through a stepper or ultrasonic motor. The mechanism uses an encoder to determine its absolute position. The CLC-USB reads the encoder values and reports them in the ‘ls’ command. Encoder values can be negative and thus confusing to use. Please note that every lens has different encoder values.

To simplify focus control, the CLC-USB calculates the focus range in steps. This allows for control in the step based numerical range. The maximum step value can be read with the ‘fs’ command which returns #steps. A step value of 0 is equal to ‘focus zero’ and a step value of #steps is equal to ‘focus infinity’ using the ‘fa’ focus absolute command.

An additional command is provided to set the focus in percent of full range. This command is ‘fc’ <value> where value is between 0.0 and 100.0 in a float format.

The following diagram shows the encoder, focus and step control range concept.



Example of focus range values for the EF 50mm f/1.8 II lens.

CLC-USB Command Overview Continued

Aperture Control:

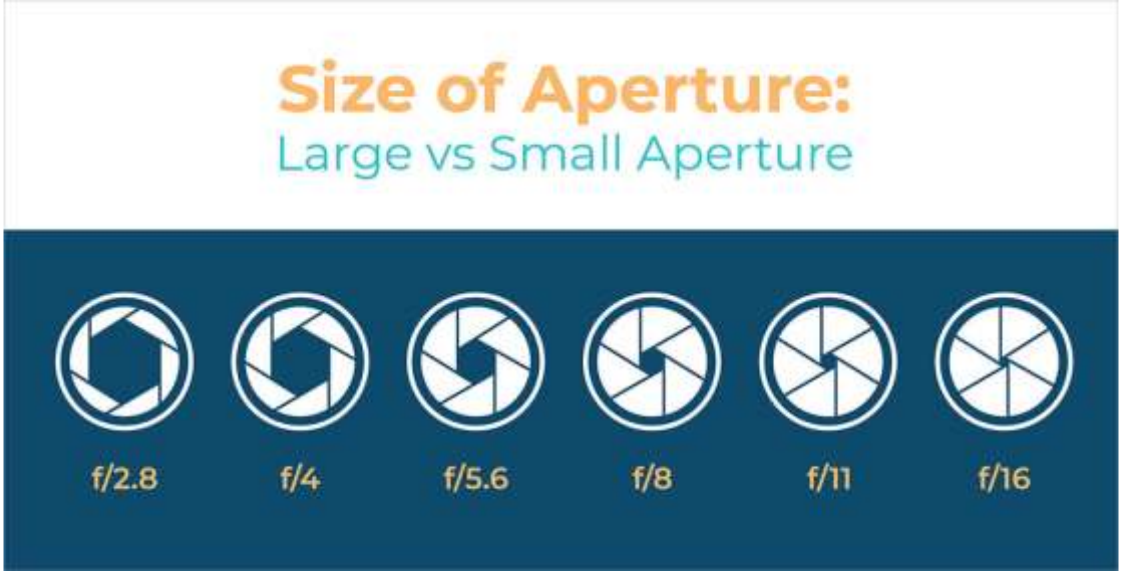
Each lens has an aperture with various lenses. The design of the lens itself determines the range of aperture settings. The CLC-USB provides three methods of setting the aperture.

#1 The aperture can be forced full open and full closed.

#2 The aperture can be set in native (internal) lens steps.
These steps are in 1/8th of an F-stop.
The aperture can be set in absolute or incremental steps.

#3 The aperture can be set as a F-Stop.
F-Stop is specified as 10X the value requested
Example: > ms 180 <CR> = Set F-stop 1.8
Example: > ms 165 <CR> = Set F-stop 16.5

Note : Aperture display status is output as 10X the F-Stop
Example:
Aperture min : F28 (f/2.8)
Aperture max : F160 (f/16)
Aperture curr : F56 (f/5.6)



CLC-USB Commands

The illunis Canon Lens Controller uses a text based interface to command the lens and set parameters. The BAUD rate is fixed to 56,700, 8 bit, no parity. The serial interaction can be operated in the following modes

Quiet Mode : No text is sent by the CLC-USB unless it is commanded by the host.
Normal Mode: (Non Quiet) Camera info and command help is sent on startup
Verbose Mode: This mode sends detailed text data for each command.

Setting Quiet Mode saves the setting in EEPROM and is restored at startup. This allows for a simpler command and control interface to the CLC-USB.

The CLC-USB Normal Mode detects an attached lens and displays the following text at startup:

```
Canon Lens Controller
(c) illunis LLC 2020
Lens attached : EF100mm f/2.8L Macro IS USM
Lens EEPROM state restored
SerialNum: 1024

Canon EF Commands:'*'=EEPROM, @I2C=0x20/21
Ver: 3 Rev: 6 Lens Auto PowerDown: 10mins 0secs
ls          Lens status
lc          brief status: focal len,Ap min,Ap #steps,Ap max
la          Lens attach
ln          Lens name
ge <#>      Get Info
in          Initialize and open aperture
ad          Print aperture info. brief
da          Print aperture info.
pa          Print aperture position
ma <stop>   Move aperture abs. 1/8stop
mc          Move aperture fully closed
mn <pos>    Move aperture inc.  1/8stop
mo          Move aperture fully open
ms          Move aperture to f-stop
mf          Move focus incremental
mi          Move focus infinity
mz          Move focus zero
fa <pos>    Move focus to abs pos.
fc <pos>    Move focus percent
pf          Print focus position
fp          Print focus positions
fs          Print focus steps
f#          Print focus #'s
ep          Print encoder positions
lf          focus min,max,cur
pz          Print zoom position
qm <0/1>    * Quiet Mode
bw a d      * EEPROM byte write decimal
br a        * EEPROM byte read decimal
ed          * EEPROM dump in HEX
es          * EEPROM save lens state
er          * EEPROM restore lens state
vr          * print version
sn          * print serial number
to          * Get/Set power down time in sec
?           print help
```

Lens Info Commands

The CLC-USB detects the attached lens. The “ls” command shows lens info.:

```
>ls

 Lens Name (From Lens): EF85mm f/1.8 USM
 Prime Lens           : 85mm
 Aperture min         : F18
 Aperture max         : F226
 Aperture curr        : F18
 Aperture motor steps : 58
 Focus steps          : 1695
 Focus Position       : 1692
>
```

When a lens is dynamically detached or attached a message is displayed.:

```
>Lens detached...
Lens attached : EF85mm f/1.8 USM
Lens EEPROM state restored
>Lens detached...
Lens attached : EF85mm f/1.8 USM
Lens EEPROM state restored
>
```

Lens Info Commands Continues

- CLC-USB Commands
  - Version
  - Serial number
  - Quiet Mode
  - Get Info

- Lens Info Commands
  - Lens status
  - Lens attach
  - Lens name
  - Lens status register

- Aperture Commands
  - Initialize aperture
  - Print aperture info
  - Print aperture position
  - Move aperture absolute 1/8 stop
  - Move aperture fully closed
  - Move aperture incremental 1/8 stop
  - Move aperture fully open
  - Move aperture to F-stop #

- Focus Commands
  - Move focus incremental
  - Move focus infinity
  - Move focus zero
  - Move focus to absolute position
  - Move focus percent
  - Print focus position
  - Print focus positions
  - Print focus steps
  - List focus min,max,current

- Zoom Commands
  - Print Zoom position

- EEPROM Commands
  - EEPROM dump
  - Write byte
  - Read byte
  - Save lens state to EEPROM
  - Restore lens state from EEPROM

Lens Info Commands Continued

Command: Help (menu)
Syntax: **?**
Returns: Table of commands
Description: Returns table of commands and descriptions
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
?
Canon EF Commands:  '*'=EEPROM
Ver: 1 Rev: 1
ls          Lens status
lc          brief status: focal len,Ap min,#steps,Ap max
la          Lens attach
ln          Lens name
….
vr          * print version
gs          * get serial number
sn          * print serial number
help or ?   print help
>
```

Command: Print Version
Syntax: **vr**
Returns: Test Version :<number> Rev ::<number>
Description: Returns internal version information from CLC-USB.
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
vr <CR>
Version :3 Rev :3
>
```

Command: Serial number
Syntax: **sn**
Returns: :<number>
Description: Returns serial number of the CLC-USB
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
3
>
```

Command: Quiet Mode
Syntax: **qm <0,1>**
Returns: nothing
Description: Sets quiet <1> or normal <0> mode.
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
qm 0
qm 1
>
```

Lens Info Commands Continued

Command: Get Info
Syntax: **ge <#>**
Returns: CLC-USB internal information
Description: Returns data in the form of a signed integer
Prompt is returned if in normal mode.

Request #'s

```
#define       CLCD_SN                      0
#define       CLCD_LENS_ATTACHED           1
#define       CLCD_VER_MAJOR               2
#define       CLCD_VER_MINOR               3
#define       CLCD_APERTURE_MIN            4
#define       CLCD_APERTURE_CUR            5
#define       CLCD_APERTURE_MAX            6
#define       CLCD_FOCUS_MIN               7
#define       CLCD_FOCUS_CUR               8
#define       CLCD_FOCUS_MAX               9
#define       CLCD_ZOOM_MIN                10
#define       CLCD_ZOOM_CUR                11
#define       CLCD_ZOOM_MAX                12
#define       CLCD_MF_ON                   13
#define       CLCD_IS_ON                   14
#define       CLCD_LENS_ID                 15
#define       CLCD_FNUM_MIN                16
#define       CLCD_FNUM_CUR                17
#define       CLCD_FNUM_MAX                18
#define       CLCD_EXTENDED_DATA           19
```

Example:

```
>ge 16
18
>
```

Lens Info Commands Continued

Command: Lens status
Syntax: **ls**
Returns: Table of lens status values
Description: Returns all lens data in table format
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
ls <CR>
Lens Name            : EF 50mm f/1.8 II
Prime Lens           : 50mm
Aperture min         : F18
Aperture max         : F226
Aperture curr        : F32
Aperture motor steps : 58
Focus steps          : 984
Focus Position       : 50
>
```

Command: Lens attach
Syntax: **la**
Returns: nothing
Description: Moves lens focus to find endpoints, sets focus to infinity
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
la <CR>
>
```

Command: Lens name
Syntax: **ln**
Returns: <string>
Description: Returns lens name if in internal data base
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
ln <CR>
EF 50mm f/1.8 II
>
```

Command: Lens internal status register
Syntax: **st**
Returns: <string>
Description: AF/MF=Auto/Manual Focus, IS=Image Stabilizer On
F@Stop/FAcell/FMoving/F@Rest = Focus Motor status
A-MotorOn, A@FullOpen = Aperture status
Example:

```
>st <CR>
0x10:AF+F@Stop+F@Rest+A@FullOpen
>
```

Aperture Commands

Command: Initialize aperture
Syntax: **in**
Returns: nothing
Description: Initializes aperture motor and move aperture fully open
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
in <CR>
>
```

Command: Print aperture info
Syntax: **da**
Returns: <string>
Description: Returns lens aperture min, max, and current settings
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
da <CR>
Aperture min          : F18
Aperture max          : F226
Aperture curr         : F18
>
```

Command: Print aperture position
Syntax: **pa**
Returns: <string>
Description: Returns lens aperture current - min, and current settings
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
pa <CR>
0,f18
>
```

Command: Move aperture absolute 1/8 stop
Syntax: **ma <stop>**
Returns: <stop>,f<number>
Description: Moves aperture to absolute position in 1/8 stop’s
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
ma 22 <CR>
22,f47
>
```

Aperture Commands Continued

Command: Move aperture fully closed
Syntax: **mc**
Returns: <stop>,f<number>
Description: Moves aperture fully closed
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
mc <CR>
58,f226
>
```

Command: Move aperture fully open
Syntax: **mo**
Returns: <string>
Description: <stop>,f<number>
Description: Moves aperture fully open.
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
mo <CR>
0,f18
>
```

Command: Move aperture incremental 1/8 stop
Syntax: **mn <stops>**
Returns: <string>
Description: Returns lens aperture min, max, and current settings
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
mn –4 <CR>
14,f33
>
```

Command: Move aperture to F-stop #
Syntax: **ms <fstop>**
Returns: <stop>,f<number>
Description: Moves aperture to absolute F-stop. **fstop** is 10x value
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example: Move to f-stop 2.2

```
ms 22 <CR>
4,f21
>
```

Example: Move to f-stop 11.0

```
ms 110 <CR>
41,f108
>
```

Focus Commands

Command: Move focus infinity
Syntax: **mi**
Returns: nothing
Description: Moves focus position to infinity focus
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:
```
mi <CR>
>
```

Command: Move focus zero
Syntax: **mz**
Returns: nothing
Description: Moves focus position to zero focus
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:
```
mz <CR>
>
```

Command: Move focus to absolute position
Syntax: **fa <position>**
Returns: nothing
Description: Moves focus position to absolute position
Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:
```
fa 333 <CR>
>
```

Command: Move focus incremental
Syntax: **mf <delta position>**
Returns: nothing
Description: Moves focus position incrementally from current position
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Negative numbers moves focus towards zero focus.
Positive numbers moves focus towards infinity focus.
Focus motors will stop at end points.

Example:
```
mf –55 <CR>
>
```

Focus Commands Continued

Command: Move focus percent
Syntax: **fc <percent>**
Returns: postion:focus steps
Description: Moves focus position to a percent of full range
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Percent is 0.0 to 100.0
Example:

```
fc 44.4 <CR>
44.40:402
>
```

Command: Print focus position
Syntax: **pf**
Returns: focus step position
Description: Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
pf <CR>
511
>
```

Command: Print focus positions
Syntax: **fp**
Returns: Focus motor positions
Description: Prints focus positions in motor value
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
fp <CR>
Fmin:-913 Fmax:251 current:-402
>
```

Command: Print encoder positions
Syntax: **ep**
Returns: Focus encoder positions (NOTE: Not motor step position)
Description: Prints focus positions in encoder value
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Works only in extended data mode
Example:

```
ep <CR>
>EZero:19458 Einf:608 current:11568
```

Command: Print encoder positions
Syntax: **cm**
Returns: Focus in cm (NOTE: Not motor step position)
Description: Prints focus positions in centimeters.
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Works only in extended data mode
Example:

```
cm <CR>
>Fcm:41
```

Focus Commands Continued

Command: Print focus steps
Syntax: **fs**
Returns: <value>
Description: Prints number of focus steps
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
fs <CR>
1164
>
```

Command: List focus
Syntax: **lf**
Returns: <value>,<value>,<value>
Description: Prints focus values in simple format. (NOTE: Not step position)
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
lf <CR>
-913,251,-402
>
```

Zoom Commands

Command: Print Zoom position
Syntax: **pz**
Returns: <value>,<value>,<value>
Description: Prints Zoom position : min, max, current (Lens is prime if all are equal)
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
pz <CR>
50mm,50mm,50mm
>
```

EEPROM Commands

Command: Byte Write
Syntax: **bw <address> <data>**
Returns: nothing
Description: Writes byte to EEPROM, all values are decimal
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
bw 200, 23 <CR>
>
```

Command: Byte Read
Syntax: **br <address>**
Returns: <value>
Description: Reads byte from EEPROM, all values are decimal
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
br 200 <CR>
23
>
```

Command: EEPROM dump
Syntax: **ed**
Returns: <value>
Description: Reads all bytes from EEPROM (Output is in hexadecimal)
Prompt is returned if in normal mode. Nothing retuned in quite mode.
Example:

```
ed <CR>
EEPROM (HEX address and data):
 0:  1  FF  0  0  0  0  0  0  0 FF FF FF FF  D  0 1D
10:  3  0  FF FF FF FF FF FF FF FF FF FF FF FF FF FF
20:  AF 1  98  3 98  3 D8  3 FF FF FF FF FF FF FF FF
...
3E0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
3F0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
>
```

EEPROM Commands Continued

Command:	EEPROM Save lens state
Syntax:	**es**
Returns:	string
Description:	Saves lens state to EEPROM, lens state is restored on power up Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

```
es <CR>
Lens state saved
>
```

Command:	EEPROM Restore lens state
Syntax:	**er**
Returns:	aperture position <CR> string
Description:	Restores lens state from EEPROM (Aperture and Focus) Prompt is returned if in normal mode. Nothing retuned in quite mode.

Example:

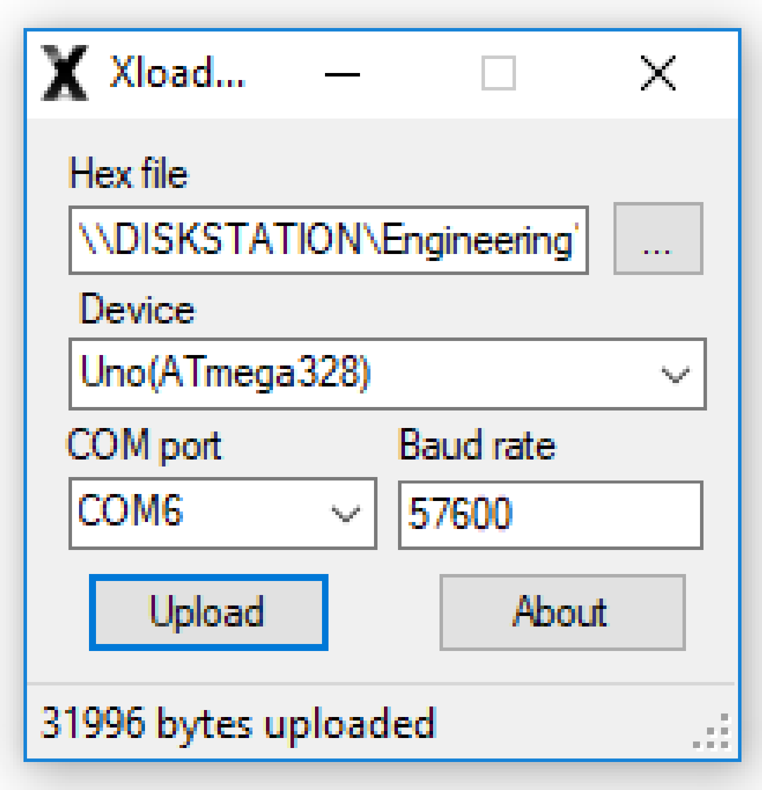
```
er <CR>
58,f226
Lens state restored
>
```

Firmware Update

Firmware can be loaded through the USB port using the utility XLoader.exe.

To upload firmware please do the following:

1. Remove lens mount assembly from camera body. Access to the back of the lens controller PCB is required for the firmware update.
2. Attach the CLC-USB to the computer through a USB port
3. Locate the firmware hex file
4. Open XLoader application
5. Select the firmware Hex file
6. Select the Device "Uno(ATmega328)"
7. Select the COM port and baud rate = 57600



Hex file: \\DISKSTATION\Engineering

Device: Uno(ATmega328)

COM port: COM6

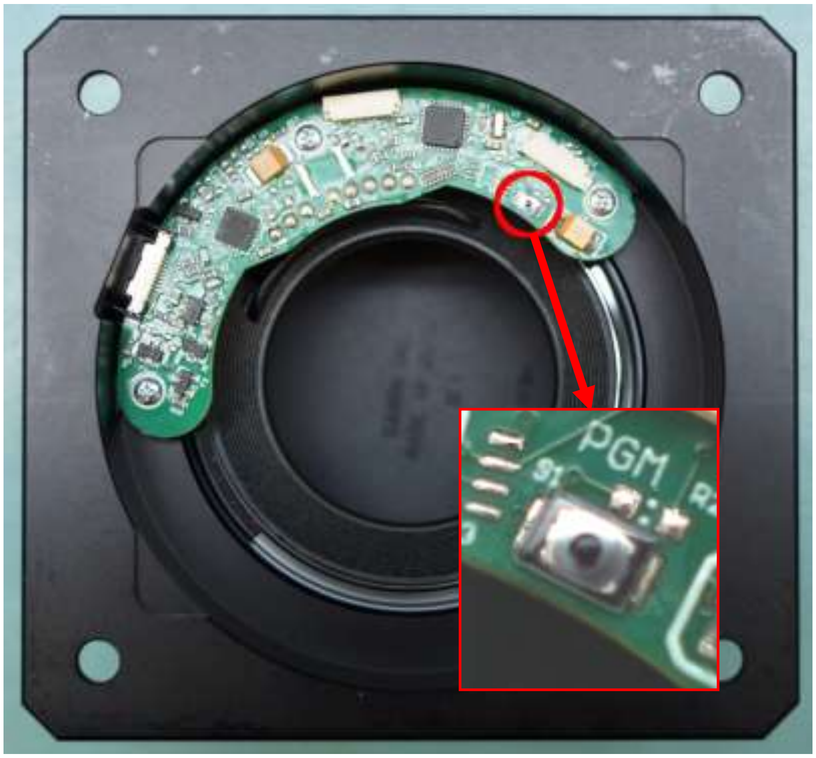
Baud rate: 57600

31996 bytes uploaded

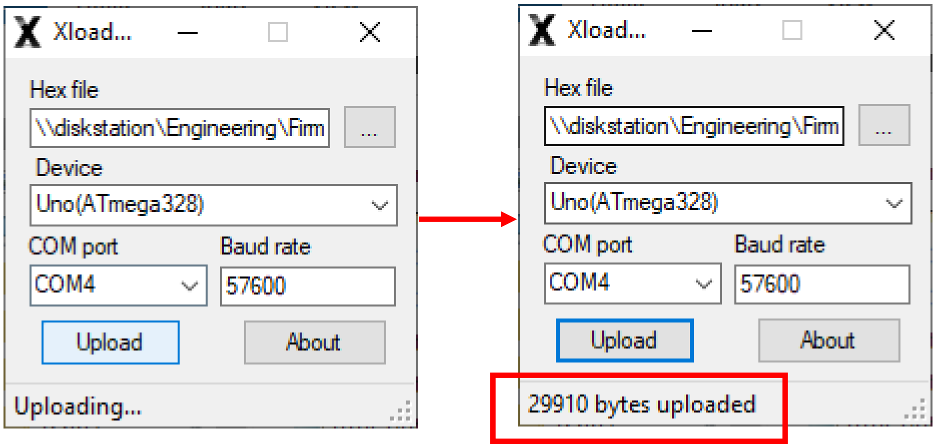
Continued on next page...

Firmware Update

Firmware Update Continued...



8. Press and hold the button shown above and click **Upload** on Xloader.
9. The button may be released once the upload has started.
10. Firmware upload is complete when the status changes to xxxxx bytes uploaded.



Hex file: \\diskstation\Engineering\Firm
Device: Uno(ATmega328)
COM port: COM4
Baud rate: 57600

Uploading...

Hex file: \\diskstation\Engineering\Firm
Device: Uno(ATmega328)
COM port: COM4
Baud rate: 57600

29910 bytes uploaded

Example Lens

The Canon 85mm EF 1:1.8 is shown in this example

on lens attachment, normal (not quiet) mode.

```
Canon Lens Controller
(c) illunis LLC 2020
Lens attached : EF100mm f/2.8L Macro IS USM
Lens EEPROM state restored
SerialNum: 1024

Canon EF Commands:'*'=EEPROM, @I2C=0x20/21
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ad          Print aperture info. brief
da          Print aperture info.
pa          Print aperture position
ma <stop>   Move aperture abs. 1/8stop
mc          Move aperture fully closed
mn <pos>    Move aperture inc.  1/8stop
mo          Move aperture fully open
ms          Move aperture to f-stop
mf          Move focus incremental
mi          Move focus infinity
mz          Move focus zero
fa <pos>    Move focus to abs pos.
fc <pos>    Move focus percent
pf          Print focus position
fp          Print focus positions
fs          Print focus steps
f#          Print focus #'s
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qm <0/1>    * Quiet Mode
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br a        * EEPROM byte read decimal
ed          * EEPROM dump in HEX
es          * EEPROM save lens state
er          * EEPROM restore lens state
vr          * print version
sn          * print serial number
to          * Get/Set power down time in sec
?           print help

>
```

Example Lens Continued

Lens status ‘ls’

```
 Lens Name (From Lens): EF85mm f/1.8 USM
 Prime Lens           : 85mm        <- Lens is prime (not zoom)
 Aperture min         : F18
 Aperture max         : F226
 Aperture curr        : F18         <- Fully open
 Aperture motor steps : 58
 Focus steps          : 1675
 Focus Position       : 1675        <- Focus @ infinity
>
```

Move closed ‘mc’ and Lens status ‘ls’

```
 Lens Name (From Lens): EF85mm f/1.8 USM
 Prime Lens           : 85mm
 Aperture min         : F18
 Aperture max         : F226
 Aperture curr        : F226        <- Aperture reports closed ~ 22
 Aperture motor steps : 58
 Focus steps          : 1677
 Focus Position       : 1677
>
```

Move closed ‘mz’ and Lens status ‘ls’

```
 Lens Name (From Lens): EF85mm f/1.8 USM
 Prime Lens           : 85mm
 Aperture min         : F18
 Aperture max         : F226
 Aperture curr        : F18
 Aperture motor steps : 58
 Focus steps          : 1678
 Focus Position       : 0           <- Focus reports at zero location
>
```

Version ‘vr’

```
Version :3 Rev :6
```

The Canon 100mm EF 80-200mm f/4.5-5.6 USM is shown in this example

```
>
 Lens Name            : EF 80-200mm f/4.5-5.6 USM
 Zoom Lens min/max/cur: 80mm/200mm/195mm   <- Zoom location
 Aperture min         : F56
 Aperture max         : F281
 Aperture curr        : F56
 Aperture motor steps : 37
 Focus steps          : 9
 Focus Position       : 0
>
```

.dll Commands

A .NET .dll is provided to aid in connecting to and controlling the lens. The following commands are supported.

COM Port Commands

Function: `int PortOpen(string name)`
Returns: 1 for success –1 for failure
Description: Initialize the COM
Example:

```
Int err = initPort(“COM4”);
```

Function: `void PortClose()`
Returns: void
Description: Close the COM port connection
Example:

```
PortClose();
```

Focus Commands

Function: `void FocusCalibrationOnConnect(bool Enable)`
Returns: void
Description: On some lens models the encoder range can change each time it’s attached. This setting must be set before **PortOpen(string name)** or the focus will calibrate. **True** - Moves the lens to 0 and infinity when attached to calibrate controller to the current encoder range. **False** - does not calibrate focus on attach, can be used on lenses with stable encoders. **Default is False.**
Example:

```
FocusCalibrationOnConnect(false);
```

Function: `int GetFocusNear()`
Returns: Near Focus value
Description: Returns the Near Focus Value set by initFocus()
Example:

```
Int FocusNear = GetFocusNear();
```

Function: `int GetFocusFar()`
Returns: Far Focus value
Description: Returns the Far Focus Value set by initFocus()
Example:

```
Int FocusNear = GetFocusFar();
```

.dll Commands Continued

Focus Commands—continued

Function: `int SetFocusAbsolute(int focus)`
Returns: 1 for success –1 for failure
Description: Sets focus to absolute position between FocusNear and FocusFar
Example: `SetFocusAbsolute( 240 );`

Function: `int GetCurrentFocus()`
Returns: Current focus value
Description: Returns the current focus value
Example: `Int Focus = GetCurrentFocus();`

Function: `string SaveFocusState();`
Returns: **!** For success **?** For error
Description: Saves current focus position to EEPROM
Example: `String success = SaveFocusState();`

Function: `string RestoreFocusSatate()`
Returns: **!** For success **?** For error
Description: Performs a focus calibration, then sets focus to value saved in EEPROM. Note: This will return after command is sent, but lens may take up to 4 seconds to complete.

Iris Commands

Function: `double GetIrisMin()`
Returns: Minimum Iris Value (Most Open value)
Description: Returns the Minimum Iris Value.
Example: `double MinIris = GetIrisMin();`

Function: `double GetIrisMax()`
Returns: Maximum Iris Value (Most Closed value)
Description: Returns the Maximum Iris Value.
Example: `double MaxIris = GetIrisMax();`

Function: `int SetIrisAbsolute(double focus)`
Returns: 1 for success –1 for failure
Description: Sets focus to absolute position between GetIrisMin and GetIrisMax
Example: `SetIrisAbsolute( 1.8 );`

Function: `double GetIrisCurrent()`
Returns: Current Iris value
Description: Returns the current iris value
Example: `double Iris = GetIrisCurrent();`

.dll Commands Continued

General Commands

Function: `string GetLensName()`
Returns: Lens Name
Description: Returns Lens Name
Example:

```
String Name = GetLensName();
```

Function: `string GetLensStatus()`
Returns: Table of Lens parameters
Description: Returns Lens parameters
Example:

```
String Status = GetLensStatus();
```

Function: `string GetVersion()`
Returns: Lens Controller firmware version
Description: Returns Lens Controller firmware version
Example:

```
String Version = GetVersion();
```

Function: `void LensHeartbeat(bool Enable)`
Returns: void
Description: Enables or disables SDK periodic lens presence checks to raise LensPresenceChanged event.
Default: true
Example:

```
LensHeartbeat(false);
```

Function: `event EventHandler LensPresenceChanged`
Returns: none
Description: Event is raised when a lens is attached or detached from the controller if LensHeartbeat is set to true.
Example:

```
myLens.LensPresenceChanged += LensAttachDetach;
```

Function: `bool LensPresent()`
Returns: True if lens attached to controller
Description: Returns current lens status updated by LensHeartbeat. If LensHeartbeat is disabled it will query lens controller.
Example:

```
bool LensPresent = LensPresent();
```

Function: `string PortWrite(string command)`
Returns: returns lens controller response to command (if any)
Description: Used to send any command covered earlier in the guide that does not have a SDK function. Returns lens controller response, “!” for success on commands with no response, “?” for failed or unknown command.
Example:

```
string Response = PortWrite(“pz”);
```

For more information on any illunis product, including detailed specifications and options, please visit our website at **www.illunis.com,** email **info@illunis.com,** or call illunis at the phone number listed below.

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