

From: Fergal Brennan fbrennan@cathxocean.com
Subject: Re: trigger inputs
Date: February 18, 2016 at 12:46 PM
To: Alana Sherman alana@mbari.org

FB

Hi Alana,

Thats great progress, good to hear that!

You can increase the shot time from 65 (msec) to a max of 100 to get the max light out of the panel. Also you can inrease the target cap voltage to 55 (set_vcap) this will add a bit more energy to the pulse.

Regarding the cap discharge, the nature of the Aphos32 design means that the caps will never fully discharge. The light panel consists of 4 rows of 8 leds connected in series. Each row (channel) is essentially a seperate strobe light with its own charging circuit and capacitor bank and current/voltage sensors.

Each led has a min forward voltage of approx 3V and a nominal forward voltage of 4.0V. So that means the channel needs somewhere in the region of 24v to 32v to turn on all the leds.

The capacitor banks have a max voltage of 56.5V and there is 9900uF of capacitance per bank, so 39600uF give or take.

if you look at the graph on page 21 of the doc document i mailed you earlier you will see the led current and voltage as a function of time for 65msec.

The left side y axis is led fwd voltage for a channel. The right side is the current. So what you see is that after 65msec we have only a small fwd current but there is 24v left on the caps. At this point the leds are goign off and the panel stops drawing current.

So the strobe will only consume energy from 56.5v down to 24v beyind that the leds go off. The upside for pulsed mode ops is that once you cold charge the strobe light it is very power efficient in terms of the required recharge current.

in ur tests, when you complete a single shot pulse, if you power cycle the light a short time after you fire, the caps will have a residual charge of 24v and you only have to make up the difference between set_vcap (55) and whatever is on the cap.

if you fireva pulse, then power down for say 5 or 10mins you wil see that the light will hog more current when its charging.

another point to note is that i have attempted to split the charge cycling so that only one channels is scively topping up it charge at a time, its not perfect as the charger ccts are not synchronised but it is effective in spreading the current load.

After all that I'm not entirely sure if ive answered ur question, maybe i just put u to sleep!

Anyhow let me know if you need more info.

Regards,
Fergal....

On Thursday, 18 February 2016, Alana Sherman <alana@mbari.org> wrote:

Hi Fergal

Thanks so much for the detailed response, as a result I am now able to communicate with and trigger the LED light. I used all the commands you told me and the S_shot parameter is set to 65 (I did not change this). The one thing I find surprising is that it does not seem to charge for very long before reaching low current mode. When I turn the strobe on, it only draws more than nominal current for probably less than 10 seconds, usually the current peaks to about 1.3 A, then settles back to a nominal current of maybe 10-15mA @ 28V. That seems like an unusually short charge time which makes me believe that maybe the caps are not fully discharging. Is this expected behavior? Or do I need to change another parameter?

Thanks for all the help and documentation!

Alana

On Feb 18, 2016, at 7:05 AM, Fergal Brennan <fbrennan@cathxocean.com> wrote:

Hi Alana,

Many thanks for the detail in the email. I have a few suggestions for you and hopefully we should have you operating real quick. The periodic current 'gulping' is how the light maintains its charge as you correctly surmised. The light draws very little average current when maintaining its charge level. I suspect one of the issues you have is the target capacitor voltage was defaulted to 31V when Damien (Cathx) updated the lights firmware in November. I would advise updating this to 52V and have included that in point 1.2 below.

1. Serial communications with the light

I've attached a document to this mail, it's an early revision operations manual for the strobe light so is not very complete. Included in this manual on page 4 is a section describing serial communications with the Aphos32's.

I am not certain how you are interfacing with the light but I would draw your attention to [Note 2](#) in the manual (page 5). For the lights you have, you will need to add a carriage return and line feed with each packet you send. This is to avoid a bug where packets can get ignored by the light.

Also I was just checking thru the lights we sent you, and as far as I know the 'Permanent' lights have the following serial

number and RS485 addresses;

Light with serial number **A32-0102** is set to RS485 address **1**

Light with serial number **A32-0103A** is set to RS485 address **2**

The AUV lights we sent you should have the following details;

Light with serial number **A32-0104** is set to RS485 address **1**

Light with serial number **A32-0105** is set to RS485 address **2**

If you use the wrong RS485 address the light will not respond, also if the RS485 lines are reversed the light will also not respond.

1.1 Getting connected with the lights

Once you have the light powered send the following command;

RS485 address = 1

<C,1,version*ZZZZ>

The light should answer this command with the following reply:

<R,1,132*ZZZZ>

Note that the light will send a checksum value instead of the "ZZZZ". Once you get this reply you have communications established with the light.

RS485 address = 2

<C,2,version*ZZZZ>

The light should answer this command with the following reply:

<R,2,132*ZZZZ>

1.2 Setup commands for single shot mode

The commands you selected are good, I would add one more command to the list as follows;

RS485 address = 1

1) single shot mode <C,1,s_mode 1*ZZZZ>

2) Rising edge triggered <C,1,s_trigger 0*ZZZZ>

3) auto enable <C,1,auto_en 2*ZZZZ>

4) set_vcap <C,1,set_vcap 52*ZZZZ>

RS485 address = 2

1) single shot mode <C,2,s_mode 1*ZZZZ>

2) Rising edge triggered <C,2,s_trigger 0*ZZZZ>

3) auto enable <C,2,auto_en 2*ZZZZ>

4) set_vcap <C,2,set_vcap 52*ZZZZ>

The `set_vcap` command instructs the light to maintain the capacitor voltage at its highest level. The default voltage for the strobe light is 31V, this is used to provide a soft-start mechanism for a light that is operating on an ROV / AUV and is sequentially pulsing. It allows the pulses to grow in intensity from a very low point up to the operating voltage. In single shot mode a capacitor voltage of 31V might not be enough to drive the lights fully.

As an aside we use an USB-RS485 converter when setting up lights, we use this one available from Farnell (part number = 1740357) We also use the terminal emulator program Putty or Realterm to then communicate and configure the lights. There are some details on the Putty setup we use in the manual.

2. The idea behind the “ZZZZ” in the packet

It perfectly ok to send ZZZZ in the packet, this sequence tells the light that the packet we are sending does not have a checksum attached. If you prefer to use a checksum that's OK. I normally don't but I will send you details on how to calculate it. (Simply a sum of all char's in the packet)

2.1 Broadcast address

The lights have a broadcast address of 255. If you use this as the light address it will carry out the command you send but will not reply to any read commands.

3. Trigger ground

It's no problem with the common ground. The lights opto-coupler should have no issue with that at all.

I hope the manual and this mail can solve your issue. It sounds as though you have the setup physically correct and the issue lies with the comm's to the light. Either way, don't hesitate to call/email as you need. We will do our best to get you up and running.

Regards,

Fergal....

On 17 February 2016 at 23:46, Alana Sherman <alana@mbari.org> wrote:

Hi Fergal,

I am an electrical engineer at MBARI working with Brett Hobson. I am trying to test out the Cathx LED light we recently purchased with my existing camera/strobe controller electronics. I am providing the LED light +28V and using a +5V trigger signal that is 50 msec in duration. I have not been able to successfully fire the LED light. I believe it is charged because I see that it draws very little current when the +28V is applied however it does take occasional gulps of current, which I think suggests caps that are keeping themselves charged.

I am wondering if there is a setting that is not correct, which brings me to my question, I tried to hook up the RS485 and did not succeed in communicating. I was wondering what the serial comms specs were (baud rate, etc). Also, do you have any debugging suggestions. Finally I see some of the commands, here is how I think I should set the system up for my application:

- 1) single shot mode <C,2,s_mode 1*ZZZZ>
- 2) Rising edge triggered <C,2,s_trigger 0*ZZZZ>
- 3) auto enable <C,2,auto_en 2*ZZZZ>

I also wanted to verify that the “ZZZZ” are truly just Z's and not placeholders for some other variable. Please let me know if there are any other tips or tricks I should know about communicating with the light.

Thanks so much,

Alana

ps. My trigger and power lines share a common ground, I don't have a good way to isolate them so I hope that is not an issue for the light.

On Feb 17, 2016, at 3:20 PM, Brett Hobson <hobson@mbari.org> wrote:

Brett Hobson
Hobson@mbari.com
(831)775-1941
(831)601-5499 cel

Begin forwarded message:

From: Fergal Brennan <fbrennan@cathxoccean.com>
Date: 11 February 2016 at 11:45:06 am GMT-8
To: Brett Hobson <hobson@mbari.org>
Subject: Re: trigger inputs

Hi Brett,

From the records on your lights we have Min time will be 52sec and max will be 58sec. There will be some tolerance on that, so if possible allow 5 secs of a window.

Rgds,
Fergal

On Thursday, 11 February 2016, Brett Hobson <hobson@mbari.org> wrote:

Hi
What's the min and max charge time for the ballast.
Thanks
Brett

Brett Hobson
Hobson@mbari.com
(831)775-1941
(831)601-5499 cel

On 10 Feb 2016, at 11:15 am, Fergal Brennan <fbrennan@cathxoccean.com> wrote:

Hi Brett,

I spotted a typo in the command table of the doc I sent you so I have updated that for you.
Please delete the doc I previously sent and use the one I attached to this mail.

Apologies,
Fergal....

On 10 February 2016 at 17:52, Brett Hobson <hobson@mbari.org> wrote:

Hi,
It would be great to get the basic info as soon as possible since the gal who's interfacing this keeps stopping by asking for it..
Thanks,
Brett

Brett Hobson
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<https://scholar.google.com/citations?user=S33lvhAAAAAJ&hl=en>

From: "Fergal Brennan" <fbrennan@cathxocean.com>
To: "Brett Hobson" <hobson@mbari.org>
Sent: Tuesday, February 9, 2016 2:16:00 PM
Subject: Re: trigger inputs

Hi Brett,

I am typing up a doc for you this minute on the single shot operation of the strobe light, I will add in a section on trigger configuration

Will get it to you soonest.

Regards,
Fergal....

On 9 February 2016 at 21:29, Brett Hobson
<hobson@mbari.org> wrote:

Hi Fergal,
We're finally integrating the "Permanent"
lights and are looking for some
documentation on exactly what trigger the
ballasts are configured for (5 v, pull-up,
pull down, switch closure to grnd) and the
process to change and the range of flash
duration.
Thanks,
Brett

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[https://scholar.google.com/citations?
user=S33lvhAAAAAJ&hl=en](https://scholar.google.com/citations?user=S33lvhAAAAAJ&hl=en)

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<MBARI Permanent lights overview (1).docx>

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<Aphos 32 Strobe light.docx>

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