



ADVANCED  
ILLUMINATION



# **Pulsar 320**

## **Strobe Controller**

Operator's Manual  
& Installation Guide

**The shipping container should contain the following items:**

Packing List

Qty	Description	Ai Part #
1	Pulsar 320 Controller	
2	3 Pin, Trigger input connectors	1805314
1	2 Pin, Power input connector	1777989
1	USB Cable	172-1024



(1)



(x2)



(1)



(1)

Advanced illumination, Inc.  
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# Pulsar 320 Controller

## Operator's Manual

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## 1.0 Introduction

The Pulsar 320 Controller, used in conjunction with an external 24VDC power supply, is a compact, 2 output, high power pulse (strobe only) current source incorporating a wide range of flexibility in selecting the operating parameters. The unit may be controlled and operated locally (with optional local control interface) or remotely via a USB interface and host computer. In addition, the unit employs built in Ethernet connectivity.

The balance of this manual contains the necessary operating instructions, specifications and other details required to allow the user to utilize the full capabilities of the Pulsar 320.

### 1.1 Safety

The Pulsar 320 is designed to protect Advanced illumination light heads having the Signatech I or Signatech II light head identification parameters. When using light heads configured for Signatech I, an adapter cable must be used to connect these lights to the Pulsar 320.

In certain modes of operation, the output voltages and currents provided by the Pulsar 320 could result in a potentially injurious or fatal electrical shock. **For this reason, light heads should be connected BEFORE the power switch is turned on.** At no time should the operator touch the output connector pins or light head leads when the power is on.

During normal operation, the Pulsar 320 may reach light head output voltages as high as 100 volts. For specific applications, or to comply with local codes, the Pulsar 320 may be configured to limit the light head output voltage to a maximum of 48 volts. Please contact Advanced illumination when this requirement exists.

Advanced illumination makes no warranty, expressed or implied, if illumination or other devices produced by manufacturers other than Advanced illumination are connected to the Pulsar 320.

### 1.2 Warranty

Every Advanced illumination, Inc. (Ai) product is thoroughly inspected and tested before leaving the factory. Products are warranted to be free of defects in workmanship and materials for a period of *TWO YEARS* from the

original date of purchase. Should a defect develop during this period, return the complete product, freight prepaid, to one of Ai's distributors or to the Ai factory. Ai will inspect the unit, and if a defect is found will, at our option, repair or replace the product without charge. Ai disclaims liability for any implied warranties, including implied warranties or "merchantability" and "fitness for a specific purpose."

Ai cannot be held responsible for the unauthorized or inappropriate use of our products.

## **NO LIABILITY FOR CONSEQUENTIAL DAMAGES.**

In no event shall Advanced illumination, Inc. be liable for consequential, special, incidental or indirect damages of any kind arising from the sale or use of products.

### **1.3 Return Policy**

Standard Products may be returned within 30 days of receipt of the order. Products must be in resalable condition, in function and appearance, with shipping charges prepaid. A restocking fee of 15% will be applied to all items accepted for return to stock. If you need to make a return, please call our Customer Service Department at 802.767.3830 x237 for a Return Merchandise Authorization (RMA) number. Clearly mark the outside of the package with the RMA number.

## **NO RETURNS CAN BE ACCEPTED FOR STANDARD VARIATION, CUSTOM VARIATION, AND CUSTOM PRODUCTS.**

There are currently over 100,000 unique configurations of the Ai product line. Therefore, we cannot restock a light built to your specifications. We would be glad to help you order your light if you are unsure of the correct part number or your exact requirements.

## **2.0 Features**

The following is a brief overview of the features provided by the Pulsar 320. These features will be covered in greater detail within the Operation and Specification sections of the manual.

### **2.1 Light Head Outputs**

Two outputs capable of high power are provided. Each will provide up to 50A of pulse current drive. The current of each channel is independently selectable. Output pulse widths can be set between 1 and 100 milliseconds in 1 microsecond increments at pulse repetition rates up to 400 Hz.

### **2.2 User Interface**

**2.2.1 Remote Operation:** Remote operation via a host computer allows the operator to make full use of the flexibility offered by the Pulsar 320. Communication is accomplished by both a USB interface and Ethernet. Operating parameters are set by user friendly Windows based Pulsar 320 controller software. Supported operating systems are Windows 2000, Windows XP, and Windows Vista.

**2.2.2 Local Control** (future implementation): An optional local control is available which allows complete control of all Pulsar 320 settings and features. A 2X16 LCD display along with four front panel momentary switches allows users to easily navigate the Pulsar 320's many features and set points.

### **2.3 Diagnostics**

A comprehensive set of diagnostic routines and indicators are provided. Error codes are displayed by the Pulsar 320 via LED indicators on the front panel. Code definitions are found in section 6.0 "Troubleshooting" where diagnostics are covered in greater detail.

## **3.0 Quick Start**

The purpose of this section is to allow the operator to perform a quick functional test. This will permit an easy checkout of the Pulsar 320 and attached light head for proper operation.



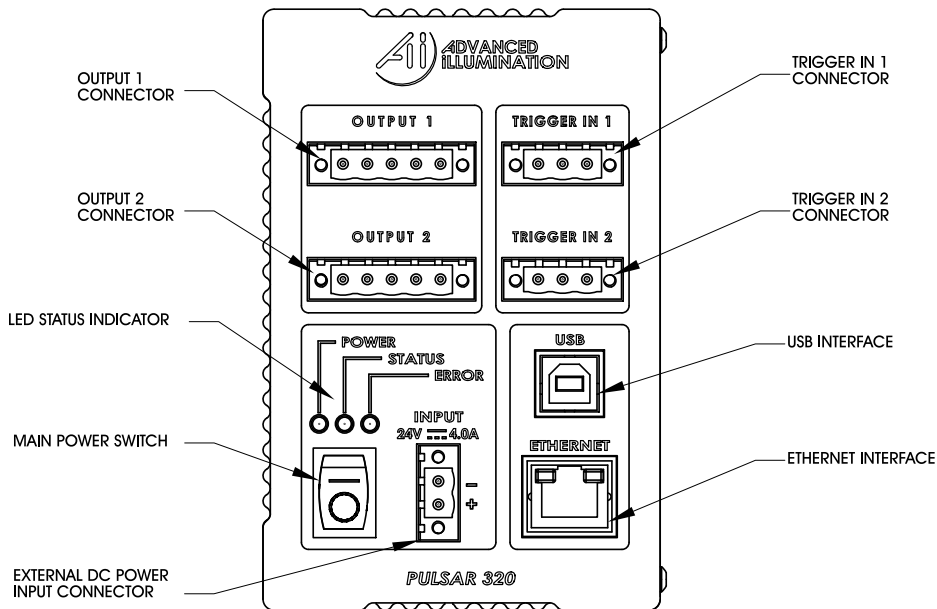


FIGURE 1. PULSAR 320 FRONT PANEL

### 3.1 Pulsar 320 Controller Cable Connections:



Figure 2: 24v Supply Connection

Two physical cable connections will be required to operate the Pulsar 320 and light head in self test mode. Figure 1 shows the front panel of the Pulsar 320.

**3.1.1 Power:** The Pulsar 320 requires an external 24 volt supply for operation. A power cable is provided. The black wire is negative and the red wire is positive. Plug the 2 pin connector into the socket labeled “VDC INPUT”. Observe the polarity markings on the panel below the VDC INPUT socket. Refer to section 4.2.1 for more details regarding the 24 volt supply.

**3.1.2 Light Head:** Figure 3 shows how the output connectors on the front panel of the Pulsar 320 mates with the light head connectors. Plug the



Figure 3: Pulsar 320 Light Head Output Connection

connector(s) from the light head(s) into the 5 pin socket in the front of the Pulsar 320 as shown in Figure 3.

### 3.2 Pulsar 320 Status Indicator Lights:

The Pulsar 320 has three LED indicator lights as shown in Figure 4

**3.2.1 Green:** This light indicates that the Pulsar 320 has power either from the USB connection to the host computer or the main 24VDC power connection.

**3.2.2 Amber:** The amber light indicates the operational status of the Pulsar 320. A blink rate of once per second indicates normal operation. A blink rate of 5 times per second indicates an error condition.

**3.2.3 Red:** The red light blinks an error code in the case of an error condition. The condition is indicated by three sets of sequential flashes. For example: 4 flashes followed by 2 flashes followed by 3 flashes indicate an error code of 423 which signifies that the main power switch is off. Two common error codes are:

- 351: No light head detected.
- 423: The main power switch is off.

Refer to section 6.0 “Troubleshooting” for more detailed error code information.

### 3.3 USB Control

1. Connect Pulsar 320 USB cable to host PC, 24vDC, and applicable light head
2. Switch the main rocker power switch **ON**. A green power LED will illuminate, followed by a flashing amber LED.

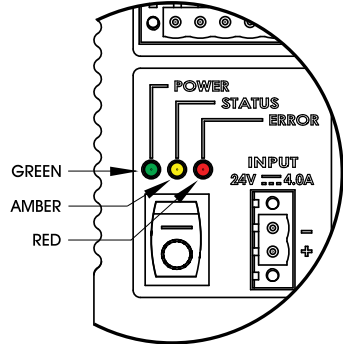


Figure 4: Status Indicator Lights

3. Launch **Pulsar 320 Utility**
4. Choose **USB**
5. Select a USB port. Use port 0 by default. Press **Connect**

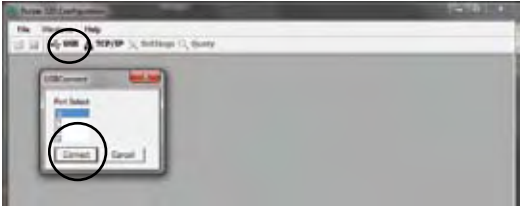


Figure 5: USB Dialog Open

6. Upon Connecting to a USB port, the strobe settings window will open (Fig 6) - Grayed-out outputs mean no light is connected.



Figure 6: USB Connected

7. Test the light head: Press **SETUP** radio button.
  - a. The light head should immediately enter a continuous current mode that will allow for visible detection that the light is working. This mode is useful for orientating the light in the system.
  - b. This mode should NOT be used for inspection purposes as it will provide indeterminate results.
  - c. This mode may make the light appear to flicker - this is normal.



Figure 7: Ready to Program Test Mode

8. Test the light in TEST MODE
  - a. Press TEST radio button
  - b. Set Pulse Width slider to 1000
  - c. Set current to 10
  - d. Press PROGRAM

The light should flash at 10Hz with no external trigger applied.

At this point the attached light head(s) will be ON. Any further adjustments can be made at any time using the same procedure as above. Adjusting PW will change the duration of the output pulse, and adjusting CURRENT will change the output level of the output pulse. Keep in mind that TEST mode always produces a 10Hz repetition rate pulse.

***The Pulsar 320 can communicate via ETHERNET. For instructions on this, please refer to the TCP/IP setup guide in Appendix D.***

## **4.0 Operation**

The following section details the procedures for operation of the Pulsar 320 Controller and defines its various operating modes.

### **4.1 Definition of Terms**

The following terms are used within this manual and, more generally, in relation to machine vision illumination.

**4.1.1 Duty Cycle:** The ratio of the time the light head is “on” (pulse width, Pw) to the time it is “off” (period, Tp). Calculated as  $(Pw / Tp) \times 100$ . The result is expressed in percent. The Signatech II feature of the Pulsar 320 allows the Pulsar 320 to limit the maximum duty cycle based on the characteristics of the driven light head.

**4.1.2 Latency:** The time between the receipt of a trigger signal and initiation of the output drive pulse. The latency is the sum of the rise-times and propagation delays within the trigger processing circuitry. This time is purposely kept to a minimum.

**4.1.3 LED and Light head Characteristics:** Many factors contribute to the operational parameters of an LED light head. To optimize Pulsar 320/light head operation, these characteristics are stored as part of the information provided to the Pulsar 320 by the Signatech II circuit within the light head. Some of the variables that affect how the light head can be driven are outlined below.

**4.1.3.1 LED Forward Voltage:** The forward voltage drop across an LED (VFWD) depends upon the nature of the semiconductor junction and the current through the LED. The specified VFWD for an LED is usually given at its recommended operating current. Please note that when driven by high current pulses, VFWD can increase by 10 to 20 times. For this reason voltage levels at the Pulsar 320 output can be as high as 100 volts.

**4.1.3.2 LED Thermal Resistance:** A measure of temperature difference between the LED junction and the LED connection to an external heat sink. Overheating of the junction is the primary cause of failure in LEDs. The value of the LED thermal resistance, combined with the heat sink thermal resistance and the overall thermal time constant determine the maximum pulse width, pulse current, and duty cycle of the light head.

**4.1.3.3 LED Voltage Slope:** The relationship between VFWD and the forward current IFWD, used by Signatech II to calculate the voltage required to provide the desired current.

**4.1.3.4 Light head Characteristics:** Also contained within the data provided by Signatech II to the Pulsar 320 are the number and type of LEDs in each string and the number of parallel strings connected to each channel.

**4.1.4 Period:** The length of time between two successive pulses or the reciprocal of the pulse frequency.

**4.1.5 Pulse Width:** The length of time the light head is activated by the Pulsar 320. This is typically measured between the 50% amplitude points of the pulse.

**4.1.6 Repetition Rate:** The rate at which successive pulses are initiated. Also known as frequency, which is measured in Hertz (cycles per second). Repetition rate is usually multiple times per second.

**4.1.7 Signatech II:** A proprietary feature of Ai light heads and the Pulsar 320. Signatech identifies the type of light head connected to the Pulsar 320 and maintains safe operating limits for each type. The Pulsar 320 can be set so that Signatech preferentially limits pulse current, pulse width, or period to remain within the safe power dissipation range of the light head.

**4.1.8 Strobe Modes:** The strobe mode is used to “freeze” a moving item at a particular moment in time. Typically, with LED illumination sources, the strobe mode involves driving the light head with a high current, short duration pulse. This provides a very intense light output pulse. As long as the duty cycle is kept short, no damage to the LEDs occur as a result of the high current.

**4.1.9 Trigger:** The signal which initiates an output from the Pulsar 320 to the light head. The trigger signal is normally generated by an external source such as a camera or other sensor. Several modes of trigger operation are provided for in the Pulsar 320. The trigger may start on either a rising or falling edge. For test purposes, the Pulsar 320 also has an internal trigger source.

**4.1.10 Trigger Delay:** Certain applications require that a known, fixed time elapse between the receipt of a trigger signal and the initiation of an output pulse. This is the trigger delay. For example, if the trigger signal is received from a position sensor, prior to the arrival of the item to be inspected, a delay to account for that transit time would be introduced. If the trigger signal originates from the camera at the start of the shutter opening, a short delay might be introduced to assure the shutter is fully open or that the illumination pulse occurs elsewhere within the frame time.

## 4.2 Pulsar 320 Controller Cable Connections

Four physical connections, one of which needs to be a USB or Ethernet will be required to operate the Pulsar 320 and light head. Refer back to figure 1 for an illustration of the Pulsar 320's front panel.

**4.2.1 Power:** The input power connector is located near the bottom center of the Pulsar 320's front panel. The Pulsar 320 requires an external 24 volt supply for operation. The power supply needs to have sufficient amperage rating to drive the light head in the desired mode of operation. Advanced illumination recommends a minimum of 4A for full output operation. A power cable is provided. The black wire is negative and the red wire is positive. Plug the 2 pin connector into the socket labeled "INPUT". Observe the polarity markings on the right hand side of the connector socket.

**4.2.2 Trigger:** The trigger input connectors are located at the upper right of the Pulsar 320's front panel. The differential trigger levels are CMOS/TTL compatible but will accept input pulses as great as 30V. Two input trigger connectors are provided, one for each output. One trigger may be mapped to both outputs. For more detailed triggering information refer to section 4.6 "External Trigger Interface".

**4.2.3 Ethernet:** An RJ45 connector is located to the lower right of the front panel and is provided for Ethernet connectivity. Standard protocols supported are TCP/IP, UDP, TFTP via 10/100Base-T. For more detailed information on Ethernet connectivity.

**4.2.4 USB:** The USB connector is located to the right and center of the front panel. A host computer will communicate with the Pulsar 320 via this USB connection. Connect the provided USB cable between the USB connection on the host computer and the connector labeled USB on the Pulsar 320. The Pulsar 320 is Microsoft HID USB compliant. Therefore, a host computer with Windows 2000, Windows XP or Windows Vista will auto-detect the Pulsar 320.

Figure 6 is a connection diagram for the output connector. Connect light head(s) in accordance with Figure 6.

**4.2.5 Light Head:** Power to light heads is supplied by two independent connectors on the front panel each having 5 pins. Table 1 identifies the

function of each pin for the 5 Pin power connector. Plug the connector from each light head into the 5 pin socket as shown in Figure 3.

### 4.3 Pulsar 320 Status Indicator Lights

The Pulsar 320 has three LED indicator lights. Refer back to figure 4 for an illustration of these indicator lights.

**4.3.1 Green:** This light indicates that the Pulsar 320 has power either from the USB connection to the host computer or the main 24VDC power connection.

**4.3.2 Amber:** The amber light indicates the operational status of the Pulsar 320. A blink rate of once per second indicates normal operation. A blink rate of 5 times per second indicates an error condition.

**4.3.3 Red:** The red light blinks an error code in the case of an error condition. The condition is indicated by three sets of sequential flashes. For example: 4 flashes followed by 2 flashes followed by 3 flashes indicates an error code of 423 which signifies that the main power switch is off. Two common error codes are:

- 351: No light head detected.
- 423: The main power switch is off.

Refer to section 6.0 “Troubleshooting” for more detailed error code information.

### 4.4 Host Computer Control (REMOTE)

To take full advantage of the flexibility of the Pulsar 320, software is provided which permits the operating parameters to be set by a host computer. The host computer will be connected to the Pulsar 320 via a USB port utilizing a USB Type B connector. (See Figure 7) The USB port is Microsoft HID compliant.



Figure 8: USB Connection



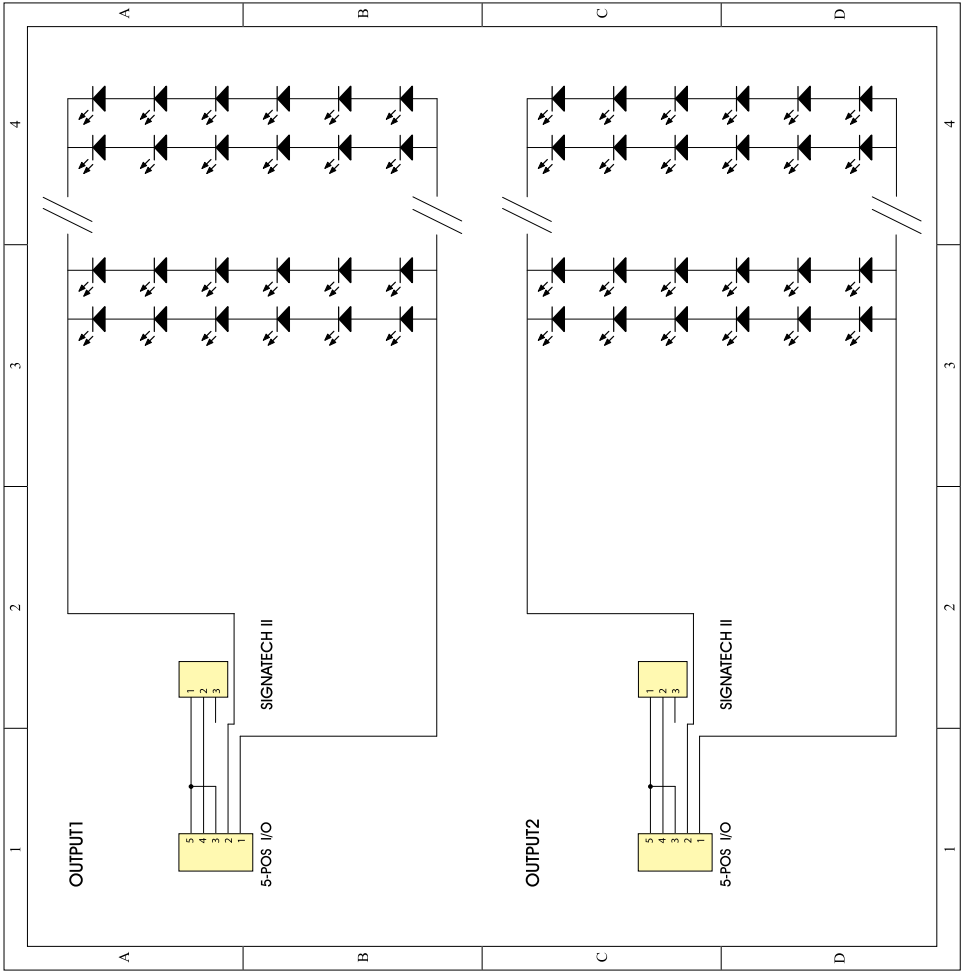


Figure 9: Light Head Connection Diagram

Pin # Description

1	+V (LED+)
2	RET (LED-)
3	SIG 1/ID1
4	SIG 1/ID2, SIG2, Light Head Detect
5	Power Gnd

Table 1: Pin Function Chart

**4.4.1 Software Installation:** Pulsar 320 Controller user interface software is required to set the operational parameters of the Pulsar 320. This utility program is included online at our website, and is installed as follows:

Note: Administrator Access to the system is usually required to install the software.

Note: Supported operating systems are Windows XP through Windows 10.



Figure 10A: Software Installation Window

1. The software can be found on our website under: Resources -> Downloads -> Software -> Pulsar 320 Control Software.

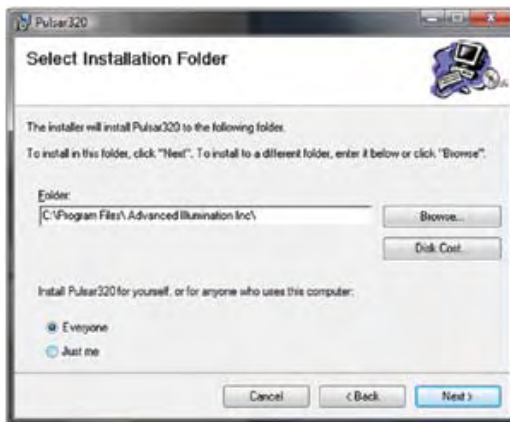


Figure 10B: Software Installation, Program Group

2. Select setup.exe.

3. Close all open applications if prompted and press OK.
4. Select a Program Group or use the default (Advanced Illumination) and click Next. (See figure 10B.)

Note: If for some reason the automatic installation program cannot be used, the software can be manually installed as follows: Place the four support files from the downloads in the same folder on the PC.

- 1) MPDH8USB\_TCP.dll
- 2) PulsarAPI.dll
- 3) Pulsar320Loader.exe

## 4.4.2 Running under Host Computer Control

**4.4.2.1 Configure Pulsar 320:** The Pulsar 320 comes pre-configured for normal use. See section 8 “Advanced User Section” for a complete description of optional configurations.

**4.4.2.2 Launch Pulsar 320 Controller user interface:** To run the program; go to Start -> Programs -> Advanced illumination -> Pulsar Controller. Upon execution of the Pulsar Controller Utility program, the dialog box shown in figure 11A will appear.

### GUI Dialog Descriptions

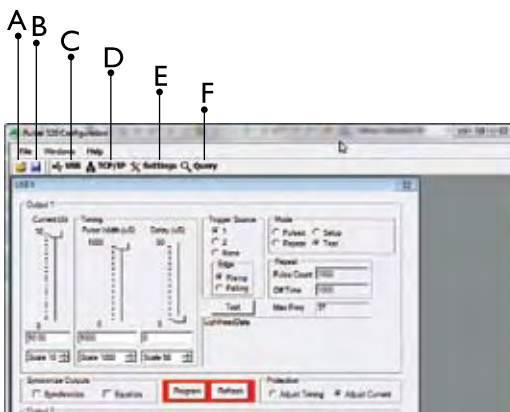


Figure 11A: GUI Dialog Window

- A. Open Dialog: Opens saved configuration
- B. Save Dialog: Saves active configuration to host PC
- C. USB: Opens USB connection dialog

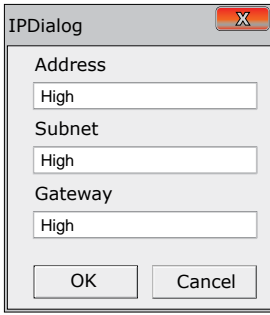


Figure 11B: TCP/IP Dialog Window

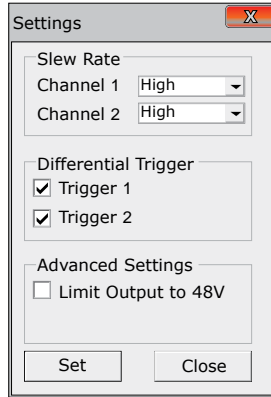


Figure 11C: Settings Window

- D. TCP/IP: Opens TCP/IP connection dialog
- E. Settings: Opens Pulsar 320 configuration settings dialog
  - 1. Slew Rate: used to reduce output ripple/ringing on the output light pulse. **Using the proper slew rate setting may improve lighting performance.**

- a. High: (default) Used when pulsing below 100uSec
- b. Mid-High: Used when pulsing 100 - 500uSec
- c. Mid-Low: Used when pulsing 500 - 1000uSec
- d. Low: Used when pulsing >1000uSec

- 2. Differential Trigger: Default checked. Activates the differential trigger inputs. Recommendation is to leave this on unless otherwise instructed.

- 3. Advanced Settings: 48V output limit. Default unchecked. Apply this setting to clamp the output strobe voltage to 48V. This may reduce performance significantly for certain light sources.

- F. Query: Displays device information

Edit Network button allows for TCP/IP and network configuration to occur for the device.

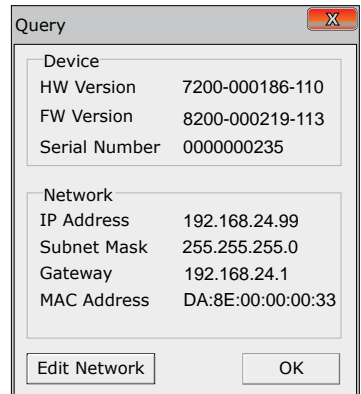


Figure 11D: Query Window

### 4.4.2.3 Pulsar 320 Utility Dialog Box Status Indicators:

**4.4.2.3.1 Light head:** Window will appear active (not grayed-out) to indicate there is a light head connected to the Pulsar320. The type of light head will also be displayed when available.

**4.4.2.3.2 USB Connection:** If the menu is not grayed-out, it indicates that a USB connection has been established between the host computer and the Pulsar 320. A USB connection is required to set up the Pulsar 320.

**4.4.2.3.3 Status Panels:** The two panels below the indicators show connection status details. The top panel shows the results of the last command. The bottom panel shows information about the Pulsar 320.

### 4.4.2.4 Pulsar 320 User Interface Output Controls:

**4.4.2.4.1 Select Channel:** The buttons labeled 1 & 2 select which channel the settings are to apply to. Synchronize and Equalize options can be selected by checking the appropriate box.

- Synchronize: When this box is checked, any change in the settings for the selected channel are added to the other unselected channel.
- Equalize: When this box is checked the settings of the selected channel are applied directly to the remaining unselected channel.

**4.4.2.4.2 Program Button:** None of the settings described below will take effect until the Pulsar 320 is programmed. Pressing the program button will transfer the settings from the host computer to the Pulsar 320 allowing the settings to take effect. The program button will be highlighted to indicate that there are new settings that have not yet been transferred to the Pulsar 320.

**4.4.2.4.3 Mode:** One of four modes can be selected here.

- Pulsed: The Pulsar 320 produces pulses in response to a trigger signal. The current and timing are determined by the control settings.
- Repeat (Pulse Train): The Pulsar 320 generates a succession of output pulses for every single trigger event. Output then ceases until next trigger event occurs. The number of pulses (pulse count) and the off time (time between pulses) is entered in the appropriate text boxes within the user control interface.
- Test: The Pulsar 320 outputs pulses at 10 hertz. The current and timing are determined by the control settings.

- **Setup:**The light head should immediately enter a continuous current mode that will allow for visible detection that the light is working. This mode is useful for orientating the light in the system.

**4.4.2.4.4 Control Settings:** There are three parameters that can be set to control the output of the Pulsar 320.

- **Current:**The current setting determines the brightness of the light output. Units are in Amps.
- **Pulse Width:**This is the length of the output pulse in microseconds.
- **Delay:**This is the time in microseconds, between detection of a trigger signal and the start of the output pulse. Each parameter can be set by adjusting its slider control or by entering the value directly in the text box. Each slider control has a scale adjustment.

All settings are internally checked by the Pulsar 320 for compatibility with the attached light head. Settings that will overdrive the light head will not be allowed. If an unsafe setting is attempted, either the current or the pulse width will automatically be reduced to a safe level and a message will be displayed in the status box. The protection setting determines whether pulse width or current is adjusted.

**4.4.2.4.5 Protection:** This selection determines what setting, timing or current, is adjusted to produce a safe setting for the light head.

- **Adjust Timing:** Pulse width is reduced and current setting will be maintained, so that the light head is not over driven.
- **Adjust Current:** Current is reduced and pulse width setting will be maintained, so that the light head is not over driven.

**Note:** In some cases current may be adjusted when Adjust Timing is selected. This happens when the current setting exceeds the absolute maximum current setting for the light head. In this case current would be reduced to the absolute maximum current and then timing adjusted as necessary.

**4.4.2.4.6 Triggers:** This selection determines which trigger input drives the selected channel in Pulse, Timing Bypass, and Repeat modes. Use the edge selection to choose the rising or falling edge.

**4.4.2.4.7 Test:** This selection provides a 'One Shot' trigger pulse to test trigger settings and light head output.

## 4.5 External Trigger Interface

The Pulsar 320 employs two independent trigger inputs utilizing RS485 receivers. These differential trigger inputs are effective in suppressing excessive noise and EMI that could be present in the installation area or when long trigger lines are required. Advanced illumination recommends using shielded, twisted pair cable for the trigger inputs. Table 2 identifies the “standard” function of each pin within the two external trigger interface connectors on the front panel of the Pulsar 320 as shipped from the factory.

The wiring of the trigger input is dependent upon the trigger source. Though the Pulsar 320 utilizes differential trigger inputs, single ended sources may also be utilized.

Refer to Appendix “A” Figure 15 for common trigger connection schematics.

When utilizing a single ended trigger source it is important to realize that the Pulsar 320 requires a “sourcing” output (PNP or Pull Up) as the trigger input is “sinking”.

Figure 15 in appendix “A” is a connection diagram for the Trigger Input connector. Suggested wiring conventions are shown depicting the most common types of trigger sources. After setting the power switch to the “OFF” position, connect an external trigger in accordance with this diagram.

For special trigger requirements not shown please contact Advanced Illumination.

Trigger selection is performed using a host computer and the Pulsar 320 software.

In the single-ended trigger configuration, the input will accept TTL/CMOS compatible signals and is internally clamped so that trigger inputs of up to 30V may be applied. If the differential trigger connection is chosen, the Pulsar 320 will recognize input logic levels that are compliant with RS232/485 protocol. For all triggered modes, the trigger signal should have a minimum width of 2 microseconds and a rise and fall time of less than 200 nanoseconds.



Figure 12: Trigger Connector

#### 4.5.1 Alternate Trigger Configurations:

Note: If the Pulsar 320 will be triggered by a PLC refer to Appendix “A” for schematics depicting different PLC configurations.

### 5.0 Custom Programming

For those needing to develop a custom interface to control the Pulsar 320, please consult Technical Support at Advanced illumination.

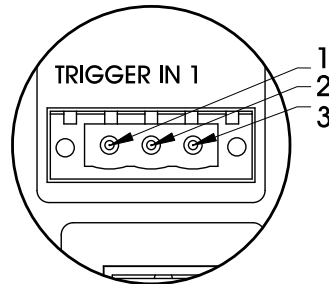


Figure 13: Trigger Pinout

Trigger Connector Pin Number	Pin Function
1	Sig +
2	Sig -
3	Common (GND)

Table 2: Pulsar 320 Trigger Connector Pin Description

## 6.0 Troubleshooting

### 6.1 Pulsar 320 Status Indicator Lights

There are three LED indicators on the front panel of the Pulsar 320. During normal operation, the green LED will be illuminated indicating that power is “on.” Just to the right of the green LED, an amber LED will pulse at about 1 pulse per second. This “heartbeat” indication occurs when the operating conditions are normal. If a fault is sensed, the amber LED will start to flash rapidly, about 5 times per second, and the red LED just to the right will produce a sequence of flashes to form an error code. Count the flashes and refer to the error codes listed below.

Please note that there are several hundred error codes. Most of these are for factory use in diagnosing problems which occur during initial test and calibration



procedures. Only the codes most commonly encountered in use are listed here, together with a few which would indicate an internal fault. If a code is encountered which is not listed here, the operator should contact Technical Support at Advanced illumination for further assistance. If the corrective action suggested for the listed error code does not resolve the problem, the operator should contact Advanced illumination.

## 6.2 Error Codes

The codes are listed below in bold face with a description of the fault indicated and a corrective action.

### **351** No lighthouse detected.

Corrective action – Be sure lighthouse is plugged in to output connector. Check wiring of lighthouse to connector.

### **352** Signatech I ID1 resistance not within known range.

Corrective action – Verify that lighthouse is equipped with Signatech I. Check wiring of lighthouse to connector. Check values of ID1 resistor in connector. Verify proper value with Ai.

### **353** Signatech I ID2 resistance is not within known range.

Corrective action – Same as 352.

### **354** Signatech II lighthouse definition data is invalid.

Corrective action – Check lighthouse wiring to connector. Verify that the Signatech II identifier integrated circuit (EEPROM) is present in the connector. It should be attached to pins 11, 12, and 13. Call Ai if identifier integrated circuit is present, the wiring is correct, and problem persists.

### **411** The specified drive channel is invalid.

Corrective action – Select valid drive channel. Check to see if lighthouse wiring in connector is such that lighthouse is connected to selected channel.

Error codes 212 through 219 indicate that internal voltage levels are not correct. If these, or any codes other than those listed above occur, contact Technical Support at Advanced illumination for assistance. Under no circumstances should the user attempt repairs on the unit.

## 7.0 Specifications

	Requirements	Notes
Packaging		
Weight	453.6 g (1.0 lb)	Dimensions and weight are measured excluding LCD display and din rail plate
Dimensions	96.52mm x 86.36mm x 129.54mm (3.8" L x 3.4" W x 5.10" H)	
	Din Rail Mounting Feature	Optional bolt-on din rail mounting plate
Hardware Config.		
	Optional User Interface	
	Front panel PCB	PCB, interface
	Main PCB on side panel	PCB, main
Output Power		
General Characteristics	2 Outputs	
Pulse Output	Max Output Current: 100A per output	1.0 A Resolution on 100 A Scale
	Max Output Current: 100A per output	0.1 A on 50 A Scale
		0.01 A on 1 A Scale
	Max Output Voltage: 100VDC per output	Optional 48V available by request
	Min. Output voltage: $V_{input} - 1V$	
	Pulse Width Range: $1\mu S - 100\text{ mS}$	
	Max Repetition Rate: 400 Hz	Power limited, Based on 100W avg power
	Trigger to Pulse Latency: $<2\mu S$	
	Trigger Delay: 0 - 999 $\mu S$	$1\mu S$ resolution
	Pulse Width Variation (pulse to pulse): $<1\mu S$	
	Pulse Current Variation (pulse to pulse): $<1\%$	

(continued next page)

(Specifications cont.)

PC Application	Uses VB application for user control	
PC DLL	Abstracts Pulsar firmware protocol from VB app.	Available by request
	USB compatible	
	TCP/IP via 10/100Base-T	
Firmware	Updates via USB Loader software	Performed by Advanced Illumination, Inc.
	High Level Source - 'C'	Available by request
Standard User Interface	Power switch (Rocker on/off)	
	Setup Mode: Switched by software or user interface	Provides Pulses @ 50 Hz Rate (internally generated) on both outputs for light head setup. Light Output Controlled by Signatech II.
	3 Front panel mounted 3mm LEDs (Power, Controller Status, Error)	Power - Green Controller Status - Amber; Error - Red Front mounted LEDs integral to connector
Optional User Interface	Includes standard options plus:	
Inputs	4 Front panel mounted momentary switches	Optional Local Control Provides Complete Control of Unit
Outputs	Front panel mounted 2 x 16 LCD	
External Interfaces		
USB		
(Electrical)	USB 2.0 Full Speed compatible	USB Power can be used to power kernel and any required peripherals to perform programming / config. / and perhaps some calibration
(Mechanical)	USB Type B w/Metal Shield	
(Protocol)	Microsoft HID Compliant	Uses native Microsoft USB HID driver - Ai will not have to supply a USB device driver

(continued next page)

(Specifications cont.)

Ethernet		
(Electrical)	Ethernet	Not fully supported by current software interface
(Mechanical)	8 position - 8 conductor RJ45 w/ metal shield	Link and Rx/Tx LEDs for Ethernet
(Protocol)	TCP/IP, UDP, TFTP via 10/100Base-T Other protocols TBD	
Trigger		
(Electrical)	2 Independent Trigger Inputs (hardware)	1 Trigger may be mapped to both outputs
	Differential (RS485 Receiver-AC Termination)	0 - 30V
	Timing Bypass Function	Light output follows gated input pulse width up to maximum output pulse width allowed by controller. Active high or active low
		Uses proprietary Signatech II parameters
	Pulse repetition mode with hold time	Allows user to produce a train of light pulses from a single trigger incident. Will allow up to a maximum 16-bit input value (64000 pulses). Users can adjust hold time for timing purposes.
(Mechanical)	See model	
(Protocol)	Trigger Width: $> 2 \mu\text{s}$	Leading or Trailing Edge Selection
	Trigger Pulse Rise/Fall Time: $< 200\text{ns}$	
Input Power		
(Electrical)	12-36 VDC (24V nominal @ 4A max)	
(Mechanical)	2-pin - Mateable Terminal Block (5.08mm Phoenix Terminal Block)	Polarity Protected, On-Board Fuse Protected (Replaceable) Power is switched via a SPST rocker switch

(continued next page)

(Specifications cont.)

Light Head Outputs	2 Independent Outputs with Independent Signatech II for each Output	
(Electrical)	Employs Proprietary Signatech II Protection Scheme	Generally located within attached light head
	Signatech I Compatible	Requires AD-C2C5 adapter cable
(Mechanical)	Independent Connector Available for Each Output	5-Position Phoenix Contact Combicon header
(Protocol)	Maxim/Dallas 1024-Bit 1-Wire EEPROM	Signatech II
Diagnostics		
	Error Codes Read via LED Display (optional local control)	
	Error Codes Read via USB & Ethernet (standard remote)	
	Error Codes Read via Panel Mounted LEDs	
CE Conformance		
	Conforms to CE Requirements for EMI supression	

Table 3: Specifications

## **8.0 Advanced Users Section**

This section addresses features, settings, configurations and communication protocol used or required under certain operating conditions and installations. This information is provided as a reference and may be used when developing custom integration solutions.

It is advised that users contact Advanced illumination when special requirements exist.

Dip switch S1 and momentary switches SW2 & SW3 are located on the main pc board. Removal of the back plate is required to gain access (see Figure 14).

## Dip Switches: S1

Number	Description	Normal Operation State
1	Used to force firmware to stay in boot loader	OFF
2	H8 Emulator enable	OFF
3	Firmware write enable. Allows the H8 flash to be written	OFF
4	Internal programming mode. Used to enable the embedded flash programming algorithm. Need to be OFF for initial loading of firmware over USB.	OFF
5	JTAG enable. Controls debugger mode on Cold fire. Allows H8 Kernel to operate with USB power alone	OFF
6	Manufacturing EEPROM write protect. Needs to be ON to allow manufacturing data to be written to the EEPROM	OFF

## Momentary Switches: SW2, SW3

Number	Description	Normal Operation State
SW2	Manual reset for H8 Kernel. Resets the main microprosser	N/A (open)
SW3	Manual reset for Cold fire Kernel. Resets the Ethernet communication microprocessor	N/A (open)

Table 4: Internal Switch Functions

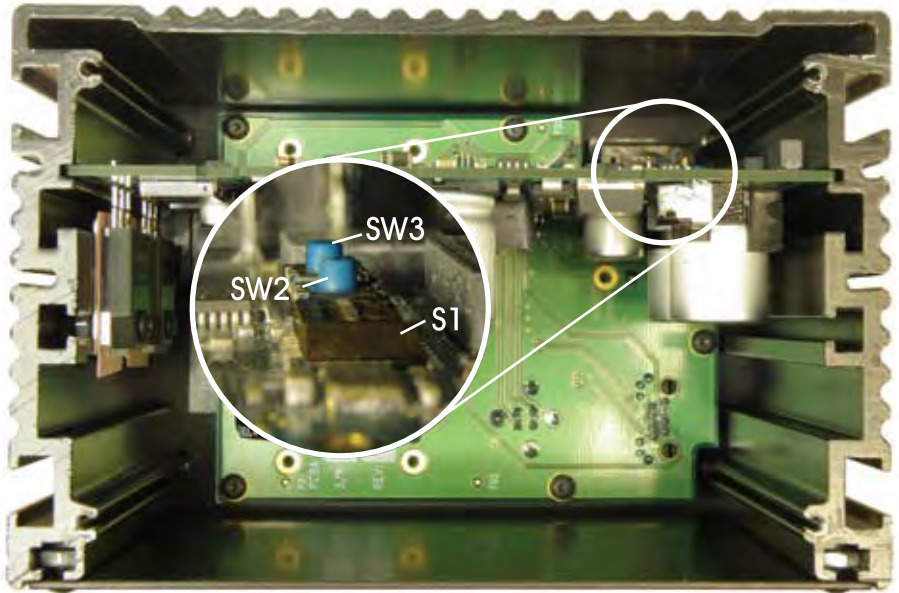


Figure 14: S1, SW2 & SW3 Locations

Note: SW2 & SW3 are not installed in some early production units.

## **9.0 Appendixes**

Appendix A: Trigger connection diagram

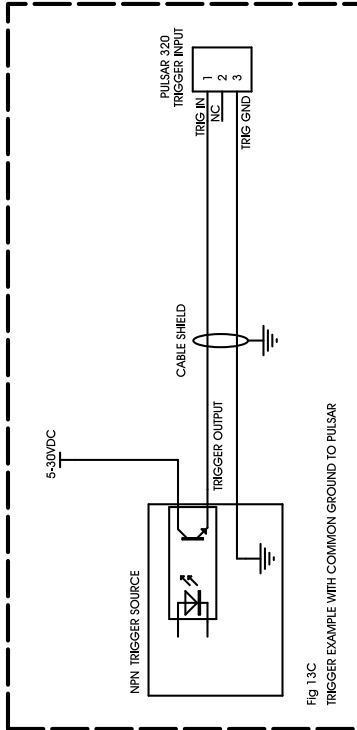
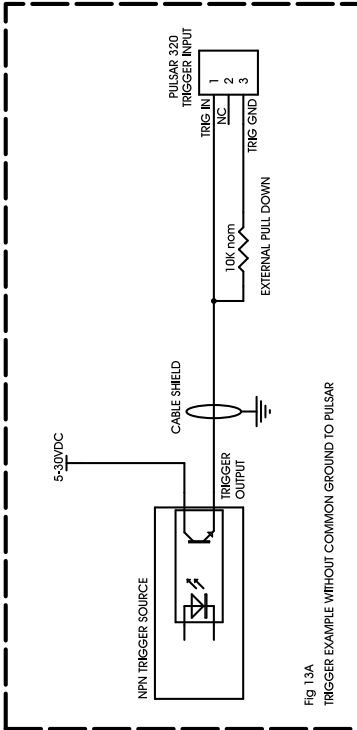
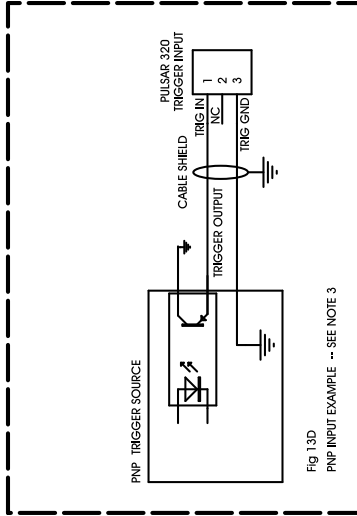
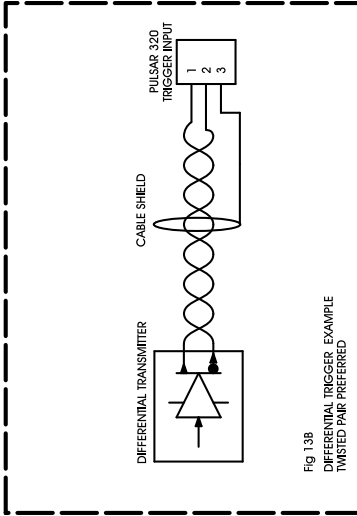
Appendix B: Pulsar 320 Loader utility

Appendix C: Installation Drawing

Appendix D: TCP/IP Setup Instructions



# Appendix A



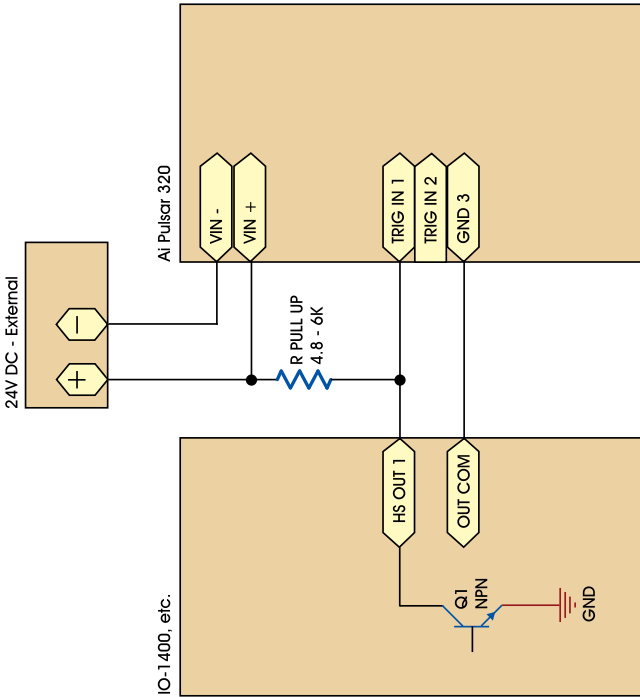
## SINGLE ENDED EXAMPLES

3) For wiring a PNP source: Differential triggers need to be DISABLED  
See Appendix B: Pulsar Configuration Utility

Note: 1) Figure 13B: Differential triggers need to be enabled via software before using.  
See Appendix B: Pulsar 320 Configuration Utility  
**Post 02/17/2010** - Differential triggers are enabled by factory default

2) Fig 13A: Some trigger sources may require an external pull down resistor as low as 1K ohm  
**Post 02/17/2010** - Pull down resistor is not required

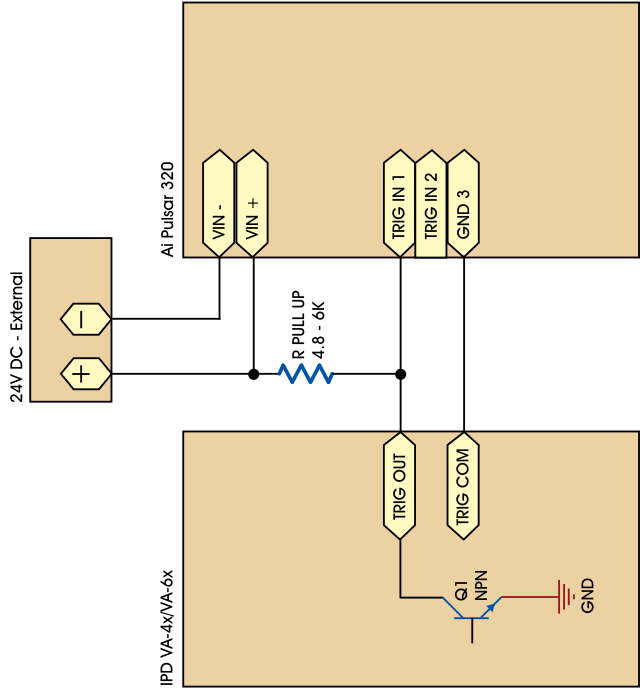
TYPICAL PULSAR TRIGGER WIRING: COGNEX INSIGHT



NPN - SINKING OUTPUT

REFER TO COGNEX USER MANUALS FOR THE PROPER STROBE TRIGGER OUT AND STROBE TRIGGER COMMON PIN NUMBERS

TYPICAL TRIGGER WIRING FOR IPD VISION APPLIANCE



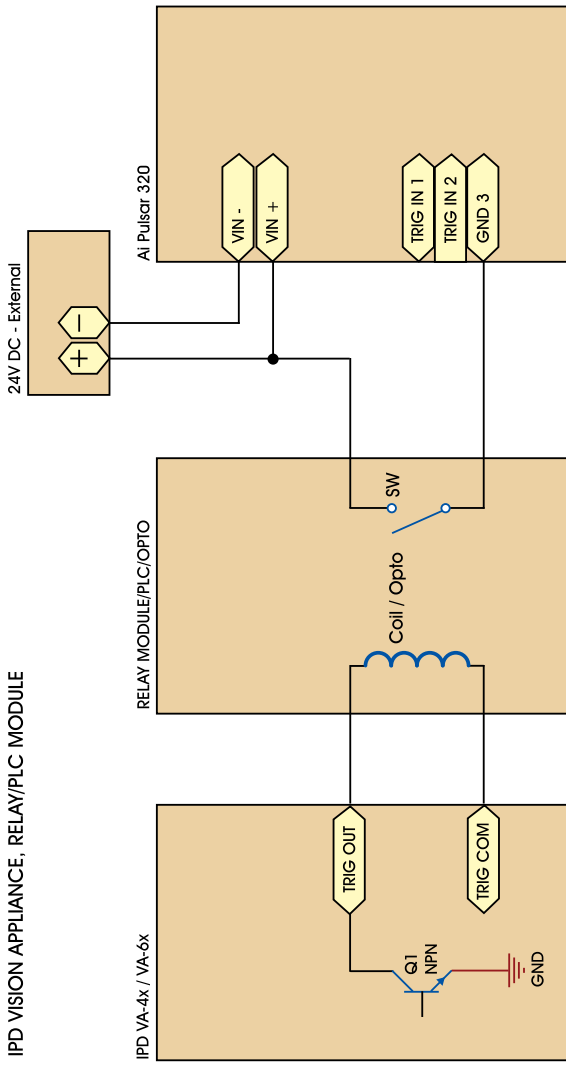
NPN - SINKING OUTPUT

REFER TO IPD USER MANUALS FOR THE PROPER STROBE TRIGGER OUT AND STROBE TRIGGER COMMON PIN NUMBERS

Appendix A - Figure 16: Cognex Connection Diagram

Appendix A - Figure 17: IPD Connection Diagram

IPD VISION APPLIANCE, RELAY/PLC MODULE

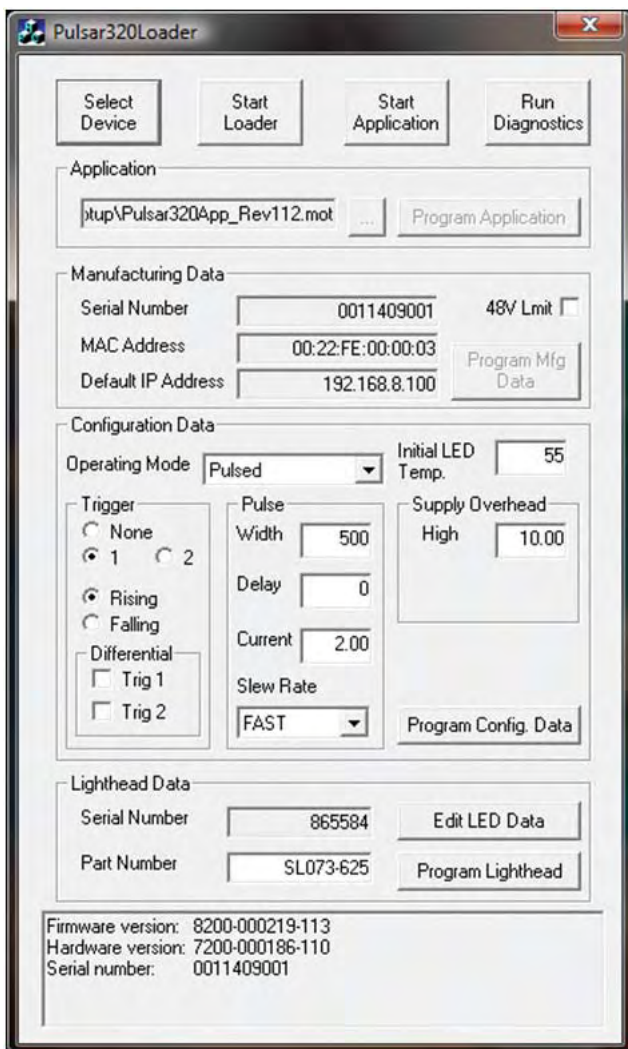


NPN - SINKING OUTPUT

REFER TO IPD USER MANUALS FOR THE PROPER STROBE OUT AND STROBE COMMON PIN NUMBERS

Appendix A - Figure 18: IPD Connection Diagram

## Appendix B



Appendix B - Figure 19: Pulsar 320 Loader Utility

### **SELECT DEVICE:**

- Connects to target Pulsar-320 (USB)

### **START LOADER:**

- Allows firmware to be flashed to memory: internal use only
- Provides access to 'Manufacturing Data': DIP switch 'SI' must have position 6 ENABLED in order to program manufacturing data

### **START APPLICATION:**

- Resets the H8 and refreshes the USB connection

### **RUN DIAGNOSTICS:**

- Performs a low-level diagnostic test: Internal use only

### **APPLICATION:**

- Loader for firmware: Internal use only

### **MANUFACTURING DATA:**

- Serial Number: Factory Set
- MAC Address\*: Factory Set

\*MAC Addresses are provided by the IEEE. Any adjustments to this address may cause conflicts with other equipment not related to this product. Advanced illumination assumes NO responsibility for conflicts caused by this parameter being changed from its factory setting\*

- Default IP: Factory Set 192.168.24.240
- 48V limit: Limits output voltage from the pulsar to 48V

### **CONFIGURATION DATA:**

- Initial LED Temp\*: Factory Set

\*This parameter contains information that could be harmful to the attached light head if altered. Advanced Illumination assumes NO responsibility for damaged products if this parameter is changed from factory settings without prior approval\*

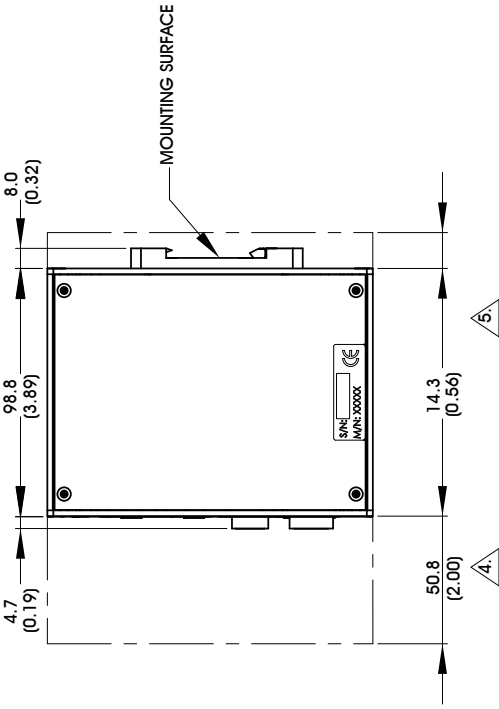
- Supply Overhead: Factory Set
- Operating Mode/Trigger/Pulse: Low-level user interface
- Slew Rate: Adjusts the On-time response of the pulse. Use to compensate for high EMI situations
- Differential (Trig1 & Trig2): Check to enable differential triggers
- Program Config. Data: stores all changes to this section into memory

## **LIGHTHEAD DATA\*:**

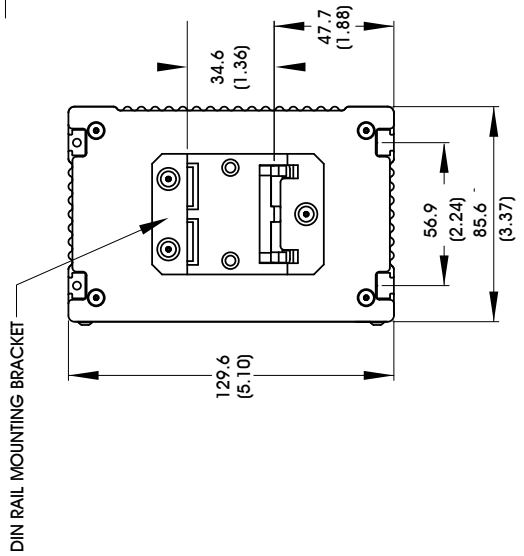
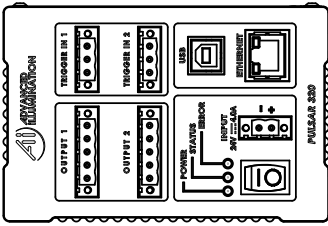
\*This section contains information that could be harmful to the attached light head if altered. Advanced illumination assumes NO responsibility for damaged products if any information in this section is changed from factory settings without prior approval\*

- Serial number: Light head serial number factory set
- Part Number: Light head part number
- Edit LED Data: Opens the Signatech 2 parameters dialog
- Program Lighthouse: Stores the Signatech 2 parameters into the light head EEPROM

# Appendix C:



POWER/TRIGGER/COMMUNICATION CABLE INTERFACE



- 5. 9/16 INCHES MINIMUM SPACE REQUIRED FOR DIN RAIL INSTALLATION.
- 4. 2 INCHES MINIMUM SPACE REQUIRED FOR POWER/TRIGGER/COMMUNICATION CABLE INSTALLATION.
- 3. UNIT MUST BE INSTALLED IN SUCH A WAY AS TO PROVIDE ADEQUATE AIR FLOW TO ENSURE AGAINST OVERHEATING.
- 2. UNIT MAY BE MOUNTED IN ANY POSITION.
- 1. UNIT WEIGHT: 1.610 LB/ .730 KG

Appendix C - Figure 20: Installation Drawings

# Appendix D:

## Pulsar 320 TCP/IP Setup Instructions

### Appendix D Contents:

#### 1.0 Configure network settings for the PC

- Connect through a network or router
- Direct connect with a single PC connection

#### 2.0 Connection to the Pulsar 320

- Pulsar 320 TCP/IP setup

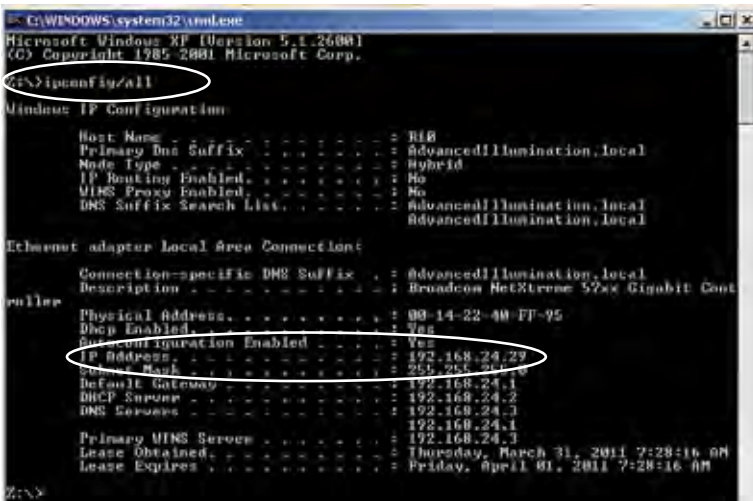
## TCP/IP Connection through network to Pulsar 320:

### PC Setup

Find your current IP address and determine whether it is **static** or **dynamic**:

1. Open Windows **Start** menu
2. Select **Run**
3. Type: **cmd** and click **OK**
4. At the blinking cursor, type: **ipconfig/all** and press Enter
5. Look for these entries near the end of the list:

- **Dhcp enabled.** “No” means your IP address is static. “Yes” means it is dynamic.
- **IP Address.** This is your current IP address
- **Subnet Mask.** This is the local subnet range
- **Default Gateway.** Gateway address of any routers or hubs.



Appendix D - Figure 21: Windows IP Configuration



If the current IP address is:

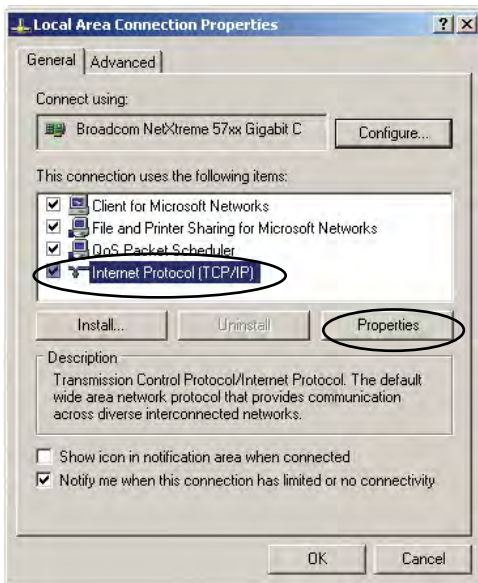
**Static**, then this IP will need to be changed to Dynamic by enabling DHCP.

**Dynamic**, then take note of: **IP Address, Subnet Mask, Default Gateway**, then continue to **Pulsar Setup**.

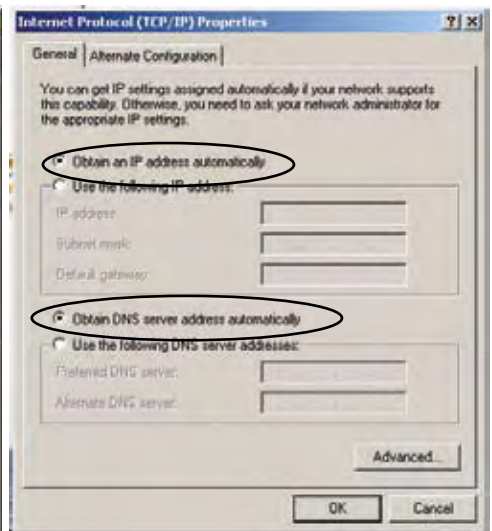
### Enable DHCP (Windows XP)

1. Open Windows **Start** Menu
2. Open **Control Panel**
3. Classic view: Open **Network Connections**  
Category view: Select **Network and Internet Connections**, and then **Network Connections**
4. Double-click on your active **LAN or Internet connection**
5. Click **Properties**

This opens the Local Area Connections Properties window.



Appendix D - Figure 22: Local Area Properties



Appendix D - Figure 23: Internet Protocol Properties

6. Enable **Obtain IP address automatically**. Enable **Obtain DNS automatically** unless advised otherwise by your network administrator.

# Direct TCP/IP connection from single PC to Pulsar320

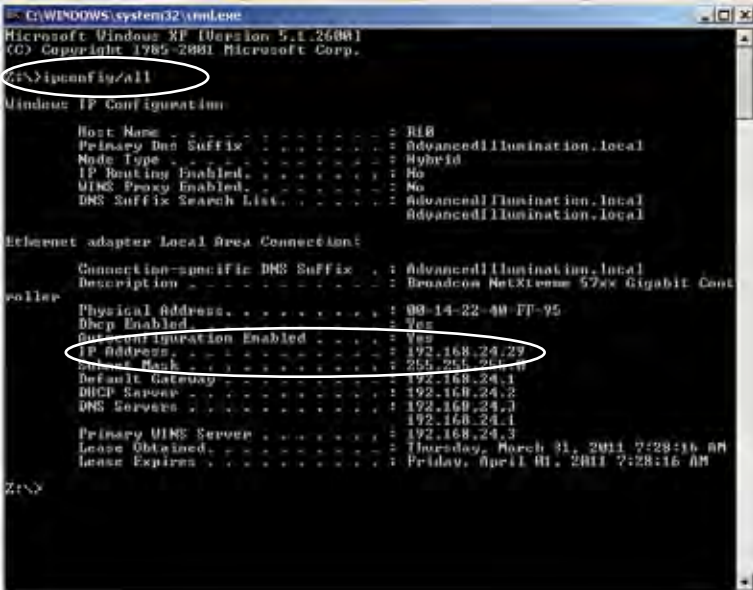
## PC Setup

You will need to assign a static IP to the host PC

Find your current IP address and whether it is **static** or **dynamic**:

1. Open Windows **Start** menu
2. Select **Run**
3. Type: **cmd** and click **OK**
4. At the blinking cursor, type: **ipconfig/all** and press **Enter**
5. Look for these entries near the end of the list:

- **Dhcp Enabled.** “No” means your IP address is static. “Yes” means it is dynamic.
- **IP Address:** This is your current IP address.
- **Subnet Mask.** This is the local subnet range.
- **Default Gateway.** Gateway address of any routers or hubs.



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600.1
(C) Copyright 1985-2001 Microsoft Corp.

C:\>ipconfig/all

Windows IP Configuration

Host Name . . . . . : RIB
Primary Dns Suffix . . . . . : advancedillumination.local
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : advancedillumination.local
                                  advancedillumination.local

Ethernet adapter Local Area Connection 2:

Connection-specific DNS Suffix . : advancedillumination.local
Description . . . . . : Broadcom NetXtreme 57xx Gigabit Cont
roller
Physical Address. . . . . : 08-14-22-40-FF-95
Dhcp Enabled. . . . . : Yes
Subnet Configuration Enabled . . . . . : Yes
IP Address. . . . . : 192.168.24.29
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.24.1
Dhcp Server . . . . . : 192.168.24.3
DNS Servers . . . . . : 192.168.24.1
                                  192.168.24.1
Primary WINS Server . . . . . : 192.168.24.3
Lease Obtained. . . . . : Thursday, March 31, 2011 7:28:16 AM
Lease Expires . . . . . : Friday, April 01, 2011 7:28:16 AM

C:\>
```

Appendix D - Figure 24: Windows IP Configuration

If the current IP address is:

- **Static**, then make note of the **IP address, subnet mask, and default gateway**. You will need to assign the Pulsar 320 network settings so they work in the same range.

- **Dynamic**, then assign a static IP address instead (covered in the following pages).

If your IP is already Static, then you can skip to **Pulsar Setup**. You only need to do these steps if you want to adjust any of the TCP settings (IP, Gateway, Subnet).

Choose an IP Address

Choose an IP address, and collect other information needed in order to assign a static IP address to your computer.

This only needs to be done if you have a router with multiple PCs and/or other devices connected with different IP addresses.

In your router administration program, find an IP address that can be assigned as a static IP. The address:

- Must not be one that might be assigned to someone as a dynamic address.
- Must not be one that has been assigned to another device
- Must be lower than the range of dynamic addresses.

This may be handled by an administrative group or network engineers. Have this group assign an IP that you can use for both the host PC and target Pulsar 320 unit. This will prevent any IP conflicts from occurring.

## **Assign the IP Address to the PC** (Windows XP)

To set a static IP address:

1. Open Windows **Start** menu
2. Open **Control Panel**

3. Classic view: Open **Network Connections**  
Category view: Select **Network and Internet Connections**, and then **Network Connections**
4. Double-click on your active **LAN** or **Internet Connection**
5. Click **Properties**

This opens the Local Area Connections Properties window

6. In the **General** tab, highlight the **Internet Protocol (TCP/IP)** item, and click **Properties**.

This opens the Internet Protocol (TCP/IP) Properties window.

7. In the **General** tab, click **Use the following IP address**, and then enter:

- **IP address**. The static IP address you want to assign to this computer.
- **Subnet Mask**. Subnet Mask used used by your router.
- **Default Gateway**. IP address of your router's default gateway.

8. In **Use the following DNS server addresses**, enter all the IP addresses for the DNS servers your router uses if applicable.

If DNS server addresses do not pertain to you, use **Obtain DNS server address automatically**.

9. Click **OK**

Then:

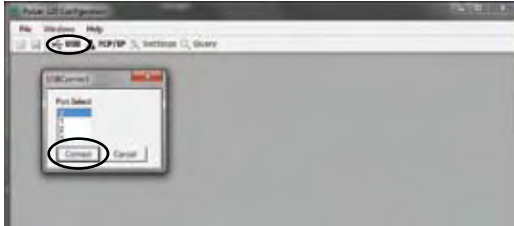
10. Click **OK** to close each window
11. Restart your computer
12. Recheck your IP address again, to make sure the changes were applied.

Run: **cmd** Type: **ipconfig/all**

Continue to **Pulsar Setup**

# Pulsar Setup

Once we know what the system and network settings are, we can configure the Pulsar 320 controller to communicate across the network via TCP/IP.



Appendix D - Figure 25: USB Port Configuration

## Connect to the Pulsar 320

The Pulsar must first be configured via USB.

1. Connect the target Pulsar 320 unit **via USB** cable to host PC
2. Connect 24VDC power source and toggle the controller **ON**
3. Launch “**PulsarV00\_02.exe**”
4. In the parent window, select the **USB icon** to establish a USB connection

This will open the USB port select dialog.

5. Select the **USB port** to connect to -- usually **port 0** for a single Pulsar
6. Once connection is established, select **Query**
7. In the information box you can view current IP, Subnet, Gateway, and other pertinent information regarding current settings on the controller.
8. To edit network settings press **Edit Network**
9. Before assigning a new IP address you must choose an IP address that won't conflict with any other devices on the network (PCs, printers, routers, other machines, etc.).

For most small networks with <255 devices, the first 3 sets of digits should match, with only the last digits being unique.

### Example:

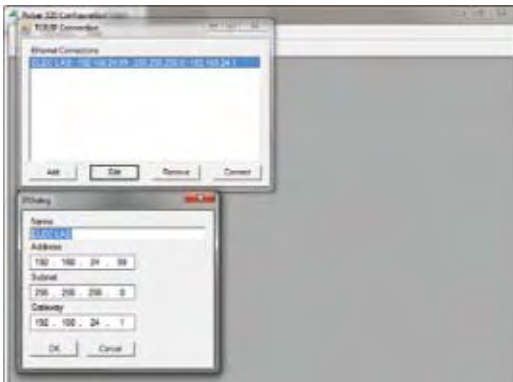
PC IP Address: 192.168.24.50  
Pulsar IP Address: 192.168.24.240

- Subnet Mask is a division of networks into separate pieces. Essentially you will want both host PC and Pulsar 320 to be on the same subnet so they can find each other.

Enter the value found from your PC settings.

**Example:**

PC Subnet: 255.255.255.0  
Pulsar 320 Subnet: 255.255.255.0



Appendix D - Figure 26: Pulsar TCP/IP Connection and IP Dialog Window

The subnet also determines how many unique places are used in **IP address**.  
**Contact your network administrator if you need more assistance.**

- Enter the same value obtained from the PC for default gateway into the Pulsar 320

PC Default Gateway 192.168.24.1  
Pulsar 320 Subnet 192.168.24.1

- Press **OK**
- Close the **Query Dialog** and close the **USB connection**
- Power down the Pulsar 320 and **disconnect the USB cable**
- Connect the Ethernet cable and power the Pulsar ON again
- Select the TCP/IP icon to open the ECP/IP connection dialog

17. Press **ADD** to add a new device to the list.
18. Name the device for easy recognition and enter all the proper IP settings that were loaded onto the controller. Once finished, press **OK**
19. Select the newly added device and press **Connect** to establish the TCP/IP connection to that device.

