ADVATEK LIGHTS

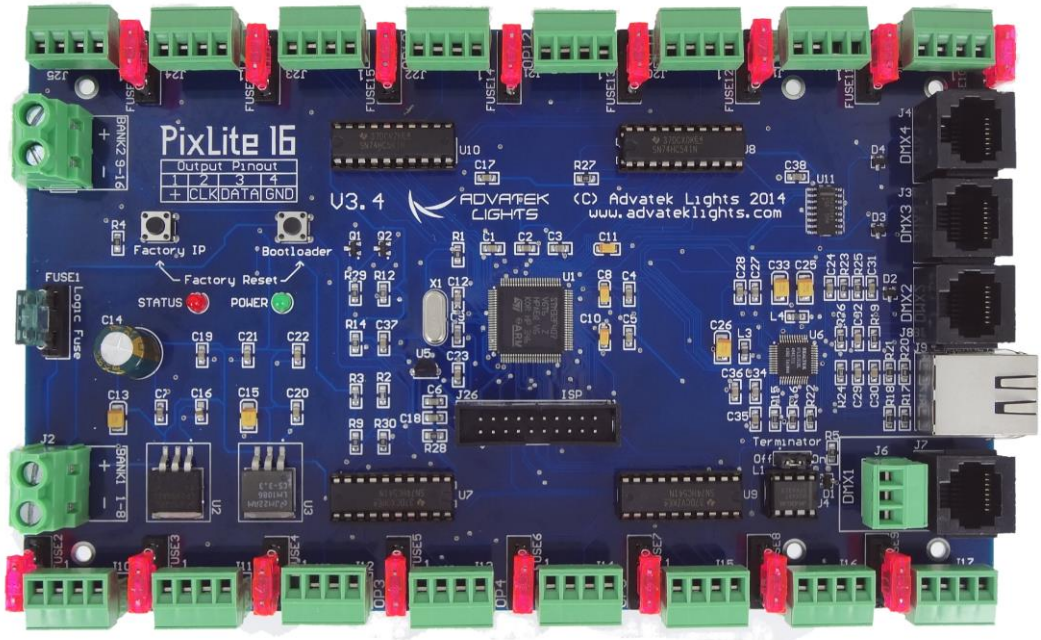
Creative Digital Lighting Solutions

PIXLITE 16

HARDWARE REV 3.4 AND PRIOR

USER MANUAL

V1.7



Contents

1. – Introduction 3
2. – Safety Notes 3
2.1 – Static Electricity 3
2.2 - Providing Power 3
3. - Installation 5
3.1 - Power and Links 5
3.2 - Control Data 7
3.2.1 – Ethernet Input 7
3.2.2 – DMX512 Outputs 7
3.3 – Lights 10
4. – Network Configuration 11
4.1 – Physical Network 11
4.1.1 – Network Layout 11
4.2 – IP Addressing 11
4.2.1 - Using a Router 11
4.2.2 - Using A Switch/Direct 12
4.2.3 - Forcing the Default IP Address 13
5. – Operation 13
5.1 – Startup 13
5.2 - Sending Data 13
5.4 – Outputs 13
5.5 – Hardware Test Pattern 14
6. - Firmware Upgrades 14
6.1 - Physical Setup 14
6.2 - Obtaining New Firmware 14
6.3 - Performing an Automatic Update 14
6.4 - Performing a “Forced Boot” Update 15
7. - Specifications 16
7.1 - Operating Specifications 16
7.2 - Mechanical Specifications 16
8. – Troubleshooting 18
8.1 - LED Codes 18

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8.2 - No Status/Power LEDs On.....18
8.3 - Other Issues.....19
8.4 – Reset To Factory Defaults.....19
8.5 - Warranty and Service.....19

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1. – Introduction

This is the user manual for the assembled control board version of the PixLite 16 pixel controller.

The PixLite 16 controller converts the E1.31 (sACN) protocol from a lighting console or lighting software into various other data protocols and outputs that data in real time to control pixel lighting fixtures.

The PixLite 16 features an output capacity of up to 32 universes of multicast/unicast E1.31 or Art-net data. It can also output up to an additional 4 universes of data (depending on the hardware revision) on 4 DMX512 outputs in sACN/E1.31 mode, bringing the total E1.31 universes up to 36. This combined with an advanced feature-set and very easy to use configuration software make the PixLite 16 an excellent choice for your pixel lighting application.

Note that this manual covers the PixLite 16 controller with hardware revisions up to V3.4 only. It only contains information specific to the physical control board, not the software configuration of PixLite controllers in general which can be found in the 'PixLite Configuration Guide'.

Separate manuals for the PixLite 16 with hardware revisions after V3.4, other PixLite controllers and the PixLite Configuration Guide may be downloaded from here:
http://www.advateklights.com/resources

2. – Safety Notes

2.1 – Static Electricity

The board comes shipped in an anti-static bag and has a number of static-sensitive components on it. Appropriate anti-static measures should be observed when handling the board. For example, you should never sit the controller on carpet and you should avoid touching components on the controller un-necessarily.

2.2 - Providing Power

Power to the outputs is applied via power bank screw terminal connectors J1 and J2, located on the left-hand edge of the board as shown in Figure 1 on the following page. They are both clearly marked on the PCB with the polarity and the power bank number.

Outputs on channels 1-8 are powered via power bank 1 and outputs on channels 9-16 are powered via power bank 2. The voltage on each bank can be anywhere between 5V and 30V DC and it is the user's responsibility to ensure that the power supply used matches the voltage of the pixel fixture they are using and that it can supply the correct amount of power/current. The total maximum current per power bank is 32 Amps, giving the board a total maximum current capacity of 64 Amps.

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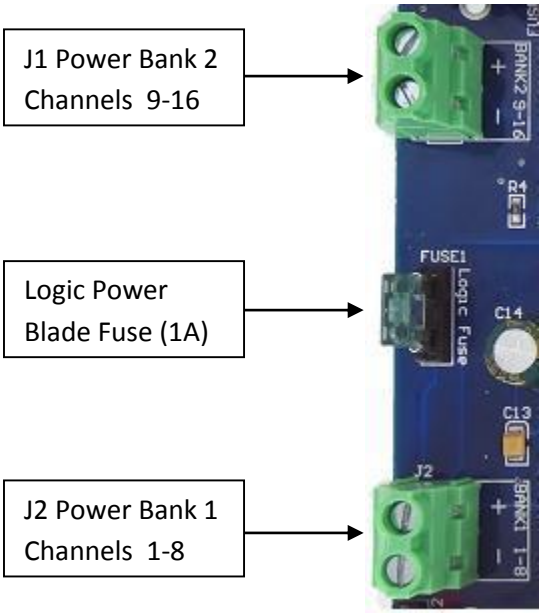

Figure 1

Board Rev 3.2

Power may be supplied directly to the on-board logic circuitry separately via the isolated connector J3. Do not apply any power without first referring to section 3.2.1 for details on how to correctly configure the various power options using the links.

Board Rev 3.3+

Logic power for this board revision is auto-regulated and is always via the bank 1 power input. Any voltage between 5-30V may be applied to bank 1 which will power the lights on that bank as well as the board's logic circuitry. A 500mA M205 fuse (1A mini blade fuse on rev 3.4+) is also provided for the on-board logic, in addition to reverse polarity protection (**but not for the light output power** – applying power with reverse polarity can destroy your pixels!)

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3. – Installation
3.1 - Power and Links

The PixLite 16 has two split power banks, each with 8 individual outputs. The split banks allow two different voltages to be used on the controller simultaneously. (You could run 5v lights off one bank and 12v lights off the other one for example.)

Output Fuses

On board revisions up to 3.3, each individual channel output is protected by a self-resetting polyfuse. These are rated to handle up to 5A @ 25˚C.

After board revision 3.4 each individual channel output is protected by a 4A mini blade fuse. These may be changed to a higher or lower value depending on your specific application, provided any individual output does not exceed 7A and the total bank current capacity does not exceed 32A.

Power Links

Board Rev 3.2

The board comes shipped from the factory with 3AG 30A fast blow fuses for fuse 1 and fuse 2 for the power banks.

Before connecting any power to the board, the power link options must be setup correctly to ensure safe and proper power operation. There are two main power configuration links L1 and L2 on the board, as shown below. L2 selects where the 5V VCC logic power for all the on-board logic circuitry is derived from. There are three main jumper configurations for this jumper link as follows:

Configuration A:

Logic power is derived directly from either the bank 1 or bank 2 power input. In order to use this configuration, the voltage being supplied to the corresponding power bank must be 5V DC +-10%. Exceeding 5V or reversing polarity for the VCC logic will destroy the on-board logic ICs as there is no protection. The L2 jumper should be in the 1-2 or ‘A’ position for this configuration as shown in figure 2.

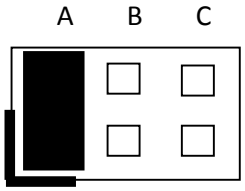

Figure 2

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Configuration B:

Logic power is derived from the on-board 5V regulator via one of the two main power banks. The regulator can accept any input voltage between 6V and 30V DC. This option is best used when powering either of the main power banks with a voltage greater than 5V DC. The L2 jumper should be in the 3-4 or 'B' position for this configuration as shown below:

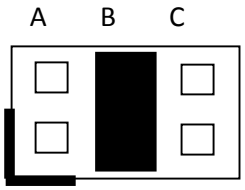

Figure 3

Configuration C:

Logic power is derived from the on-board regulator by a separate stand-alone power source via connector J3. The L2 jumper should be in the 5-6 or 'C' position for this configuration as shown below:

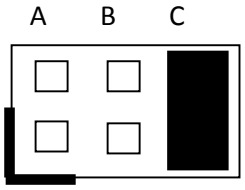

Figure 4

L1 jumper function is simply to select which of the two power banks (B1 or B2) will be used to supply either the 5V VCC logic or on-board regulator input when either configuration A or B (above) is used for L2. The 1-2 position selects power bank 1 and 2-3 position selects power bank 2.

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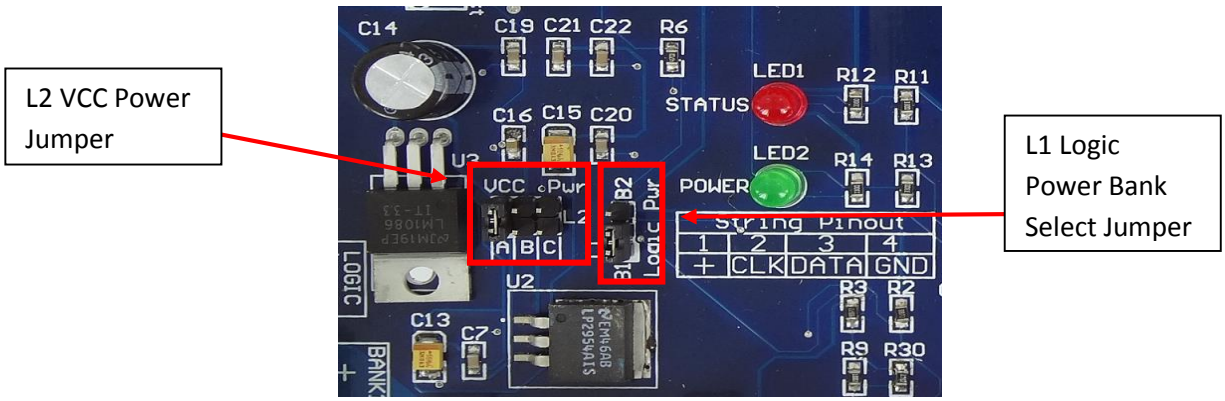

Figure 5

All PixLite 16 V3.2 boards are shipped with the jumpers set for the 'B' configuration and for VCC power via bank 1 by default.

Board Rev 3.3+

On all board revisions after V3.2, no power link settings are required. Power to the logic circuitry is automatically regulated from the bank 1 power input. Simply connect your power supply of between 5V and 30V DC to the power bank 1 screw terminal (J2 as shown in Figure 1).

3.2 - Control Data

3.2.1 – Ethernet Input

Control data to the PixLite 16 is achieved via the single horizontal Ethernet jack J9. The controller always requires an Ethernet connection to operate and it should be connected prior to powering the controller. This will help ensure the IP address is correctly obtained when using DHCP mode.

3.2.2 – DMX512 Outputs

The hardware layer on which the DMX 512 protocol operates is the RS485 electrical communications standard. This is a differential transmission system consisting of a two wire differential twisted pair and single wire ground connection. The D+, D- and ground connections are clearly labelled on the PCB for the DMX screw terminal J6.

The DMX outputs do **not** convert Art-net data to DMX, only sACN (E1.31).

The DMX outputs are **not** electrically isolated and are not recommended for commercial use.

Board Rev 3.2

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This hardware rev has a single DMX512 output.
Below is the RJ45 socket pin-out for the DMX connectors on board revision 3.2. This uses the “LOR” wiring.

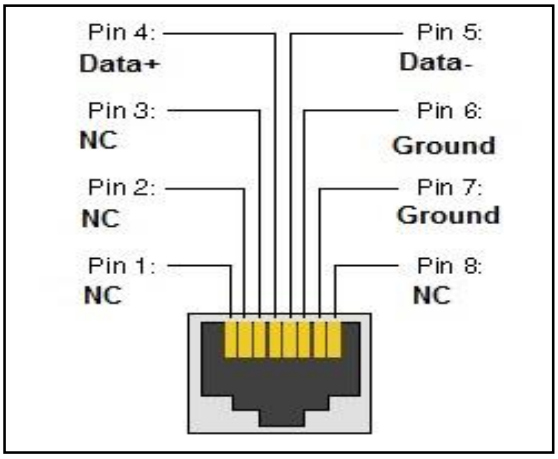

Figure 7

DMX output is connected via two vertical RJ45 sockets J7 and J8, as well as a horizontal screw terminal J6. All these connectors are located on the far right-hand side of the board.

The DMX output acts as a single E1.31 to DMX bridge output.

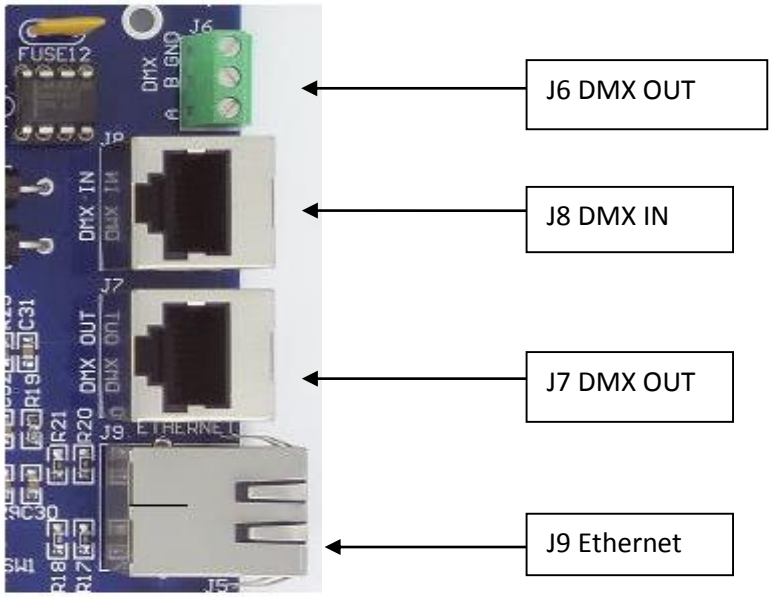

Figure 8

Board Rev 3.3+

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On board revisions after 3.2, there are 4 dedicated DMX outputs. These outputs act as 4 individual DMX512 universe outputs, effectively providing the user with an E1.31 to 4x DMX512 bridge (**in addition** to the normal pixel outputs).

Below is the RJ45 socket pin-out for the DMX connectors. Note that all board revisions after 3.2 now use the "ESTA" standard wiring as shown in Figure 9 below:

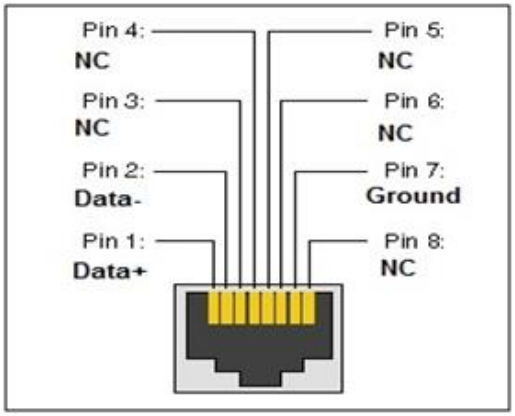

Figure 9

DMX signal data is connected via the four vertical RJ45 sockets J3, J4, J7 and J8. The DMX 1 output also has a screw terminal connector J6 for alternative connection. All these connectors are located on the far right-hand side of the board.

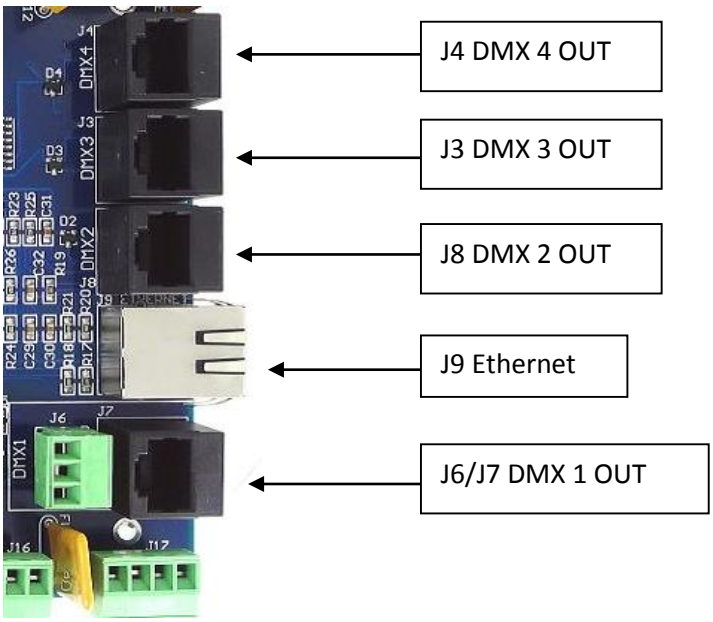

Figure 10

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3.3 – Lights

Lights are connected to the bare board version directly via the pluggable screw terminal connectors along the top and bottom edges of the board. Each connector is labelled with its output channel number (1-16) and pin 1 is also clearly marked. (There is also a pin-out for the connectors clearly marked on the PCB silk-screen for quick reference.) Simply wire your lights into each screw terminal plug and then plug them into the mating sockets.

The pinout for the connectors is also shown in Figure 11 below:

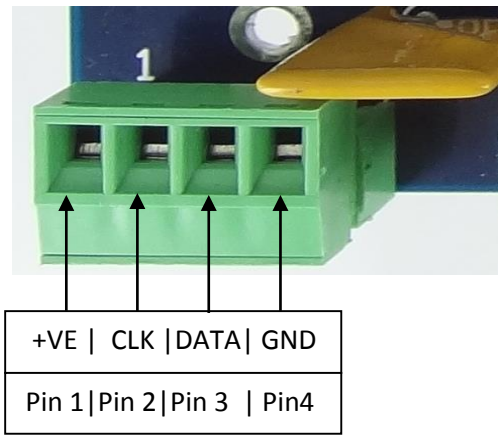

Figure 11

Some pixel protocols do not use the clock line and lights of this type will only have 3 wires. In this case you can leave the clock line disconnected.

Warning: It is very important not to short +ve onto the clock or data lines when using pixels greater than 5v. Given this mistake can happen, the part it damages has been designed for easy replacement by the user. The part is very cheap to replace and Advatek support will guide you through the process if you believe this has happened. Note that this can also happen from poor waterproofing when rain shorts the higher voltage onto either of those wires in your pixels/wiring.

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4. – Network Configuration
4.1 – Physical Network
4.1.1 – Network Layout

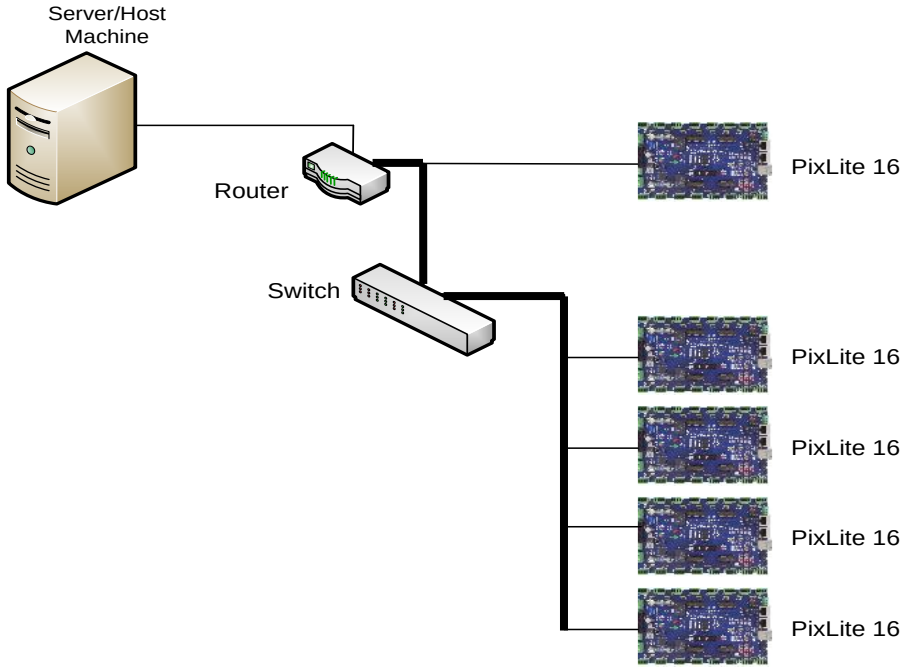

Figure 12

Figure 12 shows a typical network topology for the PixLite 16 controller(s) LAN. The host machine typically connects to a router and then to the PixLite 16 controller(s). If you are only using a few controllers, they can be connected straight to the router. Larger installations will benefit from using a network switch between the router and controllers.

In smaller installations it may be preferable to connect the controller directly to the host machine's network adapter using a crossover network cable.

The PixLite 16 controller(s) can also be integrated straight into any pre-existing LAN.

4.2 – IP Addressing

4.2.1 - Using a Router

Routers have a DHCP server in them – this means they will tell a device plugged into them what IP address to use, if asked.

DHCP is always enabled by default on a PixLite controller so it can immediately connect to any existing network with a router. However it is recommended that you assign a static IP address once communications have been established via the Advatek Assistant. If the controller is in DHCP mode

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and is not assigned an IP address by a DHCP server, it will timeout after 15 seconds and default to a static IP of 192.168.0.50

If DHCP mode is enabled, both LEDs will flash together until the controller receives an IP address, at which point the power LED will remain on solid and the status LED will flash slowly indicating it is in run mode and ready for use.

If a static IP address is assigned to the board, then the power LED will be solid from power up. If a DHCP timeout occurs the power LED will stop flashing and go solid also.

4.2.2 - Using A Switch/Direct

It may be desirable to connect the controller directly to a switch or even directly to the host machine instead of using a router. In this case (for first time configuration) you will need to ensure that the network adapter of your computer is set in the IP range that the controller will default to (controller defaults to 192.168.0.50). This means you PC's IP should be 192.168.0.xxx where xxx is anything between 1 and 254 other than 50. The subnet mask on your PC should be set to 255.255.255.0.

Once you can successfully discover the controller in the Assistant, we recommended setting the controller to a static IP address other than the default.

Figure 13 shows a screenshot of typical computer network settings to communicate with a PixLite 16 for the first time without a router.

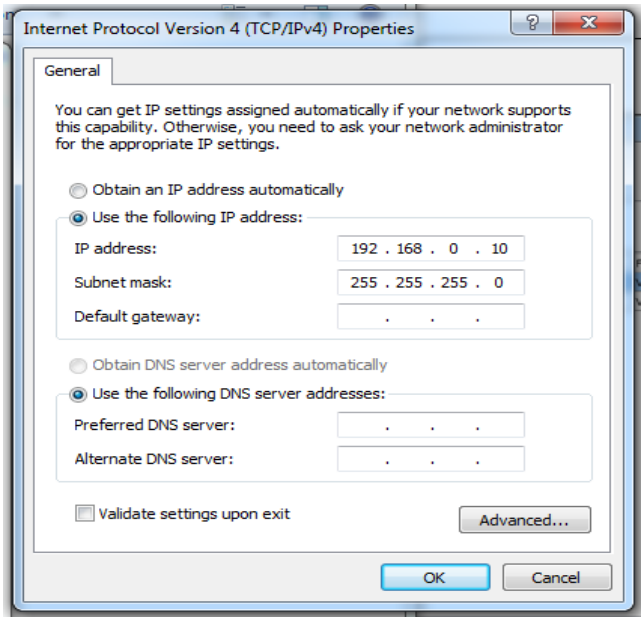

Figure 13

If you want to connect the PixLite directly to a PC then in addition to setting the computer's IP range as specified above, you may also need to use a crossover network cable as opposed to a straight-through cable as described in section 4.1.1.

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4.2.3 - Forcing the Default IP Address

In the event that you forget the IP of a controller and you can't see it in the Assistant, it can be forced to its default IP. A simple procedure can be employed on power up:

1. Hold down the "Factory IP" button and power up the board
2. After a few seconds release the button. The controller's IP address will now be 192.168.0.50.

You should now be able to setup your PC's network settings to find the controller at this IP and change the IP settings to what you prefer. After changing the settings or if you power the controller off and on again, the controller will revert to using the saved settings.

5. – Operation

5.1 – Startup

Upon applying power, if you already have strings connected they will flash very briefly (<50mS) and then immediately turn off as the controller takes control of the pixels. If no data is being piped through to the controller then the pixels will remain turned off until valid data is received. During normal operation the green power LED will remain on solid and the status LED will flash slowly to indicate the controller is connected to a valid network and is ready to process data.

5.2 - Sending Data

Data is sent from the host machine to the controller via the LAN using a "DMX over IP" protocol such as sACN (E1.31) or Artnet.

Data may also be sent from a separate source over a standard DMX512 network in certain applications. This can be set-up with a PC using a USB to DMX512 (RS485) adaptor or using any other standalone type of DMX controller.(If using an RS485 adapter, ensure it has its USB drivers correctly installed or it will not appear in either the configuration utility or the lighting software program.)

5.4 – Outputs

Each of the 16 outputs can drive up to 340 individual pixels (2 DMX Universes of data). This allows for a total of 5,440 pixels to be driven out of the one controller (in addition to 4 DMX512 Universe outputs.) Driving a full 340 pixels out of a single output would also likely require some kind of power injection. How much power you need to inject and how often will typically vary depending on the number of pixels used and their individual current consumption.

The refresh rate of the pixels will depend on the operating frequency of the specific pixel chip type. Typically it can vary from a minimum of 25 fps at the low end and up to 100 fps at the higher end.

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5.5 – Hardware Test Pattern

The controller features a built-in test pattern to assist in troubleshooting during an installation. To put the controller into this mode, simply press and hold the 'Factory IP' button for 3 seconds (*after* the controller is already running.) The controller will then enter the test pattern mode and will display red, green, blue and white sequentially in a repeating pattern on all pixels on each of the 16 outputs. Pressing the button while in this mode will then cycle through each of the four colors successively (on all outputs simultaneously) before returning to the current pattern again.

To exit the test mode simply press and hold the 'Factory IP' button down again for 3 seconds and then release.

6. - Firmware Upgrades

The controller is capable of having its firmware upgraded (new software). An upgrade is typically performed to fix any bugs that may have been overlooked in previous revisions or to add new features.

6.1 - Physical Setup

To perform a firmware upgrade, ensure that you have your PixLite 16 controller connected to the LAN network as per section 3.1.1.

6.2 - Obtaining New Firmware

The latest firmware is available from the Advatek Lights website at the following link:
http://www.advateklights.com/resources

It will come in a ".hex" format.

6.3 - Performing an Automatic Update

1. Open the config utility. Click "Search" and once the desired controller appears in the main window, double click on it.
2. A configuration window will appear. Click on the "Misc" tab and then locate the "Upgrade Firmware" button and click on it. A "firmware update" window will appear (as shown in Figure 20). Click "browse" to locate the firmware file you wish to download.
3. Click on the "update" button.
4. Once the download is complete, a message box will pop up saying it has completed successfully.

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5. The controller will automatically reboot itself and then start running the new firmware application immediately.

If there is something wrong with the upgraded firmware, repeat the process again if it is still visible in the configuration utility. Otherwise, refer to the troubleshooting section for further information.

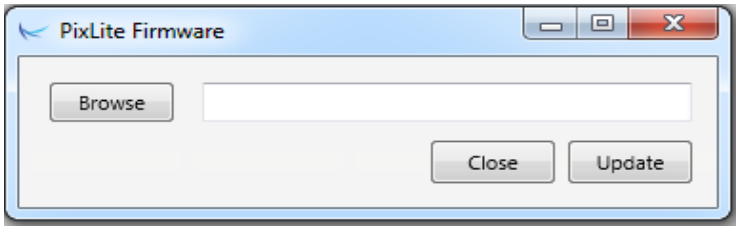

Figure 14

6.4 - Performing a "Forced Boot" Update

1. Power down the controller.

   If using board rev 3.2 move the "Force Boot" jumper L5 (located centre-right on the board) into the "On" position. (If you have a "Plug and Play" version, the lid of the enclosure will need to be removed to do this.)
2. If using board rev 3.3 or greater simply hold down the "Bootloader" button.

3. Apply power, the status and power LEDs should be flashing alternately to indicate the controller is in bootloader mode. It is now ready for a firmware upgrade.

   The current bootloader will default to an IP address of 192.168.0.50 in the force mode, so you must **ensure you are running it on a network in the same address range as this IP address**.

4. Using the Advatek Configuration utility, click search in the main window and you should see the controller appear with "bootloader" in the firmware column. Double clicking on it will bring up the file browse window as shown in Figure 14.

5. Click browse to locate the firmware file.

6. Click on the update button. The update will only take about 5 seconds, and a message box will pop up once the download is completed.

7. Power the board down again (move the jumper L5 back to the "Off" position if using board rev 3.2).

8. Apply power again and the board should now be operating with the new firmware.

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7. – Specifications

7.1 - Operating Specifications

The table below specifies the recommended operating conditions for a PixLite 16 controller.

PARAMETER	VALUE/RANGE	UNITS	TOLERANCE
Power Bank Input	5-30	V DC	+/-5%
Max Capacity Per Power Bank	32	A	+/-5%
Logic Current Consumption (@ 5V)	150	mA	+/-10%
Operating Temperature	-10 to +60	°C	+/-5%
Individual Outputs (Max)	7	A	NA

Table 1

7.2 - Mechanical Specifications

The control board dimensions are as shown below in Figure 15 on the following page.

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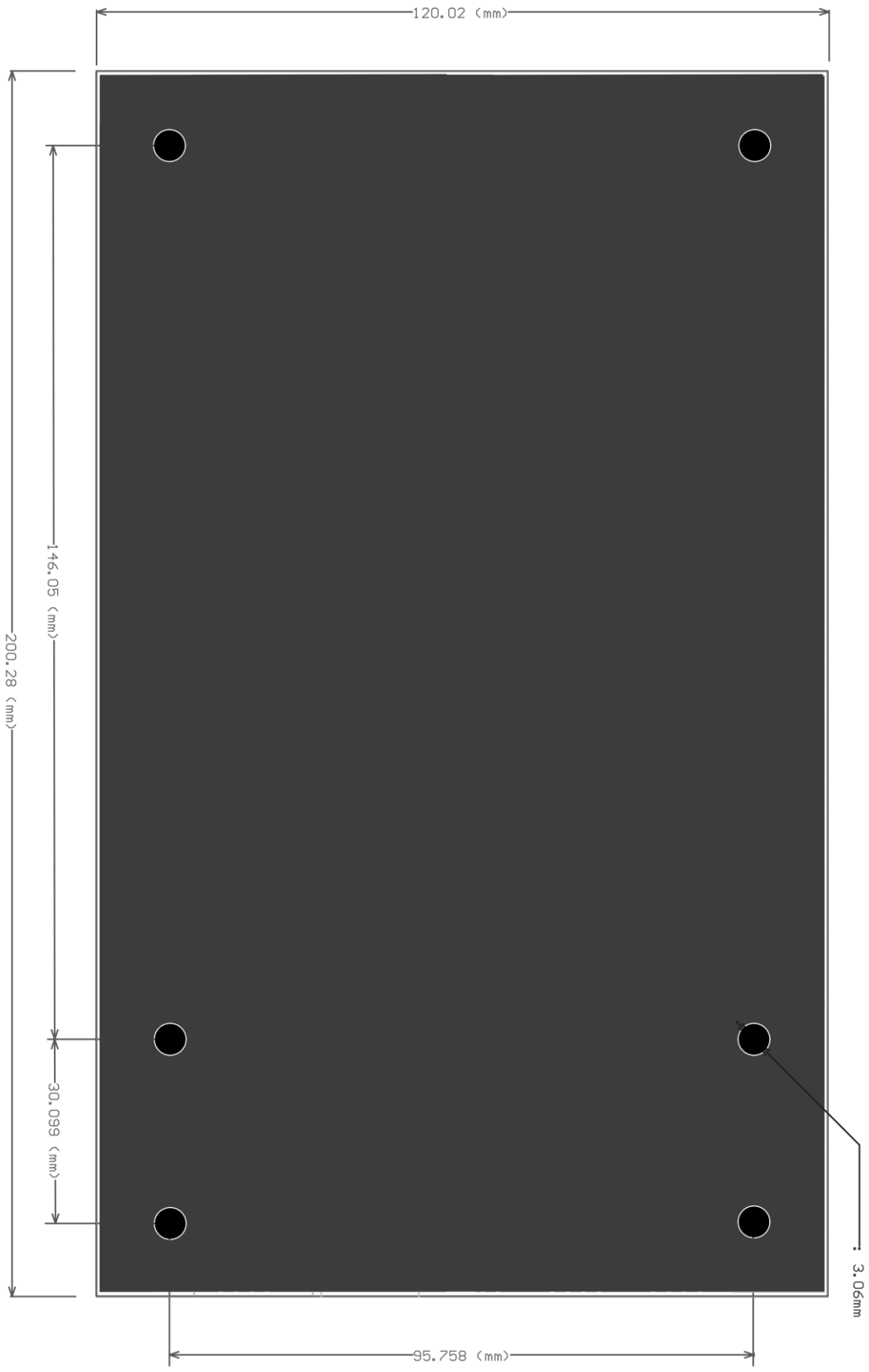

Figure 15

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8. – Troubleshooting

Generally, troubleshooting requires looking at the LEDs on the controller.

8.1 - LED Codes

Please refer to the table below for condition codes for the onboard status and power LEDs.

POWER LED (GREEN)	STATUS LED (RED)	CONDITION
SOLID	SLOW FLASHING	NORMAL OPERATION, MAIN APPLICATION RUNNING OK
SOLID	SOLID	MAIN APPLICATION NOT RUNNING
ALTERNATE FLASHING	ALTERNATE FLASHING	BOOTLOADER MODE
OFF	OFF	NO POWER

Table 2

Please refer to the table below for condition codes for the ethernet jack status LEDs.

LINK LED (GREEN)	DATA LED (YELLOW)	CONDITION
SOLID	RAPID FLASHING	CONNECTED OK, RECEIVING DATA
SOLID	OFF	CONNECTED OK, NO DATA
OFF	OFF	NO LINK ESTABLISHED OR POWER IS OFF

Table 3

8.2 - No Status/Power LEDs On

Ensure that your power supply is supplying correct voltage as per section 3.1.1. Also ensure that it can supply enough power to drive the lights that are connected as well. You should also try disconnecting all outputs and see if the controller starts then. If the supplied power is correct try performing a forced firmware update as per section 6.4.

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8.3 - Other Issues

If the device fails to perform as expected, please check the LED codes as per section 8.1. For the latest more specific troubleshooting information and other help, you should refer to our online knowledgebase here: http://www.advateklights.com/support/kb

If you can't resolve your problem with the help of our knowledgebase, you can open a support ticket here for assistance: http://www.advateklights.com/support

You can also send an e-mail to support@advateklights.com and a ticket will be automatically created for you. If you create your ticket through the website you will have the ability to login and manage past and existing tickets.

8.4 – Reset To Factory Defaults

To reset the controller to its factory default settings do the following:

1. Hold down the "Factory IP" button AND the "Bootloader" buttons together before applying power.
2. Power up the board.
3. Wait for both LEDs to flash together.
4. Release both buttons.
5. Power cycle (turn power off, wait 5 seconds then turn it on again).

8.5 - Warranty and Service

If you require support or warranty, please refer to section 8.3 for information on creating a support ticket. For warranty cases the support staff will usually require you to perform some troubleshooting steps first. If we cannot solve your problem remotely we will issue you with an RMA number through the support ticket system. You may then either return the device to a local distributor or return it to us directly for warranty services.

The PixLite 16 control board is supplied with a 12 month warranty.

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