Part 4: The Works Kit System Installation

Power:

- For 12 volt systems only.

Position/Nav LEDs:

- ~1 amp current draw per wing,
  ~2.5 amps total current draw with tail light.
  Protect with a 5 amp fuse or circuit breaker.

Strobe LEDs:

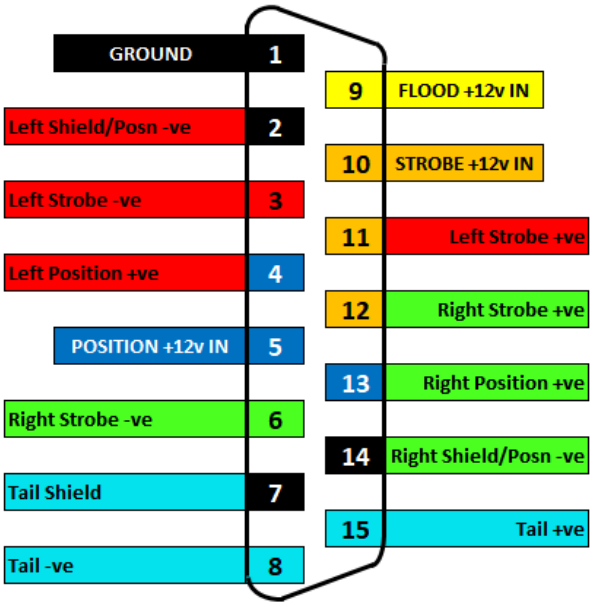
- ~6 amp peaks, ~3 amps average strobe system current.
  Protect with a 7.5 or 10 amp fuse or circuit breaker.

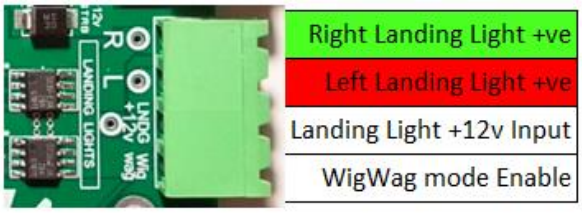
Flood Mode:

- Turns on the strobe LEDs continuously at 33% power for extra illumination from the wingtips, useful when taxiing.
- Plan for additional 2 amps drawn from Taxi or Flood switch.

Landing lights:

- 1 amp per spotlight (~6 amps total)
- Each light 1200+ lumens in an 8° beam per spotlight.
  (3600+ lumens per wingtip)





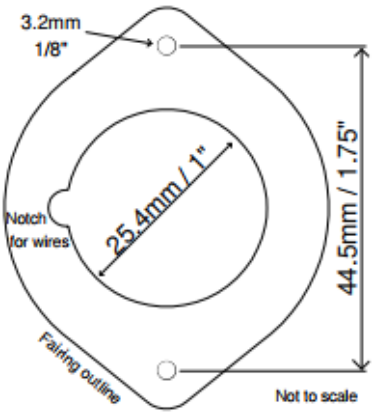
NOTE that the pinout diagrams shown for the D15 connector depicts the mating face of the female socket on the circuit board, and/or the back (wire) side of the male wiring harness plug.

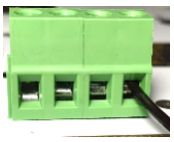
Controller Board:

The controller board is sized to fit a **Hammond 1591XXSS** or **XXSSFL** box, available from Digikey or Mouser as two sources. Most of our previous customers have chosen to use the supplied plastic stand-offs and simply mount the bare board out of the way of boots and bags, such as behind the instrument panel or in place of a conventional strobe pack behind the rear bulkhead. Some customers have supplied files for 3D printed boxes which can be found on the Information page of the Flyleds website. **Before you mount it under a seat**, please consider how much dismantling you will have to do if you want to check or change something! The plastic standoffs supplied simply push and click into place, and can be squeezed to release the board. You need to drill 4.5mm or 3/16" holes in your metalwork to accommodate them.

Tail Light Mounting

Flyleds tail lights are supplied with a laser cut bronze coloured mounting bracket and two M3 stainless steel screws. The bracket provides a sturdy method of mounting your tail light to the fiberglass rudder fairing. Drill the mounting screw holes and a 1 inch hole for the heatsink in the rudder fairing. The bronze bracket (or parts of it!) may then be permanently fixed into position *inside* the fairing using an adhesive or bonding method of your choice.





Please note: The green terminal blocks used on the wing boards and harness plugs have cages that pull *upwards* to clamp the wire. Unscrew the terminal, insert the wire, then screw the terminal tight in the regular righty-tighty clockwise direction to grip the wire.

Strobe Lights

IMPORTANT: "Negative switching" used. The Strobe LED circuits will only work when *both* the **STROBE+** and **STROBE-** wires from each wing and the tail connects back to the Flyleds Control Board. +12 volts is sent out to the strobe LEDs whenever Strobe power is applied. Then, the strobe LEDs are flashed when the *controller board* connects the STROBE- wires to ground. **Note** that there is no wire or terminal at the wings called Strobe Ground! If you make any extra local ground connections to the wing or tail strobes you will jam those lights on permanently.

When strobed, each wing draws approximately 6 amps of current for the duration of each flash. This fast rise-time current has a small potential to cause intercom noise. To eliminate the possibility of noise, for neatness, and so we can all sleep soundly, we recommend running the **Strobe** circuit to the wings and the tail using shielded wire. 18 to 22 AWG, 2 3 or 4 core shielded wire may be used. In this current driven application 22AWG works just fine. Standard 18 or 20AWG wire should be used for the power input from the panel switch to the controller board.

Position Lights

The Controller Board simply provides a convenient way to distribute +12v in from the panel switch out to each of the three position lights, by using the same shielded wires as the strobes. If you already have un-shielded power wires for the position lights out to each wing, you may continue to use these, as the position lights will not generate any radio or intercom noise. The controller board will need to be connected to this circuit as well, so that it knows when to operate the tail light at reduced power in position mode. Refer to the diagram on page 6.

The **Position-** connection at the wingtips *may* be grounded either locally at the wing, or via the controller board using the **L shield** (pin 2) and **R shield** (pin 14) connections, such as when using shielded cable for the strobes. (Normally the shield should not be used to carry any current, but in this application it works just fine.)

Kit Tail light

The Kit version of the Tail Position/Strobe light **relies** on the large resistor on the Flyleds Controller Board for current limiting. The Controller Board operates the tail light at ~10% power using PWM (short pulses of power) when the Position/Navs switch is on, and sends it 100% power for each strobe flash.

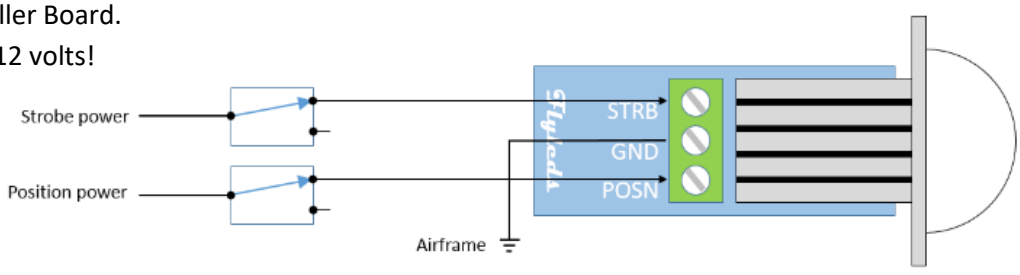
- **This model Tail Position/Strobe light *must only* have both of the + and – wires connected back to pins 15 and 8 of the Controller Board as per the wiring diagrams overleaf.**
- The shield in the cable to the tail light should be grounded at the controller board end only.
- **At the tail end insulate the shield and do not connect it to anything.**
- We leave the choice of a connector (or not) at the tail light up to you.

PLEASE NOTE! Connecting this tail light to a 12 volt source, even for a 'quick test', will result in one brief flash of light followed by the total destruction of the device!

You *may* use a square 9 volt battery to test the Kit Tail light and/or the wiring to it, as this type of battery can only deliver a limited amount of current.

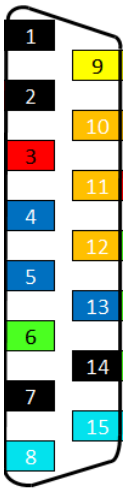
Stand-alone Tail Light

If you have purchased our Stand-Alone Tail Light with the integrated circuit board, wire it directly to your Strobe and Position/Nav light switches on the panel, and ground it locally at the tail.
Do not connect it to the Controller Board.
Yes, you can test this one with 12 volts!



Operating modes

Position (Nav) lights



Applying 12 volt power to **Pin 5 Position +IN** connects power back out to the left and right wingtips on Pin 4 and 13 respectively, providing a convenient place to terminate all of the wing position wires for new wire runs. Beyond this the controller board has no "control" over the position lights.

The orange **Position LED** and the yellow **Tail LED** illuminates.

If you have existing wiring out to your position lights, feel free to reuse that wiring by connecting those wires directly to the wing boards, and ignore the connections on Pin 4 and 13 of the controller. Pin 5 of the control board will need to be connected to the Position light circuit so that it knows to illuminate the tail strobe at low power as a position light.
See the wiring diagram on page 6.

Strobe lights

Applying 12 volt power to **Pin 10 STROBE+** activates the strobe function.

The **Left**, **Right** and **Tail LEDs** display the flash pattern selected.
The red switches on the controller board change the configuration of the flash pattern:

Switch 1 ***2/4 Flash*** selects whether the wing strobes flash two or four times each.

Switch 2 ***Slo/Fast*** changes the speed of the flash pattern.

Switch 3 selects a ***chase*** or an ***alternate*** flash pattern.
Try switch 1 and 3 both on for a unique landing light wigwag pattern.

Switch 4 selects a ***single long flash*** mode for the wingtip strobes.
- Switch 2 alters the flash duration.
- Switch 3 selects whether each strobe flash is on the same wingtip or the opposite wingtip to the landing light wigwag function.

There's hours of fun to be had choosing a pattern!

Flood Mode

Applying power to **Pin 9 FLOOD+** energises the *strobe* LEDs continuously at 33% power.
We envisage you would use this feature in addition to separately wired taxi lights such as the single spotlight in each wingtip for normal forward illumination. See the wiring diagram on Page 5.

That's around 2000 lumens of extra light from each wingtip and tail that should enable you to clearly see the taxiway edges and any temporary mobile hazards such as deer or kangaroos, depending on which continent you live.

Note that the **Strobe function takes priority** over the Flood function if both panel switches are turned on at the same time. We envisage that as you land and exit the runway you will turn the strobes off. At this point the Flood function will begin, assuming you have your Taxi or Flood switch turned on.

Landing Lights

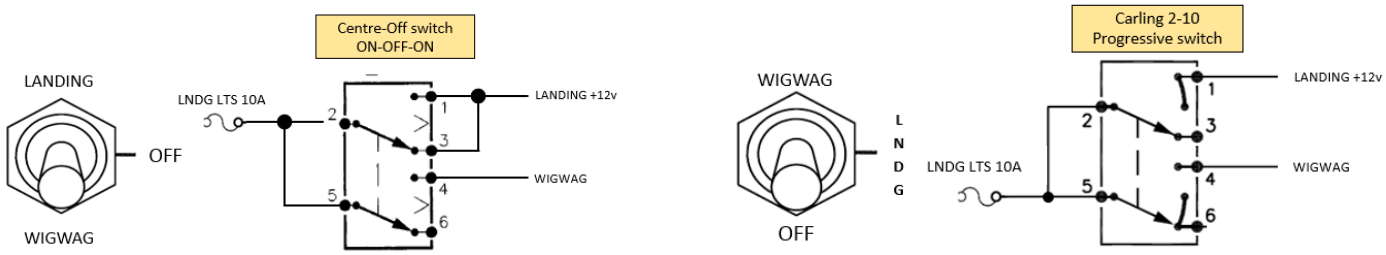
Applying 12 volt power to green plug terminal **LNDG +12v** energises the **L** and **R** landing light output terminals. Each output can supply 10 amps maximum.
The individual spotlights in the Works kit draw one amp each, so that's a load of three amps per wingtip if they are all wired together.

The white **Landing LED** shows multiple states:

On bright: Landing lights both on.
Alternate dim/medium: Wigwag mode, representing left/right landing lights active.

Wigwag mode

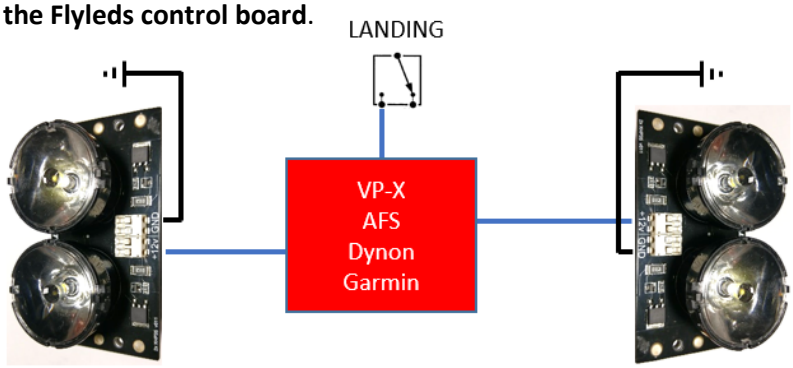
Applying 12 volt power to *both* the green plug terminals **LNDG +12v** *and* **WIGWAG** activates the wigwag function for the **landing lights**. The cycle time will vary between 24 and 40 flashes/min depending on how Switch 1, 2 and 3 are set.
The diagrams below show two examples of how you could combine the wigwag function onto one panel switch, using either a 'centre-off' type or a 'progressive transfer' type switch.



See the diagram on page 5 for a two switch solution.
Three position switches could also be used in the same way to combine the Position and Strobe lights on one switch.

External WigWag

Power control systems available from AFS/Advanced Flight Systems/Dynon, Vertical Power and the Garmin GAD27 module will automatically switch your landing lights to wigwag mode above a set airspeed.
If you have one of these external lighting controller systems in your plane then please use it instead!
Wire the Flyleds landing lights directly to these controllers following their instructions, **completely bypassing the green terminal block on the Flyleds control board**.

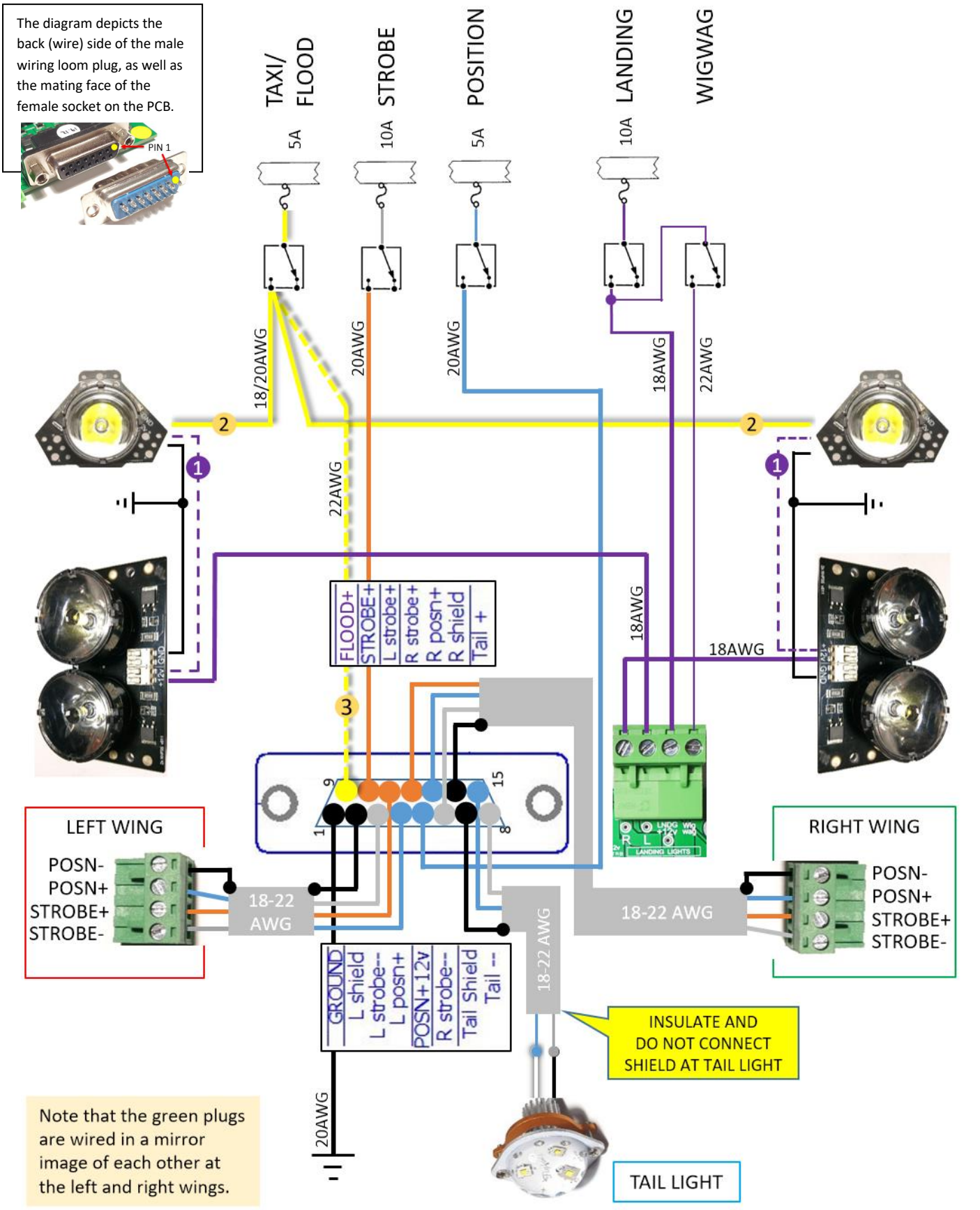


Landing light grounding

<u>Flyleds landing lights should be grounded locally at the wingtip.</u> There is no need to run this ground back to your firewall common ground point. Flyleds lights do not generate any headset noise!
By exception, if you have a magnetometer in a wing, ground the landing lights for that wing at the <u>wing root</u> instead. The magnetic fields generated in the power and ground wires will cancel each other out, keeping the magnetometer oblivious and happy.

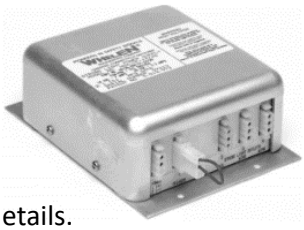
SYSTEM WIRING DIAGRAM- New wiring

(1) The single light modules can be wired in parallel with the double light modules, as per the purple dashed lines.
(2) The single lights may be wired separately as Taxi lights instead, as per the yellow lines. Choose one method only!
(3) The Flood function on pin 9 (yellow dashed line) is optional and operates the *strobe* LEDs for additional area lighting off the wingtips and tail.



SYSTEM WIRING DIAGRAM- reusing existing wiring

This diagram shows how you can re-use the existing wiring in your aircraft. If you are replacing a conventional xenon strobe system you can reuse the existing shielded wires, as well as the standard unshielded Position/Nav light wires represented by the yellow lines below.

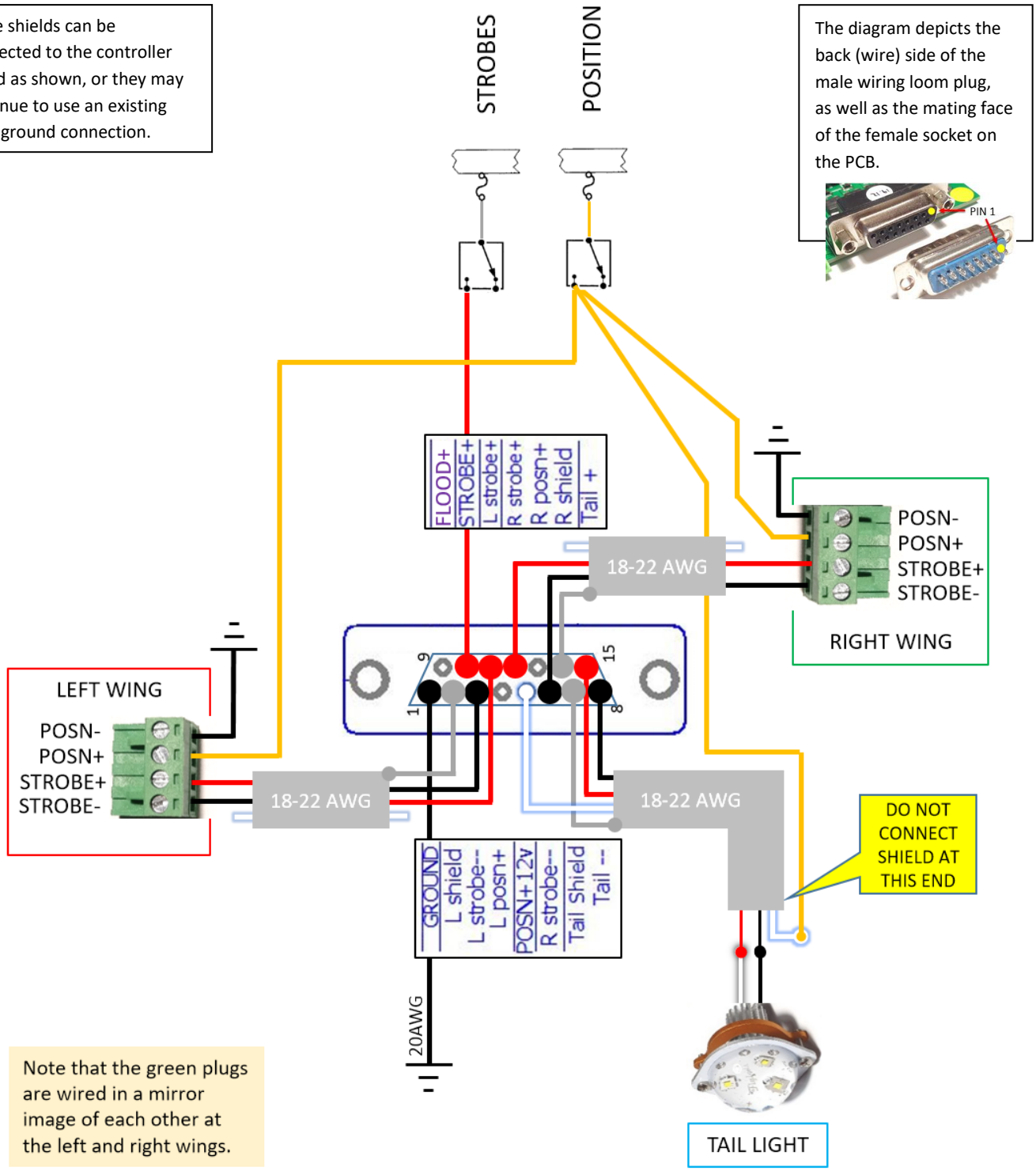


* The position lights (only) may be grounded locally at the wingtip.
* In order to fit crimp pin connectors, peel a few strands off 18AWG wire to reduce its size.

Note that we now sell a plug and play controller board to facilitate retrofitting a Whelen strobe power supply with the Flyleds controller board. See the Flyleds website for more details.

* The controller board also needs to be connected to the position light circuit so it can energise the tail strobe to act as a position light. This can be achieved by running a wire directly from the NAV/POSN panel switch to the controller Pin 5 (POSN +12v) or, the existing position light +12v power out at the tail or a wingtip could be sent back to the controller board via a spare wire within the shielded cable, as shown by the white wire from the tail light to Pin 5.

Cable shields can be connected to the controller board as shown, or they may continue to use an existing local ground connection.



The diagram depicts the back (wire) side of the male wiring loom plug, as well as the mating face of the female socket on the PCB.

Note that the green plugs are wired in a mirror image of each other at the left and right wings.