

Part 3: "The Works" lighting kit – Assembly Instructions

(For those customers who elected to have the kit soldered by us, welcome! Parts 1 and 2 detailed those steps.)

The position/strobe boards are supplied to you oversized and need to be trimmed to suit your wingtips. Note that the final shape of the boards may end up being quite different between the left and right wings, due to the moulds used to manufacture the fibreglass wingtips.

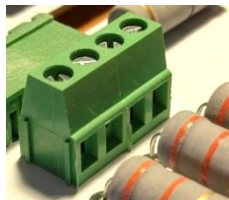
We've found that the cutout shape for the W-715-1 wingtip is pretty similar, but for all other RV models the light bay is quite different from left to right wings.

Please see page 3 for further information.



The wing boards are made from fibreglass with a thin layer of copper on either side, and then a coating of paint.

* When shaping the boards use the same tools and safety equipment you would for any other fibreglass work.



* If you choose to use a power tool to shape your boards, place some masking or electrical tape over the screws of the green terminal blocks. More than one customer has had to go looking for the screws hiding in the dust on the floor!

Search YouTube for "Flyleds spotlight assembly" for a video description of the following steps.

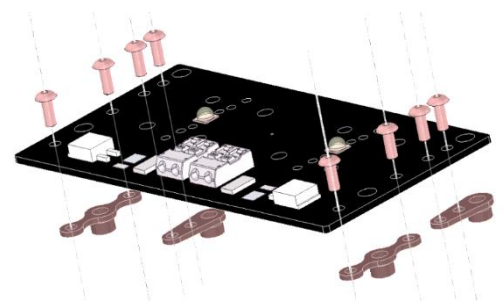
Landing light board assembly

Seeing as how you're an expert riveter, we thought we'd give you just a few more to do! Attach the nutplates to the landing light boards as shown. These boards are made from 1.6mm thick aluminium and you may substitute countersunk or pull-rivets if you feel the need.

2x K1000-L06/MS21047-L06 double lug nutplate

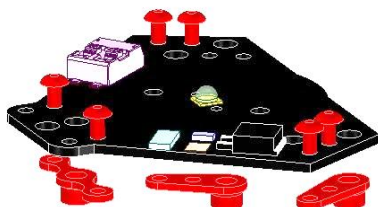
2x MK1000-L06 / MS21071-L06 single lug nutplate

8x MS20470 / AN470AD3-4 rivets



Please be extremely careful not to damage the LEDs and other components on the boards!

We highly recommend using a pneumatic rivet squeezer to do this job, which will give you the finesse required that a hand squeezer can't provide. The single lug nutplates can be difficult to rivet properly without a specially made rivet set. **One rivet is more than enough** to hold the nut plates in place in this application.



Note that the single spotlight board has several locations for the nutplates to fit. For "The Works" kit use the *inner* location marked "C" for the double lug nutplate, and the *outer* locations marked "A" for the single lug nutplates as shown here.

1x K1000-L06/MS21047-L06 double lug nutplate

2x MK1000-L06 / MS21071-L06 single lug nutplate

6x MS20470 / AN470AD3-4 rivets

If you're building an RV-9, -10 or have the early Batwing wingtips it is highly likely that you will need to trim the top edge of the single spotlight board to enable it to fit in the smaller space, and to assist with any interference issues with other nutplates, such as shown here in this test fitting.



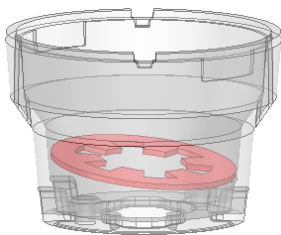
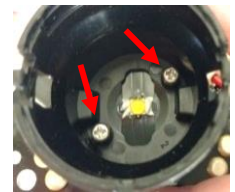


The small tube of heatsink paste contains more than enough glue for all of the heatsinks.
 * Squeeze a **small** amount on the base of the heatsink and spread it out into a thin layer.
Less paste applied here really is more!



There are two pins on the base of the lens holder. These locate the holder into corresponding holes on either side of the LED on the circuit board.

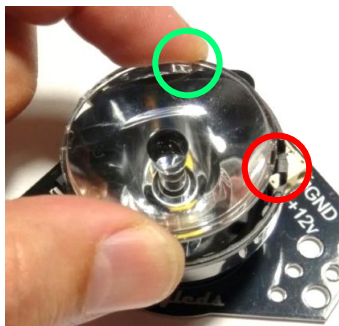
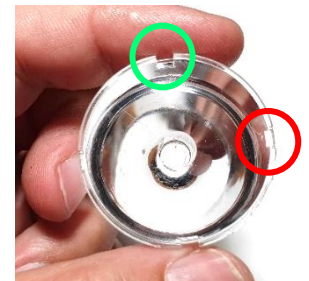
Locate a heatsink behind the LED, lining up the screw holes in the heatsink with those on the PCB. Fit two M2.5 machine screws into the holes in the lens holder and attach the heatsink to the board. The screws should be done up 'tight enough' (that's a technical term!) by hand.
Wait ten minutes or so. If any excess paste has oozed through the holes close to the LED, carefully scrape it away with a small screwdriver. Use less next time!



Place a lens locator ring inside the lens holder, shown here in red. The ring is designed to flex and it will guide the lens into the correct position in the following steps.

The collimating lenses have four notches around their edges, but if you look and feel closely two of the notches are cut all the way through (green circle), while two of them have a tab that will lock the lens in place (red circle).

Give the body of the lens a quick wipe to remove dust and fingerprints. It makes no difference to the light output but hey, why not!

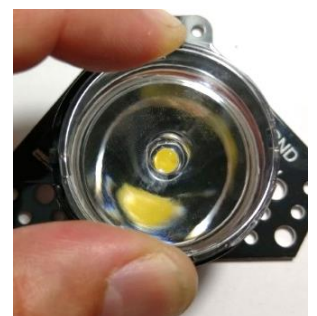


- Rotate the PCB assembly/lens holder so that the locking hooks on the black lens holders are at **east** and **west** positions.
- Hold the lens with the 'cut through' slots under your finger and thumb.
- Orient the lens directly above the holder, with your finger and thumb at the **north** and **south** positions.

As you lower the lens straight down into the holder you will observe the centre of the lens begin to change colour to yellow from the LED below. This indicates that the LED and lens are in alignment.

Using even pressure from two fingers from your other hand on the east and west sides of the lens, push the lens in gently until it clicks into place under the tabs at the left and right of the holder.

Simple! Repeat the steps above for the other lights.



Fitting the Flyleds kit is by far easier to do with the wingtips removed from the wings.

12x K1000-L06 / MS21047-L06 double lug nutplates
24x MS20426 / AN426AD3-4 countersunk rivets
12x MS35206-230 ½" 6-32 pan head machine screw

For the **forward** facing circuit boards, the large black blocks marked in the diagram show suggested locations for mounting screws. You should be able to identify these areas that are clear of copper on the circuit board.

We suggest using **four** nutplates and screws for this board due to the extra weight and to support the pressure put on the boards from the spotlight mounting springs.

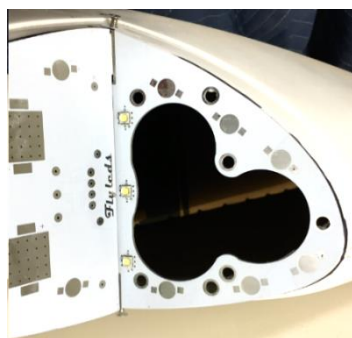
In comparison, the **outward** facing boards are very light in weight so **two** nutplates and screws will be more than enough. Alternatively, mounting them with thin double sided automotive trim tape or carpet joining tape works extremely well. We have over 300 hours on our RV-10 with the wing boards mounted with tape, and they are still stuck fast!

We recommend test fitting and trimming the forward facing board first, as this one will require the most juggling of space to allow for the landing light springs and screws. The outward facing board then butts up against this board.



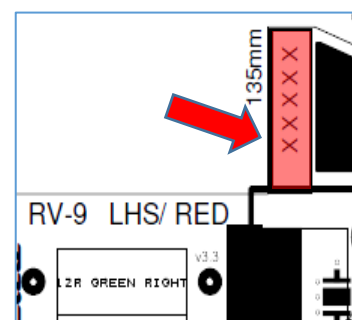
(Add the landing lights later! See page 5.)

The strobe LEDs have heatsinks fitted behind them so they will obviously need clearance holes cut to suit as well. The heat generated by the position LEDs is dissipated into the circuit board.



RV-9 boards will initially require the ‘shoulders’ of the *left hand/red* board to be trimmed as shown on the cutting templates. This is due to the several millimetre size difference between the left and right wingtips.

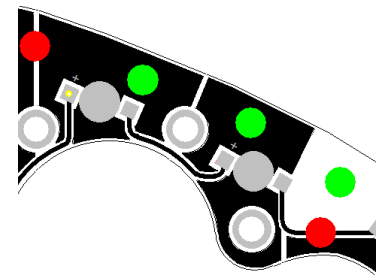
Similarly, **RV-10/14** boards will require a few millimetres to be trimmed from the *right hand/green* board for the same reason.



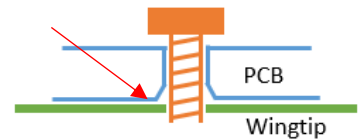
Trim enough to allow the board to sit further into the wing, but without the strobe LEDs being obstructed by the outward facing board, as demonstrated in the picture at left. This will then also mean that you don't need to trim excessive amounts from the curved outside edge of the board.

You may choose to use other screw locations to mount the boards to the wing. Feel free to drill anywhere through the area above and below the square strobe LEDs, and if you look closely at the board you will also find areas of either *no* circuit pattern, such as at the green dot on the right, or larger areas of solid copper that you can also drill through as shown with the left and middle green dots.

DO NOT drill through the circuit tracks that connect between the position LEDs, or between two adjacent areas of solid copper, as demonstrated here by the **red** dots. **Green** is good!



If you do drill through areas of solid copper on the board pattern, countersink or enlarge the hole slightly on the reverse side of the board. This will prevent the screw from making a short circuit from one side of the board to the other.



Wiring between the main boards



Ribbon wire has been supplied to interconnect the two wing boards. Trim away 1" of the webbing between each of the wires so you can strip the individual wires. You may also substitute your own 20 or 22 AWG wire.

For those readers **upgrading** from the Flyleds "The Original" kit, you will note that the four pin socket for the wiring harness input is now on the bottom of the new forward-facing board. The existing socket on your outwards-facing board will interfere with the fit of the two boards. You will find de-soldering the old socket very difficult to do without proper tools, so in this case feel free to get the dremel out and trim the plastic surrounds of the old socket down. There are metal parts in there: Be safe!

Wiring the landing lights



In order to be able to easily remove your wingtip at maintenance time, fit an inline plug and socket of your choice (not supplied) in the landing light power wires. The push fit connectors on the light boards are not designed for repeated use and are likely to be damaged with repeated use.

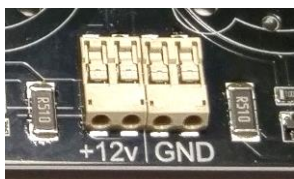
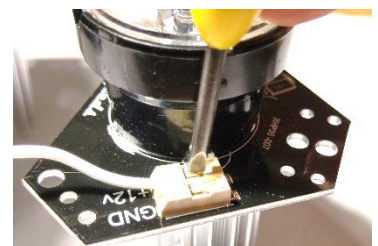


There are plenty of options available in the aviation electrical aisle at your nearest auto parts store.

18AWG wire (maximum) should be used for the landing lights. The lights should be grounded locally at the wingtip. There is no need to run a wire back to your avionics ground at the firewall.

By exception, if you have a magnetometer in a wing ground those lights at the wing root instead.

The light boards have easy to use push-fit power connectors on them. Strip ¼" of insulation from the wire and simply push the wire home into the socket. It's not coming out! Should you need to release the wire, push down on the tab above the wire using a small screwdriver and the wire can be pulled from the socket.



The dual light module has two wire entry points marked **+12v** and two marked **GND**. These provide you with a simple way to loop together both lights, as shown here. It does not matter which wire hole you use first.

You may also separately power (and aim) the single spotlight as a taxi light. See the wiring diagrams in Part 4 System Installation guide.

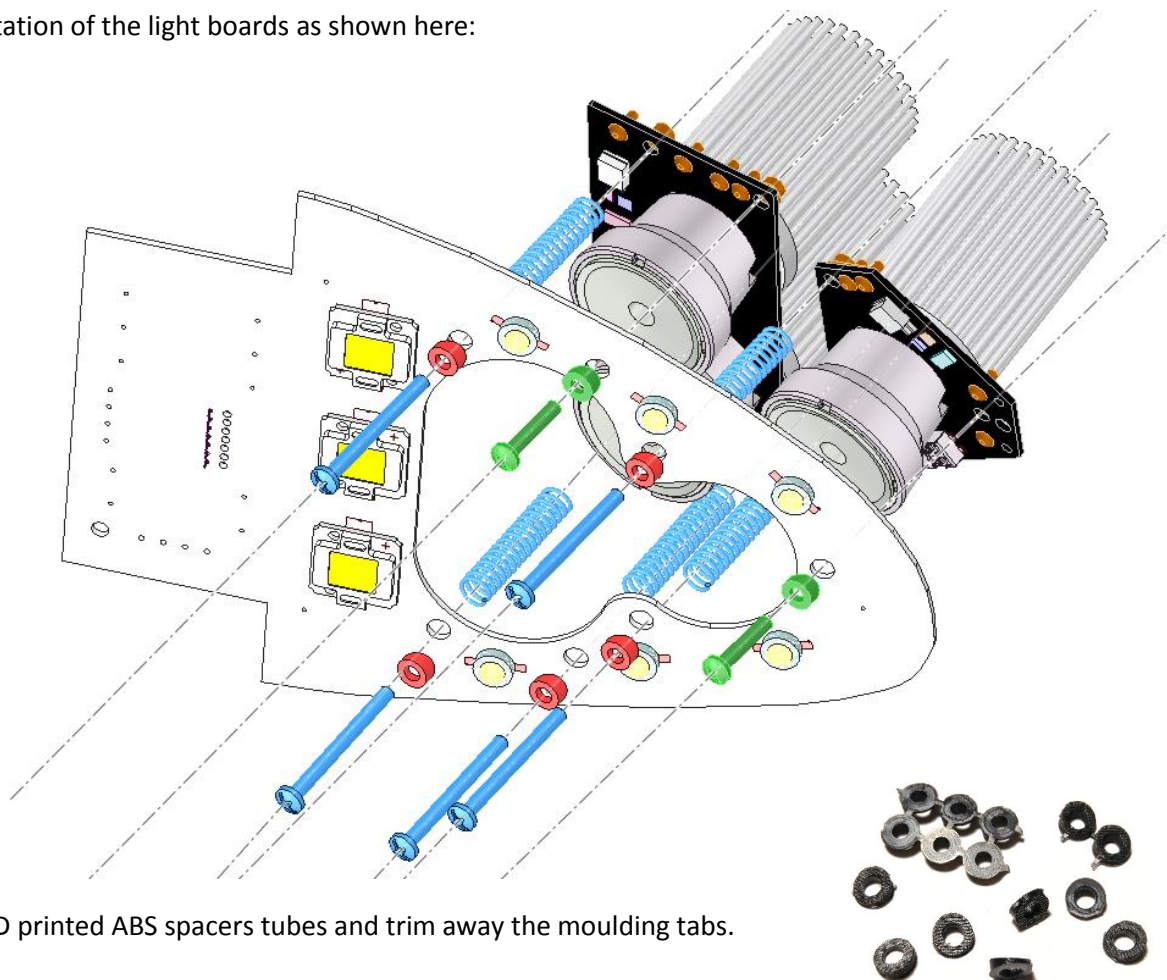


Light module attachment

Fit wiring for at least the single light module before assembling the lights to the main boards, as things do get tight!

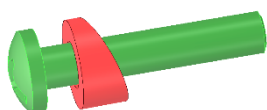
The landing lights are mounted behind the main position/strobe circuit board using **MS51957 6-32** stainless steel screws. **1.5" long screws and compression springs** (shown here in blue) keep the light boards in place and allow the lights to be aimed later on. The shorter $\frac{3}{4}$ " screws (green) do not have a spring fitted behind them. They form the pivot point for each spotlight board.

Note the orientation of the light boards as shown here:



Separate the 3D printed ABS spacers tubes and trim away the moulding tabs.

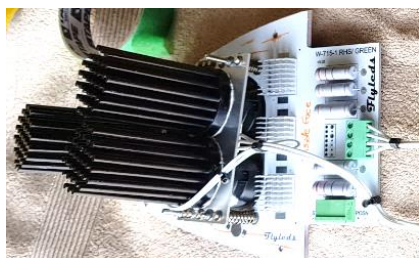
Fit a spacer to each screw,



flat side towards the screw head.

The screws along the lower edge of the wingtip will have their springs compressed the least, so begin fitting the **MS51957-36 1.5" long** screws first, shown in the diagram above in blue. Insert them from the front of the board and fit a compression spring over the screw shaft, then engage the screw just a few turns into the nutplate on the light board. Repeat for the other 1.5" long screws.

The shorter **MS51957-32 $\frac{3}{4}$ "** screws (shown above in green) screw into the outer top corner of the dual spotlight, and the outer corner of the single spotlight.

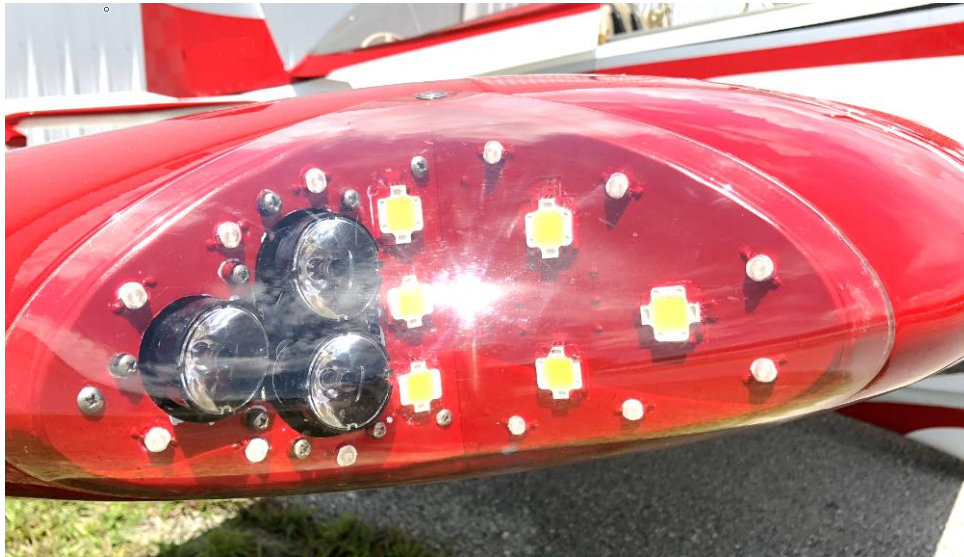


Secure the landing light wires to the main PCB for strain relief. We have provided a hole for zip tie to be used.

If you plan to paint your wingtip boards to match your paint scheme this is best done once you have completed the soldering. We'd love to see your finished results!

To mask the position LEDs make a cone using low-tack painting tape. They are fairly robust but we have had a couple of instances where some stronger tape was left for too long after painting and the dome on the position LEDs was pulled off when the masking tape was removed.

One customer also used **Liquid Latex** to mask the LEDs, which brushes on and peels off easily after painting. Use the rest for Halloween makeup!



Finally, we have supplied you with two 20° beam diffuser disks. They fit into the 'north and south' key slots of the lenses. If you have the single spotlight boards wired and aimed as taxi lights you should find the resulting light spread more useful.

Please send us some pictures of your installation! And we always appreciate your feedback.