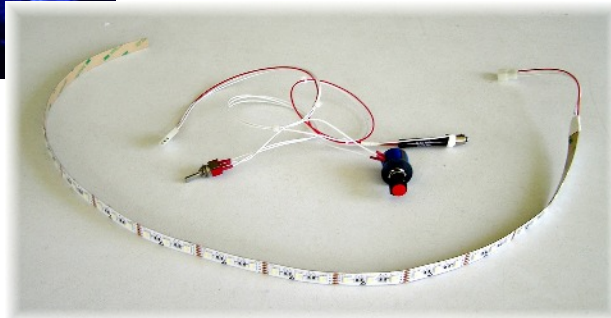


***FRESH AERO EasyBrow
Plug-In LED Eyebrow Light System
For Grumman AA-1 & AA-5 Series
Aircraft***



User Manual



Where Imagination Meets Innovation

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Fresh Aero FlightLights EasyBrow Plug-In Eyebrow LED Light System For Grumman AA-1 & 5 Series Aircraft

Thank you for purchasing the **Fresh Aero EasyBrow Plug-in Eyebrow LED Light System for Grumman AA-1 & 5 Series Aircraft**. We're confident you will be pleased with this innovation in Grumman aircraft instrument panel lighting.

If you fly your Grumman AA series aircraft at night, you know that the original instrument panel lighting leaves a lot to be desired. The EasyBrow eyebrow light is the perfect solution!

The EasyBrow LED Light System consists of a 31 inch, 48 LED light bar only 2 mm thick. The EasyBrow uses the same plug-in bayonet connector we use on our Easy Light overhead lighting unit and it plugs into a incandescent light socket in the Grumman panel eyebrow. The entire unit weighs less than 1 ounce (1.5 oz's with cover).

Innovative Features Include

- State of the art LED solid state lighting in red, green & blue (and white with multi color option).
- Illuminates entire instrument panel with bright and clean light. No halos, hot spots or weak spots – just beautiful even light. The EasyBrow accentuates the needles and indices on the gauges and makes reading the instruments a joy!
- Very long life cycle. LEDs , when used correctly, have a life span of at least 50,000 hours!
- Many times brighter than the original Grumman panel lighting and about 1/10 the power consumption.
- Unlike the original eyebrow panel lights, the EasyBrow lights run extremely cool with no heat build-up.
- All components have a UL flame retardant rating of at least HB 94.
- They are fully controllable using the existing panel rheostat -- from dim to full bright.
- Simple installation. Just remove an existing eyebrow incandescent bulb, mount the light strip on the lower eye brow panel with the attached 3M tape and plug in the adaptor into a bulb socket .
- These lights bath your panel in beautiful light and will not diminish night vision.
- Vibration proof design. Aircraft vibration will not be a factor.
- Available for both 12 and 24 volt Grumman aircraft.

Fresh Aero FlightLights EasyBrow Plug-In Eyebrow LED Light System For Grumman AA-1 & 5 Series Aircraft

Study and save this manual



Read this entire manual before using the Fresh Aero EasyBrow Light System. Make sure you understand the instructions and safety precautions in this manual. Keep this manual and your invoice in a safe place for future reference.

Fresh Aero EasyBrow Light General Safety Warnings and Precautions

Warning: always adhere to the following safety precautions when using this product

- Do not alter or modify the EasyBrow Light in any way.
- Do not tamper with internal components. These lights use internal components that match the specific LED light configuration. There are no user replacement parts.
- Handle lights carefully. Do not drop. LEDs are static sensitive so be sure to use proper grounding procedures when handling these lights.
- When installing the EasyBrow Light, locate the aircraft on a level surface and chock aircraft tires to prevent movement.
- The EasyBrow light is designed for Grumman AA-1 & 5 series aircraft with 12 volt or 24 volt electrical systems. Do not modify or use in other aircraft. Do not use the 12 volt configuration on 24 volt Grumman aircraft. Contact Fresh Aero for correct configuration or for modified units for other applications.
- Never use the EasyBrow light or any other single cockpit/cabin/panel light as the only lighting source when flying at night. As with other aircraft systems, always have redundant lighting available for safe night operations.

Warning: The warnings, precautions and instructions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors that cannot be built into the EasyBrow light and must be supplied by the person or persons using this product.

If you have questions regarding the installation or operation of the EasyBrow Light System, or just need another manual, please call or write Fresh Aero at the at the contact numbers or e-mail address at the bottom of the last page of this manual. Manuals are also available on our web site in PDF format at www.freshaero.com.

Fresh Aero FlightLights EasyBrow Plug-In Eyebrow LED Light System For Grumman AA-1 & 5 Series Aircraft

Other Legal Notices

The Fresh Aero Aviation makes no representations or warranties regarding any damages, injuries or benefit expected by using this unit lawfully, or any request from a third person, which are caused by the inappropriate use of this product.

Disclaimer of Warranty

Fresh Aero Aviation makes no representations of warranties, either expressed or implied, by or concerning any content of these written materials and in no event shall be liable for any implied warranty for any consequential, incidental or indirect damages (including but not limited to damages for loss of business profits or business interruption) arising from the use or inability to use these written materials or equipment. No liability is assumed with respect to the use of the information contained in these written materials, or for damages resulting from the use of the information contained therein.

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The Fresh Aero EasyBrow Plug-In Eyebrow Light System for Grumman AA-1 & 5 series Aircraft

3 year Limited Warranty

Fresh Aero Aviation makes every effort to provide high quality and durable products to the aviation community and warrants to the original purchaser that this product is free from defects in materials and workmanship for the period of 3 years from the date of purchase. This warranty does not apply to damage due directly or indirectly to misuse, abuse, negligence or accidents; repairs or alterations outside our facilities; or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you.

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation defect or problem must be included with the product. If inspection verifies the defect, we will either repair or replace the product at our discretion or may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return the repaired or replaced product at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then the purchaser must bear the cost of returning the product.

This warranty gives you specific rights and you may also have other rights which vary from state to state.

Fresh Aero FlightLights EasyBrow Plug-In Eyebrow LED Light System For Grumman AA-1 & 5 Series Aircraft

Photo 1

EasyBrow Light mounted on the lower eye brow panel with wire leads and adaptor plug on right side



Photo 2

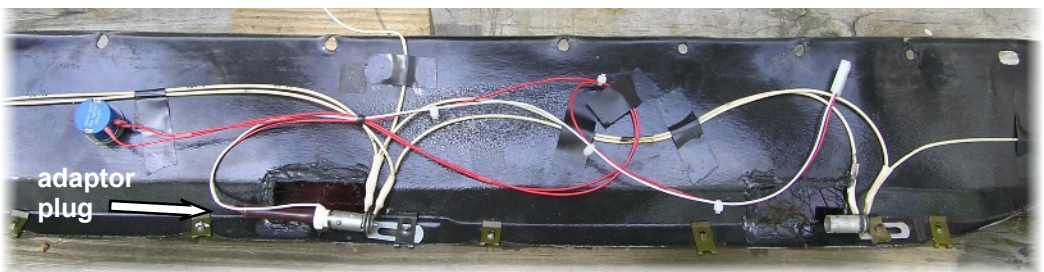
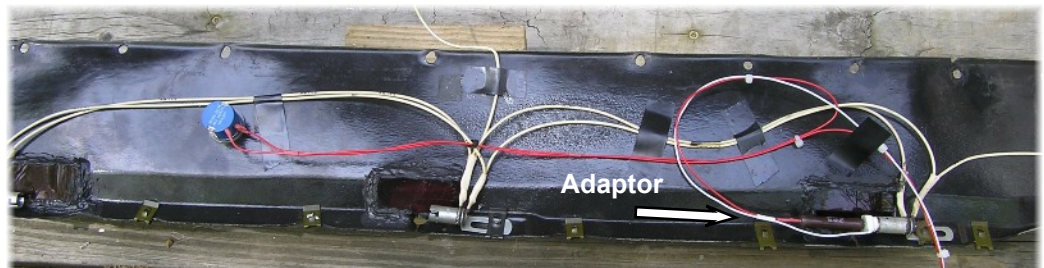


Photo 3



Photos 2 and 3 show that the EasyBrow adaptor plug can be plugged into any of the bayonet sockets in the lower eye brow panel. The optional dimmer is also shown mounted in the lower eye brow panel in a convenient location.

Photo 4

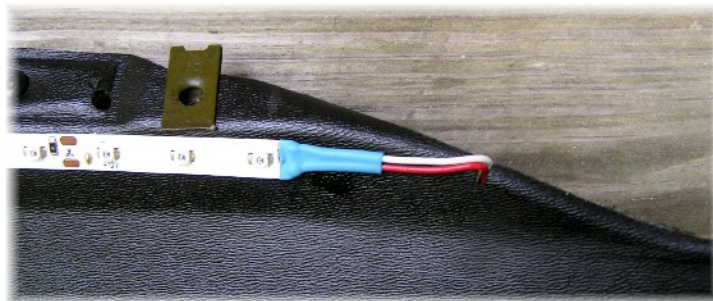


Photo 2 – Close-up of wires passing through notch and to the inside of the lower eyebrow panel. Note the position of the light strip - almost to the edge of the angled portion of the eye brow.

Fresh Aero FlightLights EasyBrow Plug-In Eyebrow LED Light System For Grumman AA-1 & 5 Series Aircraft

Installing the Fresh Aero EasyBrow Eyebrow Lighting System



Read and understand all the proceeding safety precautions and warnings before installing the EasyBrow Light System.

FAA Approval Information: *If you install the EasyBrow Light in your aircraft, you may need at least a FAA field approval to be completely legal and airworthy. Please see the last page for more information.*

- Locate aircraft on a level surface and chock aircraft tires to prevent movement.
- Remove the top of the eyebrow glare shield.
- The EasyBrow uses one of the incandescent bulb sockets in the eye brow. We recommend the center socket. If you want the redundancy, you can leave the other two original bulbs in place. Choose a socket for the EasyBrow Light and remove this bulb. Then remove the screws that hold the light sockets on the lower glare shield.
- Remove the lower glare shield (leave the wiring harness in place).
- Place the lower glare shield on a flat surface with the exterior facing up and clean the angled surface where the red lenses are located thoroughly with a non-oil based cleaner like “Fantastic”, “409” or denatured alcohol.

Note: Use proper “static sensitive” grounding procedures when handling LEDs

Another Long Note: If you purchased the EasyBrow Light with the integrated with the EasyFuel Light and/or dimmer or multi color light with switch/dimmer, include the following instructions To the EasyBrow installation instructions below. If not, just disregard the inapplicable paragraphs.

Decide where you want to locate the dimmer and/or switch in the lower glare shield (we recommend a location on the left side). The dimmer (and/or switch) should be between the EasyBrow Light and the panel.

Drill a 3/8 inch hole (1/4 inch hole for the switch) at your dimmer location on the lower eye brow panel. Use hole(s) to mount the dimmer control (and/or switch) when mounting the EasyBrow Light. Remove the control knob on the dimmer with a small blade screwdriver, the nut & lock washer and mount the dimmer shaft in this hole with the included spacer washer (if you need it), washer and nut.

The spacer washer is used to “space” the dimmer for a flush nut mounting This washer is mounted on the dimmer shaft first - before mounting. Use it if you need it..

Push on the control knob and tighten the set screw with the small blade screw driver.

Fish the EasyFuel wire leads (the long leads with the quick-disconnect) down behind the instrument panel, to the fuel gauges.

Continued

Fresh Aero FlightLights

EasyBrow Plug-In Eyebrow LED Light System

For Grumman AA-1 & 5 Series Aircraft

Long note continued

Remove the two screws above the fuel gauges and mount the EasyFuel Light using the same screws. Push the EasyFuel Light up against the panel (below the throttle/mixture controls) and tighten the screws. Do not over tighten.

Remove the two screws above the fuel gauges and mount the EasyFuel Light using the same screws. Push the EasyFuel Light up against the panel (below the throttle/mixture controls) and tighten the screws. Do not over tighten.

Plug the connector on the EasyFuel Light into the wire lead connector and secure the leads behind the panel using FAA approved procedures. The plugs are polarized and will fit only one way.

Installing the Fresh Aero EasyBrow Eyebrow Lighting System – continued

- Place the EasyBrow Light across the glare shield where the red lenses are located (photo 1). The EasyBrow light will mount flat and centered longitudinally on this angled surface. Look for the red dot on the EasyBrow strip – this is the center. When mounting the light, Favor the inboard portion of the angled surface (towards the panel when mounted). Leave the original lens openings mostly clear for the redundant incandescent bulbs.
- Remove the tape backing from EasyBrow strip in small sections – starting at the center and working to the ends and gently press the EasyBrow strip onto the lower glare shield, taking care not to apply direct pressure to the actual LEDs.
- Use an instant bond adhesive like “Super Glue” to bond the shrink wrap tubing at the end of the strip to the glare shield. (This step applies only if you’re mounting the EasyBrow Light without the protective clear covering)
- Cut a small 1/16 wide slot, ¼ inch deep in the lower glare shield about 1 inch past the shrink wrapped end (photo 2). A pair of small tin snips or a thin cut-off wheel on a “Dremel” Tool” will work nicely here. Thread the wires from the EasyBrow Light through this slot to pass the wires to the inside of the lower shield. You want to see a gentle (not too sharp) radius in the wires here.
- Reinstall the lower shield, reinstall light sockets and plug the EasyBrow adaptor into the an empty socket by aligning the “bayonet” lugs on the adaptor with the mating slots in the bulb socket and “push & twist” the adaptor into place. **Important: hold the hex portion of the adaptor to “push and twist”, not the resistor.** This will require very little turning. Confirm that adaptor is locked in socket by gently pulling on adaptor. If adaptor pops out, align and try again. If you bought the dimmer option, plug in the EasyBrow Light quick disconnect into the mating EasyBrow socket (the disconnect is polarized, so it only mates one way).

Continued

Fresh Aero FlightLights EasyBrow Plug-In Eyebrow LED Light System For Grumman AA-1 & 5 Series Aircraft

Installing the Fresh Aero EasyBrow Eyebrow Lighting System – continued

- Form a loop with the EasyBrow wires and secure the wire neatly with electrical tape (photos 2 & 3). Keep wires clear of “speed nuts”, screws or any other metal and do not allow wires to abrade on them.

Note: Confirm that ground wire is reinstalled correctly. Check for proper tightness and lack of corrosion. This is a good time to spray corrosion retardant like “Corrosion X” on terminals and light sockets. Remember – no ground, no lights)

- Re-install the top glare shield and all screws

Operating The EasyBrow Light

Except for a major improvement in the quality of panel light, nothing changes! Just use your panel mounted rheostat to control the brightness of your EasyBrow Light, just as you always have to control your other panel lights. **Note:** The EasyBrow Light LEDs are optimized for maximum brightness at 13.8 volts dc (27.6 volts on the 24 volt Tigers), the standard bus voltage on the Grumman AA-5 Series aircraft with the engine running and alternator charging. The EasyBrow Light will certainly work well with the engine off but the brightness will be slightly less than when the engine is running. Trust us, you won't notice it.

A Few Words on FAA Approval

We consider the EasyBrow and EasyFuel Light Systems to be a major improvement in Grumman cockpit and cabin lighting. Intrinsic safety and easy installation with absolutely no modification to the airframe or electrical system make the EasyBrow Light a superior panel lighting solution for your AA-1 & 5 series aircraft.

But even some minor modifications to certified aircraft need some type of FAA approval to be legally used in the aircraft.

If you install the EasyBrow and/or the EasyFuel Light unit in your aircraft, you may need at least a FAA field approval to be completely legal and airworthy. The FAA people we have talked with consider the installation of this unit a very minor “add-on” that would be approved using the field approval process (337 form). Some district offices consider the EasyBrow and EasyFuel Lights to be just bulb replacements (with an A&P logbook entry) with a power requirement significantly less than the original lighting.

We have included the EasyBrow Technical Specifications on the next two pages of this manual to help facilitate FAA approvals.

Please talk to your local FAA Flight Standards Office for more information.

To amplify on our warranty, if you are unable to get these lights approved, just return the unit to us at Fresh Aero in the condition it was received (unused) within 6 months for a full refund less shipping.

Fresh Aero FlightLights EasyBrow Plug-In Eyebrow LED Light System For Grumman AA-1 & 5 Series Aircraft

Fresh Aero EasyBrow Technical Data

This data can be used to facilitate the FAA “337” form approval process for the Fresh Aero EasyBrow Light.

The Grumman EasyBrow light is comprised of 48 LEDs spaced 16.5 mm apart on a 8 mm printed circuit strip, 31 inches long. 3M double-sided self-adhesive tape is mounted on the back of printed circuit strip for installing the light on the lower Grumman eyebrow. EasyBrow Light thickness is 2.5 mm. The unit mounts centered on the underside of the Grumman lower eyebrow panel – on the same plane as the existing eyebrow light lenses.

The circuit is a series/parallel configuration. Groups of 3 LEDs are connected in series with a current limiting resistor and all LED groups are connected in parallel on bus strands running the length of the light strip. This arrangement greatly contributes to light redundancy, because even if one LED fails and opens the circuit (very unlikely), the light array would lose only 3 lights – hardly noticeable with 48 LEDs.

Total EasyBrow current draw - single color configuration (with 100 ohm integrated resistor):

Blue – 12/14 vdc, 56 milliamps (.056 amperes); 24/28 vdc, 38 milliamps (.038 amperes)
Red – 12/14 vdc, 54 milliamps (.054 amperes); 24/28 vdc, 34 milliamps (.034 amperes)
Green – 12/14 vdc, 59 milliamps (.059 amperes); 24/28 vdc, 36 milliamps (.036 amperes)

Total EasyBrow current draw - multi color configuration (with 50 ohm integrated resistor):

White - 12/14 vdc, 97 milliamps (.097 amperes)
Red - 12/14 vdc, 94 milliamps (.094 amperes)
Green - 12/14 vdc, 95 milliamps (.095 amperes)
Blue - 12/14 vdc, 98 milliamps (.098 amperes)

The existing 3 Grumman eyebrow incandescent light bulbs draw 390-400 milliamps each for a total draw of approximately 1.2 amps. The total EasyBrow current draw is less 1/6th the original design draw – for 48 LEDs.

The EasyBrow Light uses a 100 ohm 10 watt resistor and a 50 ohm 10 watt resistor for the 12/14 vdc multi color version. This resistor is integrated with the plug-in adaptor plug to reduce brightness that is consistent with other panel lighting and to provide consistent and linear dimming control with the existing Grumman instrument rheostat. The resistor is substantially overrated (.3 watt through a 10 watt resistor) to provide excellent heat dissipation across the resistor surface. There is no objectionable heat buildup.

Additional Specifications

Light beam angle: 120 degrees
RoHS CE compliant
Starting temperature range: -40 to 122 degrees F., Operating temperature range: -14 to 122 degrees F.
Brightness: 25–40 Lux per LED
Total EasyBrow weight: 1 oz (2 oz with protective cover)
All components meet or exceed FAA Sec. 23.853
All components: non-flammable or self extinguishing.
All wiring is self extinguishing Mil-W22759/16 and meets FAA Sec. 23.1359.

MORE INFORMATION ON BACK

Fresh Aero FlightLights EasyBrow Plug-In Eyebrow LED Light System For Grumman AA-1 & 5 Series Aircraft

Fresh Aero EasyBrow Technical Data Continued

The EasyBrow Light uses a T3-1/4 bayonet adaptor plug that replaces one of the existing OEM type incandescent bulbs. No change in aircraft wiring or airframe is necessary. The unit just plugs into existing power receptacles and the application is similar to plug-in headsets and other power receptacle plug-in devices. There are no permanent connections to the aircraft. Power consumption is significantly lower than the incandescent bulb the unit replaces.

Pilot Compartment View:

The EasyBrow Light has been tested for glare issues per FAA Sec. 23.773 (a) and meets these requirements.

Pilot's view is sufficiently extensive, clear and undistorted for safe operation.

The EasyBrow Light has been tested and complies with all parts of FAA Sec. 23.1381 (a) (b) (c) and 25.1381 (a) (b)

Function and installation:

The EasyBrow Light meets all parts of FAA Sec. 23.1301 (a) (b) (c) and 25.1381 (a) (b)

The fact that the EasyBrow Eyebrow Light just plugs into an existing light socket with no modifications to the electrical system or airframe contribute to an easy IA logbook entry or FAA 337 Field Approval.

Radio Frequency Interference:

We source and specify raw LED strips that emit zero electrical and magnetic radiation. The EasyBrow Light emits zero RFI when powered by lead acid batteries and Fresh Aero has never had a complaint regarding RFI issues with our EasyBrow Lights in aircraft.

However, when powered with other types of power sources, including alternators with voltage regulators, RFI can be transferred to electrical equipment and components, including LEDs. We cannot control how EasyBrow Lights are installed in individual aircraft, it is the responsibility of the installer to confirm that RFI from any source does not interfere with any aircraft systems, navigation or communications equipment.

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