

WHELEN AEROSPACE TECHNOLOGIES

**INSTRUCTIONS
FOR
CONTINUED AIRWORTHINESS**

Document Number ICA-150212

**LED TAXI AND LANDING LIGHTS
INSTALLED IN
AIRCRAFT LISTED IN APPROVED MODEL LIST, AML-150212**

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Revision History

<u>Revision</u>	<u>Description</u>	<u>Date</u>	<u>By</u>
-	Initial release	7/8/2015	B. Millard
A	Change company name, update document format, correct typo in section 1.1, revise inspection detail	4/3/2019	T. Novak

1. Introduction

1.1. Purpose and Scope

This document provides instructions and requirements for inspection and maintenance of the LED Taxi and Landing Lights installed in aircraft listed in the Approved Model List, AML-150212 and complies with Title 14 of the Code of Federal Regulations (14 CFR) §27.1529.

It is not required to change all taxi and landing lights to the new LED lights.

1.2. References

14 CFR §27.1529, Airworthiness Standards: Normal Category Rotorcraft - Instructions for Continued Airworthiness

14 CFR §27.25 (a), Weight Limits - Maximum Weight

14 CFR §43.16, Maintenance, Preventive Maintenance, Rebuilding and Alteration - Airworthiness Limitations

14 CFR §91.403, General Operating and Flight Rules - Maintenance, Preventive Maintenance and Alterations - General

14 CFR §91.407, General Operating and Flight Rules - Operation after Maintenance, Preventive Maintenance, Rebuilding or Alteration

AML-150212, Approved Model List, latest revision

OEM Aircraft Maintenance Manual

1.3. Definitions and Abbreviations

TERM	DEFINITION
<u>WARNING:</u>	<i>ITEMS FOR WHICH PROCEDURES, PRACTICES, AND CONDITIONS WITH RESPECT TO MAINTENANCE OR INSTALLATION THAT IF NOT STRICTLY OBSERVED COULD RESULT IN INJURY TO OR DEATH OF PERSONNEL OR PROPERTY DAMAGE.</i>
<u>CAUTION:</u>	<i>ITEMS FOR WHICH PROCEDURES, PRACTICES, AND CONDITIONS WITH RESPECT TO MAINTENANCE OR INSTALLATION THAT IF NOT STRICTLY OBSERVED COULD RESULT IN DAMAGE TO EQUIPMENT OR PROPERTY.</i>
<u>NOTE:</u>	<i>Items on which special emphasis is placed as a means of bringing that information to the attention of the maintenance technician.</i>

TERM	DEFINITION
14 CFR	Title 14 of the Code of Federal Regulations
AML	Approved Model List
AMPS	Amperes
CMR	Certification Maintenance Requirements
DC	Direct Current
FAA	Federal Aviation Administration
GE	General Electric
GND	Ground
ICA	Instructions for Continued Airworthiness
LBS	Pounds
LED	Light Emitting Diode
OEM	Original Equipment Manufacturer
PAR	Parabolic Aluminized Reflector
REV	Revision
V	Volts
VDC	Volts Direct Current

2. Description

Refer to Figures 10.1 and 10.2 and Table 2.1. The Whelen Aerospace Technologies (WAT) Parmetheus Plus LED lights are physical drop-in replacements for the various legacy General Electric (GE) PAR36 and PAR46 sealed beam lamps that have been the standard for virtually all aircraft taxi and landing applications. The Parmetheus Plus lights are available in both PAR36 and PAR46 sizes. The Parmetheus Plus LED lights deliver comparable luminance, better color temperature, utilize less electrical power and weigh the same. By comparison, a typical 28VDC, PAR46 sealed beam landing or taxi light consumes 250-450W; the equivalent Parmetheus Plus consumes 35W. The power and weight characteristics ensure applicability to any aircraft utilizing a similarly rated incandescent or halogen lamp.

The use of LEDs provides a number of performance benefits including increased reliability and reduced maintenance costs. The service life of sealed beam taxi and landing lights is typically between 10 and 50 hours; the LED based lamps deliver 10,000 hours. This increased reliability significantly reduces the likelihood of a taxi or landing light failure. The Parmetheus Plus LED lamps are also immune to the luminance degradation that is associated with incandescent lamps as they age. These factors - lower failure rate and consistent luminance - increase operational safety.

The Parmetheus Plus light assemblies are available in both PAR36 and PAR46 sizes, and 14VDC and 28VDC versions to enable their use on all of the Part 27 rotorcraft platforms identified in the Approved Model List, AML-150212. Figures 10.1 and 10.2 provide illustrations of the 14VDC versions in PAR36 and PAR46 sizes. The 28VDC versions are physically identical.

Parmetheus Plus LED Taxi & Landing Light Cross Reference						
Legacy Part No.	Type	Voltage	Watts	Size	Parmetheus Plus Model / Part No.	
4313	Landing	13.0	250	PAR36	P36P1L	01-0771833-10
4509	Landing		100			
4595	Landing					
Q4509	Landing					
Q4631	Landing					
Q4632	Logo					
4505	Navigation	28.0	50		P36P2L	01-0771833-20
4587	Taxi		250		P36P2T	01-0771833-25
4591	Landing		100		P36P2L	01-0771833-20
4594	Navigation		100			
4596	Landing		250			
4626	Taxi		150			
4522	Landing	13.0	250	PAR46	P46P1L	01-0790750-10
4537	Landing		100			
4570	Taxi	28.0	150		P46P2L	01-0790750-20
4551	Taxi		250			
4553	Landing					
Q5551	Taxi					
4580	Landing					
4581	Landing		450			
4582	Flood					
4554	Taxi					
Q4554	Taxi					
Q4566	Logo					
Q4597	Flood					
Q4681	Landing					

NOTES:

1. Legacy PAR46 taxi and landing lights are replaced by the same dual purpose PAR46 Parmetheus Plus LED lamp as shown in the table above.
2. The legacy part numbers shown in the table above represent the most common PAR36 and PAR46 aircraft landing and taxi lights. The Parmetheus Plus LED lamps may be substituted for other incandescent or halogen lamps part numbers shown by selecting the appropriate size, function and voltage from the table.
3. The Watts shown in the table above are for the legacy lamps. Due to their greatly reduced current draw, the Parmetheus Plus LED lamps may be utilized for all applications irrespective of the legacy power consumption.

Table 2.1 – Parmetheus Plus LED Taxi & Landing Light Cross Reference

3. Operation

Refer to Figure 11.1. The operation of the LED taxi and landing lights remains the same as the baseline taxi and landing lights. The existing baseline DC power source, fuses or circuit breakers, taxi light switch, landing light switch and wiring are not modified.

4. Airworthiness Limitations Section

The Airworthiness Limitations section is FAA approved and specifies inspections and other maintenance required under §43.16 and §91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

No airworthiness limitations are associated with the installation of the LED Taxi and Landing Lights.

5. Weight and Balance Information

The mass properties impact associated with installation of the Parmetheus Plus LED Taxi and Landing Lights is negligible. The specification weight of the PAR36 sealed beam lamp is 0.01 pounds less than the LED equivalent. The specification weights for the PAR46 sealed beam and LED lamps are identical.

Table 5.1 provides a summary of the lamp weights. There is no change to installed location or hardware. Based on the fact that there is effectively no change to mass properties, there is no impact to aircraft empty weight or CG limits.

The aircraft weight and balance impact is negligible and the modified configuration is in compliance with §27.25(a).

Component	Specification Weight (lbs.)		
	Baseline	LED	Delta
PAR36 Taxi/Landing Lamp	0.51	0.52	+0.01
PAR46 Taxi/Landing Lamp	1.00	1.00	0.00

Table 5.1 Mass Properties Impact Summary

6. Placards and Markings

No placards are installed as part of the LED Taxi and Landing Lights installation.

7. Safety Precautions

Observe standard safety precautions when working on or around aircraft and avionics and electrical components. To prevent personal injury, wear safety glasses while installing components in the aircraft. When making continuity checks, make sure all electrical power is off.

8. Tools and Materials

To reduce eye strain during LED inspection, use an optical filter such as dark glasses or a blue covering dome.

9. Inspections

There are no special inspection techniques required for the LED Taxi and Landing Lights installation.

9.1. Standard Practices

Standard torque values are to be used when installing the LED Taxi and Landing Lights. Refer to the OEM Aircraft Maintenance Manual.

9.2. Periodic Inspections

INTERVAL	DESCRIPTION	ACTIONS	NOTES
Annually, unless the OEM specifies a shorter interval	<ul style="list-style-type: none">• Perform functional check. Observe that all LEDs are illuminated. Note: To reduce eye strain during LED inspection, use an optical filter such as dark glasses or a blue covering dome.• Inspect lens for abrasion, crazing or cracking. For additional lens maintenance detail, see SAE ARP5637.• Check Mounting, connections and wire integrity.	<ul style="list-style-type: none">• Replace if all LEDs are not illuminated.• Replace the lens.• Adjust or replace as required.	<ul style="list-style-type: none">• The unit is not repairable.

Table 9.1 – Periodic Inspections

10. Component Removal and Installation

WARNING: **TO PREVENT ELECTRICAL SHOCK TO PERSONNEL, ENSURE ELECTRICAL POWER HAS BEEN REMOVED AND CIRCUIT BREAKERS TAGGED-OUT PRIOR TO PERFORMING ANY MAINTENANCE PROCEDURES.**

CAUTION: **TO PREVENT DAMAGE TO EQUIPMENT, ENSURE ELECTRICAL POWER HAS BEEN REMOVED AND CIRCUIT BREAKERS TAGGED-OUT PRIOR TO PERFORMING ANY MAINTENANCE PROCEDURES.**

Model	Part #	Style	Application	Weight*	VDC*	Input Current*
P36P1L	01-0771833-10	PAR36	Landing	0.52 lbs.	14VDC	1.36 Amps
P36P1T	01-0771833-15	PAR36	Taxi	0.52 lbs.	14VDC	1.36 Amps
P36P2L	01-0771833-20	PAR36	Landing	0.52 lbs.	28VDC	0.68 Amps
P36P2T	01-0771833-25	PAR36	Taxi	0.52 lbs.	28VDC	0.68 Amps
P46P1L	01-0790750-10	PAR46	Landing	1.00 lbs.	14VDC	2.60 Amps
P46P2L	01-0790750-20	PAR46	Landing	1.00 lbs.	28VDC	1.25 Amps

*NOMINAL

Table 10.1 – Model List

10.1. Taxi and Landing Lights

NOTE: *The following information provides guidelines for the removal and installation of the WAT LED PAR36 and PAR46 Lights listed in Table 10.1. Refer to the OEM Aircraft Maintenance Manual for your aircraft for specific removal and installation procedures.*

- 10.1.1. **REMOVAL** - Refer to Figures 10.1 and 10.2.
 - 10.1.1.1. Remove all electrical power or disable the applicable circuit breakers.
 - 10.1.1.2. Place the lighting switch in the OFF position.
 - 10.1.1.3. Inspect the housing, attachment points and retainer for any signs of abnormal wear or damage.
 - 10.1.1.4. Loosen or remove the hardware holding the lamp in place. Take steps to ensure the retainer does not fall from the lamp assembly before it is ready to be removed.
 - 10.1.1.5. Place retainer screws in a safe place.
 - 10.1.1.6. Remove the lamp from the holder.
 - 10.1.1.7. Note there are two wires connected to the (existing) lamp. Using a multi-meter, identify negative wire by measuring continuity to ground. Place a piece of black electrical tape around the wire identified as ground. This is your negative lead.
 - 10.1.1.8. Identify the positive wire as the remaining wire lead. The LED light assembly is polarity sensitive, however you will not damage the unit by reversing the polarity.
 - 10.1.1.9. While holding the lamp, loosen the screws holding the attached wires. Remove each wire from the lamp.
- 10.1.2. **INSTALLATION** - Refer to Figures 10.1 and 10.2.
 - 10.1.2.1. Remove all electrical power or disable the applicable circuit breakers.
 - 10.1.2.2. Place the lighting switch in the OFF position.
 - 10.1.2.3. Choose the appropriate replacement light assembly.
 - 10.1.2.4. Secure the LED Light, note the terminal markings for positive and negative, attach the negative marked wire to the negative side terminal post of the LED Light.
 - 10.1.2.5. Attach the positive wire to the positive side terminal post. Remove tape or temporary placard which identified the polarity of the wiring inside the housing.
 - 10.1.2.6. If required, install the rubber gasket included with your new LED Light around the LED Light assembly. A light application of a common hand soap on the rubber may aid in its fit into the light housing.

- 10.1.2.7. Place the LED light into the housing ensuring the key (of the assembly) matches the key of the housing. Proper orientation of the lamp is necessary for beam orientation to be left and right of centerline while in operation. For a Taxi light, the 'lines' of the inner optic should be orientated vertically to produce a horizontal light beam.
- 10.1.2.8. Secure the retainer. Care should be taken to tighten the screw only to the point the retainer does not turn with hand pressure. Over-tightening may stress the polycarbonate lens of the LED Light.
- 10.1.2.9. Examine component for security. Make sure area is clean and free of foreign objects.
- 10.1.2.10. Apply electrical power and/or enable applicable circuit breakers.
- 10.1.2.11. Perform Functional Check procedure as specified in Paragraph 11.1.
- 10.1.2.12. Update records in accordance with 14 CFR §91.407.

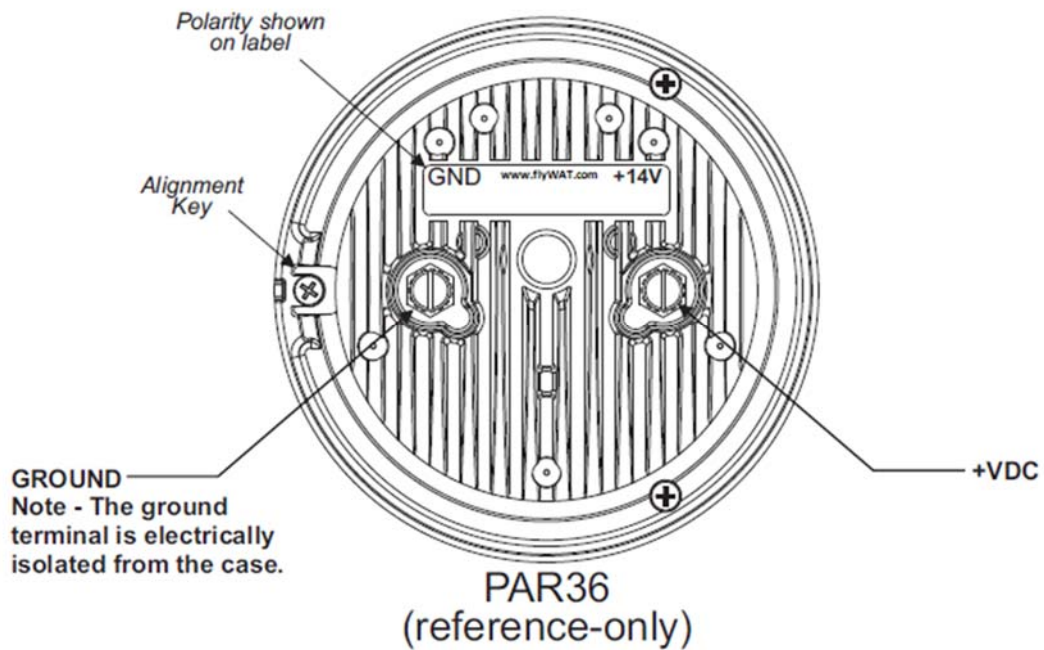


Figure 10.1 – Typical PAR36 LED Light

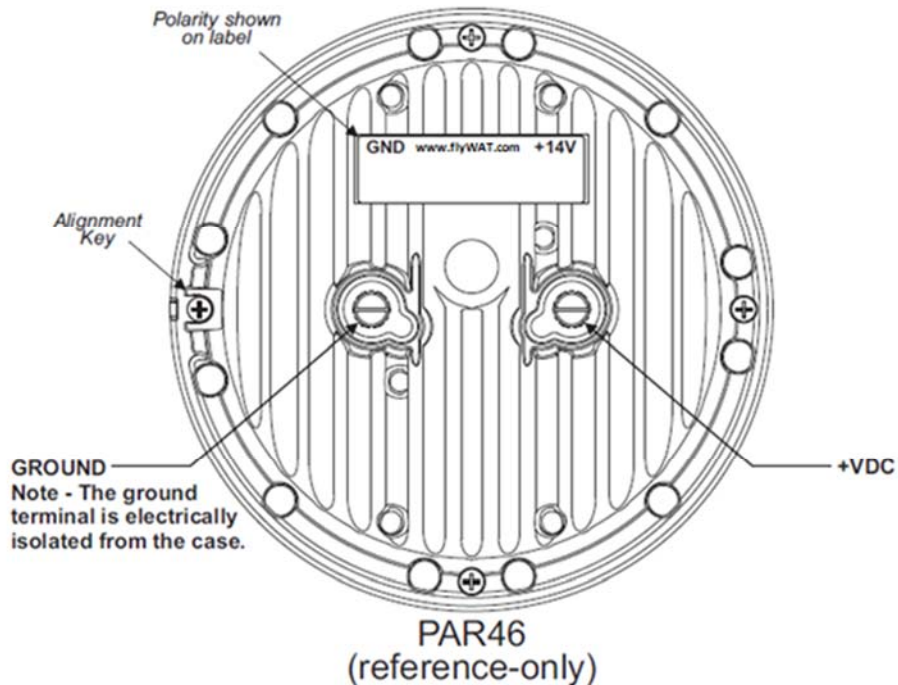
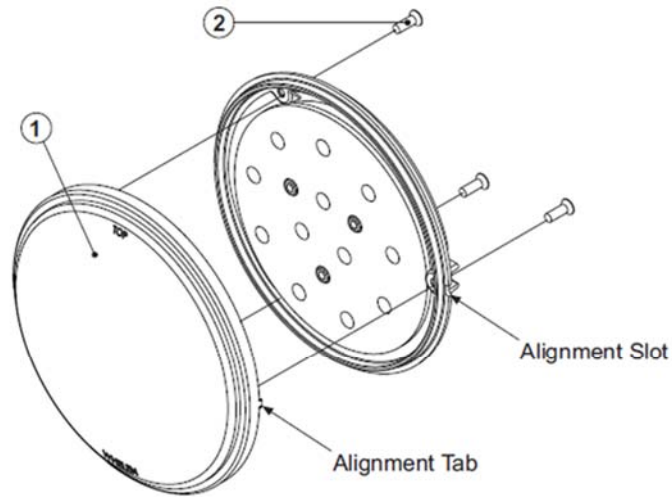


Figure 10.2 – Typical PAR46 LED Light

10.2. Lens Replacement

NOTE: *This procedure is applicable to WAT LED PAR36 and PAR46 Lights listed in Table 10.1.*

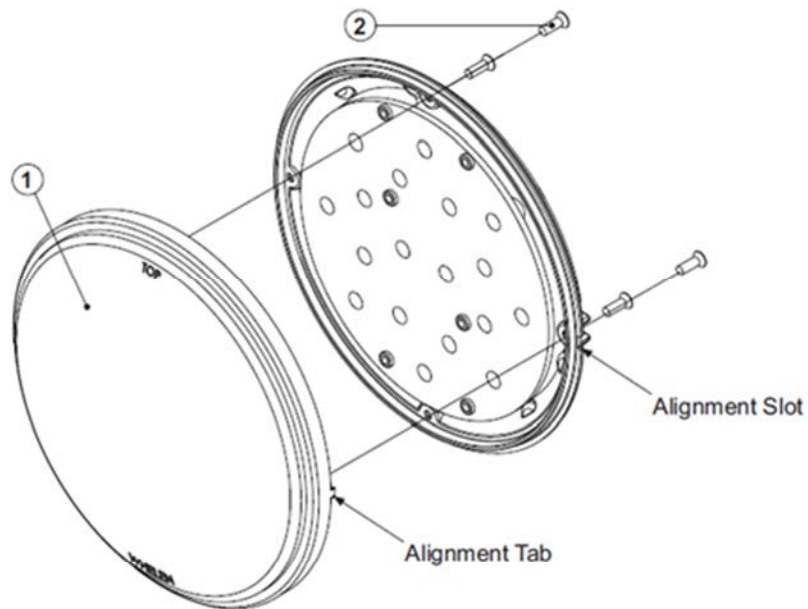
- 10.2.1. **REMOVAL** - Refer to Figures 10.3 and 10.4.
- 10.2.1.1. Remove all electrical power or disable the applicable circuit breakers.
- 10.2.1.2. Place the lighting switch in the OFF position.
- 10.2.1.3. Remove the PAR36/PAR46 light assembly from its installed location. Refer to Paragraph 10.1, Taxi and Landing Lights - Removal.
- 10.2.1.4. Remove the Phillips-Head screws (Item 2) used to secure the lens to the light assembly. Note that there are 4 screws used for this in the PAR46 and 3 in the PAR36.
- 10.2.1.5. Separate and remove the existing lens from the light assembly.
- 10.2.2. **INSTALLATION** - Refer to Figures 10.3 and 10.4.
- 10.2.2.1. Remove all electrical power or disable the applicable circuit breakers.
- 10.2.2.2. Place the lighting switch in the OFF position.
- 10.2.2.3. Install the replacement lens (Item 1) onto the light assembly, making sure that the lens' alignment tab engages the assembly's alignment slot.
- 10.2.2.4. Secure the replacement lens to the light assembly using the existing hardware. Care should be taken not to over-tighten these screws. Over-tightening may stress the lens.
- 10.2.2.5. Install the PAR36/PAR46 light assembly into its installed location. Refer to Paragraph 10.1, Taxi and Landing Lights - Installation.
- 10.2.2.6. Examine component for security. Make sure area is clean and free of foreign objects.
- 10.2.2.7. Apply electrical power and/or enable applicable circuit breakers.
- 10.2.2.8. Perform Functional Check procedure as specified in Paragraph 11.1



**REPLACEMENT PARTS:
PAR36 (All Models)**

QTY	ITEM	PART NUMBER	DESCRIPTION
1	1	68-3971486A30	LENS, CLEAR NON OPTIC PAR-36
3	2	15-045216-068	SCREW, 4 X 3/8 PFH PLASTI-LOC SS W/NYSEAL
2	3	14-082202-041	SCREW, 8-32 X 1/4 PH SLOT, BRASS, TERMINAL (NOT SHOWN)
1	4	38-0240197-00	GASKET, PAR36, BLK (NOT SHOWN)

Figure 10.3 – PAR36 Lens Replacement



**REPLACEMENT PARTS:
PAR46 (All Models)**

QTY	ITEM	PART NUMBER	DESCRIPTION
1	1	68-3971577A30	LENS, CLEAR NON OPTIC PAR-46 LED
4	2	15-045216-068	SCREW, 4 X 3/8 PFH PLASTI-LOC SS W/NYSEAL
2	3	14-082202-041	SCREW, 8-32 X 1/4 PH SLOT, BRASS, TERMINAL (NOT SHOWN)
1	4	38-0240063-00	GASKET, PAR46, BLK (NOT SHOWN)

Figure 10.4 – PAR46 Lens Replacement

11. Functional Check and Troubleshooting

NOTE: Refer to Figure 11.1.

11.1. Functional Check

NOTE: This procedure is applicable to WAT LED PAR36 and PAR46 Lights listed in Table 10.1.

NOTE: A circuit feature of the Parmetheus Plus is multiple parallel paths of LEDs and fixed current sources. For this reason, a group of 3 or 6 LEDs may not be illuminated, while the remainder of the LEDs may be operating at full intensity. This creates a situation where the light may be producing adequate light to perform its intended function, but it should still be replaced.

11.1.1. Connect external electrical power or turn on battery power.

11.1.2. Place the lighting switch in the ON position.

RESULT:

- Light goes on and operates at full intensity.

CORRECTIVE ACTION:

- If light does not go on, go to Trouble No. 1.

- If light goes on but does not operate at full intensity, replace light. Refer to Paragraph 10.1, Taxi and Landing Lights - Removal and Installation.

11.1.3. Place the lighting switch in the OFF position.

RESULT:

- Light goes off.

11.1.4. Disconnect external electrical power or turn off battery power.

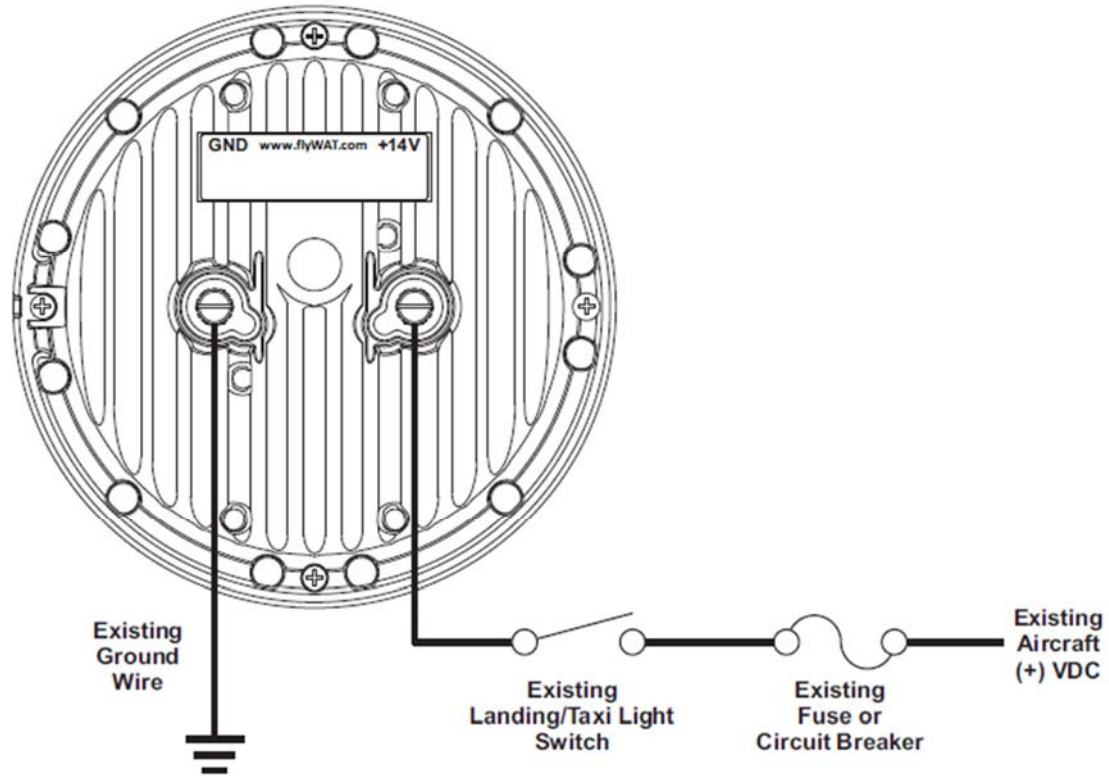


Figure 11.1 - Wiring Diagram

11.2. Troubleshooting

The following troubleshooting table provides troubleshooting suggestions in the form of a Yes/No tree of tests. The letter under the Yes or No refers to the next step to follow in the table.

TROUBLE NO. 1 - LIGHT DOES NOT GO ON WHEN LIGHTING SWITCH IS PLACED IN THE ON POSITION.

	YES	NO
a. Check wiring connections at +14V/+28V and GND terminals for tightness and integrity.	c	b
b. Tighten or repair connections	-	-
c. Check for 14 VDC/28 VDC between +14V/+28V and GND terminals.	d	e
d. Replace light. Refer to Paragraph 10.1, Taxi and Landing Lights - Removal and Installation. It is suggested that a bench check be done to confirm light failure. Refer to OEM Aircraft Maintenance Manual for additional information.	-	-
e. Troubleshoot existing aircraft lighting system. Refer to OEM Aircraft Maintenance Manual.	-	-

12. Maintenance and Repair

12.1. Cleaning

Clean LED taxi and landing lights the same as is specified for incandescent lighting in the OEM Aircraft Maintenance Manual.

12.2. Software Updates

There are no software updates required for the LED Taxi and Landing Lights installation.

12.3. Certification Maintenance Requirements

There are no certification maintenance requirements (CMR) for the LED Taxi and Landing Lights installation.

13. Access Panels

No access panels are installed as part of the LED Taxi and Landing Lights installation.

14. Lubrication

No lubrication points or lubricants are added as part of the LED Taxi and Landing Lights installation.

15. Lightning Strike

No specific known issues are associated with lightning strikes and the installation of the LED Taxi and Landing Lights. Subsequent to a lightning strike, inspect the LED Taxi and Landing Lights for external damage and security.

16. Hard Landing

No specific known issues are associated with hard landings and the installation of the LED Taxi and Landing Lights. Subsequent to a hard landing, inspect the LED Taxi and Landing Lights for external damage and security.

17. Towing and Taxing

No known issues are associated with towing and taxiing and the installation of the LED Taxi and Landing Lights.

18. Jacking, Mooring and Leveling

No known issues are associated with jacking, mooring and leveling and the installation of the LED Taxi and Landing Lights.

19. Lifting and Shoring

No known issues are associated with lifting and shoring and the installation of the LED Taxi and Landing Lights.

20. Returning Components to the Manufacturer for Service

There are no serviceable parts associated with the installation of the LED Taxi and Landing Lights.