



# Installation Instruction Mooney M20 Series

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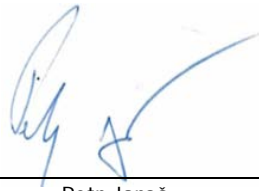
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## Part 0 Manual Administration

### 0.1 Document approval

This document has been established in accordance with an alternative procedure to DOA approved under EASA AP429.

This installation Instruction is applicable for the **Mooney** models **M20J**, **M20K**, **M20L** and **M20S**.



Compiled by: \_\_\_\_\_ 19. – Dec. - 2018

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## 0.2 Amendment Record procedure

The master copy of this document shall be kept electronically as a read only document under the control of Aveo Engineering Group, s.r.o. as Master Copy.

**ALL** amendments to this manual will initiate a raise of Issue

**ALL** raises of issue will be given a sequential Alphabetic Issue Ident sequentially from 01 to 99 in Table 01 - **Issue No:** Column– Initial Issue of Document will be "01"

**ALL** Issues of this document will be approved by Head of DO

Issue No.	Details	Date	Affected Pages
01	Initial Issue	28.Aug.2018	ALL
02	Remove models M20M, M20R, M20TN, M20U, M20V(not marked)	19.Dec.2018	3
	Correct references to installation manuals and AMM SUP		5
	Add remark		10
	Add standard for wire		12
	Correct instruction for tip installation, add EN 2267 reference, remove preheating (not marked)		14
	Add balancing of rudder		
Table 01: Document Amendment Record Table			

## 0.3 Affected Pages Procedure

ALL pages affected by ANY raise of issue of this document will be listed in Table 01 - *Affected Pages* Column.

The reason(s) for ALL raise of issue and description of change due to raise of issue will be provided for ALL raises of issue in Table 01 - *Details* Column.

Changes from the previous issue are highlighted by **YELLOW HIGHLIGHTING** over new content. AND **YELLOW HIGHLIGHTING** AND CROSSING OUT of deleted content.

Example ~~(CROSSING OUT)~~

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## **Part 1 Installation Instruction**

### **1.1 General**

This installation is to be performed in accordance to common practice as described in FAR AC 43.13-2B Chapter 4 and in FAR AC 43.13 1B Chapter 11 Section 15 (Bonding) as published by FAA.

The installer is responsible to follow the installation instructions in the latest revision of:

- FAR AC 43.13-2B Chapter 4
- FAR AC 43.13 1B Chapter 11 Section 15
- AVE-WPS-64G-IM
- AVE-PSPSYW-IM
- AVE-RBXP-001-IM
- AVE-CCPS-IM
- AVE-H30-002-IM
- AVE-SDD45-IM

All drawings applicable for this change are listed in the Drawing List:

- AVE-MOD-012-DL, issue 01

The following appliances carry an ETSO authorization:

- AVE-WPSR-64G & AVE-WPSG-64G – ETSOA 210.10053936
- AVE-RBXPR-001 – ETSOA 210.10055069

The change is to be performed using the document AVE-MOD-012-MCS in the latest issue.

The aircraft modified according to this instruction may not be released back to service without the EASA design approval certificate being provided.

### **1.2 Continued Airworthiness**

The aircraft manuals remain fully valid. The inspection intervals and the procedures of the aircraft override the general statements in the component manuals as listed under §1.1.

For inspection of the new lights themselves follow the procedure of the AMM supplement AVE-MOD-012-SUP-AMM.

### 1.3 Description

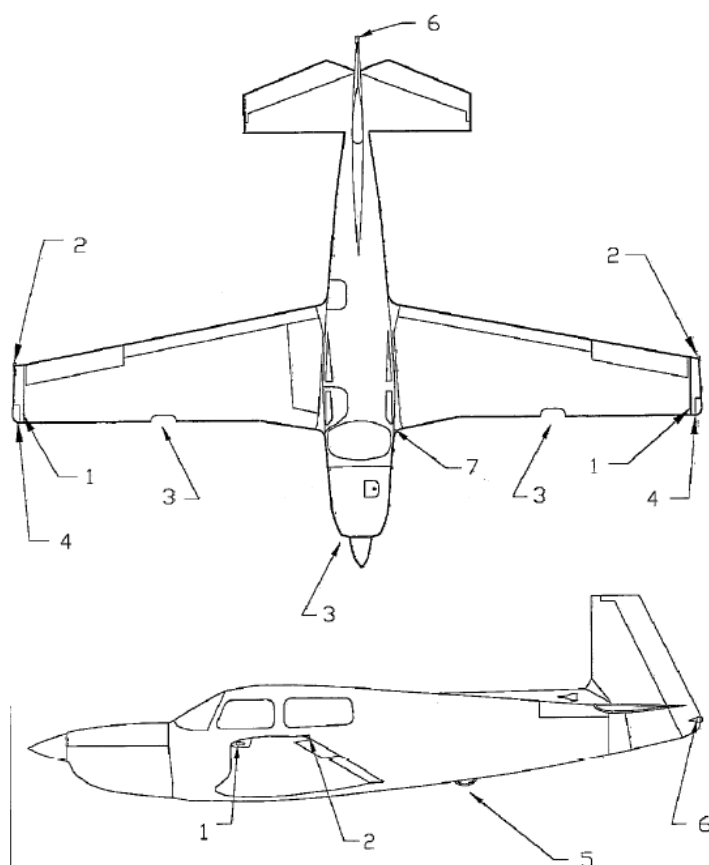
This modification is the replacement or new installation of the composite wingtip segment and of position, anti-collision, taxi- and landing lights by LED type lights.

#### 1.3.1 Wingtip lights

This modification allows on aircraft which already have a composite wingtip to replace either the complete wingtip or only the light unit inside or outside the original composite wingtip. The Mooney also exists in versions without a composite wingtip at all. For those aircraft the light unit can be replaced. Aircraft which originally have no composite wingtip cannot be equipped with the Aveo wingtip.

Aveo designed a new wingtip with integrated position lights type I and II including the strobe function.

Alternatively the originally wingtip lights on aircraft with or without wingtip can be replaced by the Aveo Ultra Galactica embedded without installation or replacement of the conformal wingtip. The Ultra Galactica embedded also fulfills the requirement for position lights type I and II plus the strobe function.



1. Light assembly navigation & strobe
2. Wingtip
3. Landing / Taxi light installation LH, RH and cowling
4. Recognition light installation
5. Beacon installation
6. Strobe assembly tail
7. Ice retrofit

#### Synchronization:

The strobe lights may be synchronized but the frequency of the strobes is so low that synchronization of the lights is not required.

For the synchronization function the blue wires of each light to be synchronized have to be connected. If for this function additional wires are to be installed then these must be installed along the wire bundle in which the lights power wires run. If the function is not used the blue wire at each light is to be capped and stowed.

**1.3.2 Aft position light**

The aft position light can be replaced by Aveo PosiStrobe CP. The light is a direct replacement. For synchronization applies description under section 1.3.1.

**1.3.3 Anti-collision lights**

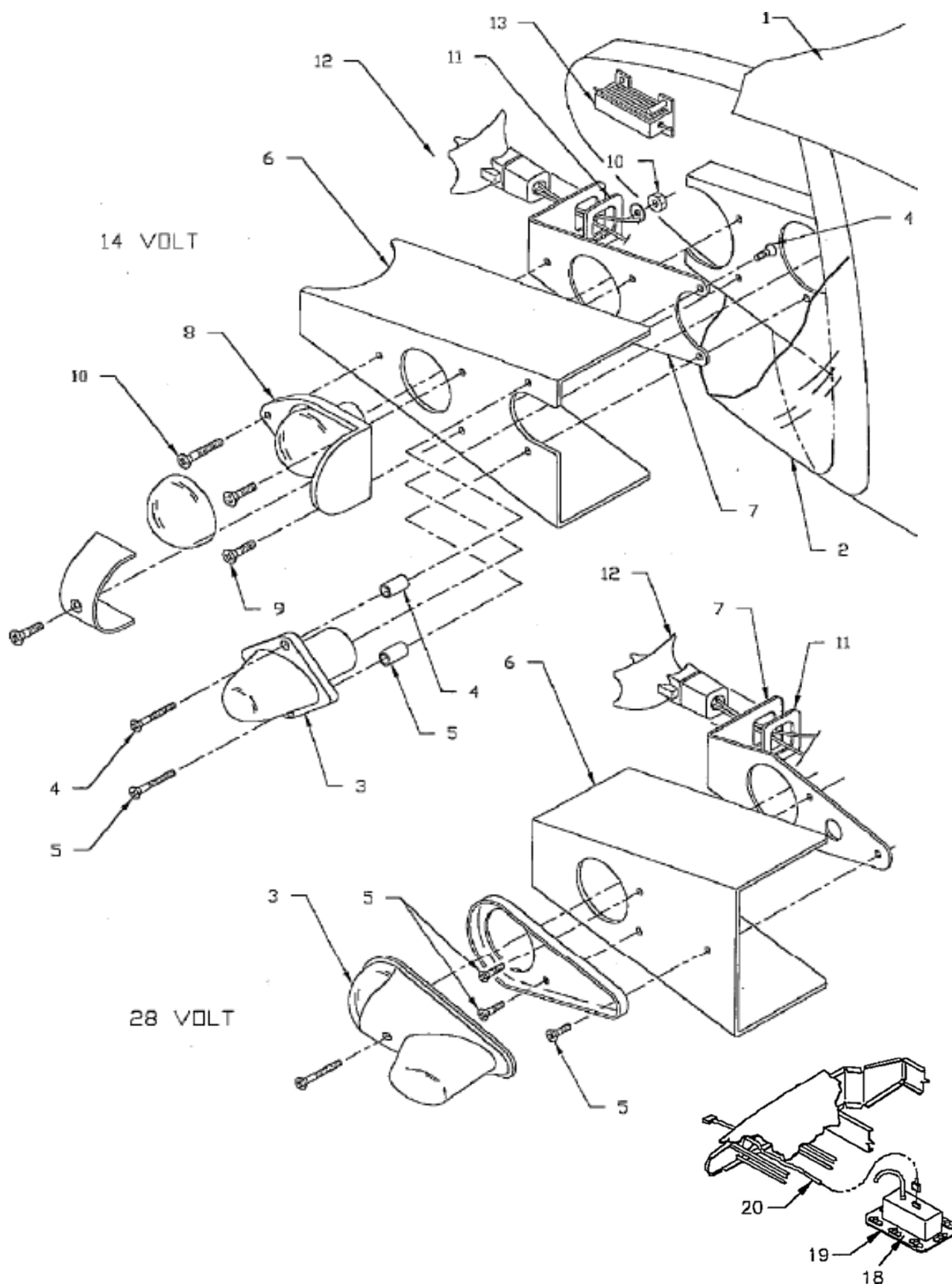
The originally installed anticollision light can be replaced by Aveo RedBaron XP red including the adapter.

**1.3.4 Taxi- and landing lights**

The M20 can be equipped with a taxi light (wide angle lens) and a landing light (narrow angle). This modification allows replacing all installed taxi and landing lights with the same configuration as installed before the modification. A configuration change is not allowed.

## 1.4 Wingtip Modification

#### 1.4.1 Option A - Replacement of Light Unit





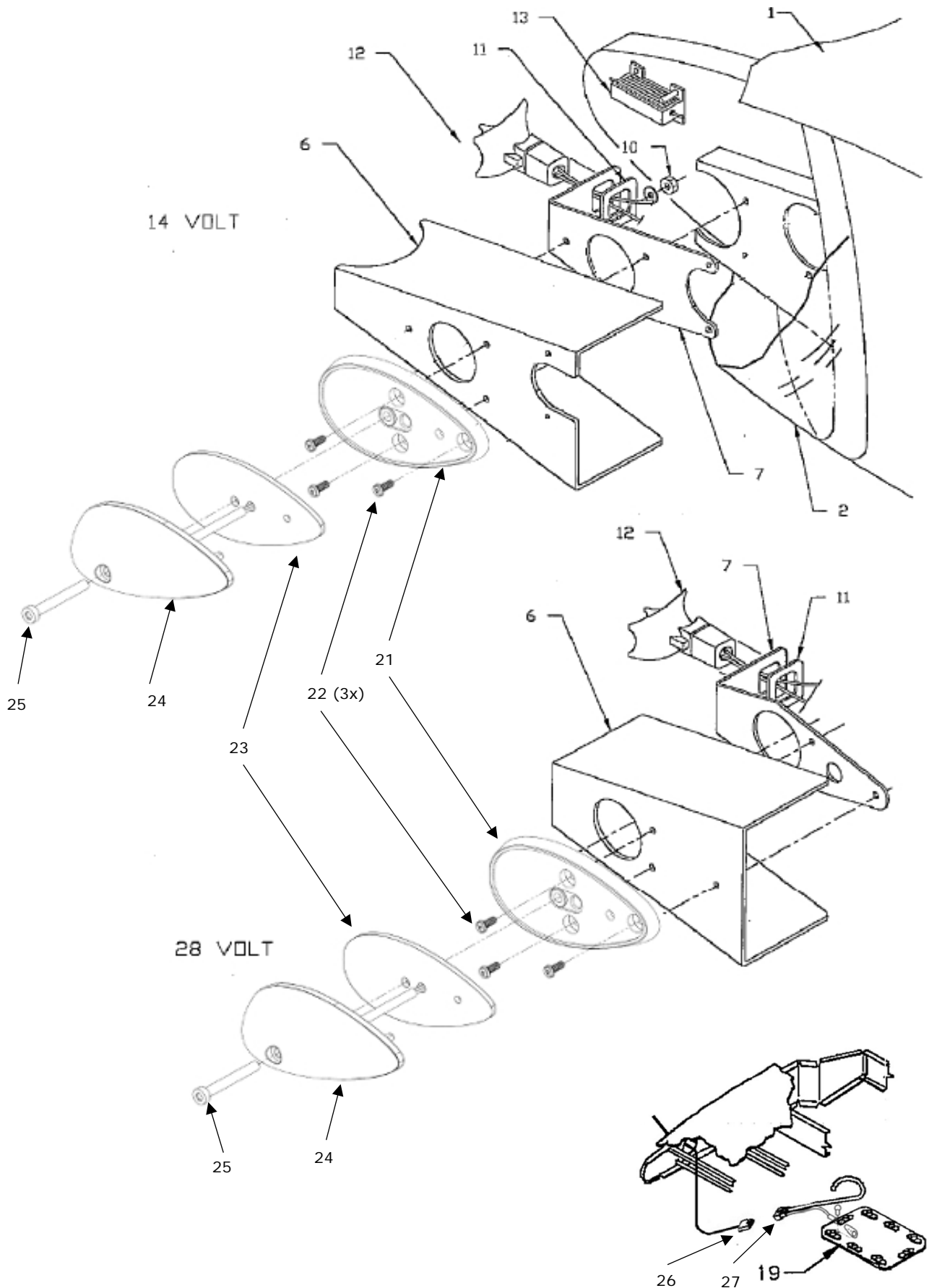


Figure and Index Number	Part Number	Description	Parts Avail.	QTY. Per assy.
21	AVS-P000100175-A60	Ultra Galactica Adapter		2
22	AVS-SCC0510LHS-C0A	Screw#6-32 x3/8" LPSHS		6
23	AVS-P001290550-A1A	Gasket		2
24	AVE-WPSR-64G	Ultra Galactica Embedded Red		1
	AVE-WPSG-64G	Ultra Galactica Embedded Green		1
25	AVS-SCM05045LHS-D0A	Mounting Screw M5 x 45		2
26	01-0430011-00	Connector Kit – Male		2
27	01-0410823	Connector Kit - Female		2
1	Original parts			
2	Several	Wingtip assy LH (RH similar)		REF
3	210384	Lens, Wingtip		REF
4	Several	Light assy strobe (14 or 28V)		REF
5	Several	Screw Strobe light 14 V		AR
	Several	Screw Strobe light 14 V or Strobe Nav. Light 28 V		AR
6	Several	Retainer LH (RH similar)		REF
7	Several	Bracket, Mounting LH (RH similar)		REF
8	W1250PR	Light assy Nav. 14V		REF
9	MS24693-S28	Screw Nav light assembly		4
10	Several	Screw, washer, nut		2
11	210409-003	Retainer		2
12	Several	Recognition light		2
13	RH-50-7.5	Resistor		2
18	Several	Power Supply		2
19	921001	Plate, Cover RH/LH		2
20	Several	Wire loom power supply to wingtip		2

## NOTES

1. Remove both position and the strobe lights (items 3 to 5 and 8 to 10) in accordance to the aircraft maintenance manual.
2. Disconnect the wire bundle from the position and the strobe light
3. Inspect the installation area for corrosion and correct according to AMM if required
4. Install item 21 to 25 as described. Holes on bracket items 6 and 7 are to be drilled on installation and anchor nuts installed as required. Items 6 to 7 may be trimmed as necessary. After trimming remove sharp edges and apply primer.
5. Remove the strobe power supply (item 18) and wire loom (item 20).
6. Add connector (item 26) to the wires of the light (item 24) and connector (item 27) to the aircraft wiring. Extend the wiring if necessary in accordance to common practice FAR AC 43.13-2B Chapter.
7. In case synchronization is to be connected and no wire available then add a wire with minimum gage 22 (standard EN 2267 or equivalent) to connect both wingtip and the aft position light (all blue wires). The synchronization wires are not to be connected to 28 V or GND.
8. Re-install cover (item 19)

Remark: item 21 may be installed with the two forward screws only in cases where the aft screw cannot be placed (e.g. existing cut out)

This exploded view diagram illustrates the assembly of a car headlight. The main components and their assembly sequence are as follows:

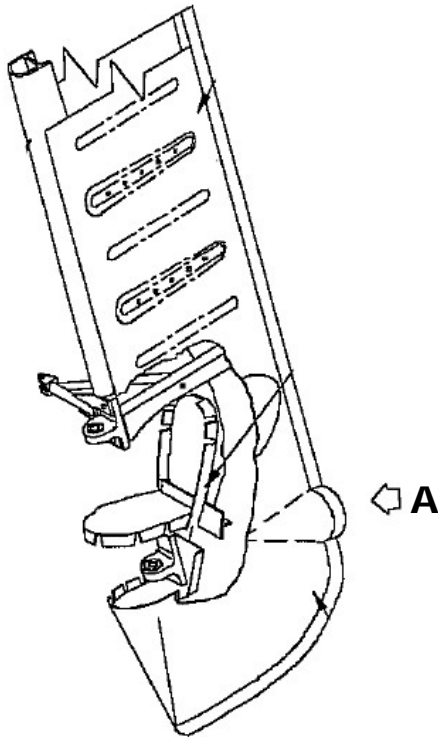
- 1, 2**: The main headlight housing, shown in a perspective view.
- 3**: A mounting bracket that fits into the housing.
- 4**: A small pin or clip used to secure the bracket.
- 5**: A small screw or pin used for mounting.
- 6**: A small washer or spacer.
- 7**: A small screw or pin used for mounting.
- 8**: A small screw or pin used for mounting.
- 9**: A small screw or pin used for mounting.
- 10**: A small screw or pin used for mounting.
- 11**: A small screw or pin used for mounting.
- 12**: A small screw or pin used for mounting.
- 13**: A small screw or pin used for mounting.
- 14**: A small screw or pin used for mounting.
- 15**: A long, thin mounting bracket or support arm.
- 16**: A mounting bracket that fits into the housing.
- 17**: A mounting bracket that fits into the housing.
- 18**: A mounting bracket that fits into the housing.
- 19**: A mounting bracket that fits into the housing.
- 20**: A mounting bracket that fits into the housing.

Figure and Index Number	Part Number	Description	Parts Avail.	QTY. Per assy.
1	AVS-C230105898-A40	Wingtip Fiberglass subassembly right		1
2	AVS-C230105897-A40	Wingtip Fiberglass subassembly left		1
	AVS-C130106889-A00	Wingtip Carbon subassembly right		1
	AVS-C130106888-A00	Wingtip Carbon subassembly left		1
3	AVE-CCPSG-R01	Raised Conforma – Green		1
	AVE-CCPSR-R01	Raised Conforma – Red		1
4	AVS-C210105961-A40	Light Holder w. nuts R		1
	AVS-C210105960-A40	Light Holder w. nuts L		1
5	AVS-SCM05030HAS-D0A	Screw		4
6	AVS-WNM0432EFN-D0A	Washer		4
7	AVS-SCM05008HAS-D0A	Screw		6
8	AVS-WAM0432DFS-D0A	Washer		6
9	01-0430011-00	Connector Kit – Male		2
10	01-0410823	Connector Kit - Female		2
12	Original parts			
13	Several	Glare fence RH (LH similar)		REF
14	Several	Lens, Wingtip RH (LH similar)		REF
14	MS24694-4	Screw		REF
15	Several	Original wingtip composite assy RH (LH similar)		1 (1)
16	220000	Skin Wing		REF
17	210047	Rib Assy		REF
18	Several	Power Supply		2
19	921001	Plate, Cover RH/LH		2
20	Several	Wire loom power supply to wingtip		2

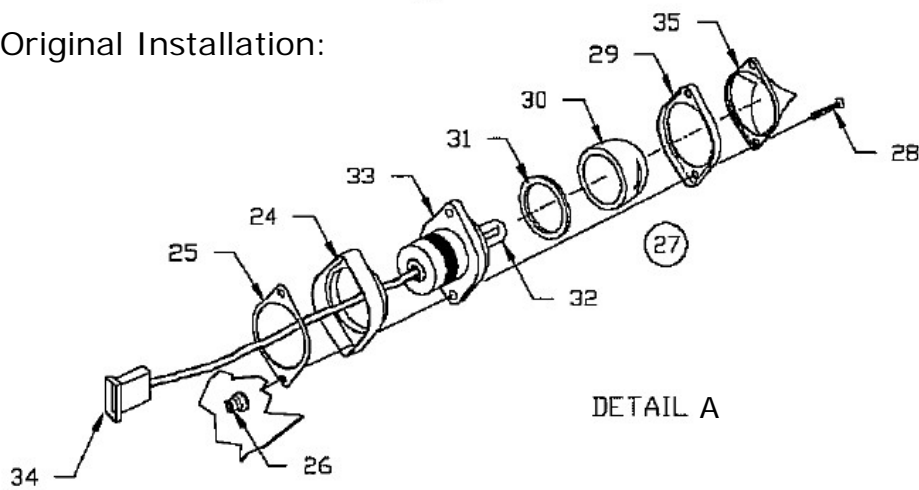
## NOTES

1. Remove both position and the strobe lights (items 3 to 5 and 8 to 10) in accordance to the aircraft maintenance manual.
2. Disconnect the wire bundle from the position and the strobe light
3. Inspect the installation area for corrosion and correct according to AMM if required
4. Install item 1 to 8 as described and in accordance with Aircraft Service Manual for replacing wingtip (57-20-02). For installation of carbon wingtips (item 2) the rivets have to be installed wet (PRC).
5. Remove the strobe power supply (item 18) and wire loom (item 20).
6. Add connector (item 9) to the wires of the light (item 3) and connector (item 10) to the aircraft wiring. Extend the wiring if necessary in accordance to common practice FAR AC 43.13-2B Chapter.
7. In case synchronization is to be connected and no wire available then add a wire with minimum gage 22 (standard EN 2267 or equivalent) to connect both wingtip and the aft position light (all blue wires). The synchronization wires are not to be connected to 28 V or GND.
8. Re-install cover (item 19)

## 1.5 Rear Position Light Installation



Original Installation:



New Installation:

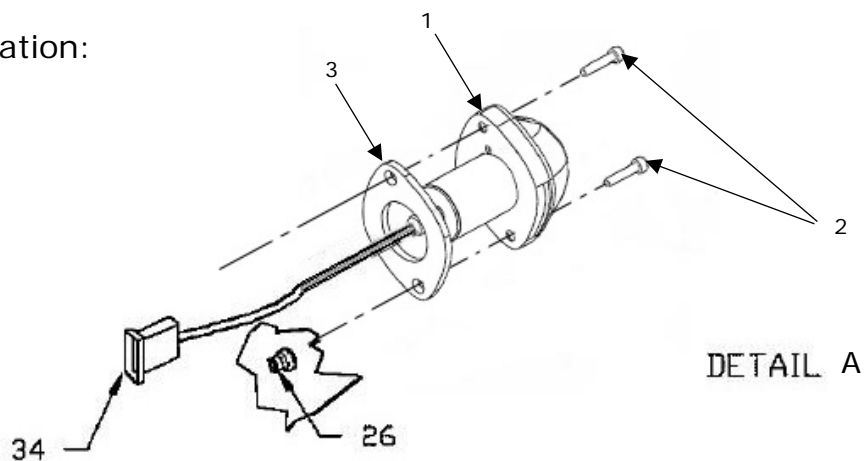


Figure and Index Number	Part Number	Description	Parts Avail.	QTY. Per assy.
1	AVE-PSPSYW-T01	PosiStrobe Titania		1
2	MS-16995-19	Screw #6-32 Thread, 5/8" SHCS		2
3	AVS-P000105638-A10	Gasket		1
-----	-----	-----	-----	-----
	Original parts			
	Several			
24	470004-003	Ring		1
25	470004-005	Plate		1
26	A6-120	Rivet Nut		2
27	Several	Nav light / Strobe light assy		1
28	Several	Screw 6-32		2
29	Several	Retainer		1
30	Several	Lens		1
31	Several	Gasket		1
32	Several	Bulb		1
33	Several	Base assembly		1
34	1-480305	Connector		1
35	470011-001	Shield		1

## NOTES

1. Remove position light in accordance to the aircraft maintenance manual.
2. Disconnect the wire bundle from the position light
3. Inspect the installation area for corrosion and correct according to AMM if required
4. Splice the new light's wires into the existing connector according to the referenced installation manuals and the common practice FAR AC 43.13-2B Chapter 4
5. In case strobe light and synchronization wire are to be added then run two wires with minimum wire gage 22 parallel to the position light wire bundle. The wires are to be connected to the corresponding wires of the wing tip lights. The strobe light might also be operated together with the position light due to low power consumption or both functions may not be used (just not connected).
6. Install items 1, 2, 3 as described.
7. After installation of the light balance the ruder according to AMM chapter 27-93-01

## 1.6 Anti-collision Lights Installation

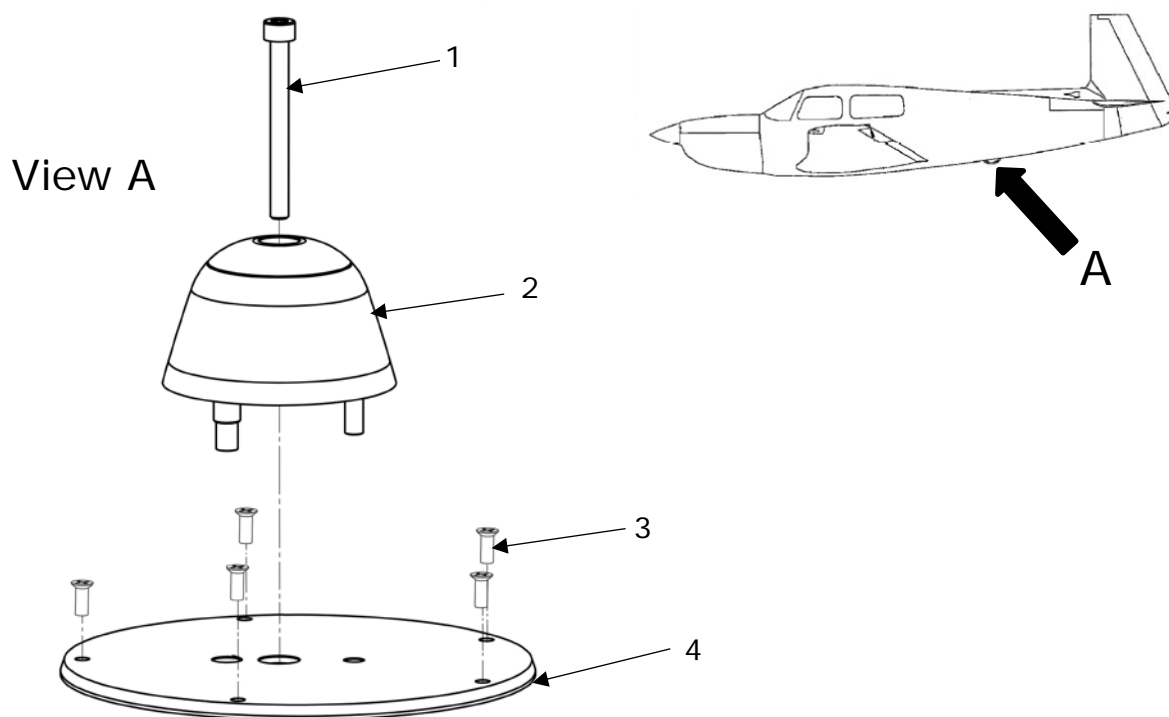


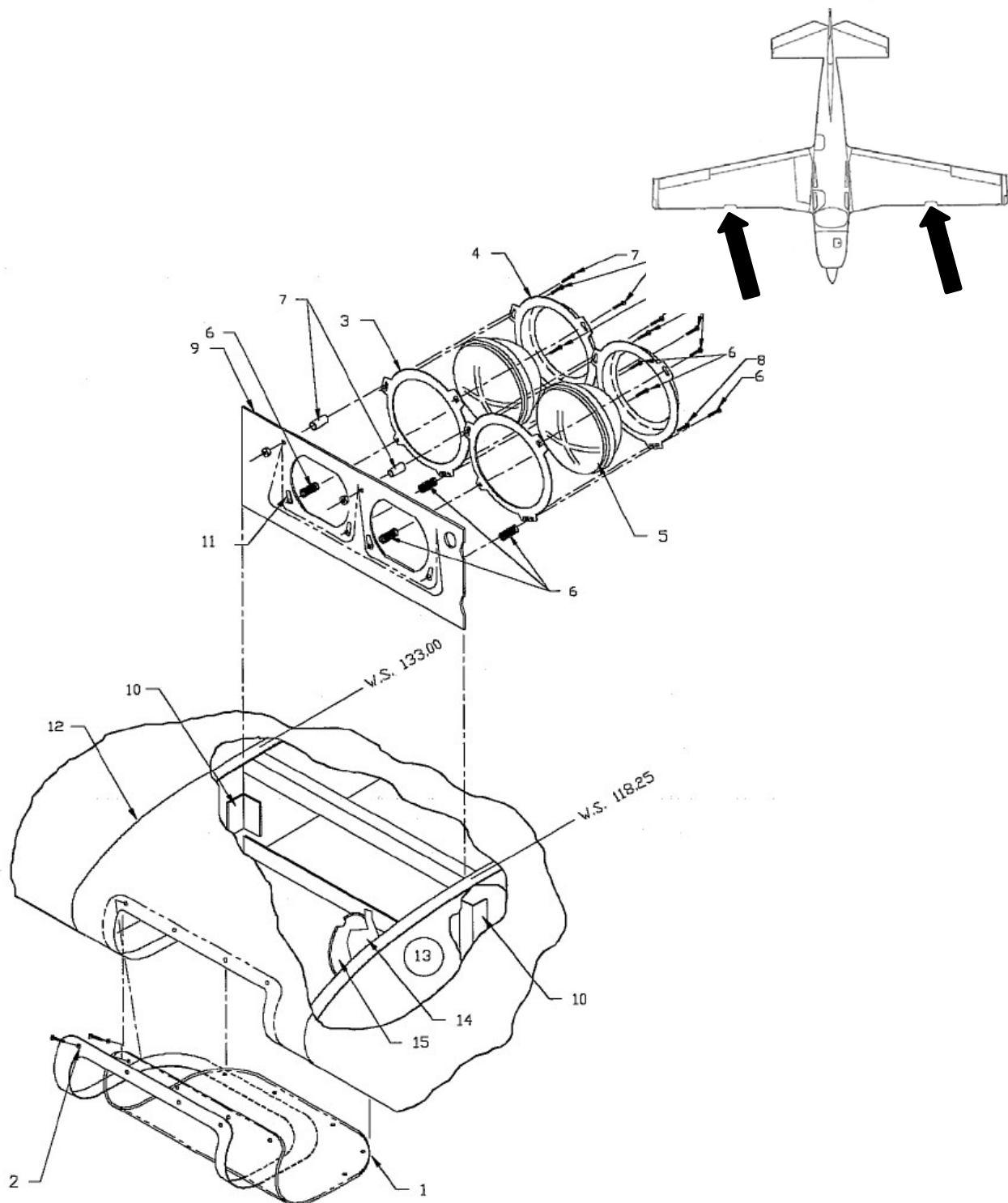
Figure and Index Number	Part Number	Description	Parts Avail.	QTY. Per assy.
1	AVS-P000102111-A3A	BOTTOM ANTI-COLLISION LIGHT INSTALLATION		1
2	AVE-RBXPR-001	Hex Socket Metric Screw Assy		1
3	AN526-632R6	RedBaron XP Galactica		5
4	AVS- P000600093-A60	Original Fasteners		1
		RedBaron XP Light Replacement Adapter 2		

## NOTES

1. Remove lower flashing or rotating beacon in accordance to the aircraft maintenance manual.
2. Disconnect the wire bundle from the flashing beacon
3. Inspect the installation area for corrosion and correct according to AMM if required
4. Splice the new light's wires into the existing connector according to the referenced installation manuals and the common practice FAR AC 43.13-2B Chapter 4
5. Install items 1 to 4 as described above.

## 1.7 Taxi and Landing Lights Installation

### 1.7.1 Wing installation





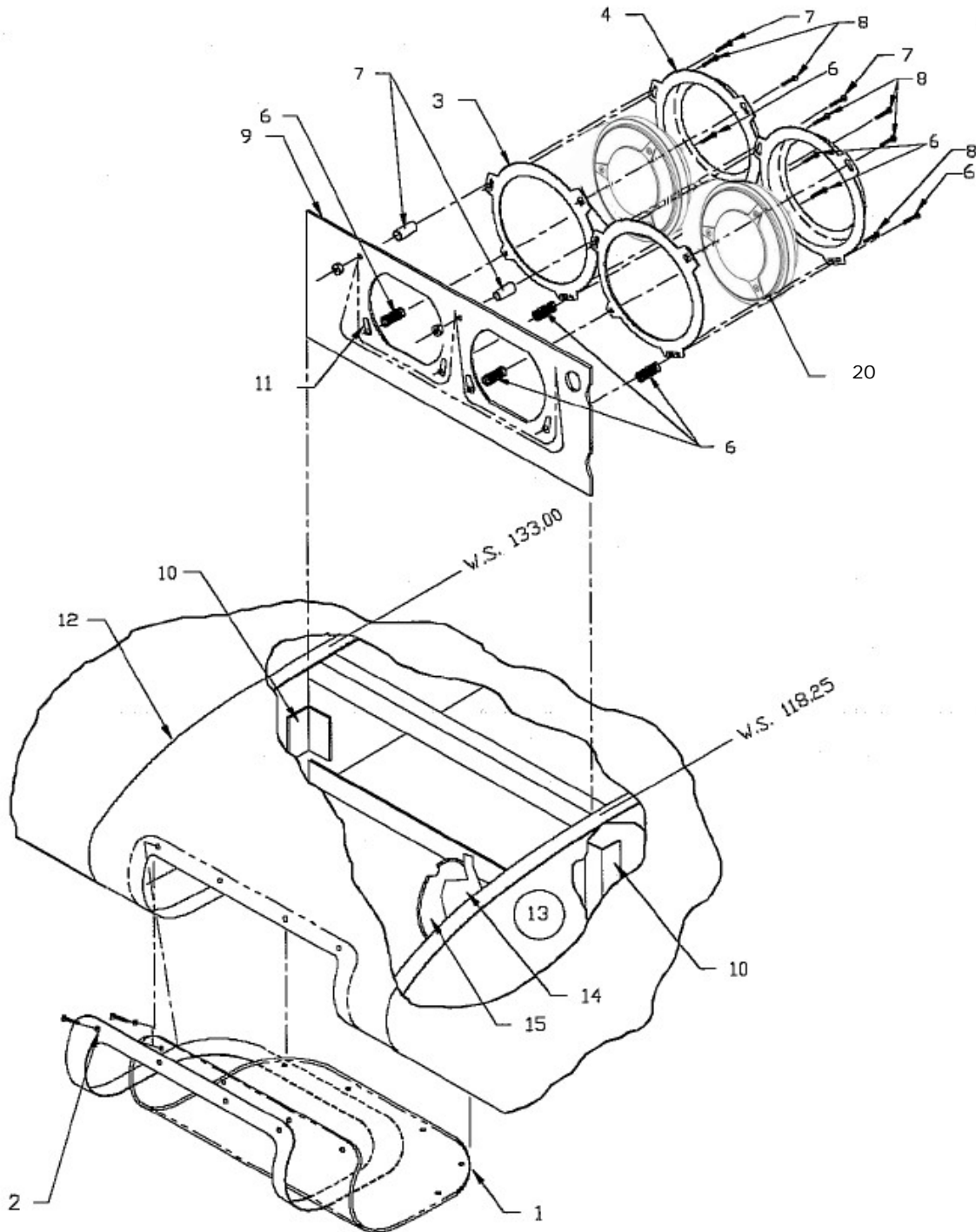


Figure and Index Number	Part Number	Description	Parts Avail.	QTY. Per assy.
20	AVE-H30TATSNL-TOA	Hercules Drop-in Landing		2
-----	-----	-----	-----	-----
	Original parts			
1	Several	Lens		1
2	2102118-001	Retainer RH (LH similar)		1
3	210204-501	Plate assembly LH/RH		1
4	210204-003	Retainer		1
5	4596	Lamp, LH/RH (GE)		2
6	MS35206-251	Screw		4
7	SMB003-0200-9	Mount (Lord) LH/RH		2
8	AN515-8R6	Screw		2
9	210216-502	Bracket RH (LH similar)		1
10	210216-003	Flange LH/RH		2
11	MS21080-08	Nutplate		4
12	210213-502	Doubler assy RH (LH similar)		1
13	210418-501	Reflector installation taxi light RH (LHsimilar)		1
14	210418-502	Bracket, RH (LH similar)		1
15	210418-003	Reflector RH/LH		1
NOTES				
1. Replace landing light bulb (item 5) in accordance to the aircraft maintenance manual by new LED landing light (item 20). Regard polarity of the new light.				

### 1.7.2 Cowling installation

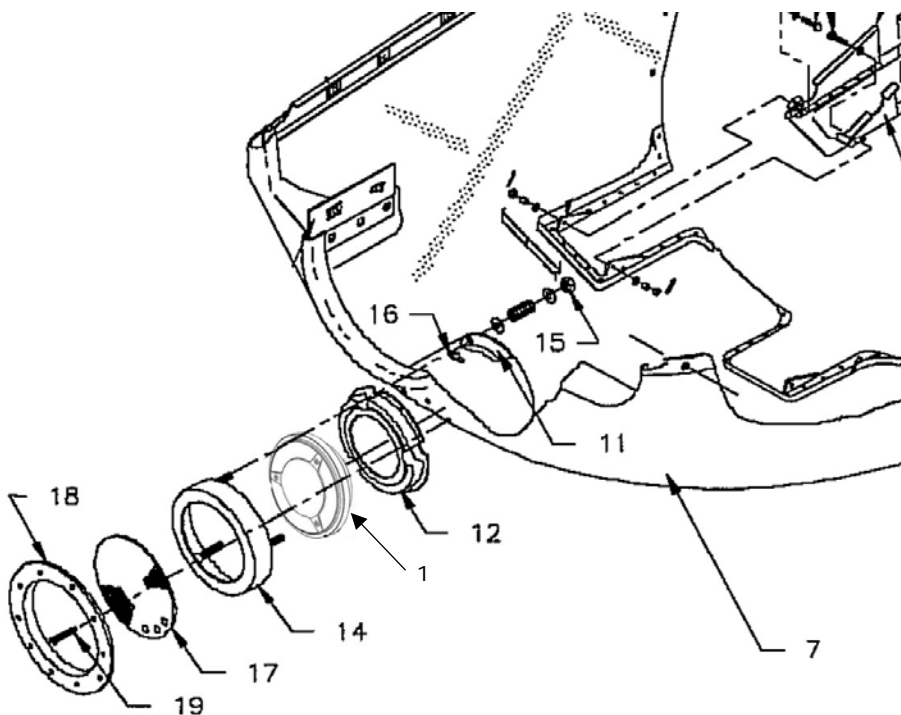
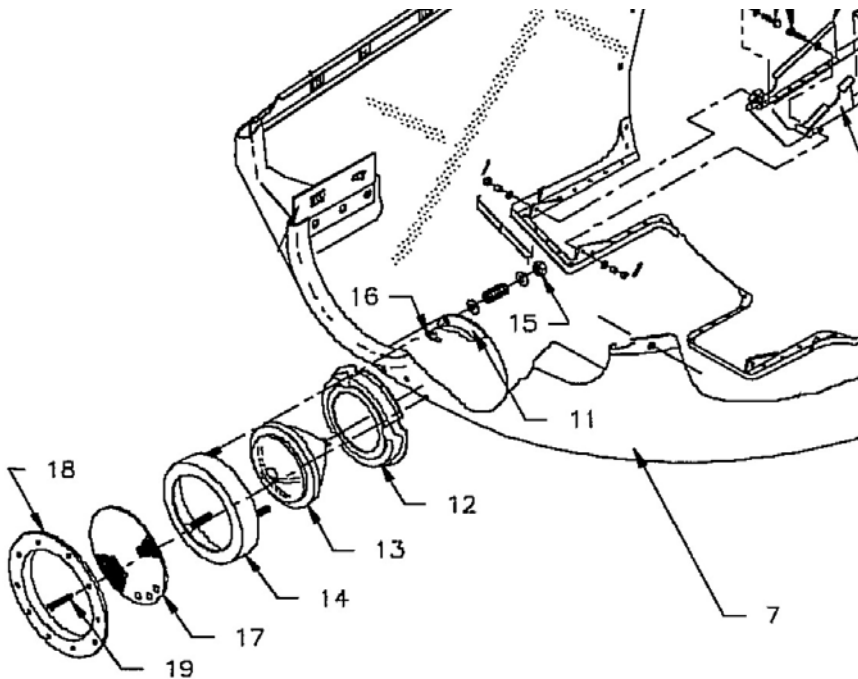
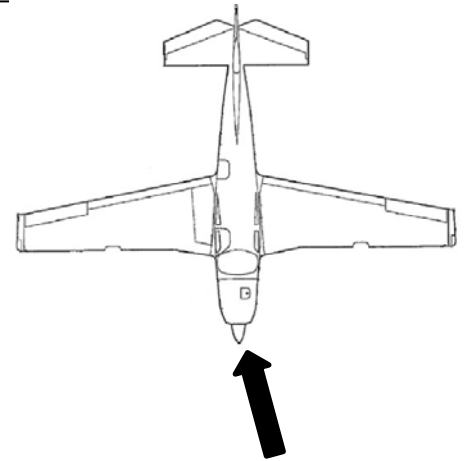


Figure and Index Number	Part Number	Description	Parts Avail.	QTY. Per assy.
1	AVE-SDD45LW-T02 AVE-SDD45LW-T03	Samson Drop-In Landing 28V DC Samson Drop-In Landing 14V DC		1 1
-----	-----	-----	-----	-----
	Original parts			
7	Several	Cowling		REF
11	650188-501	Ring Assy		1
12	650230-501	Ring Assy		1
13	GE 4522	Bulb, Landing Light (14 V)		1
	GE 4553	Bulb Landing Light (28 V)		1
14	650187-001	Retainer Landing Light		1
15	MS21045L08	Nut		3
	AN960-B	Washer		6
	LC-038D-3	Spring		3
	AN526-832R6	Screw		3
16	MS210-78-08	Nutplate		1
17	650189-001	Lens Landing Light		1
18	650190-001	Retainer		1
19	MS24694-S5	Screw		8
	A3135-017-3	Washer		8
	MS21078-08	Nutplate		8
<b>NOTES</b> 1. Replace landing light bulb (item 13) in accordance to the aircraft maintenance manual by new LED landing light (item 1). Assure that the replacement has correct voltage. Regard polarity of the new light.				

## Part 2 Compliance demonstration

This document is in relation to the certification program AVE-MOD-012-PFC.  
The compliance is demonstrated for the following certification specification:

Requirements	MoC	Statement of Compliance
CS 23.2500  General requirements on systems and equipment function	MoC 0	<b>CS 23.1301</b> (a) All navigation and anti-collision lights are ETSO certified. All landing lights are qualified according to RTCA DO160 as per AVE-H30-001-CCL. (b) Not applicable as no changes are made which would require a changed or a new label. (c) All equipment is installed within their limits. (d) It has been proven in other installation and by the qualification data that all equipment is functional for the intended purpose. Additionally the proper function is determined in a functional check as per MCS. <b>CS 23.1309</b> (a) All products have been tested to the appropriate environmental standard. In addition to that improves the new light installation the mean time between failure by a factor of about 1000. All lights are brighter at a lower power consumption and a much lower temperature.
CS 23.2625  Instructions for Continued Airworthiness	MoC 0	<b>CS 23.1529</b> The modification includes a supplement to Mooney Aircraft Maintenance Manual (AMM) modified by Aveo Modification "AVE MOD 012".