EADS CASA	FUNCTIONAL TEST	PFAFA-24-00-08-00/1	Issue	D	Pages	13
	SPF, Aircraft Systems Engineering Department					
Aircraft	A330 - MRTT					

Title:

Electrical bonding test of the new lighting installation

Summary:

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REVISIONS RECORD

Issue	Revision reason	Approved
Date	**Chapters, Sections, Affected pages**	**Signature**
A	New Issue.	R. A. Moreno
19/07/06	All pages.	
B	New Issue	R.A Moreno
24/05/07	Changes of lights position, new lights and lights without bonding requirement	
C	New Issue	C. Calderón
12/06/08	New lights requirement	
D	BEVS lights requirements	C. Calderón
29/07/08	Pages 7 and 13	

1 INTRODUCTION

1.1 Object

This document describes the necessary tests in order to ensure a proper electrical bonding of the new lights installed on the A330 MRTT aircraft.

1.2 List of acronyms and abbreviations

A	Ampere
AAR	Air to Air Refuel
AC	Alternate Current
ACT	Aircraft Central Tank
A/C	Aircraft
DC	Direct Current
GPU	Ground Power Unit
MRTT	Multi-Role Tanker Transport
NCS	Non-Conformity Sheet (HNC)
mΩ	milliohm
UARRSI	Universal Aerial Refueling Receptacle Slipway Installation

2 APPLICABLE DOCUMENTATION

NT-FA-ADR-05001	A330 MRTT AIRCRAFT IN-FLIGHT REFUELING INSTALLATION ELECTRICAL BONDING REQUIREMENTS
I+D-P-355	Bonding and Grounding Installation.
CAN68076	Electrical Bonding. Call out on drawings.
CAN68099	Grounding, return of current.

3 REQUIRED EQUIPMENT

3.1 Required hardware

The following equipment is required for the performance of the functional test:

- Low-current micro-ohm-meter, capable of giving 10 A currents and measuring resistances of at least 0,5mΩ (SEFELEC RCP2A or similar).
- Set of test probes suitable for the aircraft under test.

3.2 Required software

Not applicable.

4 DEFINITIONS

Bonding Jumper. Flexible metallic strip.

Electrical Bonding. Bonding refers to the establishment of a current path between electric conductive parts in order to assure electrical continuity. This may be between two points on a system ground plane as well as between ground reference and a part, circuit or structure element.

Electrical Continuity. Means, that structural joints or joints of pipes or other conductive members of the airframe do not hinder the flow of electric current across the joint. Its bonding resistance and its current carrying capability define the electrical properties of a joint.

Grounding. Grounding refers to the establishment of a current path to a reference potential (ground reference). The ground reference for an aircraft is the metallic aircraft structure.

5 PRELIMINARY INSTRUCTIONS

5.1 Preliminary actions

Before the execution of the test, the following items must be checked:

- Continuity tests of all power wires between power sources (generators, batteries and GPU) and buses, including returns.
- Proper aircraft connection to ground.

5.2 Security Instructions

For safety reasons, the following items must be checked:

- There exist means for the extinguishing of electric fire in the aircraft boundaries.
- Fuel tanks are empty, and there is no risk of explosion.
- The execution of the test is not hindered by any other works.
- All circuit breakers, control switches and selectors of the electrical installation are in OFF position.

6 TEST EXECUTION

6.1 Check that all ground points have been made successfully in its manufacturing operations according to I+D-P 355, and that all operations related to ground points creation have been closed and stamped.

6.2 Electrical resistance shall be measured between the points stated in table 1 of chapter 7.

The procedure for all measurements shall be the following:

a) Prepare the micro-ohm-meter for resistance measurements, and connect its probes to the A and B points indicated in table 1. Be careful to place the probes in ground zones or conductive elements of the primary structure that are free of paint or any other non-conductive layer.

IMPORTANT NOTE: If any measurement point is not free of paint or any other non-conductive layer, press the probe slightly in order to reach the metallic zone. If the measurement is still off limits, clean the measurement point eliminating any non-conductive layers and perform the measurement again. In both cases, after performing the measurement correctly, replace the damaged protective layers.

b) After each measurement, compare the obtained value with the maximum permitted value. If the measured value is off limits, take the appropriate corrective action, making an NCS if necessary. Write down NCS numbers on table 3 of chapter 7.

c) Once the corrective action is accomplished, perform the measurement again. If the obtained value is correct, write down the results on the corresponding table. Repeat step b) if the measurement is again off limits.

6.3 Write down all data related to the test equipment used on table 2 of chapter 7.

7 TEST RESULTS

N.	Measurement Point "A"	Measurement Point "B"	Maximum Value (mΩ)	Measured Value (mΩ)	Ref.	Remarks
1	PDL elevation row (metallic assembly)	Adjacent metallic structure	10		1-1 a	See fig. 1
2	PDL telescoping row (metallic assembly)	Adjacent metallic structure	10		1-1 b	See fig. 1
3	Boom marker lights (metallic assembly)	Adjacent metallic structure	10		1-2 a	See fig. 2
4	UARRSI left lights (metallic assembly)	Adjacent metallic structure	10		1-3 a	See fig. 3
5	UARRSI right lights (metallic assembly)	Adjacent metallic structure	10		1-3 b	See fig. 3
6	Left inner wing light (metallic assembly)	Adjacent metallic structure	10		2-1 a	See fig. 4
7	Right inner wing light (metallic assembly)	Adjacent metallic structure	10		2-1 b	See fig.4
8	Left outer wing light (metallic assembly)	Adjacent metallic structure	10		2-2 a	See fig. 5
9	Right outer wing light (metallic assembly)	Adjacent metallic structure	10		2-2 b	See fig. 5
10	Left HTP light (metallic assembly)	Adjacent metallic structure	10		2-3 a	See fig. 6
11	Right HTP light (metallic assembly)	Adjacent metallic structure	10		2-3 b	See fig. 6
12	Upper Beacon lights (metallic assembly)	Adjacent metallic structure	10		3-1 a	See fig. 7

N.	Measurement Point "A"	Measurement Point "B"	Maximum Value (mΩ)	Measured Value (mΩ)	Ref.	Remarks
13	Upper rendezvous lights (metallic assembly)	Adjacent metallic structure	10		3-2 a	See fig. 7
14	Lower Beacon lights (metallic assembly)	Adjacent metallic structure	10		3-3 a	See fig. 8
15	Lower rendezvous lights (metallic assembly)	Adjacent metallic structure	10		3-4 a	See fig. 8
16	LH Lateral Belly Fairing laser module (metallic assembly)	Adjacent metallic structure	10		4-1 a	See fig. 9
17	LH Lower Belly Fairing laser module (metallic assembly)	Adjacent metallic structure	10		4-2 a	See fig. 9
18	RH Lateral Belly Fairing laser module (metallic assembly)	Adjacent metallic structure	10		4-3 a	See fig. 9
19	RH Lower Belly Fairing laser module (metallic assembly)	Adjacent metallic structure	10		4-4 a	See fig. 9
20	LH Trailing Cone laser module (metallic assembly)	Adjacent metallic structure	10		4-5 a	See fig. 10
21	RH Trailing Cone laser module (metallic assembly)	Adjacent metallic structure	10		4-6 a	See fig. 10

Table 1. List of required measures

TEST EQUIPMENT USED

EQUIPMENT	MANUFACTURER	MODEL	TOOL IDENTIFICATION	CALIBRATION DATE	NEXT CALIBRATION DATE
Micro-ohm-meter					
Test probes					

Table 2. List of equipment used.

IMPORTANT NOTE: Any comments or remarks arisen during test execution shall be written down here and sent to Engineering Department. Non-conformities shall be processed according to CASA-1023.

NOTE: In case of NCS, write down its number on Table 3.

N.C.S. Number	DATE
	/ /
	/ /

Table 3

NOTE: After this functional test execution, stamp the correspondent operation on the Production Order.

NOTA: Every result sheet must be stamped and attached to the Production Order.

STAMP:	
DATE:	

8 ATTACHMENTS

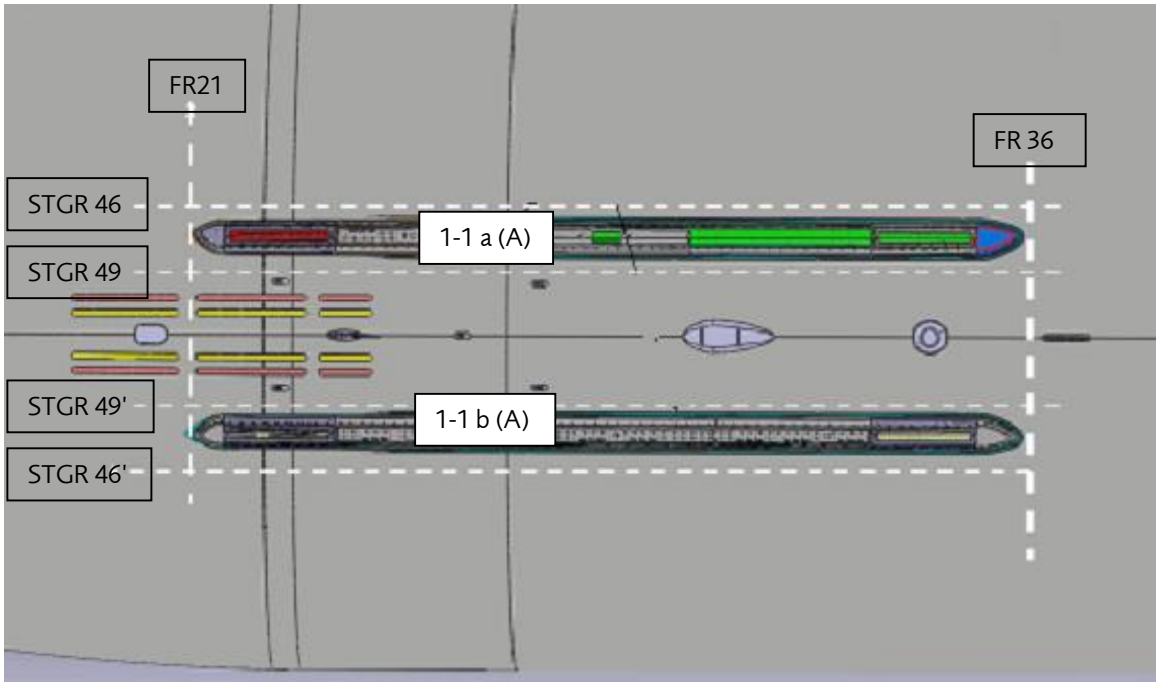

Figure 1. PDL lights (elevation and telescoping rows). Located in the lower part of the forward fuselage.

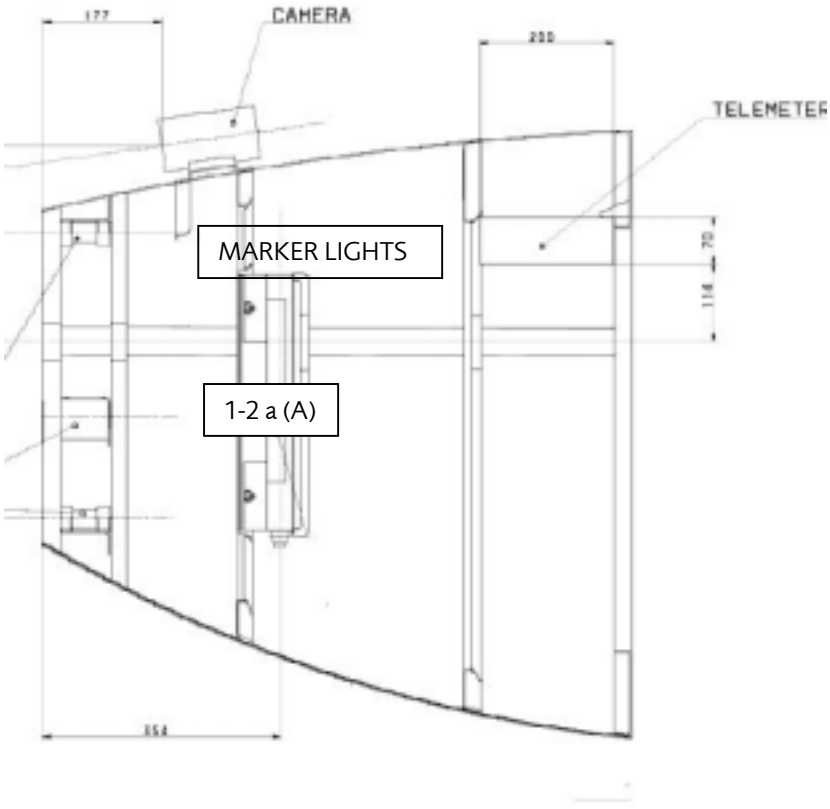

Figure 2. Location of marker lights at the boom nozzle.

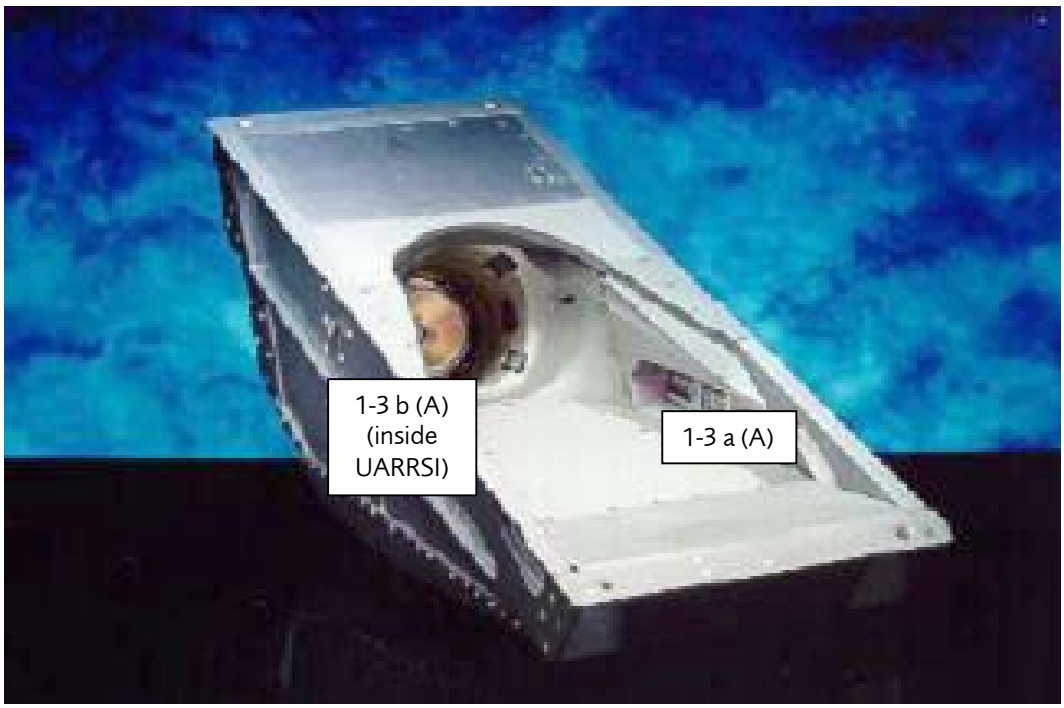

Figure 3. Location of UARRSI lights.

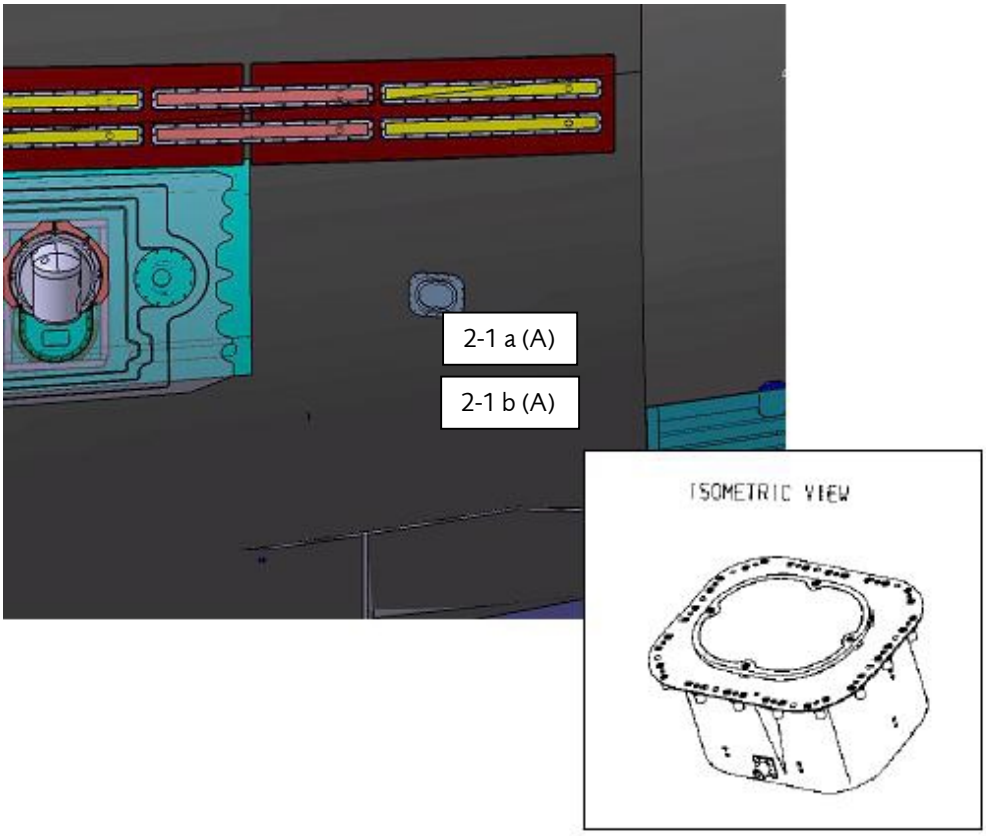

Figure 4. Location of inner wing lights. Flush mounted lights located at the fuselage of the aircraft (section 17). The figure shows only one wing, but both must be measured.

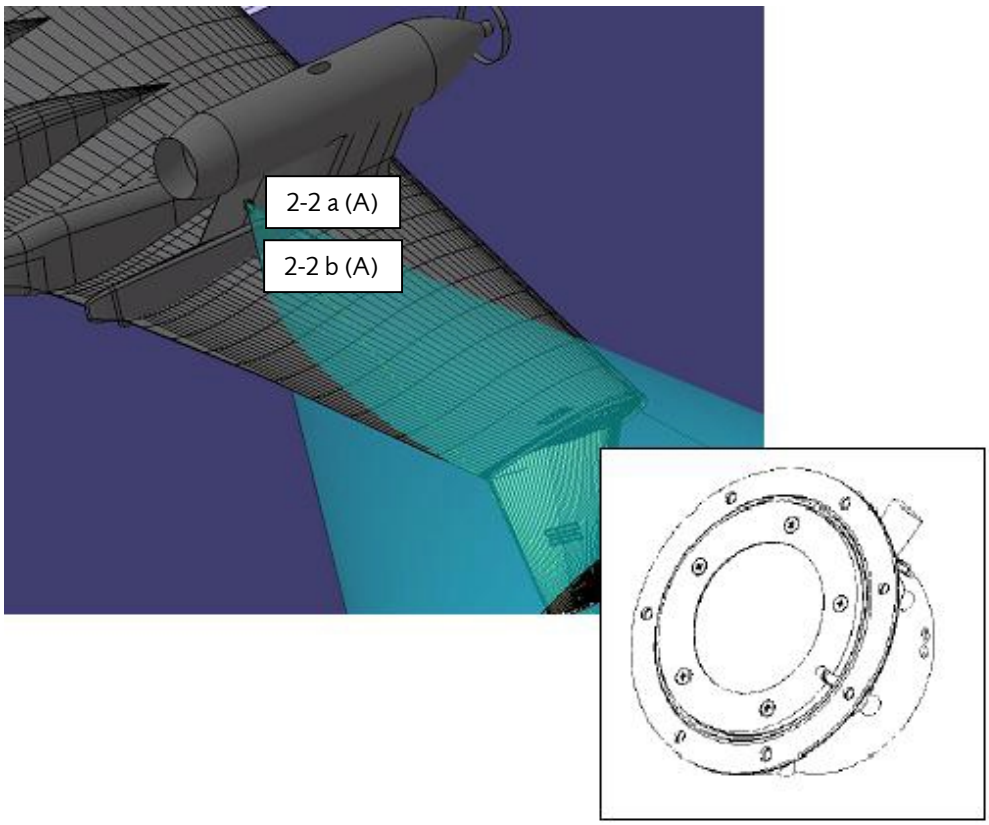

Figure 5. Location of outer wing lights. Flush mounted lights located at the pod pylons. The figure shows only one wing, but both must be measured.

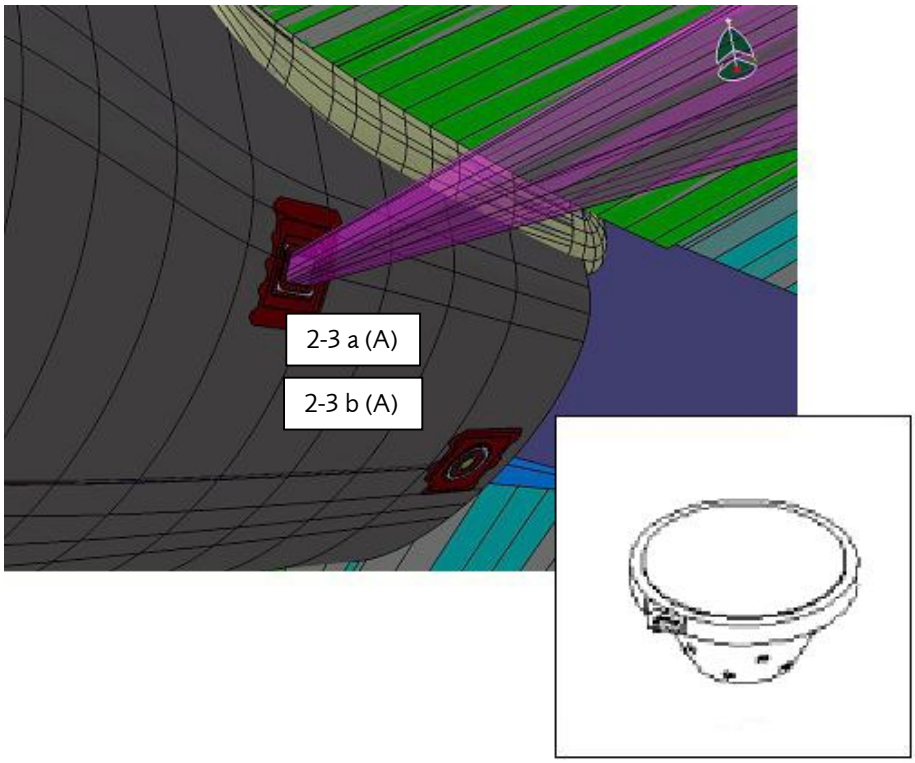

Figure 6. HTP lights located at the tail cone. The figure shows only one light (left side), but both must be measured.

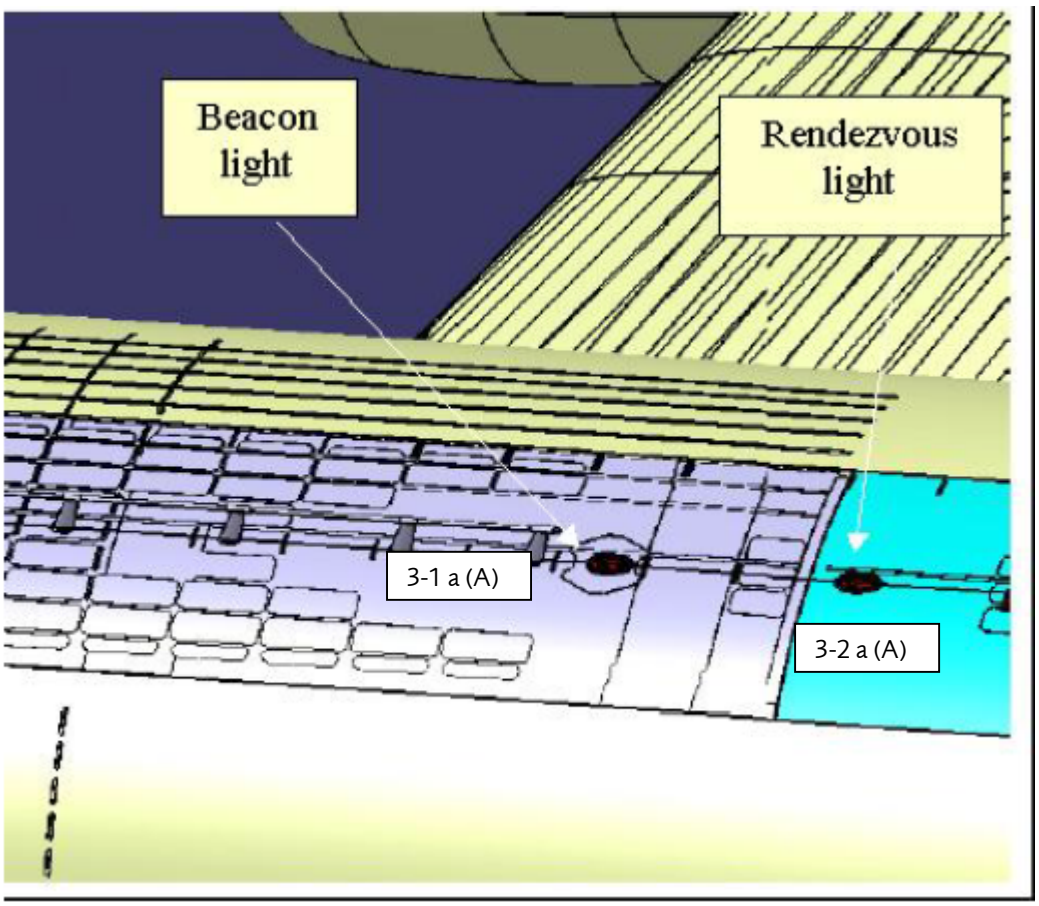

Figure 7. Upper rendezvous and beacon lights.

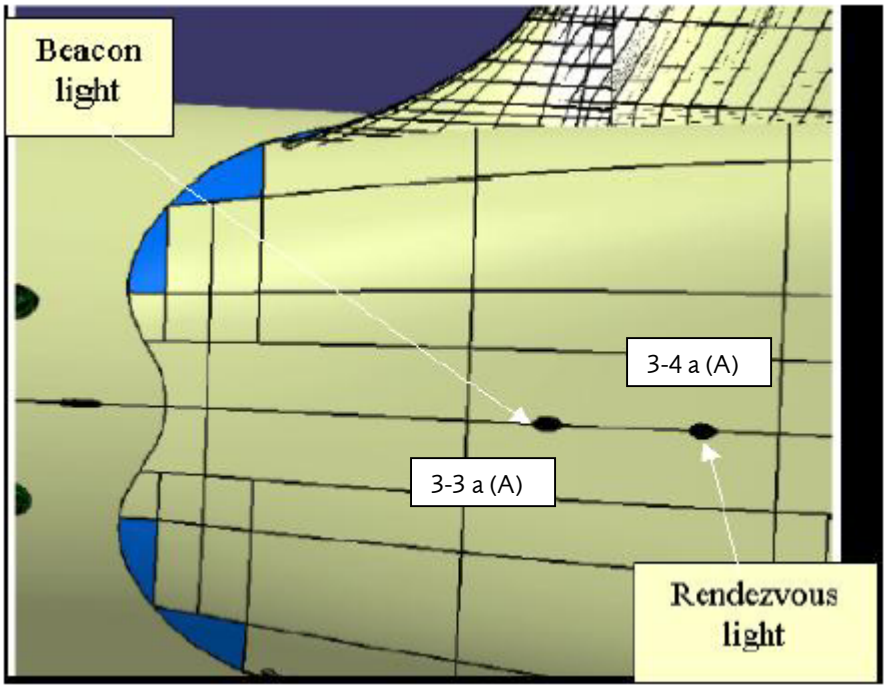

Figure 8. Lower rendezvous and beacon lights.

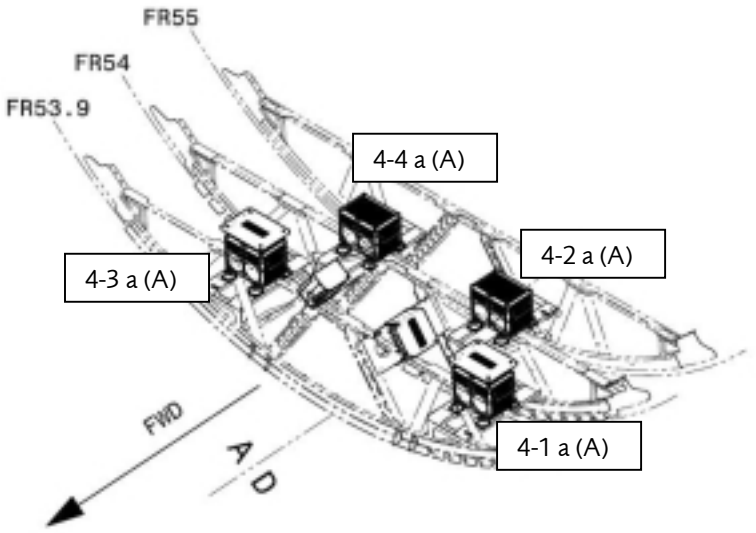

Figure 9. BEVS laser modules at belly fairing.

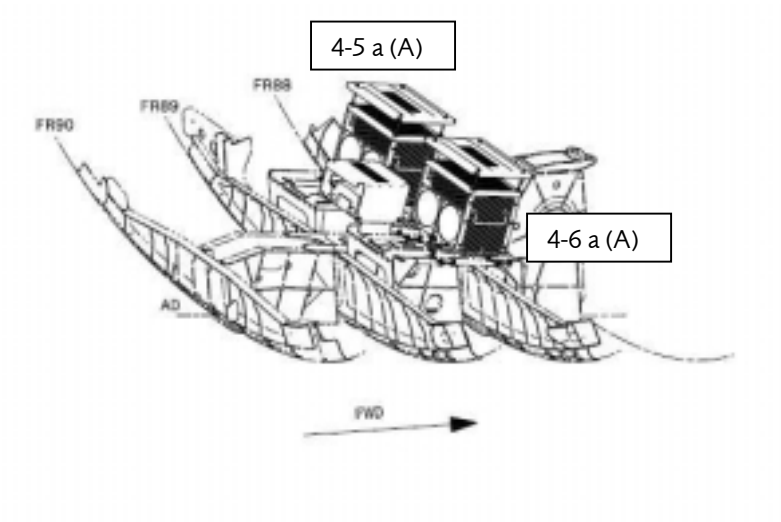

Figure 10. BEVS laser modules at trailing cone.