


	FUNCTIONAL TEST	PFAFA-24-00-09-00/1	Issue	E	Pages	17
	SPF, Aircraft Systems Engineering Department					
Aircraft	A330 - MRTT					
Title: <i>Electrical bonding test of new antennas installation</i>						
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Date: 29/07/08		Date: 29/07/08		Date: 29/07/08		

REVISIONS RECORD

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1 INTRODUCTION

1.1 Object

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

1.2 List of acronyms and abbreviations

A	Ampere
AC	Alternate Current
A/C	Aircraft
ARBS	Advanced Refuelling Boom System
DC	Direct Current
GPU	Ground Power Unit
MRTT	Multi-Role Tanker Transport
NCS	Non-Conformity Sheet (HNC)
mΩ	milliohm
RF	Radio-frequency

2 APPLICABLE DOCUMENTATION

NT-FA-ADR-05001	A330 MRTT AIRCRAFT IN-FLIGHT REFUELING INSTALLATION ELECTRICAL BONDING REQUIREMENTS
NT-FA-SAM-05002	ANTENNA INSTALLATION REQUIREMENTS FOR A330-200 MRTT RAAF
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.



IMPORTANT NOTICE: every antenna bonding measurement must be performed after disconnecting the antenna. The measurement point "A" must be always the antenna connector shield, and not the wire or cable connector.

7 TEST RESULTS

N.	Measurement Point "A"	Measurement Point "B"	Maximum Value (mΩ)	Measured Value (mΩ)	Ref.	Remarks
1	Top V/UHF 1 Antenna	Ground point of the main A/C structure near the antenna location.	2.5		1-1	See fig. 2
2	Bottom V/UHF 1 Antenna	Ground point of the main A/C structure near the antenna location.	2.5		1-2	See Fig. 2
3	Top V/UHF 2 Antenna	Ground point of the main A/C structure near the antenna location.	2.5		1-3	See Fig. 2
4	Bottom V/UHF 2 Antenna	Ground point of the main A/C structure near the antenna location.	2.5		1-4	See Fig. 2
5	Bottom V/UHF 3 Antenna	Ground point of the main A/C structure near the antenna location.	2.5		1-5	See Fig. 2
6	DF Antenna	Ground point of the main A/C structure near the antenna location.	2.5		2	See Fig. 3
7	Combined V/UHF LOS / UHF SATCOM Antenna	Ground point of the main A/C structure near the antenna location.	2.5		3	See Fig. 4
8	Top TDL Antenna	Ground point of the main A/C structure near the antenna location.	2.5		4-1	See Fig. 5
9	Bottom TDL Antenna	Ground point of the main A/C structure near the antenna location.	5		4-2	See Fig. 5
10	ADF Antenna	Ground point of the main A/C structure near the antenna location.	5		5	See Fig. 6
11	DME-1 Antenna	Ground point of the main A/C structure near the antenna location.	5		6-1	See Fig. 7

N.	Measurement Point "A"	Measurement Point "B"	Maximum Value (mΩ)	Measured Value (mΩ)	Ref.	Remarks
12	DME-2 Antenna	Ground point of the main A/C structure near the antenna location.	5		6-2	See Fig. 7
13	TACAN Top Antenna	Ground point of the main A/C structure near the antenna location.	2.5		7-1	See Fig. 8
14	TACAN Bottom Antenna	Ground point of the main A/C structure near the antenna location.	2.5		7-2	See Fig. 8
15	AIRTAC Beacon Antenna	Ground point of the main A/C structure near the antenna location.	5		8	See Fig. 9
16	Marker Beacon Antenna	Ground point of the main A/C structure near the antenna location.	5		9	See Fig. 10
17	Military GPS CRPA Antenna	Ground point of the main A/C structure near the antenna location.	2.5		10	See Fig. 11
18	Radioaltimeter 2 Transmitter Antenna	Ground point of the main A/C structure near the antenna location.	5		11-1	See Fig. 12
19	Radioaltimeter 2 Receiver Antenna	Ground point of the main A/C structure near the antenna location.	5		11-2	See Fig. 12
20	HF 2 Towel Bar Antenna (feed-though mast base mounting screws)	Ground point of the main A/C structure near the lead-in mast.	2.5		12-1	See Fig. 13
21	HF 2 Towel Bar Antenna (metallic support mast)	Ground point of the main A/C structure near the spark gap location	2.5		12-2	See Fig. 13
22	HF 2 Towel Bar Antenna (antenna connector – feed point)	Ground point of the main A/C structure near the lead-in mast.	10		12-3	See Fig. 13
23	HF 2 Towel Bar Antenna (grounding mast)	Ground point of the main A/C structure near the grounding mast.	2.5		12-4	See Fig. 14

N.	Measurement Point "A"	Measurement Point "B"	Maximum Value (mΩ)	Measured Value (mΩ)	Ref.	Remarks
24	TCAS Bottom Antenna	Ground point of the main A/C structure near the grounding mast.	5		13-1	See Fig. 15 Measurement should be taken in one of the antenna connectors

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 arised 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

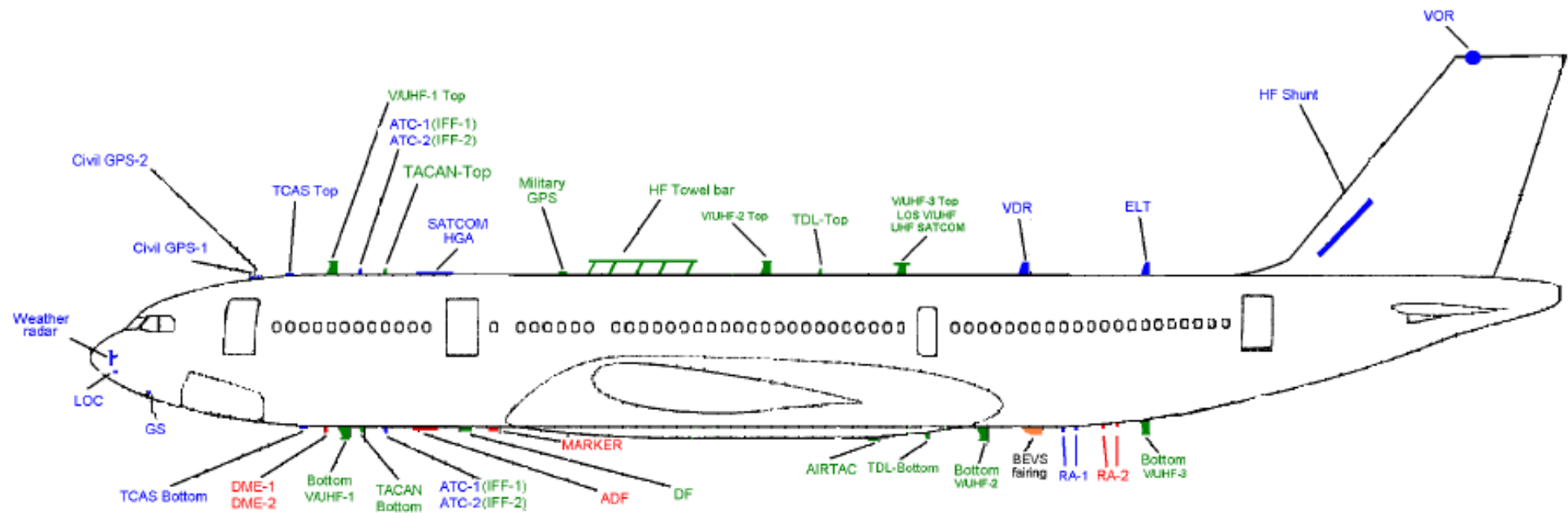


Figure 1. Antennas installation on A330-MRTT.

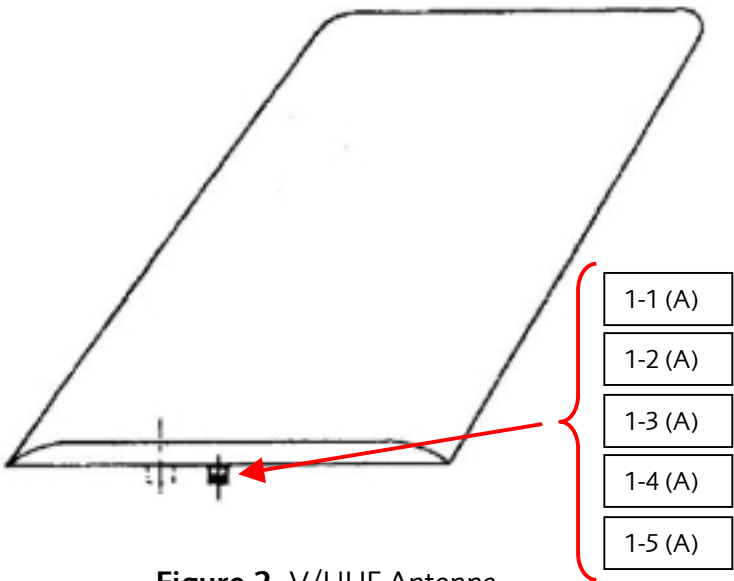


Figure 2. V/UHF Antenna.

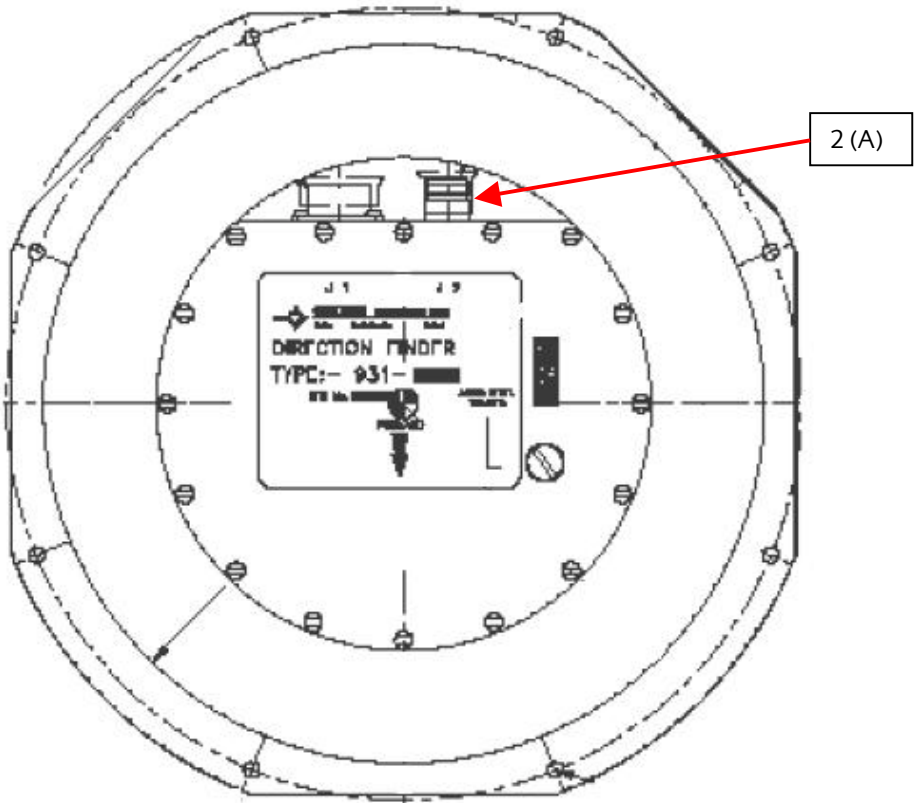


Figure 3. DF Antenna.

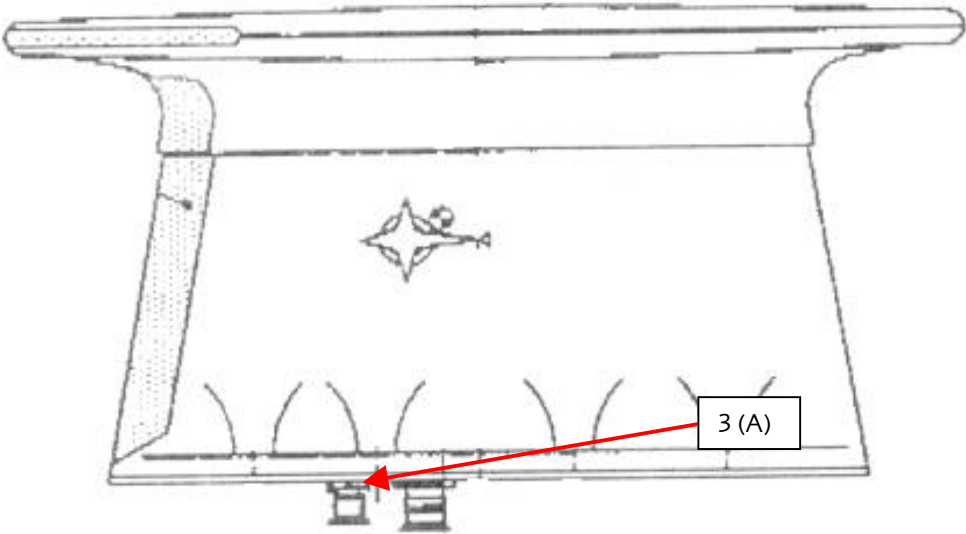


Figure 4. V/UHF LOS / UHF SATCOM Antenna.

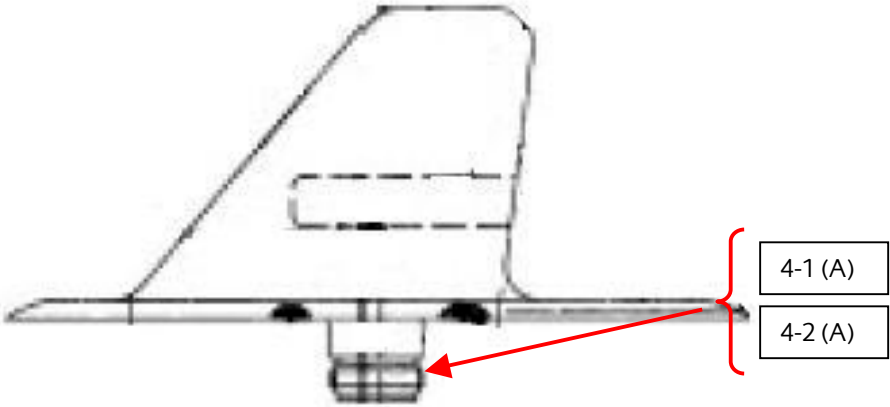


Figure 5. TDL Antenna.

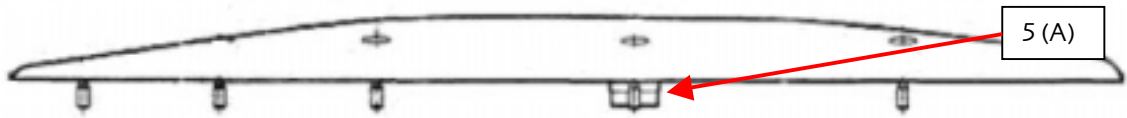


Figure 6. ADF Antenna.

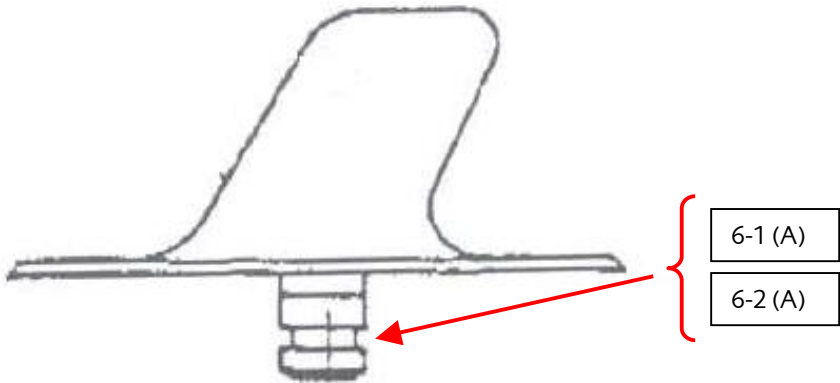


Figure 7. DME Antenna.

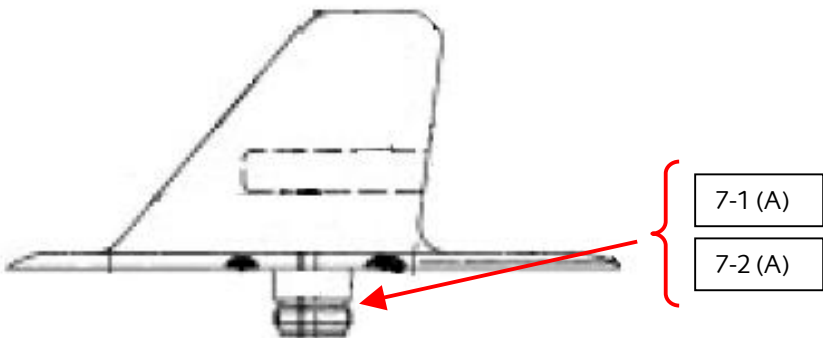
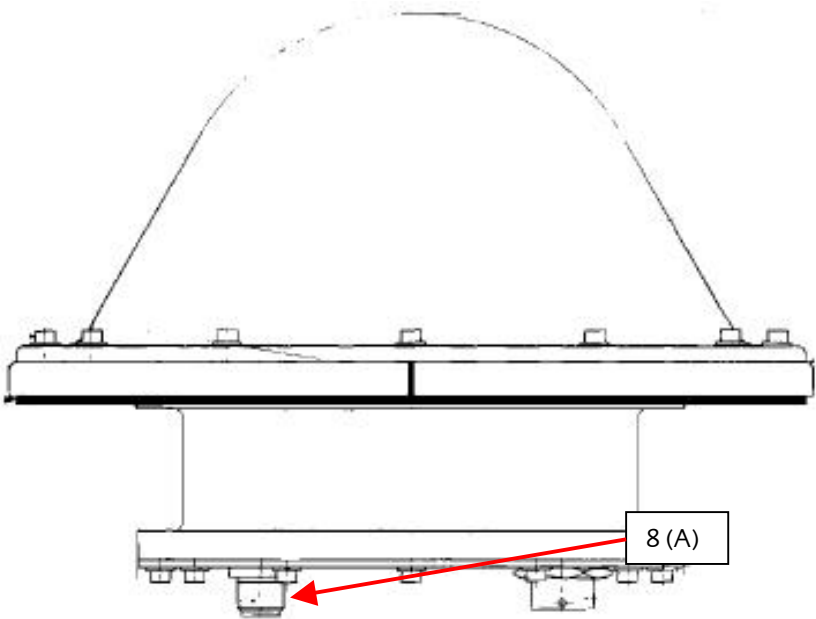
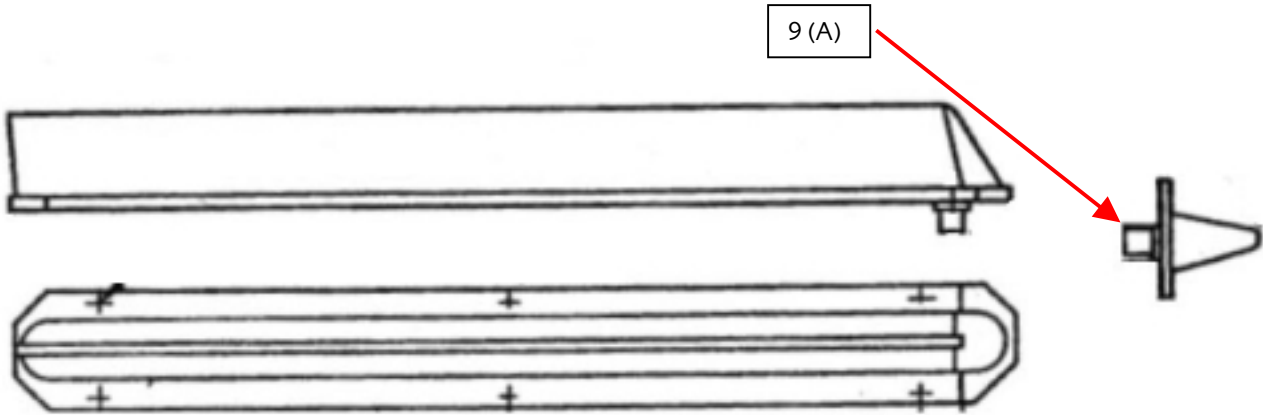


Figure 8. TACAN Antenna.



8 (A)

Figure 9. AIRTAC Antenna.



9 (A)

Figure 10. Marker Beacon Antenna.

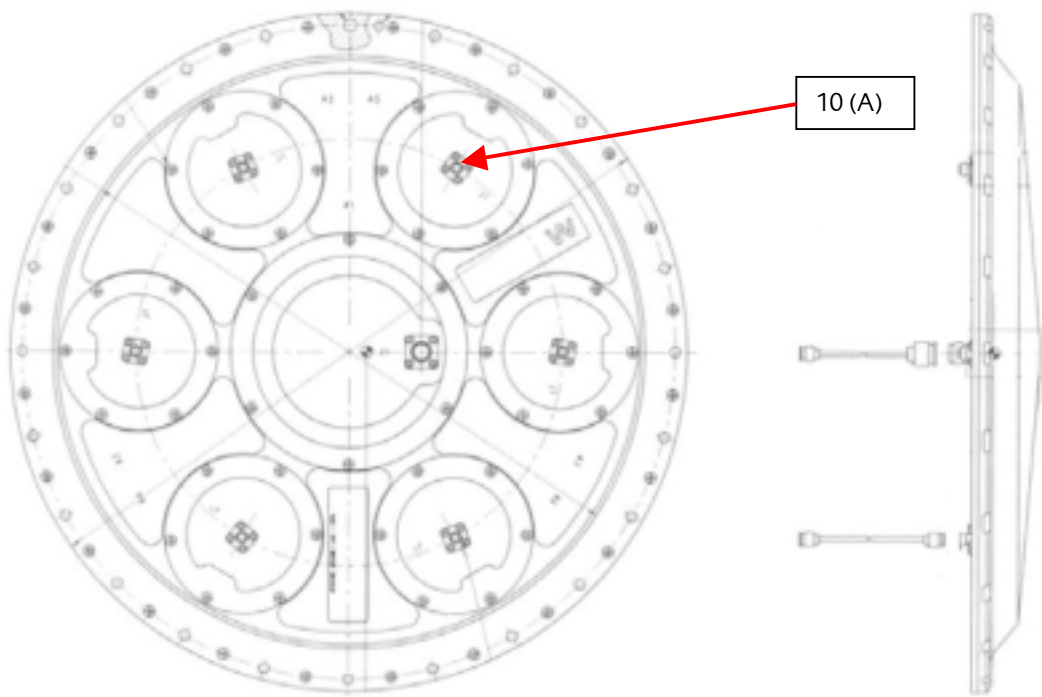


Figure 11. Military GPS Antenna.

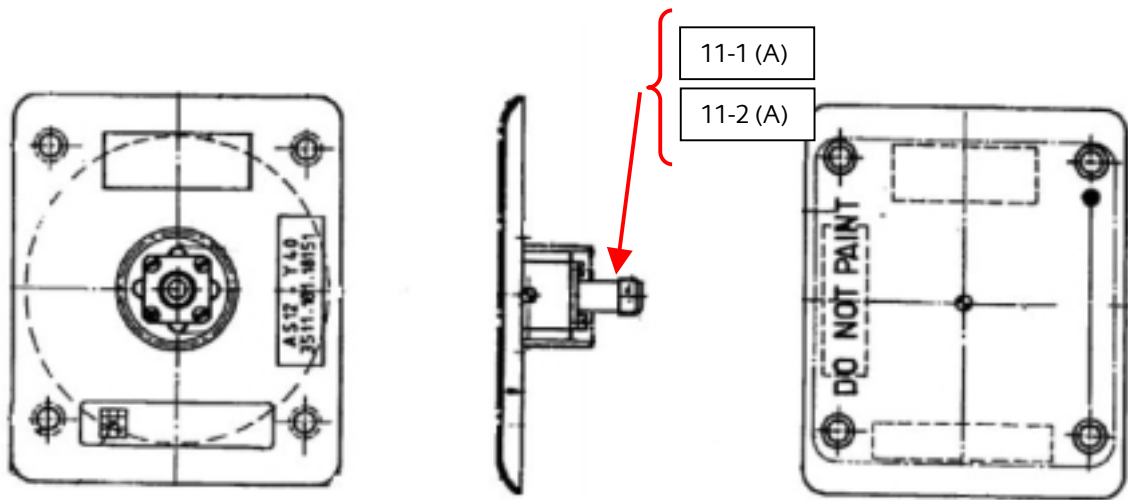


Figure 12. Radioaltimeter Antenna.

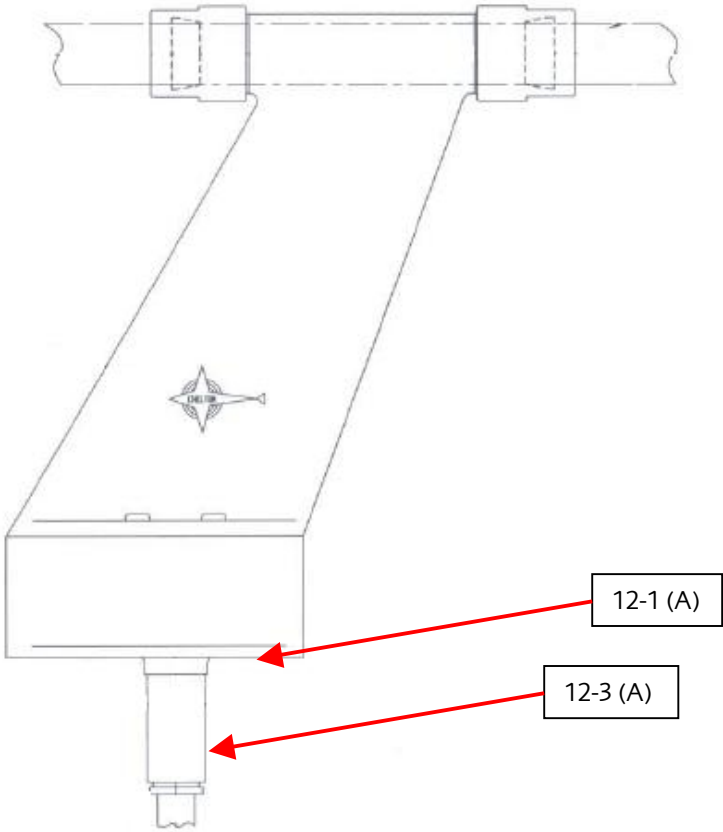


Figure 13. HF Towel Bar Antenna: Feed-Through Mast.

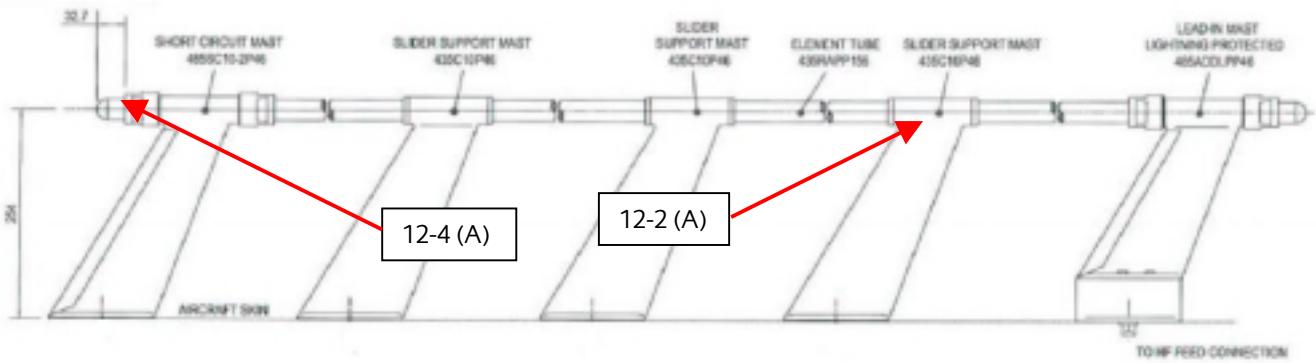


Figure 14. HF Towel Bar Antenna Array

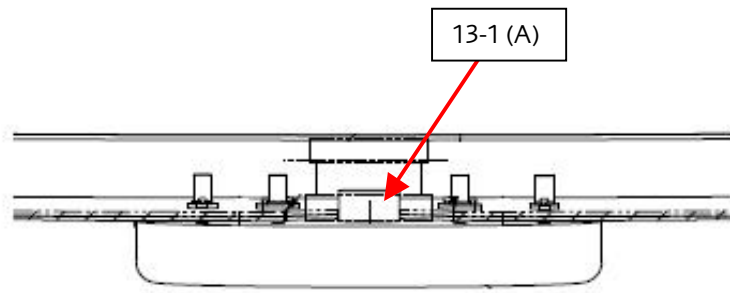


Figure 15. TCAS Bottom Antenna