spidertracks

# Installation of Spiders

Spider Tracks Limited

Spider Tracks Limited does not hold any STCs or TSOs for any of the Spidertracks products. It is the intention of Spider Tracks Limited that spiders are installed as required, or in most cases, used as they were intended to be – carry on equipment. This viewpoint has been suggested by CAA of New Zealand.

Any installation or hard wiring of the Spiders is at the discretion of an Aircraft Maintenance Engineer/Technician, and can be performed under one of several rules. The following pages contain copies of some paperwork associated with these recommendations. These recommendations are made for either New Zealand or the United States, and may apply in other countries.

Option One: AC43-14. Aircraft that fit within the limits of AC43-14 are able to install Spiders under appendix 9 of CAA of NZ's AC 43-14, as non-aeronautical avionics equipment. For installations into EC135 or Cessna Aircraft with Garmin G1000 Avionics, NTO letters have been issued following EMI testing. Reports are appended.

Option Two: The power lead for the unit may be hardwired into the aircraft power system. This is a modification performed in the field by any approved AME/AMT by submitting an FAA 337 form. Whether installation qualifies as a major modification will be at the discretion of the FAA Flight Standards District Office. For more information we recommend contacting your local AME/AMT.

In support of either of these, Spider Tracks Limited makes available the results of a DO-160E test carried out. This test result is appended.

You are of course, welcome to contact Spider Tracks Limited for any further information requested by your AME/AMT at support@spidertracks.com or by calling +64 6 353 3395.

## *Design Change – Application for approval of Technical Data*
## *Conformity Certificate – Major Modification, Major Repair*

CIVIL AVIATION AUTHORITY OF NEW ZEALAND

| INSTRUCTIONS: | Refer to AC43-9 before completing this application.<br>Print or type all entries and tick appropriate boxes.<br>Once completed, this form constitutes part of the aircraft records. | **Design Change Reference:** | |
|---|---|---|---|
| **1. AIRCRAFT** | Make: | Model: | |
| | Serial Nº: | Registration: ZK- | |
| **2. ORIGINATOR** | Name: | Address for service in New Zealand: | |
| | | | |
| | | | |

| **3. UNIT IDENTIFICATION** | | | | **4. TYPE OF ACTION** | |
|---|---|---|---|---|---|
| Unit | Make | Model / Part Nº | Serial Nº | Repair | Modification |
| Airframe | ~~~~~ *(As described in item 1 above)* ~~~~~ | | | | |
| Powerplant | | | | | |
| Propeller | | | | | |
| Component | Type | | | | |
| | Manufacturer | | | | |

### 5. TECHNICAL DATA CLASSIFICATION

The technical data identified overleaf in Section 8 ☐ **IS APPROVED** ☐ **REQUIRES APPROVAL AND I APPLY FOR APPROVAL**

Date: _____ Name: _____ Signature: _____

Phone: _____ Fax: _____ Email : _____

### 6. APPROVAL OF TECHNICAL DATA

Pursuant to the authority given persons specified below the technical data identified overleaf in Section 8 was assessed and subject to any conditions specified in Section 10 is :

☐ **APPROVED** *(see below)*
☐ **NOT APPROVED**

☐ The data identified herein complies with the applicable airworthiness requirements and is approved for the above described aircraft.

☐ The data identified herein complies with the applicable airworthiness requirements and is approved for duplication on identical aircraft make, model, and modified configuration by the original modifier.

☐ The embodiment of this [modification or repair] would normally be considered major and would require a conformity inspection by a person authorised in accordance with Part 43, Subpart E.

☐ Civil Aviation Authority ☐ Certificated Design Organisation Approval reference _____

Date: _____ Delegation or Certificate No: _____ Signature: _____

### 7. CONFORMITY STATEMENT

I hereby certify that a [repair or modification] has been carried out on this [aircraft or aircraft component] and that the [repair or modification] conforms to the applicable technical data specified in Part 21, Appendix D and described on the reverse or attachments hereto.

☐ IA Holder ☐ Certificated Maintenance Organisation ☐ Other (specify) _____

Date: _____ Certificate No: _____ Signature: _____

**N O T I C E**

**Embodiment details, including items fitted or removed, weight and balance, and reference to this form shall be entered in the aircraft record. Operating limitations, and flight manual supplements shall be included in the flight manual. A modification or repair must be compatible with all previous modifications or repairs to assure continued compliance with airworthiness requirements.**

**The technical data provided should include descriptive data, weight and balance calculations, and document amendments such as flight manual supplements. For applications for approval of the data, substantiating data and calculations should be supplied along with a statement of compliance or a request that such a statement be prepared.**

**8. TECHNICAL DATA**

*(This block may be used to list additional sheets if more room is required or if the data is considered proprietary. Identify each additional sheet with the aircraft details from Block 1 or the design change reference.)*

DESCRIPTION OF WORK ACCOMPLISHED: Number of additional sheets attached: ☐

WEIGHT AND BALANCE DATA: Number of additional sheets attached: ☐

DOCUMENT AMENDMENTS *(Flight Manual Supplements etc.)*: Number of additional sheets attached: ☐

**9. ADDITIONAL INFORMATION REQUIRED FOR APPLICATIONS FOR APPROVAL OF THE ABOVE TECHNICAL DATA**

SUBSTANTIATING DATA AND CALCULATIONS: Number of additional sheets attached: ☐

A statement of compliance has been issued by _____ and is attached ☐

I request that the design organisation/CAA prepare a statement of compliance ☐

**10. CONDITIONS OF APPROVAL (Design Organisation/CAA use only)**:

US Department of Transportation
**Federal Aviation Administration**

# MAJOR REPAIR AND ALTERATION
## (Airframe, Powerplant, Propeller, or Appliance)

Form Approved
OMB No. 2120-0020 11/30/2007

**For FAA Use Only**

Office Identification

INSTRUCTIONS: Print or type all entries. See FAR 43.9, FAR 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. 1421). Failure to report can result in civil penalty not to exceed $1,000 for each such violation (Section 901 Federal Aviation Act of 1958).

| | | |
|---|---|---|
| **1. Aircraft** | Make | Model |
| | Serial No. | Nationality and Registration Mark |
| **2. Owner** | Name *(As shown on registration certificate)* | Address *(As shown on registration certificate)* |

**3. For FAA Use Only**

**4. Unit Identification** | **5. Type**

| Unit | Make | Model | Serial No. | Repair | Alteration |
|---|---|---|---|---|---|
| AIRFRAME | *(As described in Item 1 above)* | | | | |
| POWERPLANT | | | | | |
| PROPELLER | | | | | |
| APPLIANCE | Type / Manufacturer | | | | |

**6. Conformity Statement**

| A. Agency's Name and Address | B. Kind of Agency | C. Certificate No. |
|---|---|---|
| | ☐ U.S. Certificated Mechanic | |
| | ☐ Foreign Certificated Mechanic | |
| | ☐ Certificated Repair Station | |
| | ☐ Manufacturer | |

D. I certify that the repair and/or alteration made to the unit(s) identified in item 4 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herin is true and correct to the best of my knowledge.

| Date | Signature of Authorized Individual |
|---|---|
| | |

**7. Approval for Return To Service**

Pursuant to the authority given persons specified below, the unit identified in item 4 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☐ APPROVED ☐ REJECTED

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BY | ☐ | FAA Flt. Standards Inspector | ☐ | Manufacturer | ☐ | Inspection Authorization | Other *(Specify)* |
| | ☐ | FAA Designee | ☐ | Repair Station | ☐ | Person Approved by Transport Canada Airworthiness Group | |

| Date of Approval or Rejection | Certificate or Designation No. | Signature of Authorized Individual |
|---|---|---|
| | | |

**NOTICE**

*Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.*

**8. Description of Work Accomplished**

*(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

☐ Additional Sheets Are Attached

**Paperwork Reduction Act Statement:** The reason for collecting this information is to track major maintenance performed on aircraft. The collected information is used as part of the aircraft's historical file. The public reporting burden for this collection of information is estimated to average 30 minutes per response. Responses are mandated by 14 CFR Part 43. Collected information becomes part of the public record and no confidentiality is required. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control number associated with this collection is 2120-0020. Comments concerning the accuracy of this burden and suggestions for reducing the burden should be directed to the FAA at: 800 Independence Ave. SW Washington, DC 20591, Attn: Information Collection Clearance Officer, ABA-20.

Electronic Version (Adobe)

EMC Technologies (NZ) Ltd
PO Box 68-307
Newton, Auckland
Phone 09 360 0862
Fax 09 360 0861
E-Mail Address: aucklab@ihug.co.nz
Web Site: www.emctech.com.au

# TEST REPORT

## Spider Tracks, Spider S3
## GPS Tracking Unit for Aircraft

*tested to the specification*

## AS/NZS CISPR 22, 2009

*for*

## Spider Tracks Ltd

This Test Report is issued with the authority of:

**Andrew Cutler- General Manager**

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

# Table of Contents

# 1. STATEMENT OF COMPLIANCE

The **Spider Tracks, Spider S3,** GPS tracking unit for aircraft complies with AS/NZS CISPR 22, 2009 as a Class B device.

# 2. RESULTS SUMMARY

The results from testing are summarised in the following table:

| Parameter | Result |
|---|---|
| Noise Terminal Voltage<br>0.15 - 30 MHz | Not applicable – battery powered device. |
| Radiated Emissions<br>30 - 1000 MHz | Complies – No emissions observed with 20 dB of the limits prescribed. |

# 3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification.

**The client selected the test sample.**

**This report relates only to the sample tested.**

**This report contains no corrections or erasures.**

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

# 4. CLIENT INFORMATION

| | |
|---|---|
| **Company Name** | Spider Tracks Ltd |
| **Address** | P.O. Box 5203,<br>Terrace End |
| **City** | Palmerston North |
| **Country** | New Zealand |
| **Contact** | Mr James McCarthy |

# 5. DESCRIPTION OF TEST SAMPLE

| | |
|---|---|
| **Brand Name** | Spider Tracks |
| **Model Number** | Spider S3 |
| **Product** | GPS tracking unit for aircraft |
| **Manufacturer** | Spider Tracks Ltd |
| **Country of Origin** | New Zealand |
| **Serial Number** | 2V7HG5MP3N |

# 6. SETUPS AND PROCEDURES

**Standard**

The sample was tested in accordance with AS/NZS CISPR 22, 2009.

**Methods and Procedures**

The measurement methods and procedures used were as follows:

**Description of Radiated Emissions Test Setup**

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand (Note: Site conforms to the requirements of CISPR 16, Part 1, Clause 16, and ANSI C63.4 - 2003).

Before testing was carried out, a receiver self-calibration was undertaken. Additionally, a check of all cables and programmed antenna factors was carried out.

The device was placed on the test tabletop, which was a total of 0.8 m above the test site ground plane and 3 m from the antenna.

Testing was carried out in a mode in which the device operated normally.

Any external cables were orientated for the worst-case emissions level.

Testing was carried out by manually scanning between 30 MHz and 1000 MHz in 100 kHz steps while aurally and visually monitoring for emissions.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height with an automated antenna tower.

The emission is measured in both vertical and horizontal antenna polarisations.

During the test, a number of ambient emissions are identified (list of which can be provided upon request).

The emission level is determined in field strength by taking the following into consideration:
Level (dBμV/m) = Receiver Reading (dBμV) + Antenna Factor (dB) + Coax Loss (dB)

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (30 - 1000 MHz) ± 4.1 dB

# 7. TEST EQUIPMENT USED

| Instrument | Manufacturer | Model | Serial No | Asset Ref |
|---|---|---|---|---|
| Aerial Controller | EMCO | 1090 | 9112-1062 | RFS 3710 |
| Aerial Mast | EMCO | 1070-1 | 9203-1661 | RFS 3708 |
| Biconical Antenna | Schwarzbeck | BBA 9106 | - | RFS 3612 |
| Log periodic Antenna | Schwarzbeck | VUSLP 9111 | 9111-2801 | 3785 |
| Measurement Receiver | Rohde & Schwarz | ESCS-30 | 847124/020 | E1595 |
| Turntable | EMCO | 1080-1-2.1 | 9109-1578 | RFS 3709 |

# 8. ACCREDITATIONS

The tests were carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ ISO 17025.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ ISO 17025.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

# 9. RESULTS

**Radiated Emissions 30 – 1000 MHz**

The DUT was placed in the centre of the test table and was powered at 12.0 Vdc.

Testing was carried out by manually scanning between 30 MHz and 1000 MHz in 100 kHz steps while aurally and visually monitoring for emissions.

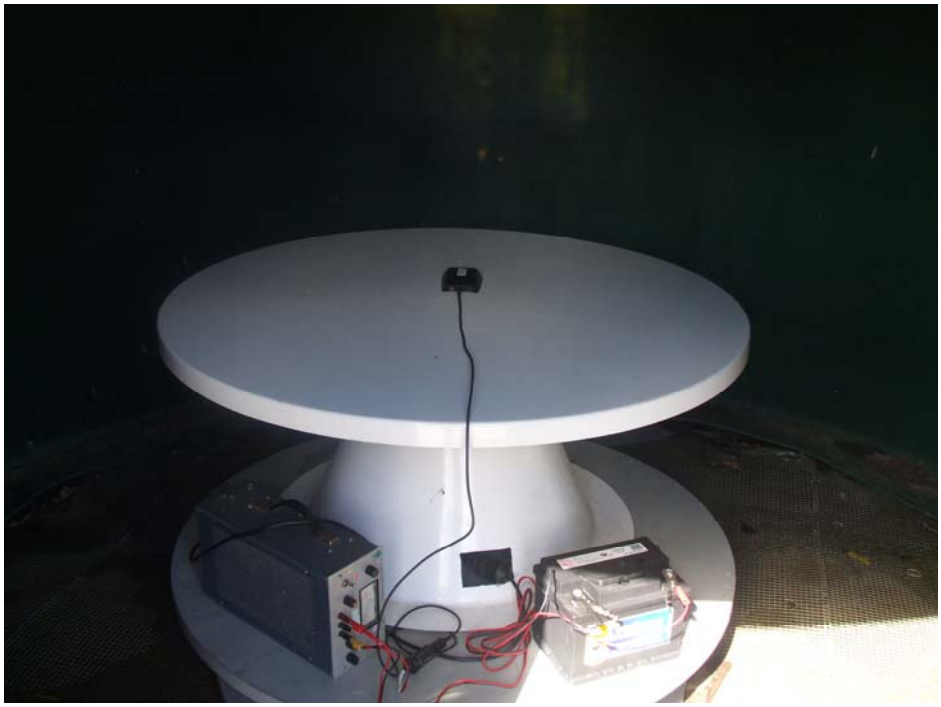
The device was placed on the test tabletop, which was a total of 0.8 m above the test site ground plane and 3 m from the antenna.

Testing was carried out in a mode in which the device operated normally.

The power cable was orientated for the worst-case emissions level.

No emissions observed within a 20 dB margin of the limit up to 1GHz.

# 10. PHOTOGRAPH (S)

SAAB

Dokumentslag *Type of document*
**Report**

Reg-nr *Reg. No*
ETN-2012-005

Ägare *Owner*
OTTFGSZ Tomas Nilzon
Fastställd av *Confirmed by*
OTTFGS-M Jan-Åke Bjärkmar

Datum *Date*
2012-04-12
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Saab AB
Support and Services
Aircraft Services
Bröderna Ugglas gata
581 88 Linköping

Ärende *Subject*
**EMC Test – Spidertracks S3**

Fördelning *To*
Anders Bergstrand



**Test Engineer/**
**Test Method Responsible EMC Lab**

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## Contents

**Document revision history**

| Edition | Date | Paragraph | Details |
|---|---|---|---|
| ETN-2012-005 (1) | 2012-02-23 | N/A | First Issue |
| ETN-2012-005 (2) | 2012-03-07 | 2.4 | Updated Table 2 with EUT p/n |
| ETN-2012-005 (3) | 2012-03-12 | N/A | Changed Info class from COMPANY RESTRICTED to COMPANY UNCLASSIFIED |
| | | | |

Table 1: Revision history.

# 1 ABSTRACT

EMC test has been carried out on the Spidertracks S3 supplied by Saab AB Support and Services, Aircraft Services.

The test was performed according to RTCA/DO160F sections 15 (category Z) and 21 (category M).

## 1.1 Summarized result

The tested unit showed compliance with the requirement for the tests performed.

This report accounts for the procedures and detailed results of this test.

# 2 GENERAL

## 2.1 References

[1] RTCA DO-160F, "ENVIRONMENTAL CONDITIONS AND TEST PROCEDURES FOR AIRBORNE EQUIPMENT". RTCA Inc. Issued December 6, 2007.

## 2.2 Abbreviations

| | |
|---|---|
| A | Ampere |
| AUX | Auxiliary |
| CE | Conducted Emission |
| DC | Direct Current |
| EM | Electromagnetic |
| EMC | Electromagnetic Compatibility |
| EUT | Equipment Under Test |
| GP | Ground Plane |
| GPS | Global Positioning System |
| ID | Identification |
| LED | Light Emitting Diode |
| mA | Milliampere |
| mΩ | Milliohm |
| N/A | Not Applicable |
| PC | Personal Computer |
| p/n | Part Number |
| RBW | Resolution Bandwidth |
| RE | Radiated Emission |
| Rev. | Revision |
| SAC | Semi Anechoic Chamber |
| s/n | Serial Number |
| T&M | Test and Measurement |
| V | Volt |
| VDC | Volt Direct Current |

EUT specific abbreviations are not covered in this list.

## 2.3 Scope

Qualification of the tested equipment's EM environment characteristics regarding conducted and radiated emission of EM-signals and also magnetic effect. This qualification shall ensure safe and interference free operation of the tested equipment when installed on its platform.

## 2.4 Test object

The test object is referred to as ”EUT”.

| EUT | Unit | p/n | s/n |
|---|---|---|---|
| 1 | Spidertracks S3 | 6000.S3 | 56ZAU3P49Z |

Table 2: Test object.

Supplier: Saab AB – Support and Services
Aircraft Services
Bröderna Ugglas gata
581 88 Linköping
Sweden

### 2.4.1 EUT firmware/software version

N/A

## 2.5 Auxiliary equipment

Equipment supplied by the customer used during the tests in order to power supply, connect, load or monitor the EUT.

| AUX | Unit | Model | ID |
|---|---|---|---|
| 1 | GPS Repeater | GPS-Source p/n:GPSRKL1-A25-P230/5 | A08285 |

Table 3: Auxiliary equipment.

## 2.6 Site and date

The test took place at Saab AB EMC-Test facility in Linköping Sweden on February 16, 2012.

Saab AB - Aeronautics
Flight Test and Verification
Gelbgjutaregatan 2
SE-581 88 Linköping
Sweden

Test Method Responsible EMC Lab
Tomas Nilzon tomas.nilzon@saabgroup.com
Phone +46 13 185669

## 2.7 Test environmental conditions

Temperature, controlled: 20 °C
Humidity, ambient: 37 % relative
Air pressure, ambient: 1012 hPa

## 2.8 Personnel

**Contractor test engineer**
Saab AB – Aeronautics Tomas Nilzon
Flight Test and Verification

**Customer representatives**
Saab AB Support and Services Anders Bergstrand
Aircraft Services

## 2.9 Miscellaneous

- There are only selected samples of pictures from the test in this report. All of the pictures can be supplied upon request.
- ASCII tables from emission result charts can be supplied if precise frequency and/or amplitude determination is desirable.
- The "EUT" identification (EUT 1, EUT 2 etc.) printed with date, time and file data in some of the charts are automatically generated by the T&M software and thus not always valid. Therefore always refer to document text and tables.
- A test logbook (written in Swedish) is also available.

# 3 PERFORMED TESTS

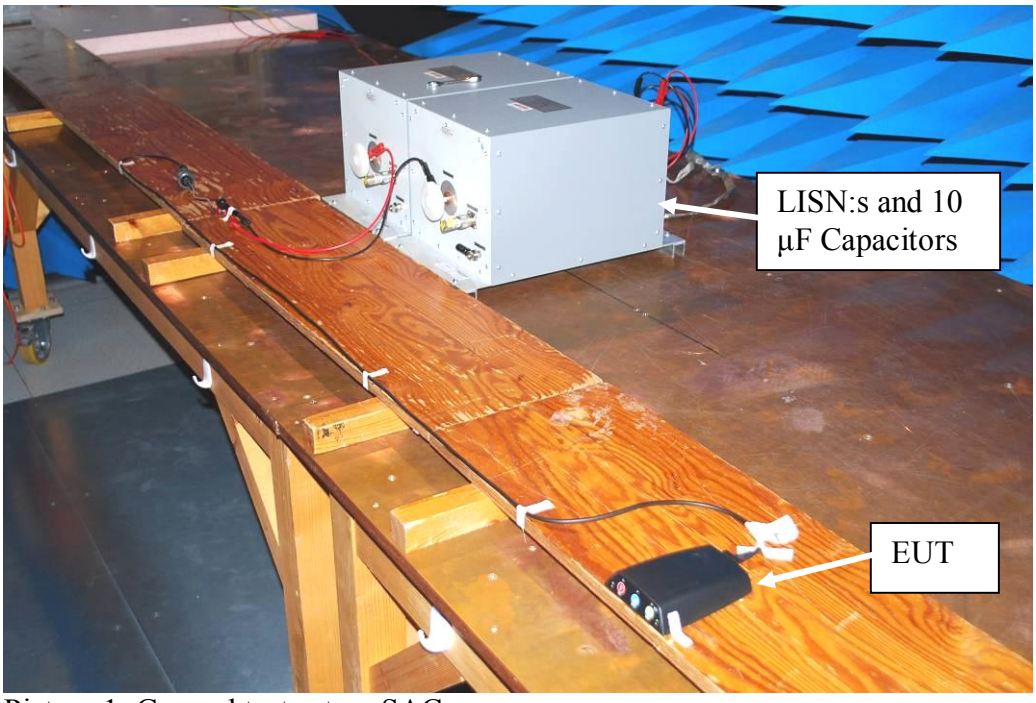
The test facility consists of an SAC with two adjoining shielded rooms, one of which is equipped with a ground plane table with the same ground reference as in the SAC, this accommodation is the customer control room. The other room houses the test equipment. See 4.1 Main characteristics of test facility.

## 3.1 Traceability

All tests are performed using calibrated instruments traceable to national/international standards and with parameters (e.g. RBW, Sweep- and Dwell- Time) set according to applicable reference documentation if nothing else noted.

## 3.2 General Test setup

The EUT with its power cable was placed on a ground plane test table in the SAC supported 5 cm above the ground plane. A GPS-repeater was also arranged in the SAC to provide a GPS-signal so that the EUT could operate in correct mode for the EMC-test. Power cable supplied for the test was the one intended for actual installation and was 2 m in length.




Picture 1: General test setup, SAC.

### 3.2.1 Bonding

There was no bonding to the ground plane of the EUT case.

### 3.2.2 Power

The EUT was supplied by 28 VDC nominal voltage. Current during normal operation was ≈60 mA.

| *Equipment* | *Model* | *Reg. No.* | *Cal. Due* |
|---|---|---|---|
| Power Supply | DELTA Elektronika SM7020-D | NA02200 | OPMON |
| LISN | Solar 9233-50TS-50-N | UM03000 | 2013-01 |
| LISN | Solar 9233-50TS-50-N | UM03100 | 2013-01 |
| Feed Through Capacitor 10 µF | Solar 9146-1 | UM01400 | N/A |

Table 4: Power supply equipment

### 3.2.3 EUT operation mode

The EUT was in mode 3 during the EMC test, see below.

Information provided by the EUT manufacturer.

The EUT has three basic modes as follows:

1. Power on initialisation, including GPS Fix acquisition.
2. Location monitoring (GPS fIx established)
3. Location transmission (Iridium Session instigation).

Peak output (worst case regarding transmitting power) occurs in mode 3. Testing the unit where connectivity with the Iridium system is not possible ensured that maximum power is used during this mode, when trying to establish contact with the Iridium satellites.

### 3.2.4 EUT monitoring

EUT operation was monitored by observing the indicator LED:s on the front panel.

### 3.3 RTCA DO160F

Reference [1].

#### 3.3.1 Section 15

Magnetic Effect

##### 3.3.1.1 Acceptance criteria

With the equipment operated in the steady state mode that produce the maximum magnet deflection and also oriented to produce maximum magnet deflection, the distance between the magnet pivot and the nearest part of the equipment at which a deflection of Dc (Deflection angle) is one degree.

| Equipment Class | Distance for a Deflection of Dc |
|---|---|
| Z | ≤ 30 cm |

##### 3.3.1.2 Test equipment

| *Reg. No.* | *Equipment* | *Model* | *Cal. Due* |
|---|---|---|---|
| N/A | Software | HMR 800-323-8295 Rev. C | |
| PC00400 | Computer | Fujitsu ErgoPro | N/A |
| UA03600 | Digital Compass Module | Honeywell HMR3000 | 2013-02 |

Table 5: Section 15, Magnetic effect, Test Equipment.

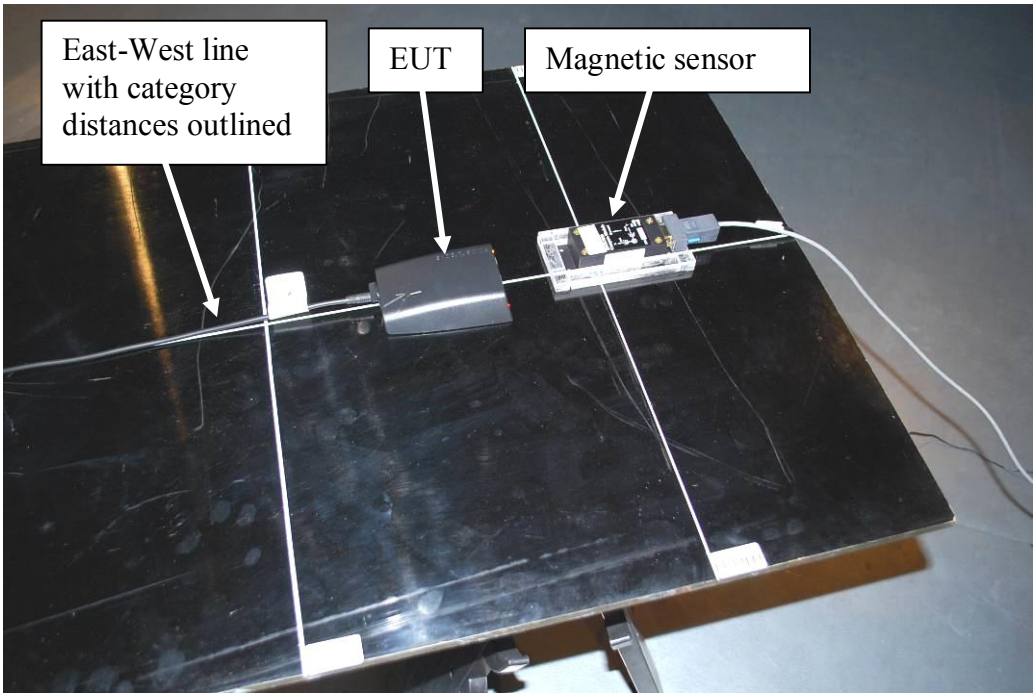
##### 3.3.1.3 Test configuration

See 3.2 General Test setup.

Magnetic deflection was observed while bringing the EUT closer and further away to a fixed precision compass sensor lined up on an east-west line. See Picture 2.

*Note: The horizontal component of the magnetic field produced by the earth on the test location[1)] requires +0.2° compensation. So Dc for this test is 1.2° [1].*

*[1)] The horizontal component of the magnetic field produced by the earth in Linköping, Sweden is 12.4 A/m.*




Picture 2: Section 15, Magnetic effect, test setup.

#### 3.3.1.4 Result

The EUT complied with the requirement. Distance to the compass sensor for a deflection of 1.2° was ≤30 cm[1)] for all sides of the EUT.

[1)] Worst case with the EUT front facing the compass was 5 cm distance.

### 3.3.2 Section 21

Emission of Radio Frequency Energy.

#### 3.3.2.1 Acceptance criteria

Category M. Emission (Conducted and Radiated) shall be within the limits according to Figure 1 and Figure 2.

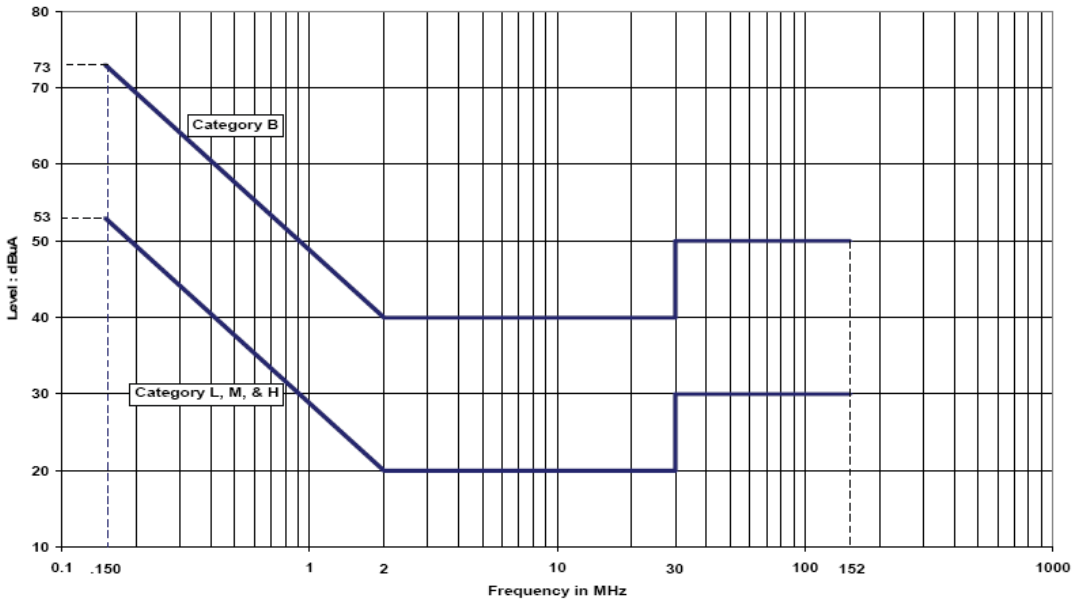



Figure 1: Section 21, Emission of Radio Frequency Energy, Conducted Emission Power Lines Category M applies.

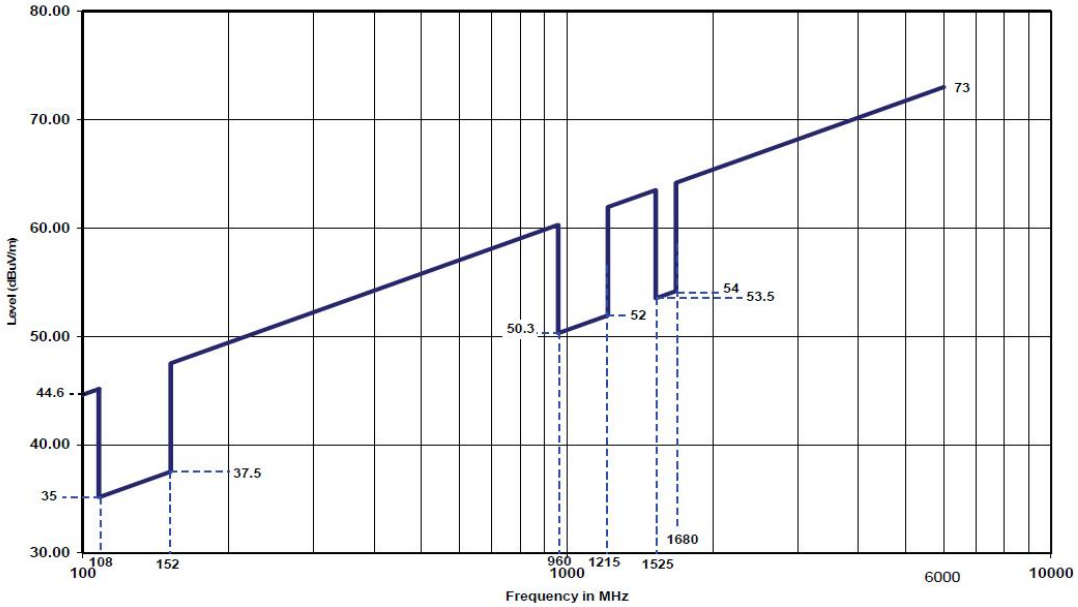



Figure 2: Section 21, Emission of Radio Frequency Energy, Radiated Emission Category M.

### 3.3.2.2 Test equipment

| *Equipment* | *Model* | *Reg. No.* | *Cal. Due* |
|---|---|---|---|
| Software | REMI v2.134 | N/A | N/A |
| Computer | DELL OPTIPLEX 780 | PC00900 | N/A |
| EMI Test Receiver | Rohde&Schwarz ESI 40 | AN00500 | 2012-09 |
| Biconical Antenna | EMCO 3110B | AT01600 | 2012-09 |
| Horn Antenna | EMCO 3106 | AT03000 | 2012-09 |
| Horn Antenna | EMCO 3115 | AT03600 | 2012-09 |
| Preamplifier | HP 8449B | FO02200 | 2013-11 |
| Current Probe | Stoddart 91 550-1 | PR00700 | 2013-10 |
| Resistive load | AT-R1-(28) | UM02200 | N/A |

Table 6: Section 21, Emission of Radio Frequency Energy, Test Equipment.

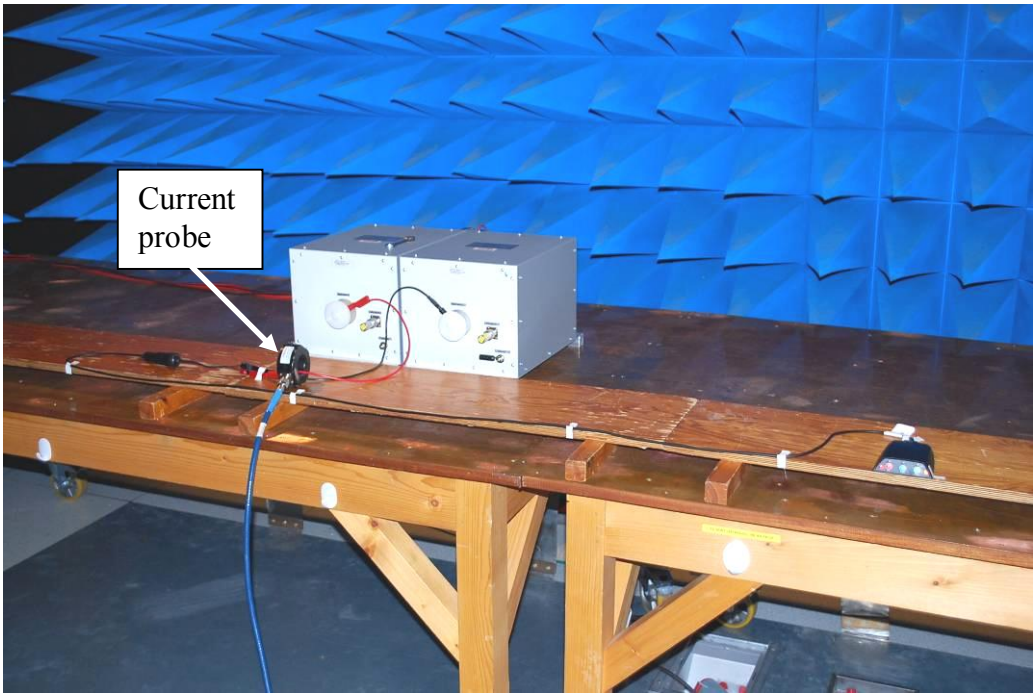
### 3.3.2.3 Test configuration

See 3.2 General Test setup.

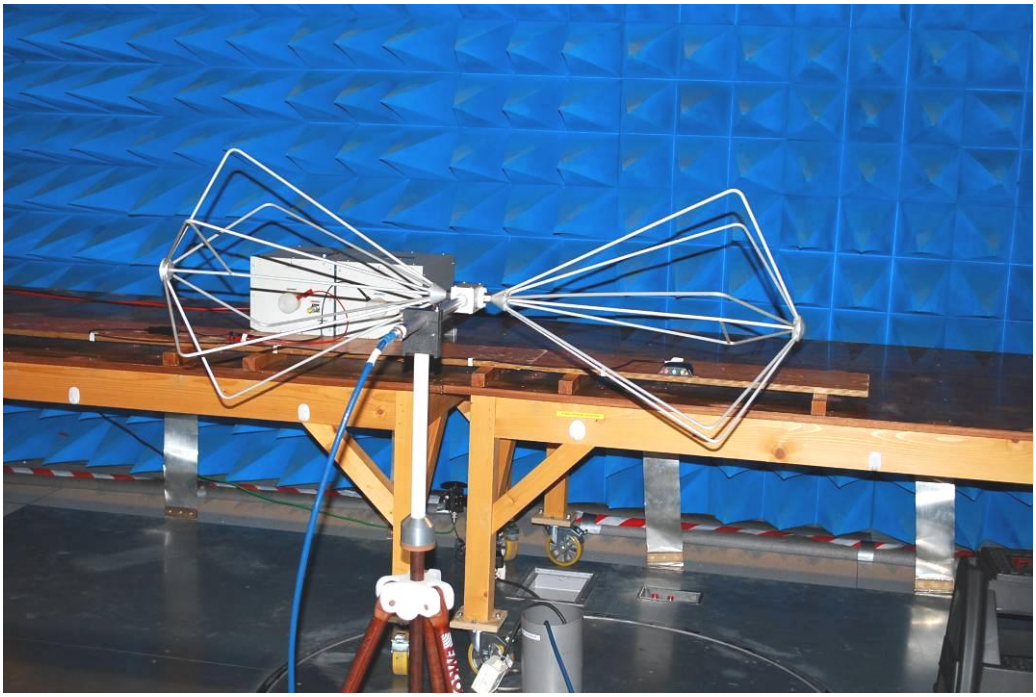
**Conducted**
Conducted emission was measured with a current probe placed 2 m from the EUT connector[1)]. See Picture 3.

[1)] Should have been 5 cm according to [1], but with the EUT cable configuration 2 m was the closest possible.

**Radiated**
Radiated emission was measured with antennas 1 m in front of the test setup boundary. See Picture 4.




Picture 3: Section 21, conducted emission test setup.



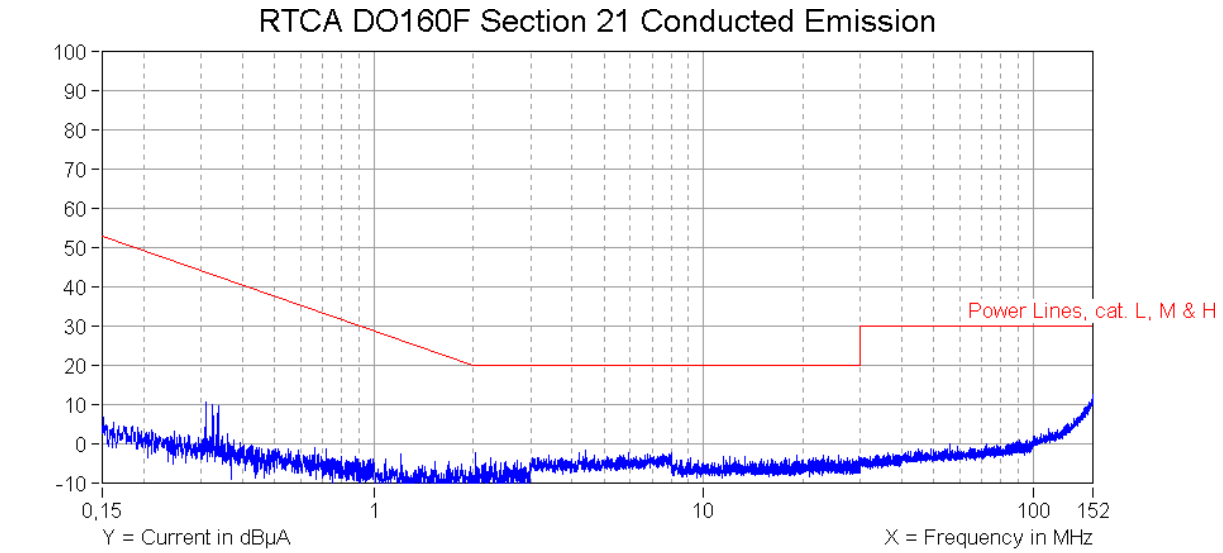
Picture 4: Section 21, radiated emission test setup.

### 3.3.2.4 Result

The EUT complied with the requirement. No emission above limit was registered.

*Note: Emission peak at 1625 MHz in Chart 5 is the EUT Iridium™ transmission. This transmission was intermittent and not captured in Chart 6, but manually observed in real time with the same amplitude in both antenna polarizations.*

Chart 2 to Chart 3 display conducted emission.
Chart 5 and Chart 6 display radiated emission.
Chart 1 and Chart 4 display ambient noise.

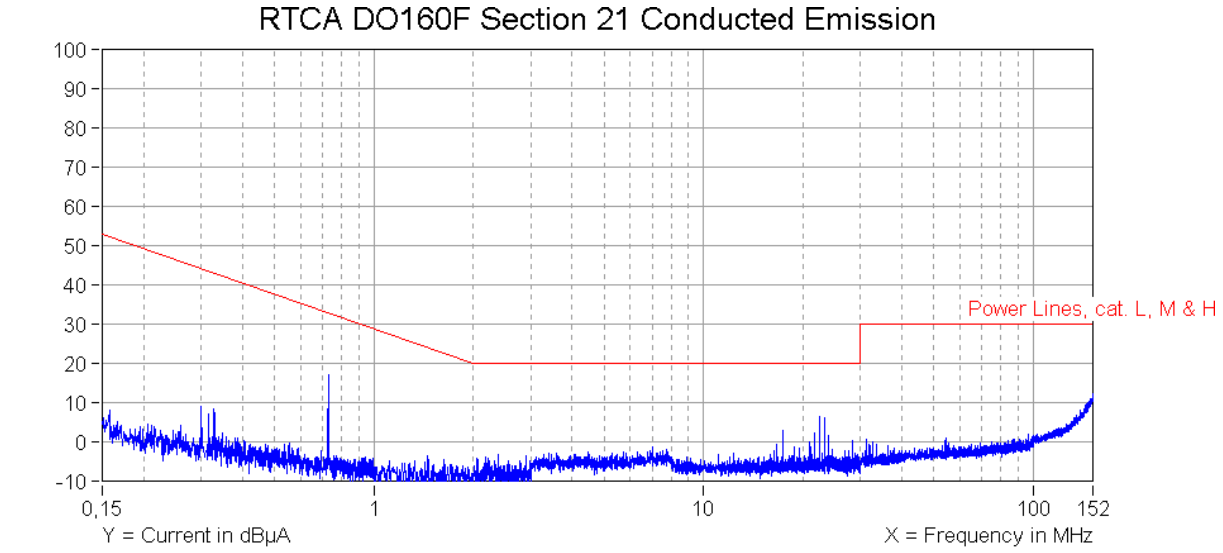



2012-02-16 09:26:25 File: CE01.TO1, EUT 1, Spidertracks S3 s/n:56ZAU3P49Z

Ambient noise
EUT off, resistive load on power (40 ohm)
Mode of operation: N/A
Cable: +28 VDC

Saab AB Aeronautics, SE-581 88 Linköping, Sweden OTTFGSZ-TN

Chart 1




2012-02-16 10:47:51 File: CE02.TO1, EUT 1, Spidertracks S3 s/n:56ZAU3P49Z

EUT on
Mode of operation: Normal mode
Cable: +28 VDC

Saab AB Aeronautics, SE-581 88 Linköping, Sweden OTTFGSZ-TN

Chart 2

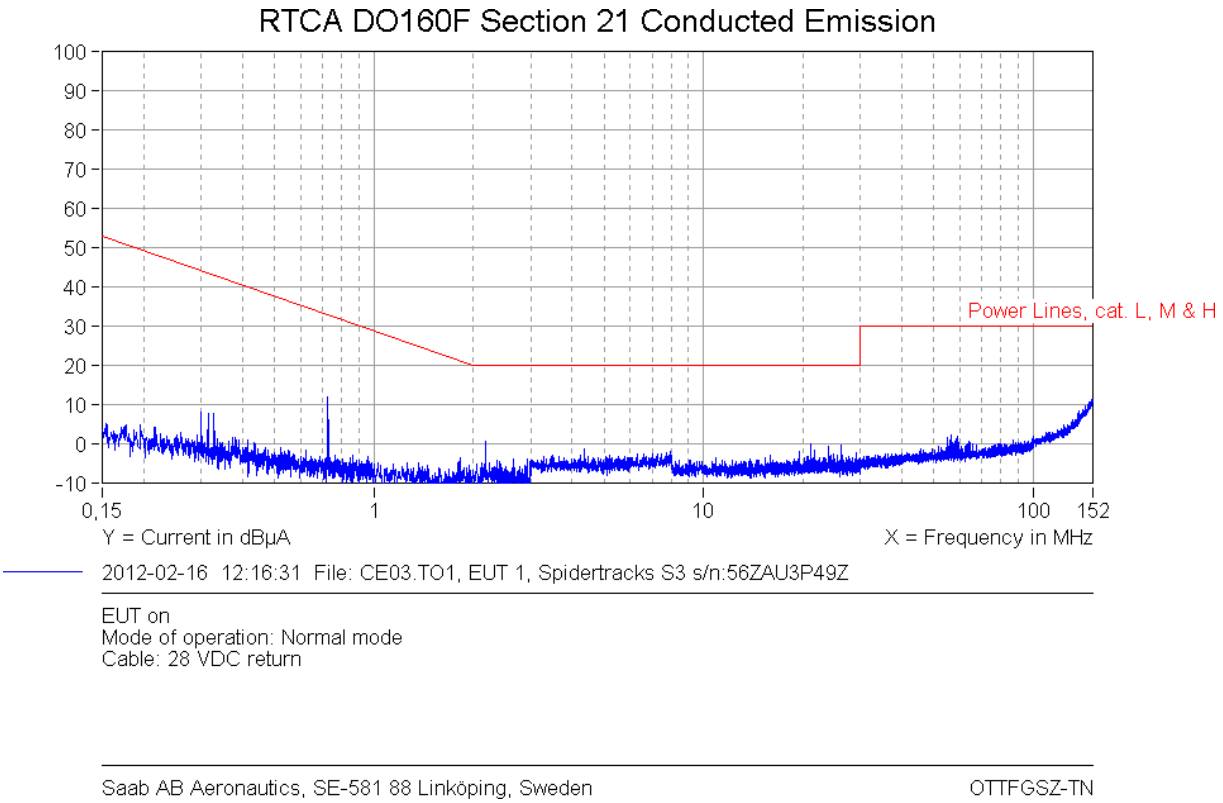



Chart 3

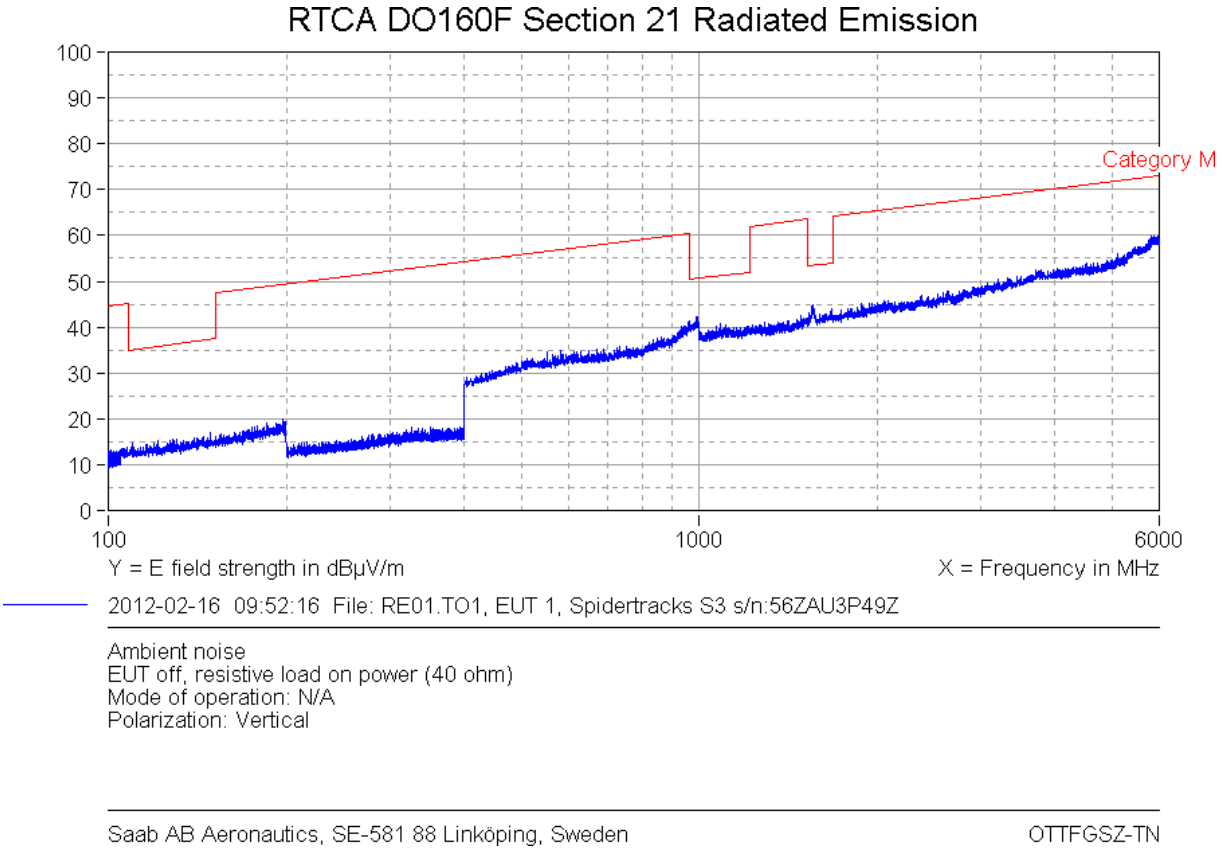



Chart 4

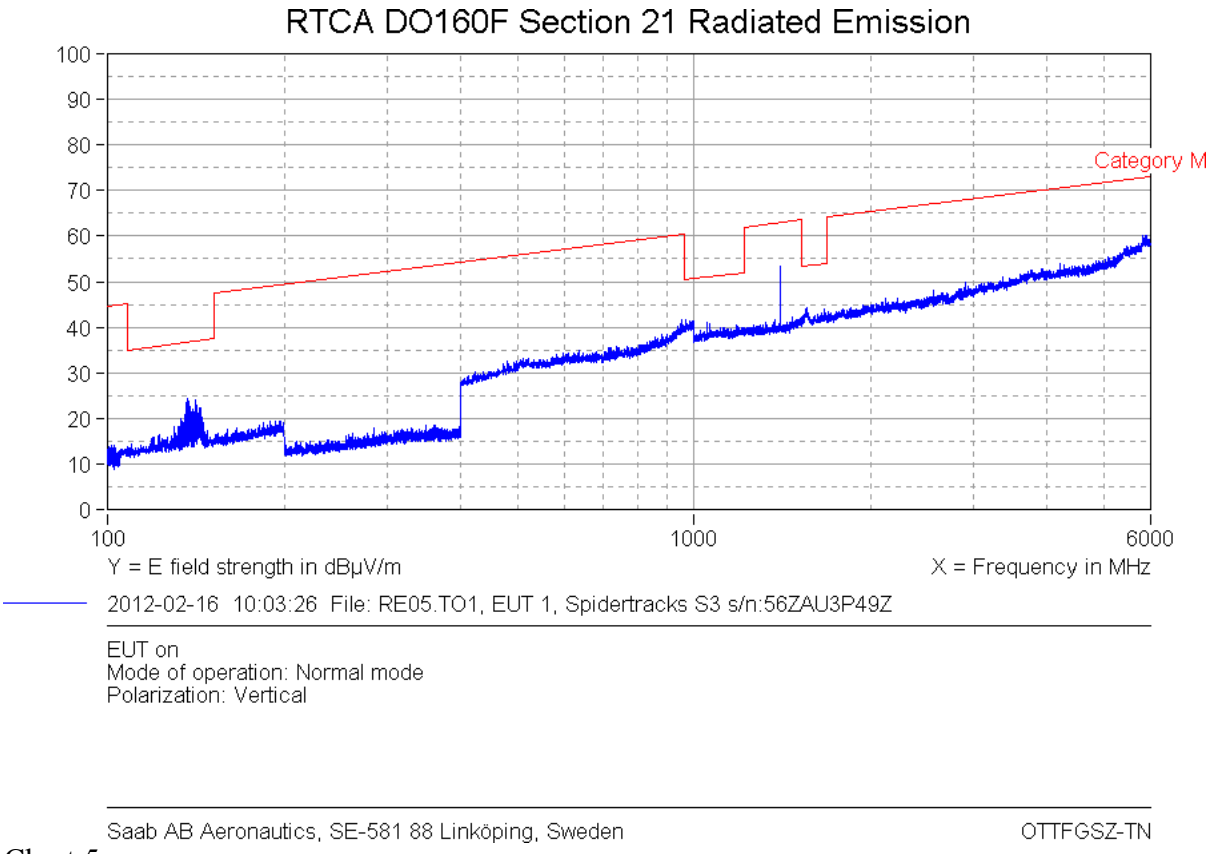



Chart 5

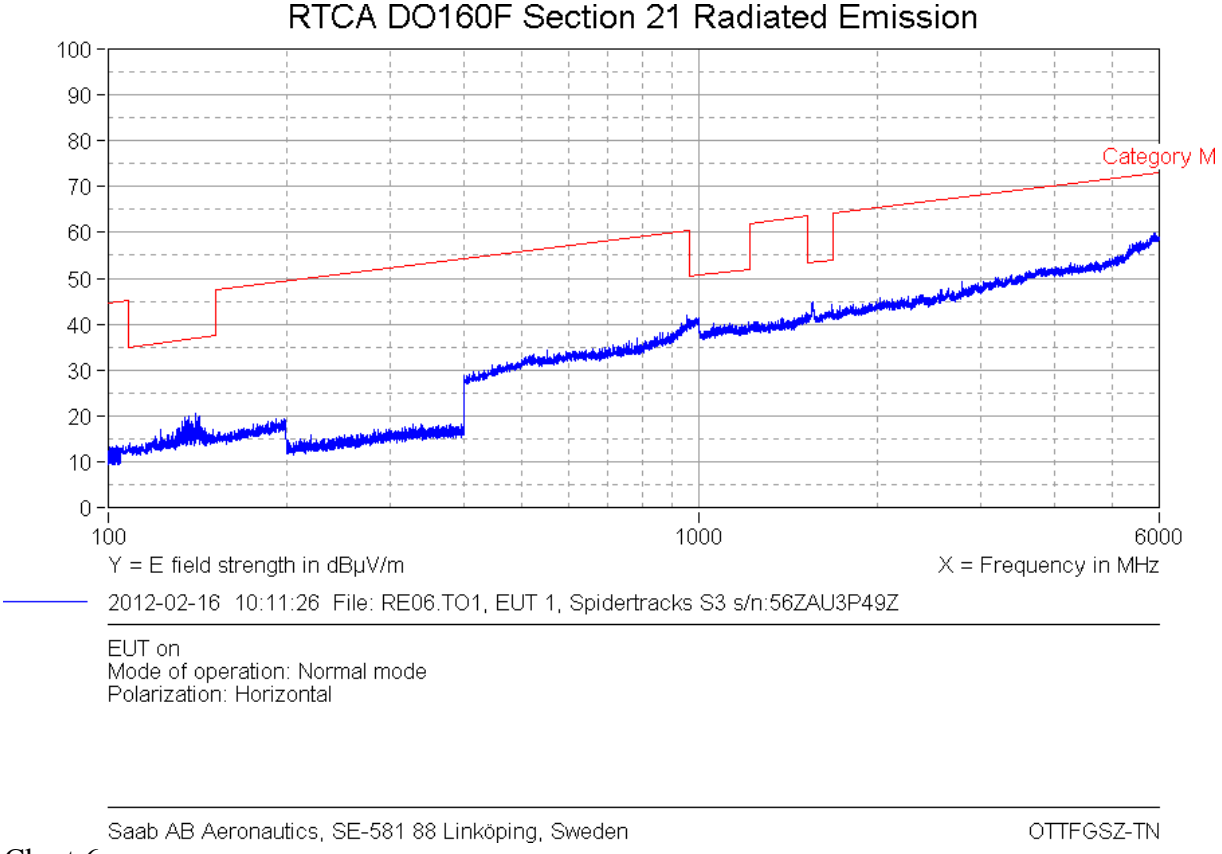



Chart 6

# 4 APPENDIX

## 4.1 Main characteristics of test facility

### 4.1.1 Semi Anechoic Chamber (SAC)

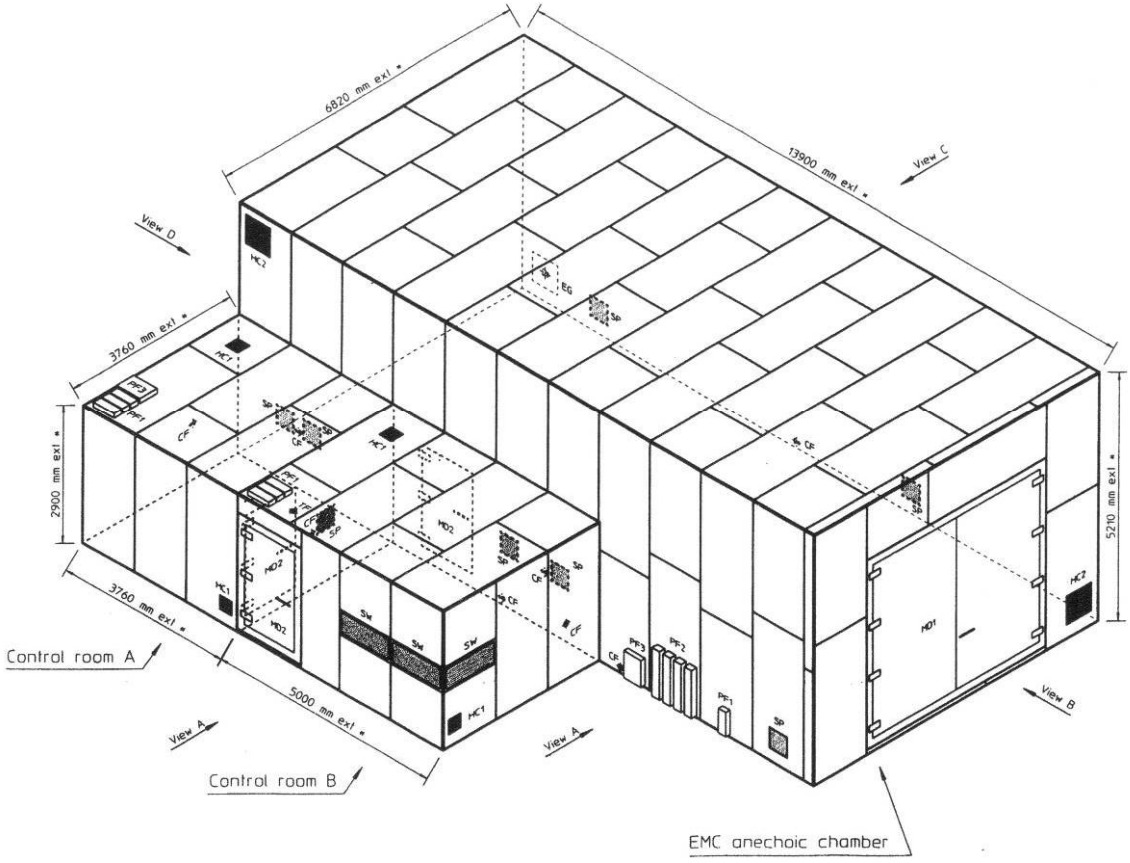



Figure 3: Test Camber

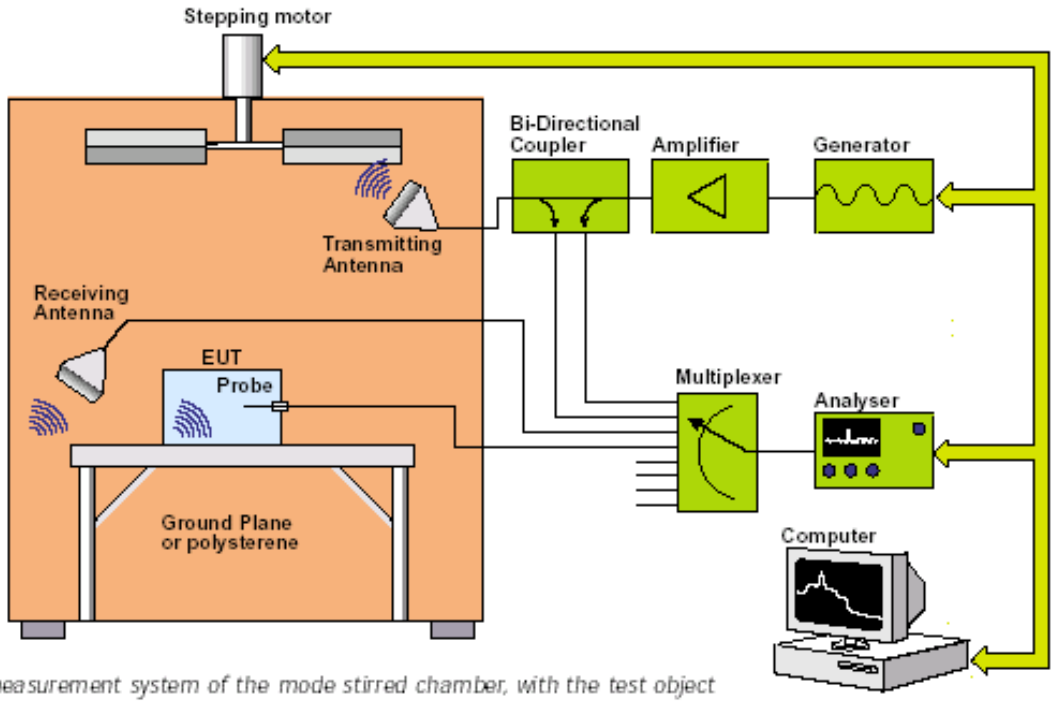
SEMI-ANECHOIC TEST CHAMBER SPECIFICATIONS

Manufactured by Siepel with Hyfral absorbers APM66 and APM30
to meet MIL-STD-462, DO-160 (ED14D) and EN61000-4-3 standards

| | |
|---|---|
| *Chamber inner size* | 12.5 x 5.5 x 4.2 m |
| *Door size* | 4.0 x 3.6 m |
| *Ground plane floor* | 13.0 x 4.5 m with a 3000 kg capacity |
| *Ground plane table* | 4.5 x 1.2 m with a 600 kg capacity |
| *Turn table* | Ø 1.5 m with a 2000 kg capacity |
| *Power supply* | 3-phase 400/230 V 32 A 50 Hz |
| | 1-phase 230 V10 A50 Hz |
| | 3-phase 200/115 V 16 A 400 Hz |
| *Customer control room* | 3.7 x 3.7 m with a 3.5 x 1.0 m ground plane table |

### 4.1.2 Reverberation Chamber (RC)

Sometime also named Mode Stirred Chamber (MSC)




*The control and measurement system of the mode stirred chamber, with the test object being subjected to susceptibility testing and probed for leakage.*

Figure 4: Mode Stirred Chamber.

**MODE STIRRED CHAMBER SPECIFICATIONS**

| **Mechanical construction** | **Electrical data** |
|---|---|
| The chamber is of a continuously welded aluminium construction.<br>*Chamber dimensions*<br>Length 5 m<br>Height 3 m<br>Width 2.5 m<br>*Door size*<br>2 x 1 m.<br>*Mechanical stirrer dimensions*<br>Diameter 236 cm<br>Height 26 cm | *Frequency range*<br>0.2-18 GHz (first resonance mode at 58.3 MHz)<br>*Q value*<br>100,000<br>*Field strength*<br>1-3 kV/m (at 200 W input power) |

Cessna
A Textron Company

# MEMORANDUM
## To Sell Aftermarket Product

| **Date Submitted:** 21 July 2008 | **Champion:** Jeff Kelsey |
|---|---|

**Focus Product:**

Engineering acceptance of Cessna Parts Distribution (CPD2) selling the Spider Tracks Global Tracking System.

**Conclusion:**

Engineering has no technical objection for the sale of the Spider Tracks Global Tracking System.

| **Recommendation:** | **Initial:** | **Date:** | **Team Members:** | **Role:** |
|---|---|---|---|---|
| No technical objection to the sale of the Spider Tracks Global Tracking System. | DALE | 7/23/08 | Wayne Dale | Engineer Specialist-Sr |
| | | 7/23/08 | Peter Wilkinson | VP Cessna Parts Distribution |
| | SWD | 7/23/08 | Sterlon Decker | Engineer Specialist |
| | PW | 7/23/08 | Pat Winter | Mgr, Program-D |
| | DRiley | 7/23/08 | Dennis Riley | Mgr. Engineering-D |

**Background:**

CPD2 has the desire to market the Spider Tracks Global Tracking System. A cross-functional team was assembled. The team finds that the Spider Tracks Global Tracking System is acceptable to sell based on the results of the tests conducted.

**Facts:**

- The Spider Tracks Global Tracking System is a hand held carry on device that plugs into the ships 12 volt power outlet.
- Cessna Engineering has flown the device in a prototype airplane equipped with the Garmin G1000 avionics package and did not detect any interference with the Garmin G1000 avionics package. Different avionics and/or equipment installations may produce different results and should be checked by the installer.
- This NTO letter does not imply installation approval for any particular application. Obtaining installation approval is the responsibility of the installer.

Sincerely,

Jeff Kelsey
Engineering Business Development

US Department of Transportation
**Federal Aviation Administration**

# MAJOR REPAIR AND ALTERATION
## (Airframe, Powerplant, Propeller, or Appliance)

Form Approved OMB No. 2120-0020 2/28/2011

Electronic Tracking Number

**For FAA Use Only**

INSTRUCTIONS: Print or type all entries. See Title 14 CFR §43.9, Part 43 Appendix B, and AC 43.9-1 (or subsequent revision thereof) for instructions and disposition of this form. This report is required by law (49 U.S.C. §44701). Failure to report can result in a civil penalty for each such violation. (49 U.S.C. §46301(a))

| | | | |
|---|---|---|---|
| **1. Aircraft** | Nationality and Registration Mark | Serial No. | |
| | Make | Model | Series |
| **2. Owner** | Name *(As shown on registration certificate)* | Address *(As shown on registration certificate)*<br>Address<br>City State<br>Zip Country | |

**3. For FAA Use Only**

| **4. Type** | | **5. Unit Identification** | | | |
|---|---|---|---|---|---|
| Repair | Alteration | Unit | Make | Model | Serial No. |
| ☐ | ☐ | AIRFRAME | — | *(As described in Item 1 above)* | — |
| ☐ | ☐ | POWERPLANT | | | |
| ☐ | ☐ | PROPELLER | | | |
| ☐ | ☐ | APPLIANCE | Type<br>Manufacturer | | |

**6. Conformity Statement**

| A. Agency's Name and Address | B. Kind of Agency | | |
|---|---|---|---|
| Name | ☐ U. S. Certificated Mechanic | ☐ Manufacturer | |
| Address | ☐ Foreign Certificated Mechanic | C. Certificate No. | |
| City State | ☐ Certificated Repair Station | | |
| Zip Country | ☐ Certificated Maintenance Organization | | |

D. I certify that the repair and/or alteration made to the unit(s) identified in item 5 above and described on the reverse or attachments hereto have been made in accordance with the requirements of Part 43 of the U.S. Federal Aviation Regulations and that the information furnished herein is true and correct to the best of my knowledge.

| | |
|---|---|
| Extended range fuel per 14 CFR Part 43 App. B ☐ | Signature/Date of Authorized Individual |

**7. Approval for Return to Service**

Pursuant to the authority given persons specified below, the unit identified in item 5 was inspected in the manner prescribed by the Administrator of the Federal Aviation Administration and is ☐ Approved ☐ Rejected

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BY | ☐ | FAA Flt. Standards Inspector | ☐ | Manufacturer | ☐ | Maintenance Organization | ☐ Persons Approved by Canadian Department of Transport |
| | ☐ | FAA Designee | ☐ | Repair Station | ☐ | Inspection Authorization | Other *(Specify)* |

| | |
|---|---|
| Certificate or Designation No. | Signature/Date of Authorized Individual |

**NOTICE**

*Weight and balance or operating limitation changes shall be entered in the appropriate aircraft record. An alteration must be compatible with all previous alterations to assure continued conformity with the applicable airworthiness requirements.*

**8. Description of Work Accomplished**
*(If more space is required, attach additional sheets. Identify with aircraft nationality and registration mark and date work completed.)*

| | |
|---|---|
| Nationality and Registration Mark | Date |

☐ Additional Sheets Are Attached

**Paperwork Reduction Act Statement:** The reason for collecting this information is to track major maintenance performed on aircraft. The collected information is used as part of the aircraft's historical file. The public reporting burden for this collection of information is estimated to average 30 minutes per response. Responses are mandated by 14 CFR Part 43. Collected information becomes part of the public record and no confidentiality is required. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control number associated with this collection is 2120-0020. Comments concerning the accuracy of this burden and suggestions for reducing the burden should be directed to the FAA at: 800 Independence Ave. SW Washington, DC 20591, Attn: Information Collection Clearance Officer, AES-200.

Turbomeca
Groupe SAFRAN

| Procès Verbal d'Essai | AA035648 | Version A |
|---|---|---|
| PVE_ARRIEL2B1_STC_4556_ENGINE_46113 | | |

| | |
|---|---|
| Langue principale : | Anglais |

## LIENS / *Links*

### DOCUMENTS DE REFERENCE / *Reference documents :*

| **Type** / *Type* | **Référence** / *Doc Number* | **Désignation** / *Designation* |
|---|---|---|

Turbomeca
Groupe SAFRAN

# P R O C E S  V E R B A L  D ' E S S A I

**DIRECTION DES ETUDES**

| | |
|---|---|
| **Procès verbal d'essai N° :** AA035648 | Page 1 /14 |
| Service :CCSR/AS | Bordes, le 11 Décembre 2008 |
| Internal phone number : | De :Luc REBERGA |
| Compte de dépense : | |
| Destinataires : | **Eurocopter International Pacific Ltd, New Zealand** |
| | **TAA : M. EVANS** |
| Copie : | **TM : E. DACCORD - C. RIMLINGER – T. GUESNIER – C. NOUSSITOU – S. GANDIL – JP. MARIN – MT. BASCOUGNET** |
| Objet : | **EMC testing for non-qualified equipment and equipment known to have a high potential for interference when installed on EUROCOPTER EC-130 helicopter S/N : 4556** |
| Participants : | |

Ref[1]: Techair Ltd, EMI Test Schedule TR107-01 Issue 1, dated 5.MAY.04.

## 1. INTRODUCTION

This document provides the test results of the ARRIEL 2B1 Electronic Control Unit obtained after EC-130 optimal equipment tests. Tests were performed on November 20,2008 by Turbomeca Australasia. TURBOMECA provided test support and evaluated the test results for the Electronic Control Units aspects.

## 2. CONCLUSION

The results of the tests provided on November 20,2008 by TURBOMECA on EC-130 S/N 4556 AIRCRAFT according to Ref[1] do not show any interference on the ARRIEL 2B1 Electronic Engine Control Unit.

## 3. TEST EQUIPEMENTS

- A portable computer for test records: P.C. + ARINC 429 interface + CONDOR software version 2.80.
  The computer permits monitoring and recording of the ARRIEL 2B1 Electronic Control Unit parameters during testing. For that, it is connected on the ARINC 429 data link in parallel with the Cockpit Display System. The list of the recorded parameters is provided in table 1. The ARINC record file is pre-processed by the software BUS TOOL ARINC and then analysed and plotted using TM software and MAGALI data processing software.

## 4. TEST ARTICLES

Engine: S/N 46113
Electronic Engine Control Unit: S/N 6376
Reference 70BMF01020

## 5. Equipment tested:

1. GNS430 Garmin GPS/NAV/COM
2. GMX200 Garmin Multi-Function Display
3. M800 Motorola Cellphone
4. TRA3500 RAD ALT
5. GTX327 Garmin XPONDER
6. PMA 7000H PS Engineering Audio System
7. WHELEN Strobe Light and Anti-Coll System
8. TAS610 Avidyne TCAS System
9. KX165A NAV/COM
10. TRA3500 Freeflight RAD ALT
11. 6000 Spidertracks Flight Tracking System
12. 3060 Pulselite Flashing Light Controller
13. BOSE ANR Headset System

File name:

IPV ANTI COLL.log (test file of WHELEN Strobe Light and Anti-Coll System)
IPV AVIONICS SW.log (test file of GNS430 Garmin GPS/NAV/COM, GMX200 Garmin Multi-Function Display, TRA3500 RAD ALT, GTX327 Garmin XPONDER, TAS610 Avidyne TCAS System, KX165A NAV/COM, TRA3500 Freeflight RAD ALT and 6000 Spidertracks Flight Tracking System )
IPV PULSELITE.log (test file of 3060 Pulselite Flashing Light Controller)
IPV BOSE ANR.log (test file of BOSE ANR Headset System)
IPV CELL PHONE.log (test file of M800 Motorola Cellphone)
IPV INTERCOM.log (test file of PMA 7000H PS Engineering Audio System)

## 6. TEST RESULTS

The test records plotted are provided in appendix of this document.

The acceptance criteria used for these tests were:

- No abnormal deviations of the engine parameters
- No detected failure
- No EECU control status modification.

**TABLE 1**
**Recorded parameters**

| | |
|---|---|
| XPC | Collective pitch position |
| N1_Gap | Calculated delta NG |
| Entrees Logiques (EL) | EECU discrete inputs |
| MOT_PAN1_VOIE_AB (MOT1) | Maintenance faults (word 1) channel A+B |
| MOT_PAN2_VOIE_AB (MOT2) | Maintenance faults (word 2) channel A+B |
| NG | Gas Generator Speed |
| NTL | Power Turbine Speed |
| XTL | Pedal TRIM |
| P0_MOTEUR | Ambient pressure (FADEC probe) |
| T0_HELICOPTERE | Ambient temperature (Helicopter probe) |
| T0 | Ambient temperature (FADEC probe) |
| P3 | P3 Pressure |
| T45 | Raw exhaust gas temperature |
| Sorties Logiques 1 (SL1), Sorties Logiques 2 (SL2) | EECU discrete outputs, status modes, failure levels |
| Couple | Corrected torque |
| Debit | Fuel flow calculated from the fuel metering valve position |

**TABLE 2**
**EL : Logic inputs word description**

| Bit | Bit signification | ALL RECORDED FILES |
|---|---|---|
| 1 (LSB) | - | |
| 2 | - | |
| 3 | Neutral position switch | 1 |
| 4 | Main selection : stop switch | |
| 5 | Main selection : flight switch | 1 |
| 6 | Main selection : idle switch | |
| 7 | Manual switch | |
| 8 | - | |
| 9 | - | |
| 10 | P/PI selection | |
| 11 | Bleed valve open switch (1=open) | 1 |
| 12 | TRIM1 | 1 |
| 13 | TRIM2 | |
| 14 | TRIM3 | |
| 15 | - | |
| 16 | Sand filter active switch | |

ALL FILES:

EL = 0000 1100 0001 0100 $\Rightarrow$ EL = 3092

**TABLE 3**
**MOT1_VAB : maintenance faults word 1 description (Channel A+B)**

| Bit | Bit signification | ALL RECORDED FILES |
|---|---|---|
| 1 (LSB) | Watch dog | |
| 2 | Pedal trim | |
| 3 | Main selector | |
| 4 | At least one failure in channel A | |
| 5 | Collective pitch | |
| 6 | T45 | |
| 7 | T0 from helicopter (via ARINC) | |
| 8 | P3 | |
| 9 | torque | |
| 10 | T45 bias before power-up | |
| 11 | Torque bias before power-up | |
| 12 | T45 bias after power-up | |
| 13 | Torque bias after power-up | |
| 14 | FADEC internal failure | |
| 15 | P3 drift or flame-out | |
| 16 (MSB) | P0 internal probe | |

ALL FILES :

MOT1=0000000000000000 $\Rightarrow$ MOT 1 = 0

**TABLE 4**
**MOT2_VAB : maintenance faults word 2 description (Channel A+B)**

| Bit | Bit signification | ALL RECORDED FILES |
|---|---|---|
| 1 (LSB) | Fuel metering position | |
| 2 | Stepper motor | |
| 3 | Bleed valve | |
| 4 | T45 from helicopter (via ARINC) | |
| 5 | T1 | |
| 6 | Inter-channel | |
| 7 | N2 | |
| 8 | N1 | |
| 9 | P0 from helicopter (via ARINC) | |
| 10 | No message from helicopter (ARINC) | |
| 11 | Alternator | |
| 12 | 28 volts power supply from helicopter | |
| 13 | P0 inconsistency | |
| 14 | Shut-off valve | |
| 15 | At least one failure on channel B | |
| 16 (MSB) | software | |

ALL FILES :
MOT2=0000000000000000 $\Rightarrow$ MOT 2 = 0

**TABLE 5**
**SL1 : FADEC discrete outputs, status modes, failure level, Word 1 description**

| Bit | Bit signification | ALL RECORDED FILES |
|---|---|---|
| 1 (LSB) | - | |
| 2 | Stepper motor autotest in progress | |
| 3 | Autotest ended | 1 |
| 4 | State : init | |
| 5 | State : stop | |
| 6 | State : start | |
| 7 | State : idle | |
| 8 | State : shut down | |
| 9 | State : run-up | |
| 10 | State : flight | 1 |
| 11 | State : flame-out | |
| 12 | - | |
| 13 | Bleed valve position (1=closed) | |
| 14 | - | |
| 15 | Proportional mode | 1 |
| 16 (MSB) | - | |

ALL FILES :

SL1 = 0100 0010 0000 0100 $\Rightarrow$ SL1 = 16900

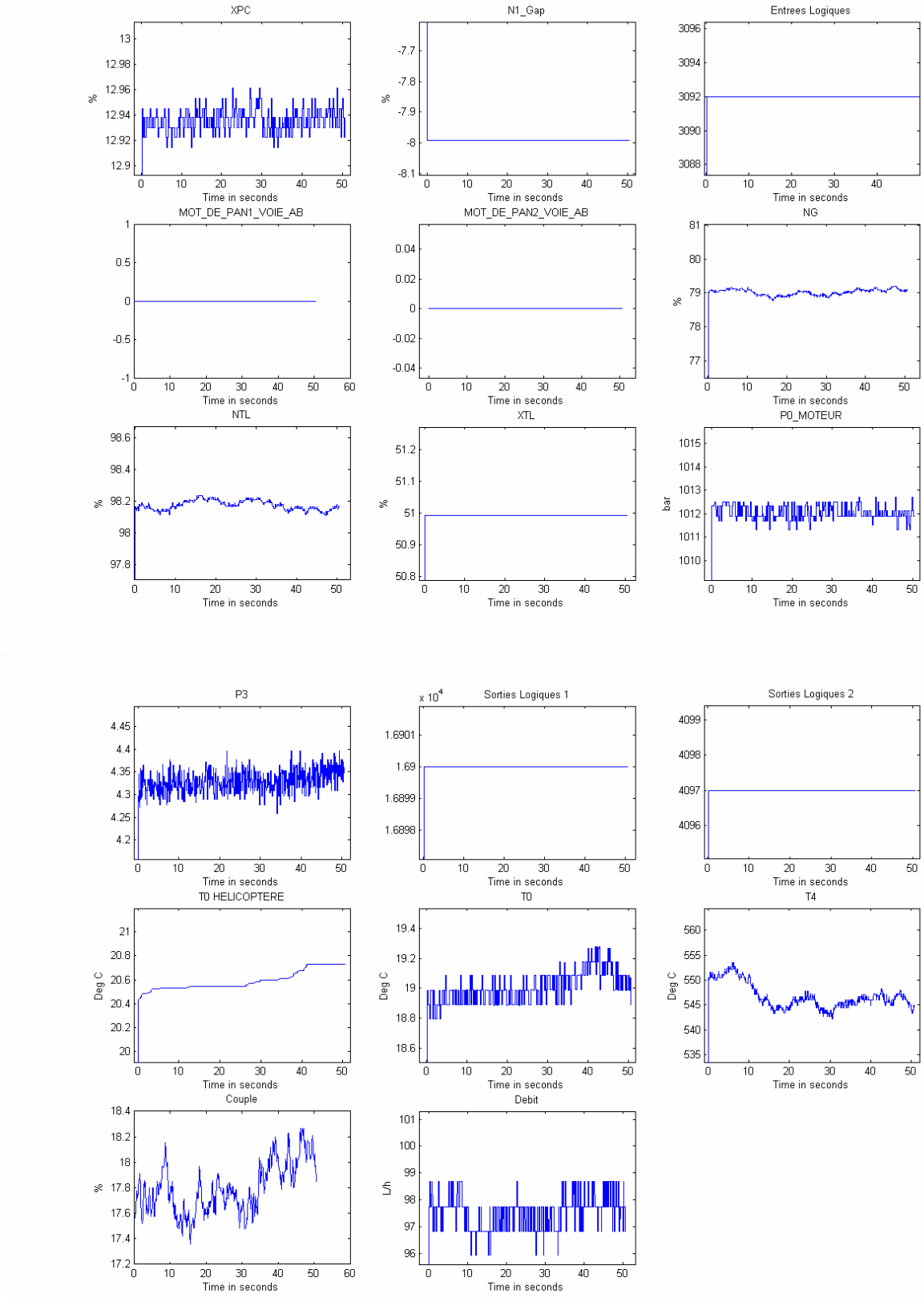
**TABLE 6**
**SL2 : FADEC discrete outputs, status modes, failure level,**
**Word 2 description**

| Bit | Bit signification | ALL RECORDED FILES |
|---|---|---|
| 1 (LSB) | Channel A in control | 1 |
| 2 | - | |
| 3 | Manual mode | |
| 4 | - | |
| 5 | Definitive FMU neutral position forcing | |
| 6 | Minor failure | |
| 7 | Redundancy failure | |
| 8 | Auxiliary control mode problem | |
| 9 | - | |
| 10 | Total failure | |
| 11 | Auxiliary control enable | |
| 12 | FMU neutral position forcing | |
| 13 | Automatic mode | 1 |
| 14 | - | |
| 15 | FMU out of neutral position | |
| 16 (MSB) | Starting accessories powered | |

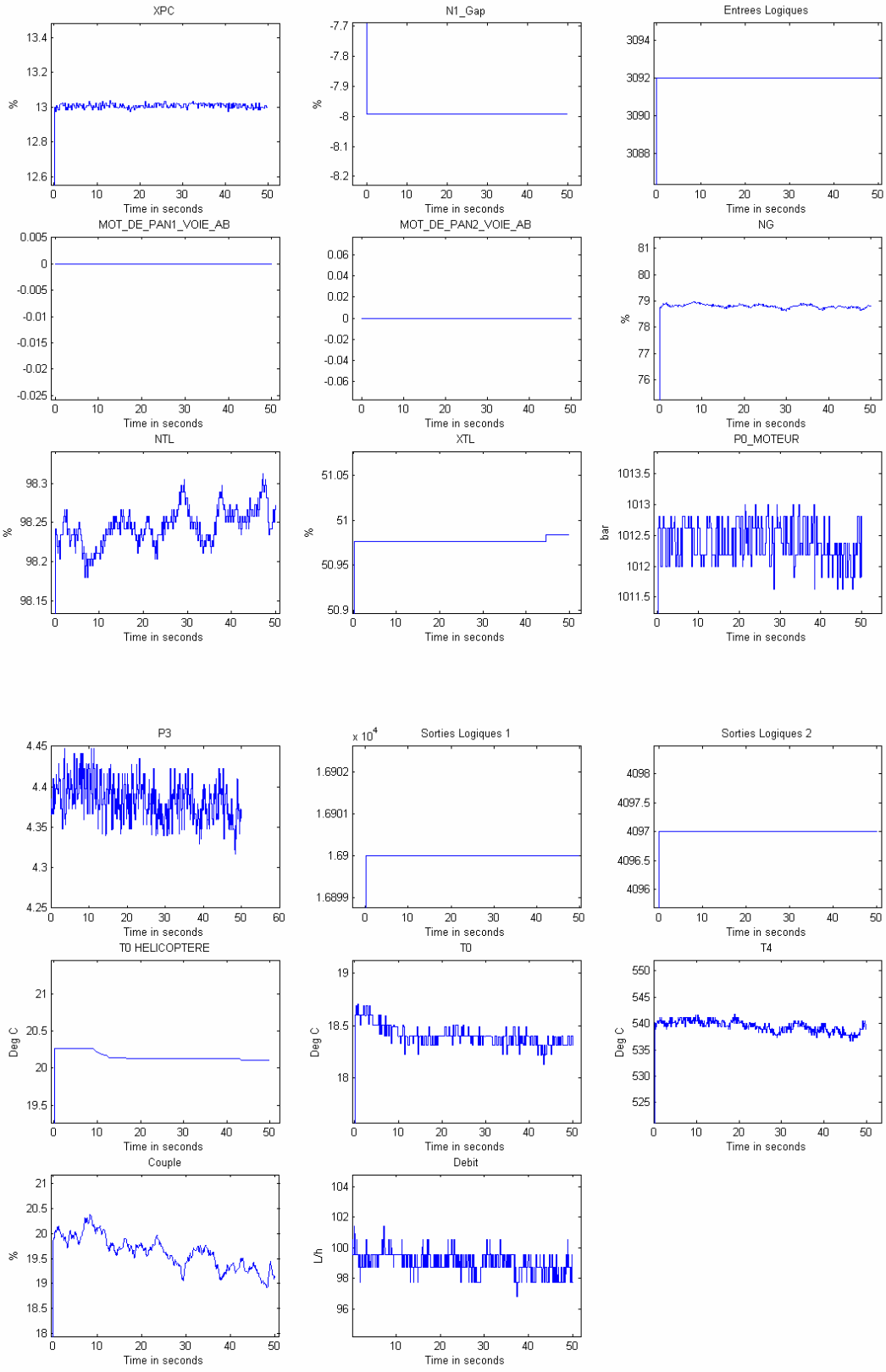
ALL FILES :
SL2 = 0001 0000 0000 0001 $\Rightarrow$ SL2=4097

# Appendix

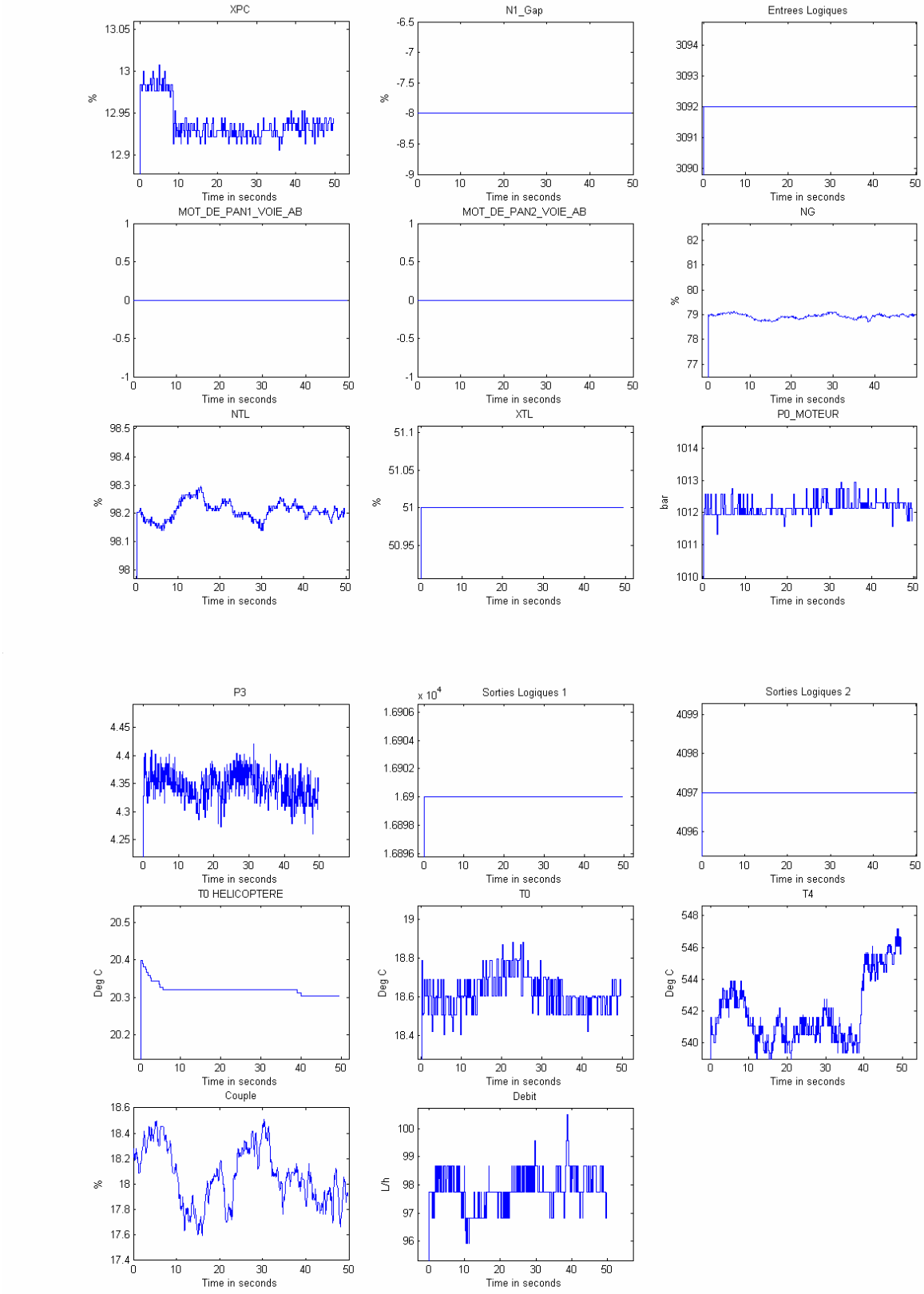
IPV ANTI COLL.log:



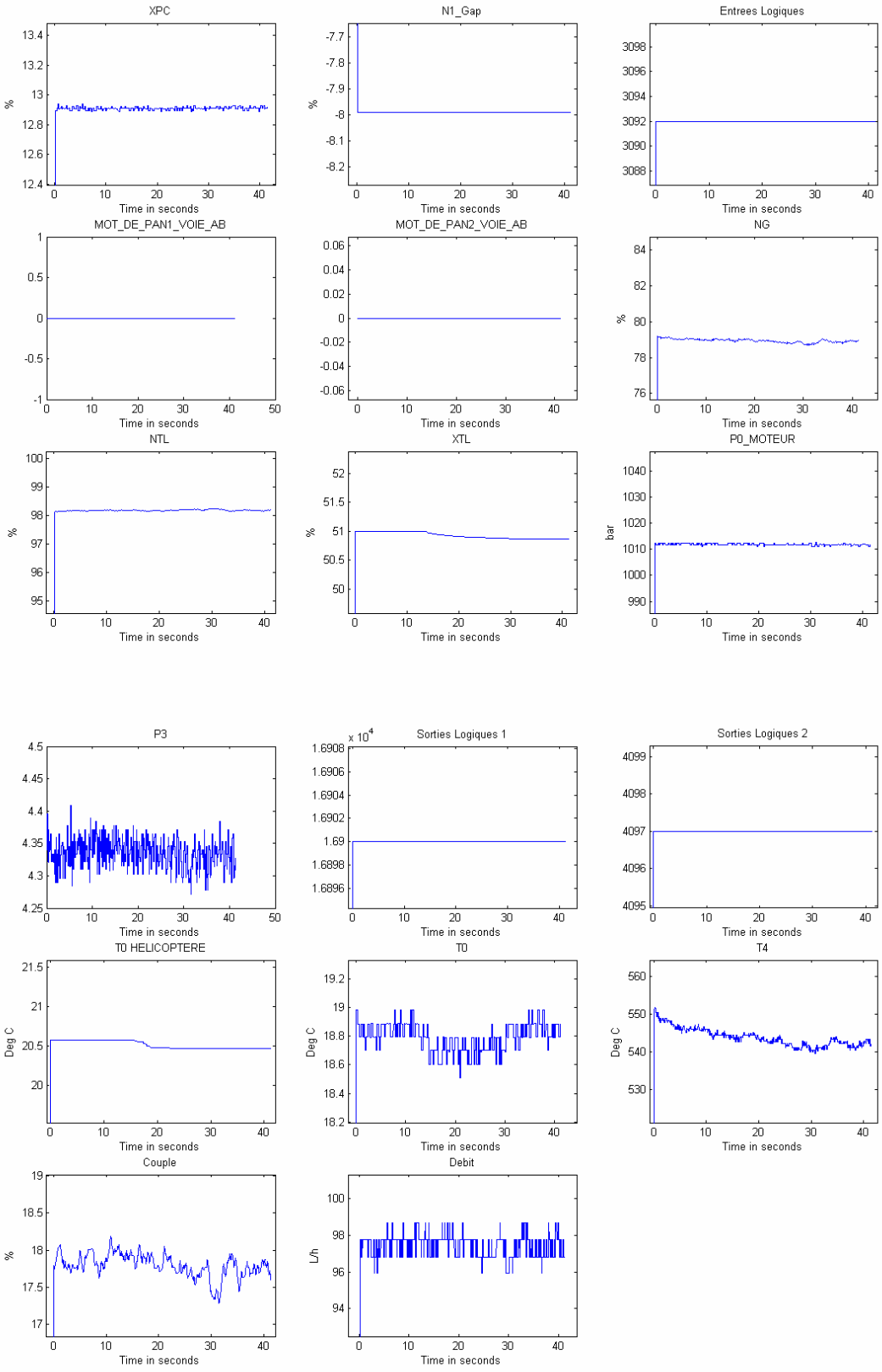
IPV AVIONICS SW.log:



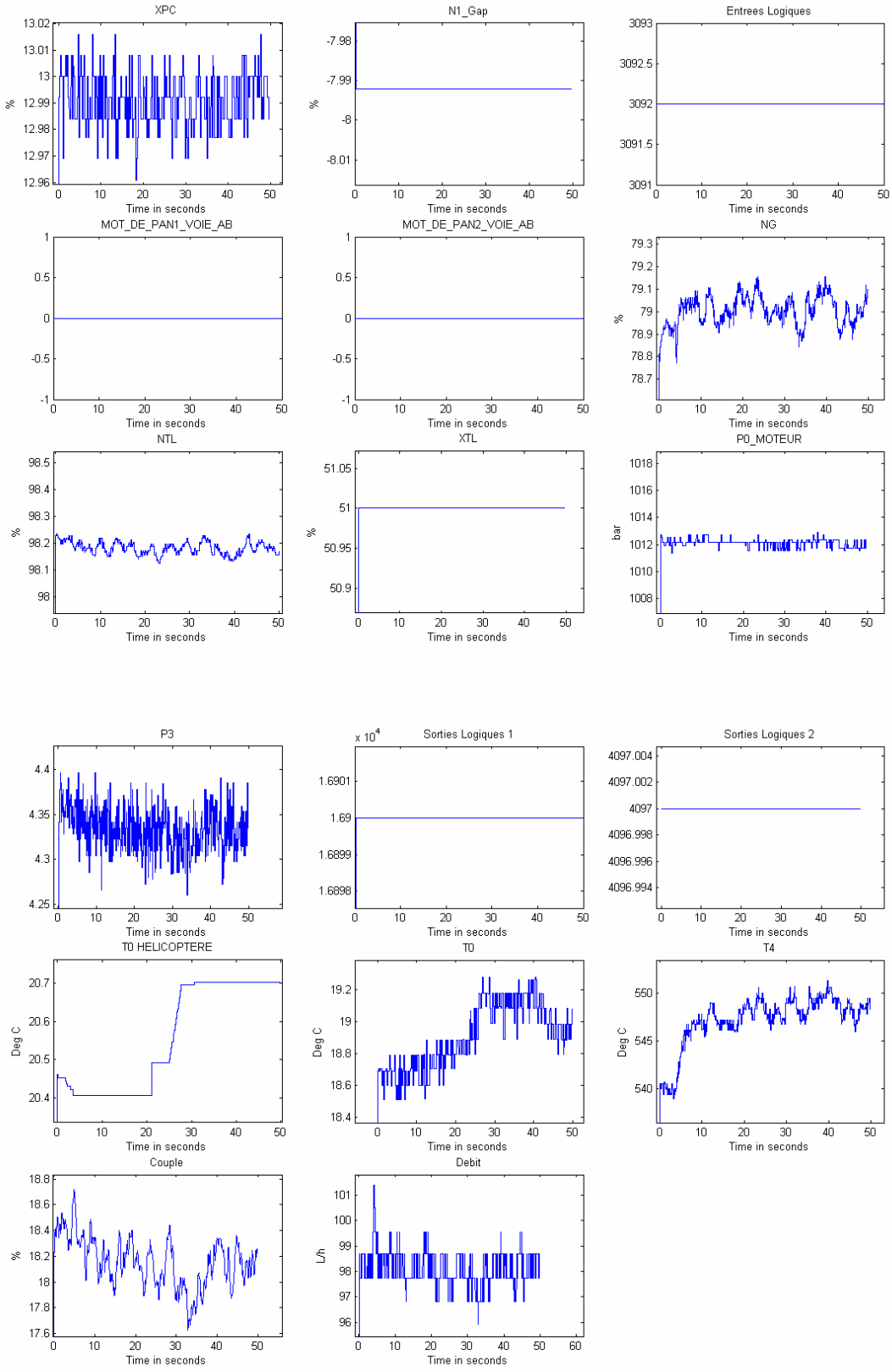
IPV PULSELITE.log:



IPV BOSE ANR.log:



IPV CELL PHONE.log:



IPV INTERCOM.log: