32-0048
Environmental Qualification Test Report for Spider S3/S5

Tested for: Spider Tracks Limited
FDS Job Nº: 21324

Flight Data Systems Pty. Ltd.
ABN: 25 060 690 753
31 McGregors Drive,
Keilor Park, Victoria 3042 Australia,
Ph: 61 38331 2900
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DOCUMENT CONTROL

32-0048 Issue B	
PREPARED BY: **Flight Data Systems** **31 McGregors Drive** **Keilor Park VIC 3042** **Australia**	**Contact: Product Support** **Phone: 61 3 8331-2900** **Fax: 61 3 9336 1758**
AUTHOR/S: C. Mills	02/05/2014
REVIEWED BY: A. Spiteri	02/05/2014
APPROVED BY: N. Wanke	02/05/2014

AMENDMENT LIST

AMENDMENT NO.	REVISION DATE	REVISED BY	AMENDMENT DESCRIPTION
B	02/05/2014	C. Mills	Changed two instances of customer company name to “Spider Tracks Limited” as per customer request. (Cover page and page 1)

Table of Contents

List of Tables

List of Figures

1. Introduction

This test report states the qualification test results for the Spidertracks Spider S3/S5 GPS tracking unit in accordance with test procedures noted in the documents & standards below.

1.1. Customer Information

Spider Tracks Limited
Auckland, New Zealand

Phone: +64 6 353 3395

Contact: James McCarthy
Email: james@spidertracks.co.nz

1.2. Product Description

The Spidertracks units are GPS tracking units for general aviation use. The unit comes in an S3 and S5 configuration which use the same hardware but different Firmware.

2. References

2.1. Standards

DO160G – Environmental Conditions and Test Procedures for Airborne Equipment issue G

2.2. Internal Documents

36-0104 issue A;	DO160G - Operational Shock
36-0105 issue A;	DO160G - Impulse Shock
36-0106 issue A;	DO160G - Sustained Shock

3. Test Unit Traceability

Product Number:	Spider S3/S5
Product:	Spider S3/S5
S/N:	7F43CY4JH3

Unit above configured as an S5

4. Test Houses

4.1. FLIGHT DATA SYSTEMS PTY. LTD.

McGregors Drive,
Keilor Park, Victoria 3042 Australia

5. Summary of Results

All Qualification tests were carried out as per the appropriate standards. The following tables summarise the results of these tests.

5.1.Environmental Tests

Table 1 - Environmental Results

Appendix	Description	Test	Category	Test Procedure	Result
A.1	Operational Shock	DO160G 7.2.1	E	36-0104 Issue A	Pass
A.2	Impulse Shock	DO160G 7.3.1	E	36-0105 Issue A	Pass
A.3	Sustained Shock	DO160G 7.3.3	E	36-0106 Issue A	Pass
A.4	Vibration	DO160G 8.0	R – Helicopter; Known Frequency	DO160G section 8.8.1	Pass

6. Environmental Test Results

The following environmental tests were completed by FDS on site and the results can be found in Appendix A.

6.1.Operational Shock

The test was carried out to DO160G section 7.2.1 Category E.

As per customer instructions unit was only powered on during shock testing as GPS was not available in test chamber. Acceptance testing was completed fully.

The Spidertracks S3/S5 complies with test conditions of section 7.2.1 of DO160G to Category E.

6.2.Impulse Shock

The test was carried out to DO160G section 7.3.1 Category E.

The Spidertracks S3/S5 complies with test conditions of section 7.3.1 of DO160G to Category E.

6.3.Sustained Shock

The test was carried out to DO160G section 7.3.3 Category E.

The Spidertracks S3/S5 complies with test conditions of section 7.3.3 of DO160G to Category E.

6.4.Vibration

The test was carried out to DO160G section 8.0 Category R.

As per customer instructions unit was only powered on during vibration test as GPS was not available in test chamber. Acceptance testing was completed fully.

The Spidertracks S3/S5 complies with test conditions of section 8.0 of DO160G to Category R for a helicopter with known frequencies.

7. Conclusions

The Spidertracks unit was tested as per the DO160G standards for vibration, Acceleration, operational shock and crash safety. The unit passed all testing without any notable issues and as a result is considered to be qualified to the standard as described in Table 1.The test results are described in more detail in Appendix A and were satisfactory with no modifications required to the test item.

Appendix A – Environmental Tests

A.1 Operational Shock

A.1.1 Equipment Under Test (EUT)

A. Part №: Spider S3/S5
B. Serial №: 7F43CY4JH3

A.1.2 Test House

Flight Data Systems Pty. Ltd

A.1.3 Equipment Used

A. Test equipment as per 36-0104 Issue A
B. Power supply capable of 10 to 28V at 1 Amp as per customer instructions

A.1.4 Test Method

Test as per 36-0104 Issue A.

A.1.5 Test Setup

EUT is connected to test equipment as per 36-0104 Issue A and test equipment is configured as per customer instructions.

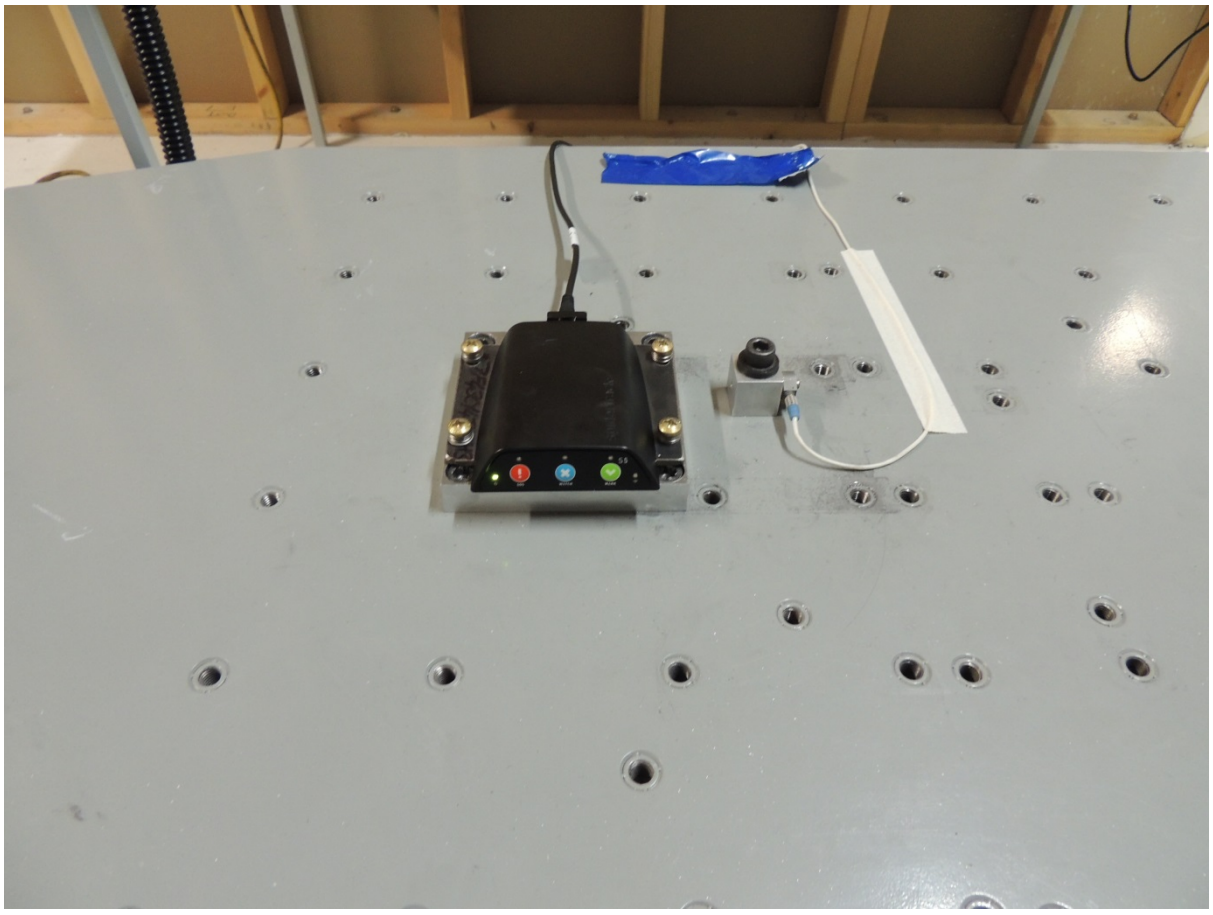


Figure 1 - EUT setup for Operational Shock (side configuration shown)

A.1.6 Summary of Procedure

Ensure calibrated transducer is installed on Shaker.

Mount EUT to shaker in the fore configuration; connect the EUT to test equipment as per customer instructions.

Setup shaker to produce a shock with the following profile:

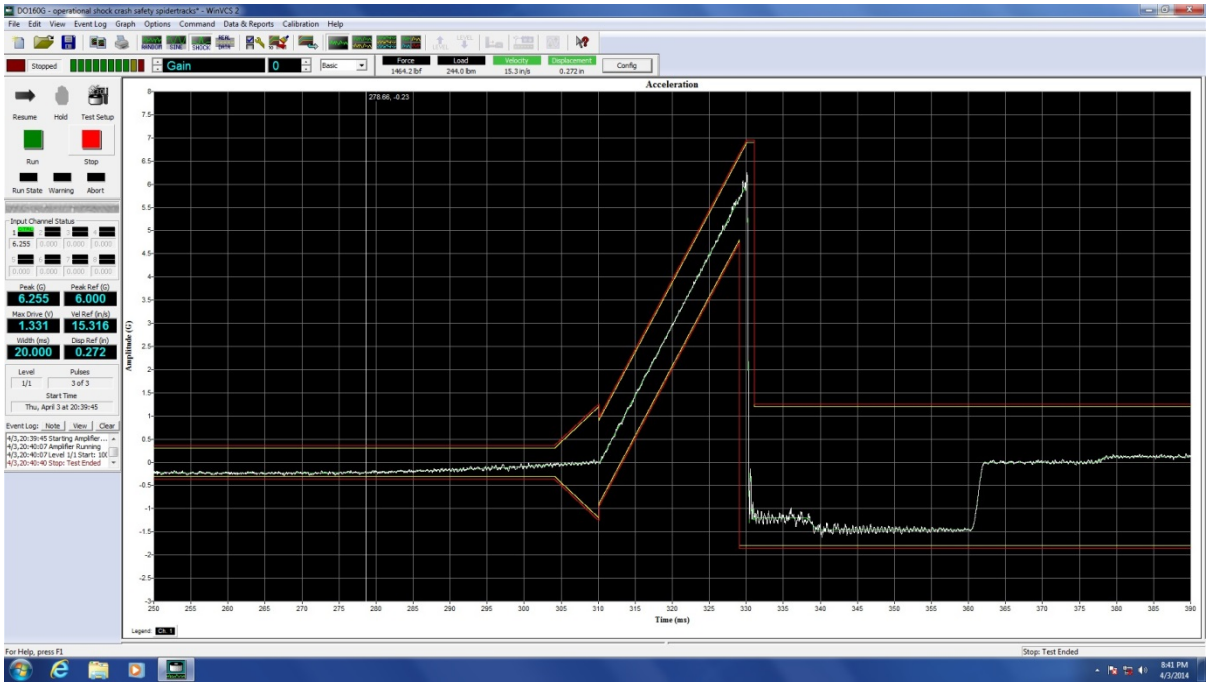


Figure 2 – example of shock profile

Ensure normal performance of EUT during test shocks as per customer instructions.

A minimum of three shock that falls completely within the above shock profile is required.

Repeat procedure in all 6 orthogonal axes.

Complete an acceptance test.

If EUT performs within specification during each pulse and the acceptance test, the EUT is considered to have passed the test.

A.1.7 Results

The EUT showed normal operation under all conditions, and therefore has passed this test.

Qualification Test Cover Sheet

Part Number: Spidertracks S3/S5 **Job Number:** 21324

Product name: Spidertracks S3/S5

S/N of provided units: 7F43CY4JH3, ~~65A2E5S8EA, G9VF6S2VK4~~

Test Required: DO160G - Section 7.2.1 Operational Shock **Operational Test:** (if required) Attached Print out (read notes)

Test Plan: 36-0104 Issue A **Acceptance Test:** Attached Print out (read notes)

Test Limits:

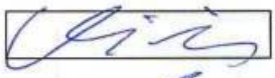
Category E (low frequency shocks) as per test plan 36-0104.

Notes:

Acceptance and Operational test instructions attached to document; from customer email.

After completing form sign below; create a copy for R&D record keeping; attach original with test report and other test documents. **Do not modify after document signed.**

Authorized by: Christopher Mills

Signed:  Date: 3-4-2014

Operator:  Date: 3-4-2014

Document No: 21-0296
Issue: A

Qualification Test Report Form

1.0 Test Information

Test Performed:	36-0104 Issue A
Operational Test (circle):	(Yes) / No
Date (DD/MM/YYYY):	03/04/2014
Location:	FDS
Outside Contractor (if required):	N/A
Test Supervisor:	JUSTIN WATSON
Present Personnel:	
Ambient Temperature:	21.4 °C

2.0 Equipment Information

Test Item

P/N: SPIDERTRACKS S3/S5 S/N: 7F43CY4JH3

Golden Unit (if applicable)

P/N: N/A S/N: N/A

Equipment:

Name	Serial Number	Cal Date (DD/MM/YYYY)	Cal Expiry Date (DD/MM/YYYY)
Thermotron EDV Shaker	42586	03/02/2014	03/02/2015
Endevco Accelerometer	14578	27/11/2013	27/11/2014
HP 34401A DMM	10012	17/05/2013	17/05/2014

Form No: 21-0274
Issue:C

Qualification Test Report Form

3.0 Start Time

Date (DD/MM/YYYY):	03 / 04 /2014	Local Time:	19:54

4.0 Finish Time

Date (DD/MM/YYYY):	03 / 04 /2014	Local Time:	20:27

5.0 Notes

Vertical positive Start: 19:54
Finish: 19:55

Vertical negative Start: 20:07
Finish: 20:09

Side positive Start: 20:39
Finish: 20:40

Side negative Start: 20:45
Finish: 20:46.

Fore positive Start: 20:29
Finish: 20:30

Fore negative Start: 20:26
Finish: 20:27.

6.0 Signatures

Confirm that the Test Item passed as per test plan referenced above (Para 1.0), and that the appropriate test procedure was completed in full.

Test Result: FAIL/PASS

Test Engineer: J. WATSON
Print/Sign

Signed:
Print/Sign

Date (DD/MM/YYYY): 03/04 /2014

Form No: 21-0274
Issue: C

Adrian Spiteri

From:	Dave Blackwell
Sent:	Wednesday, 2 April 2014 11:07 AM
To:	Adrian Spiteri
Cc:	Justin Watson; James McCarthy
Subject:	Re: Vibration test

Hi Adrian,

I apologise for not including this information with the hardware.

For the purpose of this test, nominal performance of the device an be inferred through the LED indicators on the keypad. The process for accomplishing this is fairly straight forward:

1. Position the Spider with an unobstructed and full view of the sky (horizon to horizon)
2. Power the Spider using the auxiliary lead provided - ensure power supply is stable in the range of 10-28VDC and able to deliver 1A
3. After the initial startup sequence, you should see a solid power LED indictor (bottom left)
4. Within a 2-4 minute period the signal indicator (bottom right) should first turn orange and then green shortly after - orange indicates a GPS lock has been achieved, green that the first position report has been sent through Iridium.
5. Please run through these steps before and after testing.

If you require any other info, please don't hesitate to contact me.

Regards,

Dave Blackwell
OPERATIONS MANAGER

203/150 Karangahape Road, Auckland 1010, New Zealand.
P: +64 9 222 0016 | M: +64 21 140 9131
E: dave.blackwell@spidertracks.co.nz | www.spidertracks.com

On 2/04/2014, at 12:50 pm, James McCarthy <james@spidertracks.co.nz> wrote:

Hi Adrian,

Dave will get back to you today with this information.

And yes - you can cut off the cigar lighter plug. Black is ground, Brown is +ve (12 ~ 28 V DC).

Thanks,

James

James McCarthy
SPIDERMAN

A.2 Impulse Shock

A.2.1 Equipment Under Test (EUT)

A. Part №: Spider S3/S5
B. Serial №: 7F43CY4JH3

A.2.2 Test House

Flight Data Systems Pty. Ltd

A.2.3 Equipment Used

A. Test equipment as per 36-0105 Issue A

A.2.4 Test Method

Test as per 36-0105 Issue A.

A.2.5 Test Setup

EUT is connected to test equipment as per 36-0105 Issue A and test equipment is configured as per customer instructions.

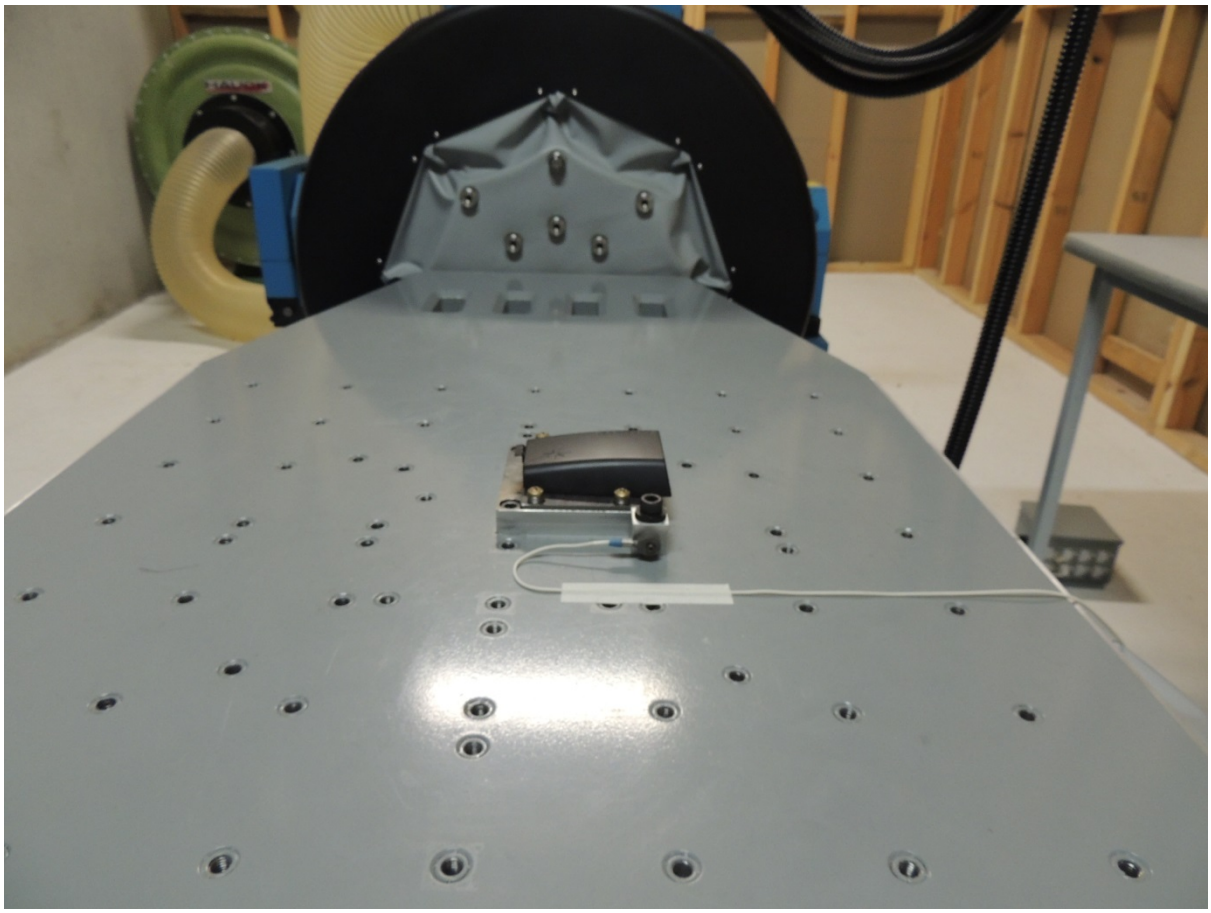


Figure 3 - EUT setup for Impulse Shock (side configuration shown)

A.2.6 Summary of Procedure

Ensure calibrated transducer is installed on Shaker.

Mount EUT to shaker in the fore configuration; connect the EUT to test equipment as per customer instructions.

Setup shaker to produce a shock with the following profile:

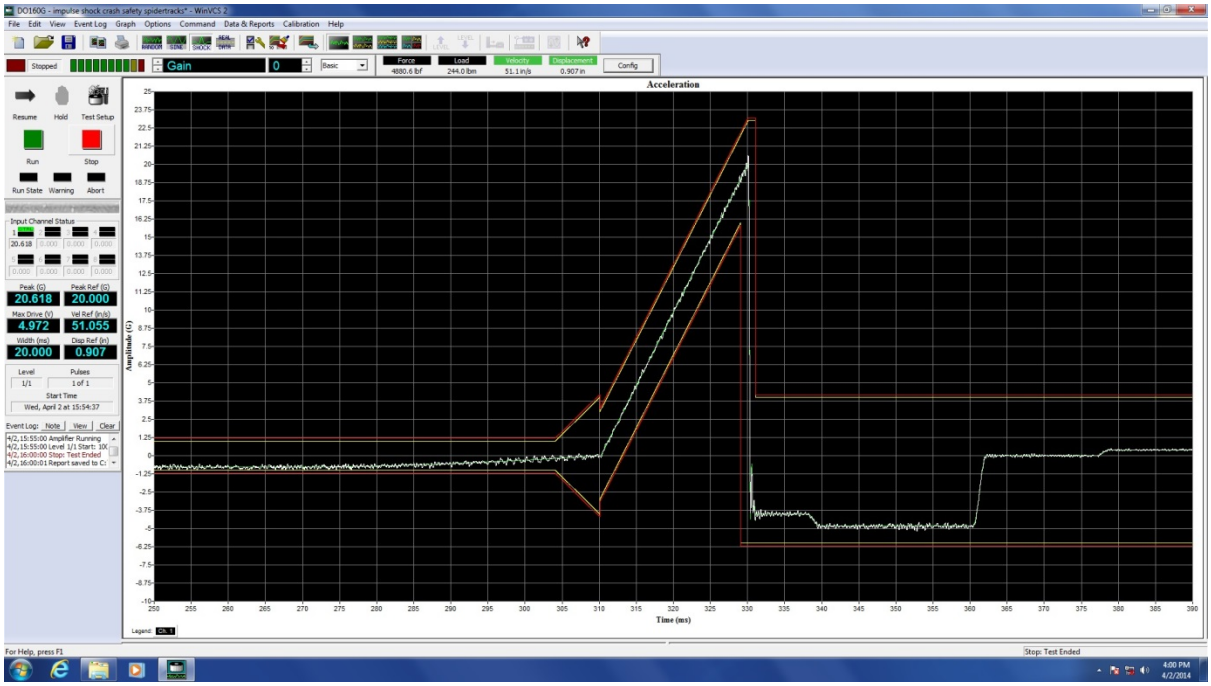


Figure 4 – example of shock profile

A minimum of one shock that falls completely within the above shock profile is required.

Repeat procedure in all 6 orthogonal axes.

Complete an acceptance test.

If EUT performs within specification during acceptance test, the EUT is considered to have passed the test.

A.2.7 Results

The EUT showed normal operation under all conditions, and therefore has passed this test.

Qualification Test Cover Sheet

Part Number: Spidertracks S3/S5 **Job Number:** 21324

Product name: Spidertracks S3/S5

S/N of provided units: 7F43CY4JH3, ~~65A2E6S9EA~~, ~~Q0VFSS2VK4~~

Test Required: DO160G - Section 7.3.1 Impulse Shock **Operational Test:** N/A (if required)

Test Plan: 36-0105 Issue A **Acceptance Test:** Attached Print out (read notes)

Test Limits:

Category E (low frequency shocks) as per test plan 36-0105.

Notes:

Acceptance test instructions attached to document; from customer email.

After completing form sign below; create a copy for R&D record keeping; attach original with test report and other test documents. **Do not modify after document signed.**

Authorized by: Christopher Mills

Signed: [signature] Date: 2/4/14

Operator: A. SPITERI Date: 2/4/14

Document No: 21-0296
Issue: A

Qualification Test Report Form

1.0 Test Information

Test Performed:	36-0105 Issue A
Operational Test (circle):	Yes / (No)
Date (DD/MM/YYYY):	02/04/2014
Location:	FDS
Outside Contractor (if required):	N/A
Test Supervisor:	ADRIAN SPITERI
Present Personnel:	
Ambient Temperature:	20.5 °C

2.0 Equipment Information

Test Item

P/N: SPIDERTRACKS S3/S5 S/N: 7F43CY4JH3

Golden Unit (if applicable)

P/N: N/A S/N: N/A

Equipment:

Name	Serial Number	Cal Date (DD/MM/YYYY)	Cal Expiry Date (DD/MM/YYYY)
Thermotron EDV Shaker	42586	03/02/2014	03/02/2015
Endevco Accelerometer	14578	27/11/2013	27/11/2014

Qualification Test Report Form

3.0 Start Time

Date (DD/MM/YYYY):	2 / 4 /2014	Local Time:	10:01

4.0 Finish Time

Date (DD/MM/YYYY):	2 / 4 /2014	Local Time:	16:16

5.0 Notes

Fore positive Start: 10:01
Finish: 10:02

Fore negative Start: 15:36
Finish: 15:40

Side negative Start: 15:47
Finish: 15:52

Side positive Start: 15:54
Finish: 16:00

Vertical positive Start: 16:11
Finish: 16:12

Vertical negative Start: 16:15
Finish: 16:16

UNIT OPERATED AFTER TEST.

6.0 Signatures

Confirm that the Test Item passed as per test plan referenced above (Para 1.0), and that the appropriate test procedure was completed in full.

Test Result: FAIL/PASS

Test Engineer: A. SPITERI
Print/Sign

Signed:
Print/Sign

Date (DD/MM/YYYY): 2 / 4 /2014

Form No: 21-0274
Issue: C

Adrian Spiteri

From:	Dave Blackwell
Sent:	Wednesday, 2 April 2014 11:07 AM
To:	Adrian Spiteri
Cc:	Justin Watson; James McCarthy
Subject:	Re: Vibration test

Hi Adrian,

I apologise for not including this information with the hardware.

For the purpose of this test, nominal performance of the device an be inferred through the LED indicators on the keypad. The process for accomplishing this is fairly straight forward:

1. Position the Spider with an unobstructed and full view of the sky (horizon to horizon)
2. Power the Spider using the auxiliary lead provided - ensure power supply is stable in the range of 10-28VDC and able to deliver 1A
3. After the initial startup sequence, you should see a solid power LED indictor (bottom left)
4. Within a 2-4 minute period the signal indicator (bottom right) should first turn orange and then green shortly after - orange indicates a GPS lock has been achieved, green that the first position report has been sent through Iridium.
5. Please run through these steps before and after testing.

If you require any other info, please don't hesitate to contact me.

Regards,

Dave Blackwell
OPERATIONS MANAGER

203/150 Karangahape Road, Auckland 1010, New Zealand.
P: +64 9 222 0016 | M: +64 21 140 9131
E: dave.blackwell@spidertracks.co.nz | www.spidertracks.com

On 2/04/2014, at 12:50 pm, James McCarthy <james@spidertracks.co.nz> wrote:

Hi Adrian,

Dave will get back to you today with this information.

And yes - you can cut off the cigar lighter plug. Black is ground, Brown is +ve (12 ~ 28 V DC).

Thanks,

James

James McCarthy
SPIDERMAN

A.3 Sustained Shock

A.3.1 Equipment Under Test (EUT)

A. Part №: Spider S3/S5
B. Serial №: 7F43CY4JH3

A.3.2 Test House

Flight Data Systems Pty. Ltd

A.3.3 Equipment Used

A. Test equipment as per 36-0106 Issue A

A.3.4 Test Method

Test as per 36-0106 Issue A.

A.3.5 Test Setup

EUT is connected to test equipment as per 36-0106 Issue A.

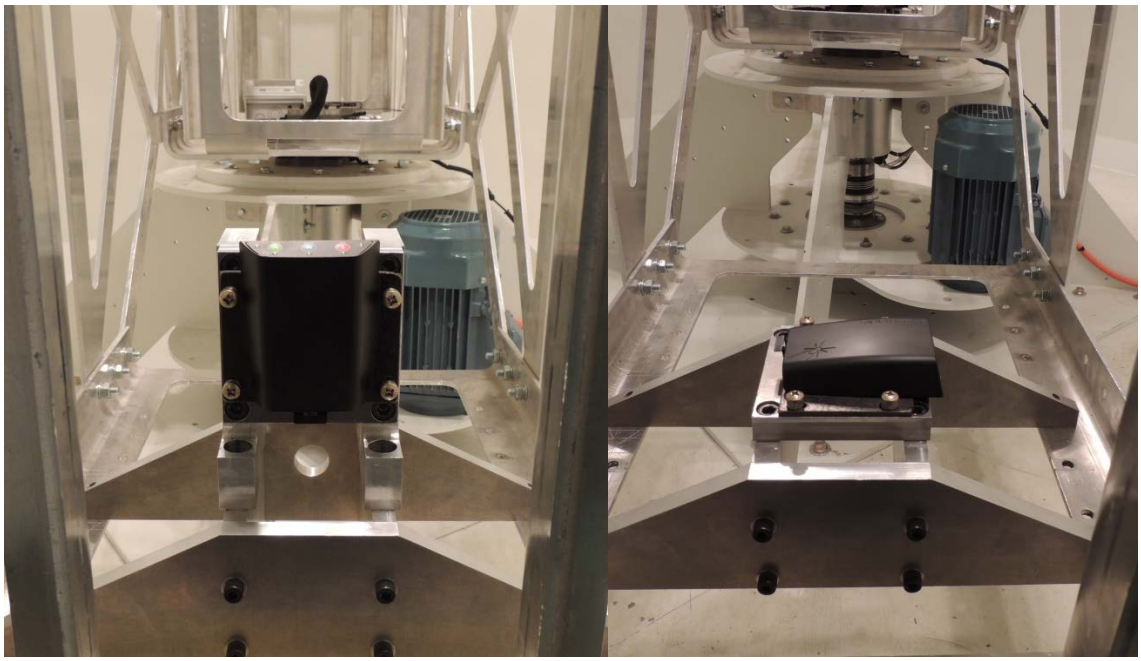


Figure 5 - EUT setup for Sustained Acceleration Test

A.3.6 Summary of Procedure

Fit EUT to centrifuge in the fore configuration.

Bring the centrifuge to speed applying 20g's of force to the EUT. Ensure motion stabilizes and run for at least 3 seconds at this level.

Stop the centrifuge, and then repeat for the other 5 orthogonal axis.

Following application of force on all the axis, complete an acceptance test on the EUT; if this acceptance test passes and there is no sign of physical damage to the EUT and its mounts.

If the acceptance test passes the EUT is considered to have passed this test.

A.3.7 Results

The EUT showed normal operation under all conditions, and therefore has passed this test.

Qualification Test Cover Sheet

Part Number: Spidertracks S3/S5 **Job Number:** 21324

Product name: Spidertracks S3/S5

S/N of provided units: 7F43CY4JH3, ~~65A2E5B9EA~~, ~~Q9VF5S2VK4~~

Test Required: DO160G - Section 7.3.3 Sustained Shock **Operational Test:** (if required) N/A

Test Plan: 36-0106 Issue A **Acceptance Test:** Attached Print out (read notes)

Test Limits:

As per test plan 36-0106.

Notes:

Acceptance test instructions attached to document; from customer email.

After completing form sign below; create a copy for R&D record keeping; attach original with test report and other test documents. **Do not modify after document signed.**

Authorized by: Christopher Mills

Signed:  Date: 7/4/14

Operator: A.Spiteri Date: 7/4/14

Document No: 21-0296
Issue: A

Qualification Test Report Form

1.0 Test Information

Test Performed:	36-0106 Issue A
Operational Test (circle):	Yes / No
Date (DD/MM/YYYY):	07/04/2014
Location:	FDS
Outside Contractor (if required):	N/A
Test Supervisor:	ADRIAN SPITERI
Present Personnel:	
Ambient Temperature:	21.2 °C

2.0 Equipment Information

Test Item

P/N: SPIDERTRACKS S3/S5 S/N: 7F43CY4JH3

Golden Unit (if applicable)

P/N: N/A S/N: N/A

Equipment:

Name	Serial Number	Cal Date (DD/MM/YYYY)	Cal Expiry Date (DD/MM/YYYY)

Form No: 21-0274
Issue:C

Qualification Test Report Form

3.0 Start Time

Date (DD/MM/YYYY):	7 / 4 /2014	Local Time:	08:21

4.0 Finish Time

Date (DD/MM/YYYY):	7 / 4 /2014	Local Time:	09:15

5.0 Notes

Top to centre Start: 08:21
Finish: 08:24

Bottom to centre Start: 08:36
Finish: 08:38

Left to centre Start: 08:49
Finish: 08:50

Right to centre Start: 08:58
Finish: 09:00

Front to centre Start: 09:07
Finish: 09:08

Back to centre Start: 09:15
Finish: 09:17

UNIT OPERATED AFTER TEST.

6.0 Signatures

Confirm that the Test Item passed as per test plan referenced above (Para 1.0), and that the appropriate test procedure was completed in full.

Test Result: FAIL/PASS

Test Engineer: A. SPITERI
Print/Sign

Signed:
Print/Sign

Date (DD/MM/YYYY): 7 / 4 /2014

Form No: 21-0274
Issue: C

Adrian Spiteri

From:	Dave Blackwell
Sent:	Wednesday, 2 April 2014 11:07 AM
To:	Adrian Spiteri
Cc:	Justin Watson; James McCarthy
Subject:	Re: Vibration test

Hi Adrian,

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5. Please run through these steps before and after testing.

If you require any other info, please don't hesitate to contact me.

Regards,

Dave Blackwell
OPERATIONS MANAGER

203/150 Karangahape Road. Auckland 1010. New Zealand.
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E: dave.blackwell@spidertracks.co.nz | www.spidertracks.com

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Hi Adrian,

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And yes - you can cut off the cigar lighter plug. Black is ground, Brown is +ve (12 ~ 28 V DC).

Thanks,

James

James McCarthy
SPIDERMAN

A.4 Vibration

A.4.1 Equipment Under Test (EUT)

A. Part №: Spider S3/S5
B. Serial №: 7F43CY4JH3

A.4.2 Test House

Flight Data Systems Pty. Ltd

A.4.3 Equipment Used

A. Thermotron Shaker
B. FDS mechanical mounts
C. Power supply capable of 10 to 28V at 1 Amp as per customer instructions

A.4.4 Test Method

Test as per section 8.0 of DO160G.

A.4.5 Test Setup

EUT is connected to support equipment and mounted to Thermotron shaker as below.

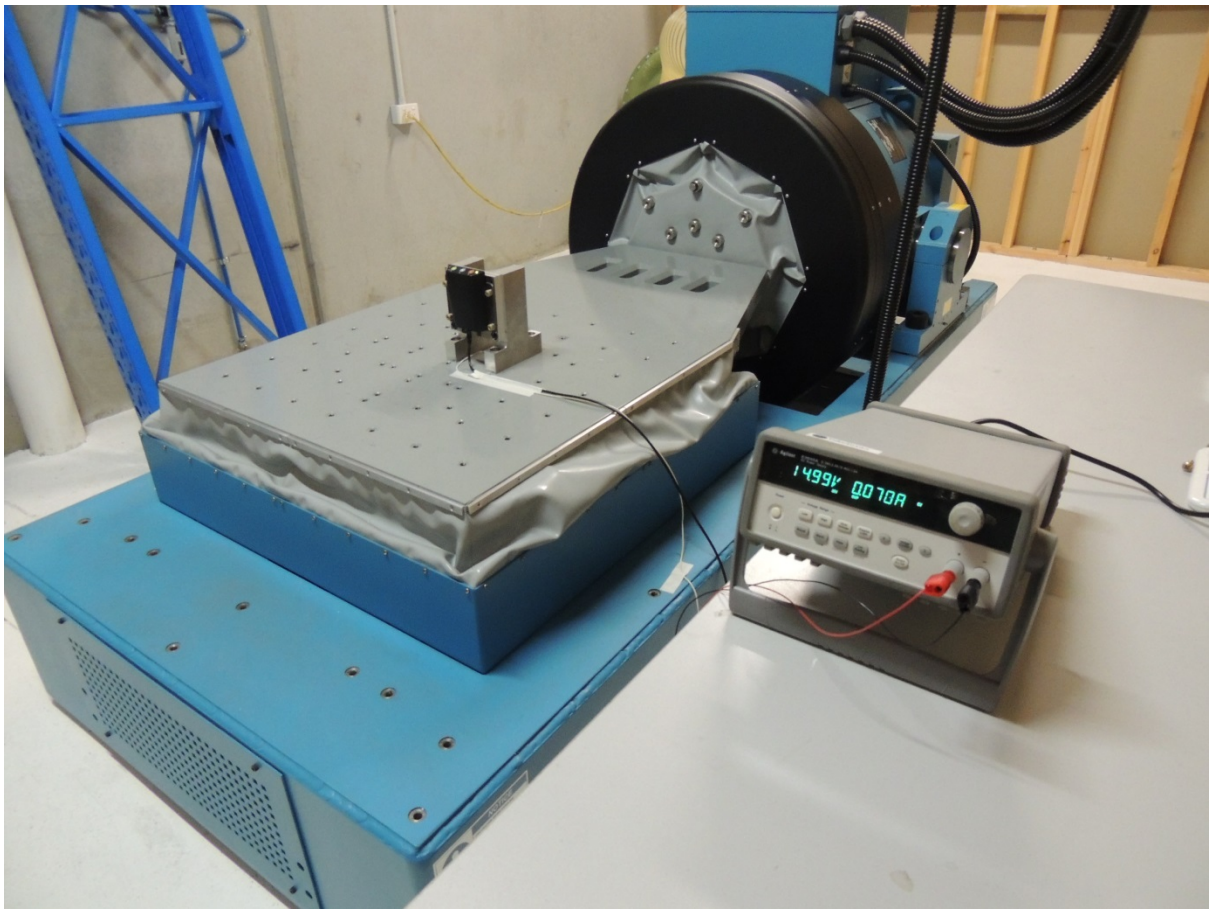


Figure 6 - EUT setup for vibration testing (Bottom to top)

A.4.6 Procedure

Based on information provided by the customer, determine the appropriate category, and test levels; in this case we have a helicopter with known rotor frequencies so Category R for a known Helicopter installation (section 8.8.1) is the most appropriate approach. We also knew that the EUT would be installed on the instrument panel, console or equipment rack which determines that the Zone/Test Curve to use is G (as per the standard).

From the above; we can determine the levels as per Table 8-2a & Table 8-2b from the standard; the results shown as below:

Customer information: Main rotor (NM) is 395 RPM and number of blades on main rotor (FM) is 4.

Therefore; test frequencies are as follows for a test level category G:

$$F_1 = NM(in\ Hz) \times FM = 395 \div 60 \times 4 = 26.3\dot{3}\ Hz$$
$$F_2 = 2 \times NM \times FM = F_1 \times 2 = 52.6\dot{6}\ Hz$$

For these test frequencies and test level, the final test specification is as follows:

Table 2 - Vibration test levels

	Performance	Endurance
F_1; g-Peak	1.053	2.500
F_2; g-Peak	1.600	2.500
W0 or random level; g/Hz (Grms)	0.01 (2.75)	0.02 (3.89)

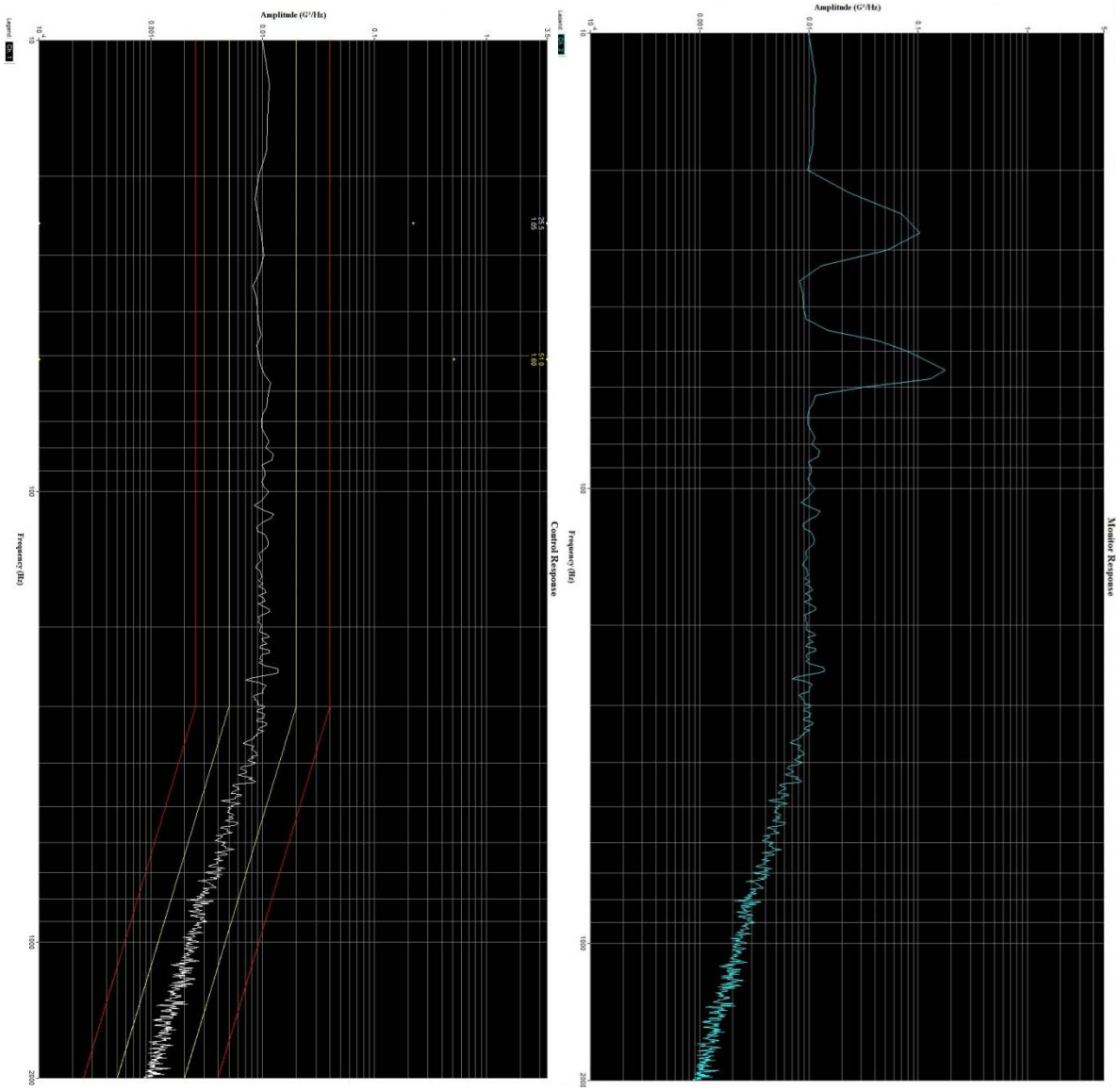


Figure 7 - Example of profile programmed into Thermotron Shaker (Performance)

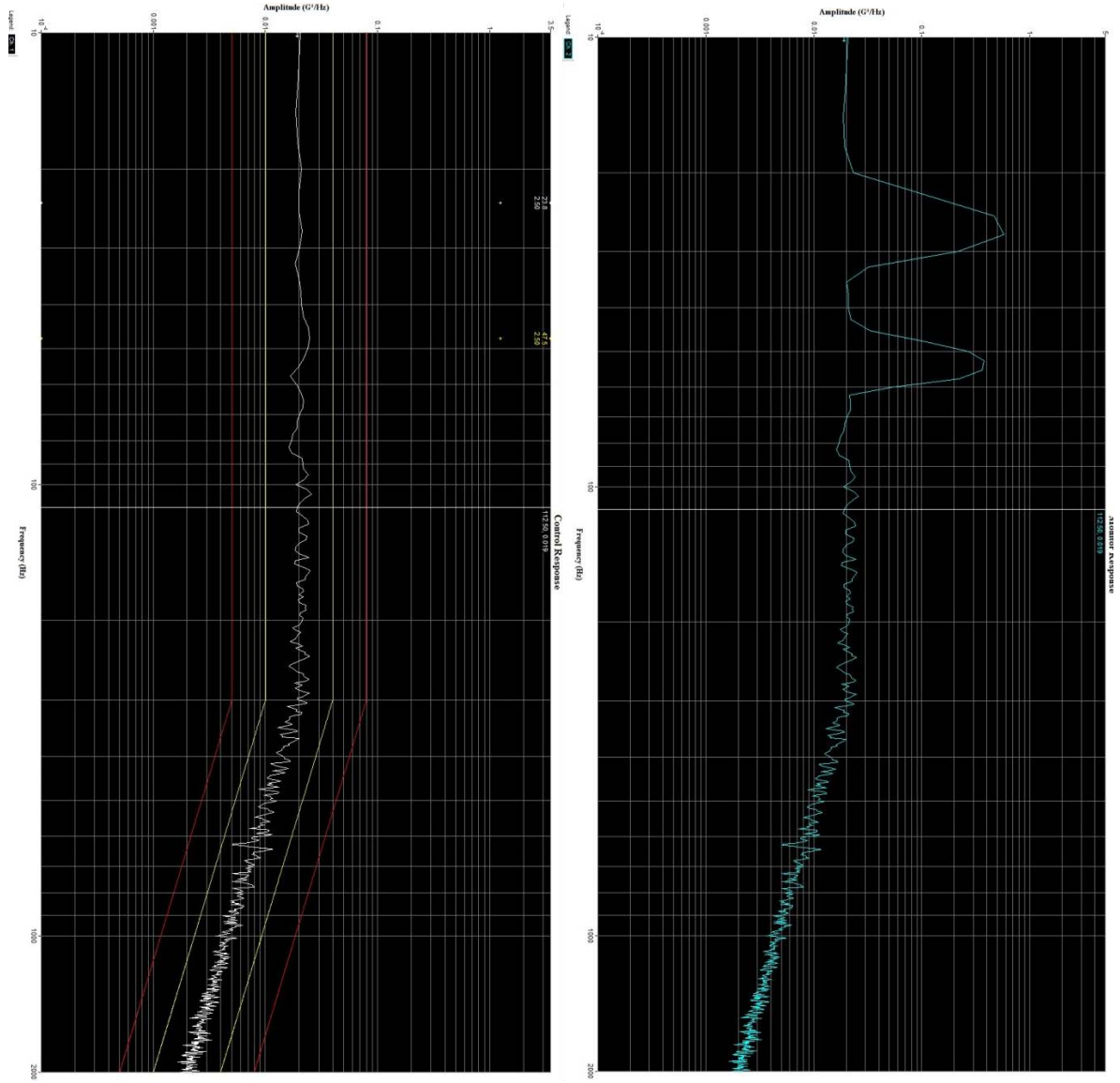


Figure 8 - Example of profile programmed into Thermotron Shaker (Endurance)

The example profiles above are the result of programming the thermotron shaker control unit using the values in Table 2. The type of test is set to 'sine on random' and the test frequencies F1 and F2 are programmed to vary, as per the standard, from Fn × 0.9 to Fn × 1.1.

Experimental Setup

Mount EUT to shaker in the fore configuration; connect the EUT to test equipment as per 36-0127.

Apply a sinusoidal sweep of 0.5 g with frequencies of 10Hz to 2000Hz sweeping at a rate of 1 octave/minute; record plots of response accelerometers to determine resonant frequencies and amplification factors.

Turn on Test Item and double check unit is operational via test setup; then configure the vibration table to expose the Test Item to performance/standard vibration levels as per above. Apply this performance level APSD for at least 10 minutes and monitor the performance of the Test Item.

Apply the appropriate endurance level test level as above for three hours; complete a performance check within 5 minutes of vibration period starting and another check 5 minutes before endurance period ending.

After completing the endurance testing, repeat the performance test levels as per above for at least 10 minutes again and monitor the performance of the Test Item.

Shut down Test Item and apply a sinusoidal sweep of 0.5 g with frequencies of 10Hz to 2000Hz sweeping at a rate of 1 octave/minute; record plots of response accelerometers to determine resonant frequencies and amplification factors.

Repeat above steps in the three major axis (Fore, Side, Vertical).

Complete a full acceptance test or performance check as listed on test cover sheet.

If EUT performs within specifications there is no failure in EUT mounting then the test is passed.

All performance checks and acceptance testing completed as per customer instructions.

A.4.7 Results

The EUT showed normal operation under all conditions, and therefore has passed this test.

Qualification Test Report Form

1.0 Test Information

Test Performed:	DO160G - Section 8.3.1
Operational Test (circle)**:**	Yes / No
Date (DD/MM/YYYY)**:**	07/04/2014
Location:	FDS
Outside Contractor (If required)**:**	N/A
Test Supervisor:	ADRIAN SPITERI
Present Personnel:	JUSTIN WATSON
Ambient Temperature:	21.2 °C

2.0 Equipment Information

Test Item

P/N: SPIDERTRACKS S3/S5 S/N: 7F43CY4JH3

Golden Unit (if applicable)

P/N: N/A S/N: N/A

Equipment:

Name	Serial Number	Cal Date (DD/MM/YYYY)	Cal Expiry Date (DD/MM/YYYY)
Thermotron EDV Shaker	42586	03/02/2014	03/02/2015
Endevco Accelerometer	14578	27/11/2013	27/11/2014
HP 34401A DMM	10012	17/05/2013	17/05/2014

Qualification Test Report Form

3.0 Start Time

Date (DD/MM/YYYY):	7 / 4 /2014	Local Time:	10:58

4.0 Finish Time

Date (DD/MM/YYYY):	08/ 4 /2014	Local Time:	10:51 ~~10:43~~ etc

5.0 Notes

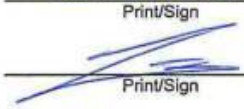
Vertical	Start:	7-4-2014	10:58
	Finish:	7-4-2014	14:01
Fore	Start:	7-4-2014	14:27
	Finish:	7-4-2014	17:26
Side	Start:	07:39	8-4-2014
	Finish:	10:43	8-4-2014

6.0 Signatures

Confirm that the Test Item passed as per test plan referenced above (Para 1.0), and that the appropriate test procedure was completed in full.

Test Result: FAIL/PASS

Test Engineer: J. WATSON
Print/Sign

Signed: 
Print/Sign

Date (DD/MM/YYYY): 08/ 04 /2014

Form No: 21-0274
Issue: C

Qualification Test Cover Sheet

Part Number: Spidertracks S3/S5 **Job Number:** 21324

Product name: Spidertracks S3/S5

S/N of provided units: 7F43CY4JH3, ~~65A2E5S9EA, Q9VF5S2VK4~~

Test Required: DO160G - Section 8.8.1 Operational Vibration - Helicopters; Known Frequencies **Operational Test:** Attached Print out (read notes) (if required)

Test Plan: As per Standard **Acceptance Test:** Attached Print out (read notes)

Test Limits:

Calculated test levels based on the following customer Information:
Robust Test for Helicopter; Know Frequencies.
Main Rotor Frequency: 395 RPM
Number of Blades on Main Rotor: 4
Installation area: Instrument Panel => Test Category G

Levels described below:
Performance Test Levels;
F1 = 26.33Hz; 1.053G
F2 = 52.67Hz; 1.600G
Random vibration level: 0.01 g^2/Hz (2.75 Grms)

Endurance Test Levels;
F1 = 26.33Hz; 2.500G
F2 = 52.67Hz; 2.500G
Random vibration level: 0.02 g^2/Hz (3.89 Grms)

Notes:

Acceptance and Operational test instructions attached to document; from customer email.

After completing form sign below; create a copy for R&D record keeping; attach original with test report and other test documents. **Do not modify after document signed.**

Authorized by: Christopher Mills

Signed: Date: 07/04/14

Operator: Date: 08/04/14

Document No: 21-0296
Issue: A

Adrian Spiteri

From:	Dave Blackwell
Sent:	Wednesday, 2 April 2014 11:07 AM
To:	Adrian Spiteri
Cc:	Justin Watson; James McCarthy
Subject:	Re: Vibration test

Hi Adrian,

I apologise for not including this information with the hardware.

For the purpose of this test, nominal performance of the device an be inferred through the LED indicators on the keypad. The process for accomplishing this is fairly straight forward:

1. Position the Spider with an unobstructed and full view of the sky (horizon to horizon)
2. Power the Spider using the auxiliary lead provided - ensure power supply is stable in the range of 10-28VDC and able to deliver 1A
3. After the initial startup sequence, you should see a solid power LED indictor (bottom left)
4. Within a 2-4 minute period the signal indicator (bottom right) should first turn orange and then green shortly after - orange indicates a GPS lock has been achieved, green that the first position report has been sent through Iridium.
5. Please run through these steps before and after testing.

If you require any other info, please don't hesitate to contact me.

Regards,

Dave Blackwell
OPERATIONS MANAGER

203/150 Karangahape Road. Auckland 1010. New Zealand.
P: +64 9 222 0016 | M: +64 21 140 9131
E: dave.blackwell@spidertracks.co.nz | www.spidertracks.com

On 2/04/2014, at 12:50 pm, James McCarthy <james@spidertracks.co.nz> wrote:

Hi Adrian,

Dave will get back to you today with this information.

And yes - you can cut off the cigar lighter plug. Black is ground, Brown is +ve (12 ~ 28 V DC).

Thanks,

James

James McCarthy
SPIDERMAN