

Version 2.0.0

17 November 2015

Spider 7 Instruction Manual

For Spider 7 with Minor MOD Summary Report, Structure Test Procedure, Electromagnetic Compatibility Test Procedure and additional information.

spidertracks

Real-time aircraft tracking. **Made easy.**

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Record of Revision and Approvals

RECORD OF REVISIONS AND APPROVALS					
Rev.	Date	Description	Pages Affected	Released by	Approved by
IR	17. Nov. 2015	Initial release	All	S. Ridder	D. Blackwell
2	22. Dec 2015	Antenna information changed	5	S. Ridder	L. McCarthy

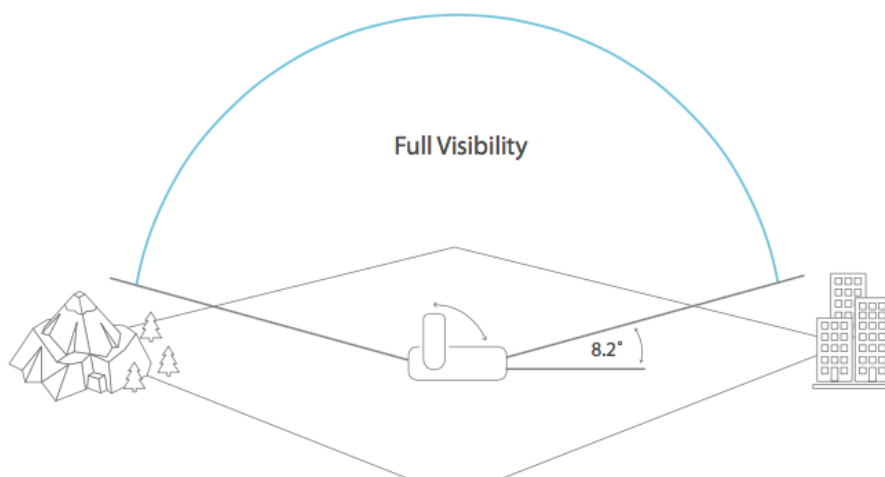


1. Installing your Spider 7

Spider's antenna needs a good view of the sky.

1.1. Positioning the Spider 7/antenna

We recommend placing the Spider 7 with internal antenna on top of the instrument panel in the aircraft. The Spider/antenna needs a clear view of the sky. Spiders have two antenna; one GPS and one Iridium. The GPS antenna is able to receive GPS information at any angle, as long as it is not obstructed by metal (such as the bracket). The Iridium antenna however, only receives and transmits data at an angle of approximately 170 degrees up from the top of the Spider. If you cannot physically see the sky from where the Spider is placed, the Spider will not be able to either. The top of the Spider should point upward. Please note, the Spider is not able to send or receive data through metal, carbon composites, or electrically heated windshields. The Spider is able to send data through glass, fibre glass, or plastic. Please see [installation examples](#) on our support website.



The Spider is not subject to Specific Absorption Rate testing, however we recommend placing it no less than 200mm from a person.

Secure the Spider to the dashboard with the bracket supplied. The Spider can be quickly removed from the mount when required.



1.2. External antenna

We recommend placing the Spider as close as possible to the external antenna, for minimising cable length and consequently losses, through the cable.

There are many options for antennas that will work, ideally there will be one available on the aircraft already. The specification for a satisfactory antenna is, a passive antenna that:

- can receive L1 GPS signal on 1575.42 MHz; and,
- can transmit L-band frequencies between 1616.0 - 1624.5 MHz; and,
- is ideally tuned as close to these frequencies as possible (bandwidth); and,
- Losses must not exceed 2dB and should always be kept to a minimum; and,
- VSWR is less than 2:1; and,
- has 50 ohm impedance; and,
- the radiation pattern is hemispherical (i.e. it points to the sky in all directions);
- Antenna cable should be RG-178 or similar (in the case where a cable of significant length is required, it may be necessary to use a higher grade of coax

1.3. Power

The Spider can be powered using the supplied power lead - just plug into your aircraft's 10 to 28 volt DC (cigarette lighter) power supply. The power supply must be capable of delivering up to 1.5 A peak current. An alternative option to using the cigarette lighter, would be to hard-wire the power supply in your vehicle. Hardwiring the power lead and keeping the Spider portable would normally be done as a minor modification by a Licensed Aircraft Maintenance Engineer or technician.

Power supply must be stable in the range of 10-28 VDC and capable of delivering at least 1.5 A peak current. The Spider must be fuse protected, in which case we recommend using a 3A in-line fuse.

The power lead supplied has three wires. Brown is positive, black is earth, and blue is not required (see Appendix (D) Wiring Diagram - Power Lead).

1.4. Keypad

Connect the external Keypad to the Spider's Mini USB port. The Keypad can be mounted in any location. We recommend locating it within reach of the pilot.



2. Normal Operation

Once your website account is set up and you have installed your Spider you are ready to go flying. For setting up your account, please refer to the [User Guide for the Spidertracks website](#).



Graphic 1: Spider 7 Keypad

2.1. Initial Start Up

The Spider 7 has an LED start-up sequence to indicate the firmware. The major firmware number is indicated by the number of flashes from left - right - left. The minor firmware version number is indicated by number of flashes the power LED makes. The power LED will stay on after the start-up sequence completed. To check if you have the latest firmware version, please refer to the support article titled '[What firmware do I have?](#)'.

2.2. GPS Lock

The Spider 7 will automatically attempt to get a GPS fix. Once a GPS lock is attained the GPS LED on the Spider (left LED) will turn on. The Signal LED on the Keypad (bottom right) will turn orange.

2.3. First position point sent

When a GPS fix is attained the Spider 7 will attempt to send the first position report through Iridium. The Satellite LED on the Spider (Right LED) and the Signal LED on the Keypad (bottom right) will turn green.

2.4. SOS

For triggering an SOS press the Radius and the Mark button on the Spider's Keypad at the same time. The Watch, Radius and Mark LEDs will flash once and an SOS will be sent to your tier one support people setup in the website. The only way to stop the alert is to power the Spider down and power it up again.



SOS alerts will not be sent to emergency services. For more information on emergency contacts please refer to [User Guide and Videos for the spidertracks website](#) within the support website.

2.5. Watch

Press the Watch button for the website to actively monitor your flight. Position reporting will immediately go to 2 minutes. The website will monitor the position reports coming in and if none are received for a 10 minute period, while Watch is active, the website will automatically send out an email and text SOS to your support people.

You can have Watch on for part or all of the flight and are able to turn it on and off by pressing the Watch button. The normal transmission rate will occur when Watch is turned off. You must turn Watch off at the end of your flight by a single press (do not hold), and wait for the Watch LED to stop flashing – this should take less than one minute – to prevent an SOS from being sent. If the Spider is shut down with Watch on (the Watch LED on or flashing) you are likely to send a false alert.

2.6. Radius

Pressing Radius suspends position reporting. Press the Radius button when working in an area for an extended period of time if you do not wish points to be sent while in this area. This may be while flying close to your home airport, or doing agricultural work. Normal tracking will resume on exiting the radius area or pressing the Radius button a second time. For information on configuring Radius please refer to [User guide and videos for the spidertracks website](#).

2.7. Mark

Press the Mark button to force a position point to be sent right now. A description will be added to the point when viewed on the website. A notification message can be sent to email and the mobile phones that have been set up to receive these in the Notification settings page on the website. When the button is pressed once a Mark 1 is sent, Mark 2 -> press twice, Mark 3 -> press three times, Mark 4 -> press four times. Presses must be within one second of each other. The LED will flash back the amount of times the button was pressed.

The Mark button can be used at any time and a point will be sent, as long as the unit has a GPS signal.



2.8. Adjusting the Keypad LED Brightness

You can adjust the Keypad LED brightness by pressing and holding the Mark button down. The LED will scroll through the levels of brightness. Release the Mark button when your desired brightness is reached.

2.9. Spidertxt

For more information on Spidertxt please refer to [STL Manual Spidertxt.pdf](#) or contact support.



3. Troubleshooting

3.1. Loss of Power

Intermittent power supply power issues are easily recognisable and are characterised by:

- Several short tracks which constitute what should have been one track between point A and B
- An excessive number of 0 min tracks
- Missing tracks (last track terminates at point C, next track originates at point D)
- Last point in track is at a high altitude and/or airspeed (in the absence of a point delay issue)
- In the case where a Spider is operating in Watch mode, an undesirable outcome of erratic power cycling may be a tier one alert being fired

Generic Causality

- Spider is powered by auxiliary power outlet (cigarette lighter) which is subject to interruption from bumps, knocks, and vibration
- Spider is powered by a battery pack which is unable to deliver enough current, and/or is running flat

Spidertracks strongly recommends hard-wiring the Spider to the avionics bus in situations where an installation is permanent.

3.2. GPS loss

If the GPS signal is lost, both the Satellite and GPS LED on the Spider will turn off. On the keypad, the Signal LED will turn off.

3.3. Satellite LED turns off

If the Spider can not connect to an Iridium Satellite for a short period of time there will be a transmission delay. If the delay exceeds 120 seconds, the Satellite LED on the Spider 7 will turn off but the GPS LED will stay on to indicate that the unit still has a GPS lock. The Signal LED on the keypad will turn orange.

The Spider uses a queue and can store a maximum of 10 points, therefore even if the Spider is struggling to send position points, it can still add points to the queue as long as there is a GPS lock. Once the Satellite connection is re-established, the Satellite LED on the Spider will turn back on and the Signal LED on the keypad will turn green.



Appendix



(A) Spider 7 Minor Modification Summary Report

(A)1.Description

The subject modification consists of the installation of a Spider 7 real-time aircraft tracking device.

(A)2.Modification Approval Basis

Spidertracks recommends classifying the subject modification as a minor modification. This recommendation is based on the evaluations of the modification against: (1) Transport Canada Civil Aviation Standard 571 Appendix A, Criteria for the Classification of Modifications and Repairs; and (2) Federal Aviation Administration FAR Part 43 Appendix A. Therefore, acceptable data will be employed to support the installation of the Spider 7. Compliance is at owner's discretion.

(A)3.Configuration Control Data

Chapter	Version	Date
Spider 7 Instruction Manual	IR	17/11/2015

(A)4.Post Installation Testing

Complete post installation in accordance with the following guidelines:

Title	Version	Date
Appendix (B): Spider 7 Structure Test Procedure	IR	17/11/2015
Appendix (C) : Spider 7 Electromagnetic Compatibility Test Procedure	IR	17/11/2015

(A)5.Operation and Limitations

Refer to Spider Tracks Limited, Spider 7 Instruction Manual for operational instructions.

Basic flight manual limitations remain applicable.

(A)6.Weight and Balance

Update aircraft weight and balance report as required:

Description	Weight [kg]	Arm [mm]	Moment [kg-mm]
Installation, Spider 7	0.165		



(A)7.Electrical Load

Installation of the Spider 7 introduces a maximum continuous draw of 1.0A at 12VDC. Update the aircraft electrical load analysis report as required.

(A)8.Continuing Airworthiness

Maintenance of the modification is in accordance with the applicable OEM maintenance manual. Instructions for Continued Airworthiness (ICA) are not required.



(B) Spider 7 Structure Test Procedure

(B)1.Test Definition

The purpose of these test procedures is to demonstrate structural integrity for the installation of the Spider 7.

(B)2.Special Tools and Equipment

A calibrated digital or analogue fish hook type scale (e.g. Transducer Techniques HFG-110) is required to conduct the structural testing.

(B)3.Test Conditions

The Spider 7 must be installed prior to starting the structural testing. Allow for adequate time for the adhesive to fully bond to the installation location.

(B)4.Applied Loads

Conservative ultimate load factors for structural testing purposes are provided for FAR 23 (normal, acrobatic and utility category airplanes) and FAR 27 (normal rotorcraft) installations. For additional information, refer to the acceptable data source, FAA AC43.13-2B, Chapter 1, Paragraphs 103 through 105.

Load Case	Ultimate Load Factor	Weight of Spider 7	Minimum Applied Load [Load Factor x Weight]
Forward	18.0g	0.165 kg	2.970 kg
Downward	20.0g	0.165 kg	3.300 kg
Upward	5.7g	0.165 kg	0.941 kg
Side	8.0g	0.165 kg	1.320 kg

Table 1: Minimum Applied Loads.

(B)5.Test Procedure

The following procedures detail the methodology for the structural test.

1. Record the serial number of the Spider 7 being used in the test and complete the test record information.
2. Apply the minimum loads listed in Chapter 3.4 to the centre of the Spider 7 in accordance with AC 43.13-2B, Para 105. Record the actual applied loads:

Forward	
Downward	



Upward	
Side	

(B)6.Pass/Fail Criteria

When no damage or permanent deformation occurs after 7 seconds of applied static load in all directions, the Spider 7 installation is acceptable. Should permanent deformation occur after 3 seconds, reinforcements are required (e.g. doubler installation) to the affected structure and repeat test.

(B)7.Test Record

Date of Test	
Spider 7 S/N	
Location of Test	
A/C Registration	

LAME conducting
testing:

Print Name

Signature

License No.



(C) Spider 7 Electromagnetic Compatibility Test Procedure

(C)1. Test Definition

The purpose of these test procedures is to demonstrate Electromagnetic Compatibility (EMC) between the aircraft's electrical or electronic systems, and the Spider 7 being tested. This test procedure is an aircraft-level test to determine if there is any electromagnetic or radio frequency interference (EMI/RFI) to the various critical aircraft systems, radios and installed equipment.

(C)2. Special Tools and Equipment

The following equipment may be required depending on aircraft installed equipment and availability of navigation aids and ATC radar in the area where testing is conducted.

- a. NAV/COM Ramp Tester (e.g. NAV-402AP, IFR-4000);
- b. Transponder/DME Ramp Tester (e.g. ATC-600A, ATC-601, IFR-6000);
- c. TCAS Ramp Tester (e.g. TCAS-201, IFR-6000);
- d. Headsets; and
- e. Other equipment as required to exercise all modes of operation for systems under test.

(C)3. Test Conditions

All aircraft systems under test must be functional prior to starting the EMC test. Any reduced functionality of the system(s) should be noted. All testing shall be conducted in day VFR conditions with a clear view of the sky to ensure that a GPS fix can be obtained for starting the Iridium transmission.

For the test, the following conditions are required:

- a. All engines running with all generators online (for part of the test);
- b. All electrical busses powered; and
- c. All avionics/electrical systems and installed equipment powered and active.

(C)4. Test Procedure

The following procedures detail the methodology for the EMC test.

1. Identify all aircraft systems under testing from the test matrix table and strike out those that are not applicable to the respective aircraft used in the test.



2. Record the serial number of the Spider 7 being used in the test and complete the test record information.
3. Power up the Spider 7. The left LED on the keypad of the Spider will glow green and the right LED will turn amber when it has a GPS fix.
4. Achieve a Bluetooth connection with the Spider 7 and an appropriate device (e.g. Apple iPhone).
5. Operate each aircraft system under test in all the modes of operation, while monitoring the system for interference. If there is no interference observed, insert a check mark in the "passed" column. If interference is observed, describe the interference in the respective observation column and contact Spider Tracks Limited for further assistance.
6. Multiple systems may be monitored in tandem to expedite the test whenever possible.
7. Systems should be tested on the ground unless the aircraft system/equipment can only be tested in flight.
8. If there are avionics/electrical systems on the aircraft that are not listed, add them at the end of the table.
9. Ensure there is no interference to aircraft systems from the use of the Spider 7.
10. When test is complete, note any comments or differences in the test procedures "Comments" section remembering to sign and date the appropriate areas at the end of this document.

(C)5.Pass/Fail Criteria

EMC testing is subjective in nature since an interference can be deemed acceptable or unacceptable. If an interference is observed, the decision of acceptability should be determined by the person who will be making a compliance finding against the applicable airworthiness standards. In general, the systems under test shall have no unintentional changes in operating mode, unexpected responses, intermittent behaviours, or unacceptable noise.



(C)6. Test Record

Date of Test	
Spider 7 S/N	
Location of Test	
A/C Registration	

Aircraft System Under Test	Test Instructions	Passed	Observations
VHF 1	Open squelch. Tune to 118, 120, 124, 128, 132, 136MHz. Listen for noise. Verify transmit and reception.	<input type="checkbox"/>	
VHF 2	Open squelch. Tune to 118, 120, 124, 128, 132, 136MHz. Listen for noise. Verify transmit and reception.	<input type="checkbox"/>	
VHF 3	Open squelch. Tune to 118, 120, 124, 128, 132, 136MHz. Listen for noise. Verify transmit and reception.	<input type="checkbox"/>	
HF 1	Tune to 3, 6, 9, 15, 21, 27MHz. Listen for noise. Verify transmit and reception in both AM and SBB modes for each channel.	<input type="checkbox"/>	
VHF/FM 1	Tune to test frequency. Verify transmit and reception.	<input type="checkbox"/>	
VHF/FM 2	Tune to test frequency. Verify transmit and reception.	<input type="checkbox"/>	
UHF 1	Tune to test frequency. Verify transmit and reception.	<input type="checkbox"/>	
VOR 1	Tune in to local stations and/or use ramp tester. Verify VOR bearing display and station audio ident.	<input type="checkbox"/>	
VOR 2	Tune in to local stations and/or use ramp tester. Verify VOR bearing display and station audio ident.	<input type="checkbox"/>	
SATCOM	Verify operation in all modes.	<input type="checkbox"/>	
ILS 1	Tune in to local stations and/or use ramp tester. Verify GS / LOC display and station audio ident.	<input type="checkbox"/>	



Aircraft System Under Test	Test Instructions	Passed	Observations
ILS 2	Tune in to local stations and/or use ramp tester. Verify GS / LOC display and station audio ident.	<input type="checkbox"/>	
DME 1	Tune in to local stations and/or use ramp tester. Verify correct DME and station audio ident.	<input type="checkbox"/>	
DME 2	Tune in to local stations and/or use ramp tester. Verify correct DME and station audio ident.	<input type="checkbox"/>	
ADF 1	Tune in to local stations and/or use ramp tester. Verify correct indication and station audio ident.	<input type="checkbox"/>	
GPS 1	Display GPS satellite data. Verify signal quality and number of satellites tracking. Verify GPS position is reasonable.	<input type="checkbox"/>	
GPS 2	Display GPS satellite data. Verify signal quality and number of satellites tracking. Verify GPS position is reasonable.	<input type="checkbox"/>	
GPS 3	Display GPS satellite data. Verify signal quality and number of satellites tracking. Verify GPS position is reasonable.	<input type="checkbox"/>	
RAD ALT 1	Verify RAD ALT displays zero feet on ground.	<input type="checkbox"/>	
RAD ALT 2	Verify RAD ALT displays zero feet on ground.	<input type="checkbox"/>	
ELT	Monitor ELT for inadvertent trigger.	<input type="checkbox"/>	
WX RADAR	Operate weather radar in all available modes. And verify no erroneous indications.	<input type="checkbox"/>	
CLOCKS	Verify no erroneous indications.	<input type="checkbox"/>	
STBY INST	Verify no erroneous indications.	<input type="checkbox"/>	
STBY COMPASS	Monitor for erratic indications.	<input type="checkbox"/>	
HSI/DG 1	Monitor for erratic indications.	<input type="checkbox"/>	
HSI/DG 2	Monitor for erratic indications.	<input type="checkbox"/>	



Aircraft System Under Test	Test Instructions	Passed	Observations
AHRS 1	Monitor for erratic attitude and heading indications.	<input type="checkbox"/>	
AHRS 2	Monitor for erratic attitude and heading indications.	<input type="checkbox"/>	
CVR	Run self-test if available. Verify no flags or lights appear.	<input type="checkbox"/>	
FDR	Run self-test if available. Verify no flags or lights appear.	<input type="checkbox"/>	
COCKPIT LIGHTS	Verify normal operation.	<input type="checkbox"/>	
EXTERNAL LIGHTS	Verify normal operation.	<input type="checkbox"/>	
HTAWS	Monitor for erroneous indications. Perform self-test if available.	<input type="checkbox"/>	
TCAS	Monitor for erroneous indications. Perform self-test if available.	<input type="checkbox"/>	
MFD	Monitor for erroneous indications. Perform self-test if available.	<input type="checkbox"/>	
TRANSPONDER	Use ramp tester or check in flight to establish Mode C interrogations.	<input type="checkbox"/>	
CAUTION PANEL	Monitor for erroneous indications.	<input type="checkbox"/>	
CIRCUIT BREAKERS	Monitor for erroneous indications.	<input type="checkbox"/>	
SPAS	Perform system test and monitor for erroneous indications.	<input type="checkbox"/>	
AFCS / SCAS / CSAS	Perform system test and monitor for erroneous indications.	<input type="checkbox"/>	
FLIGHT DIRECTOR 1	Engage flight director in all modes of operation.	<input type="checkbox"/>	
FLIGHT DIRECTOR 2	Engage flight director in all modes of operation.	<input type="checkbox"/>	
ADC 1	Perform a system function test. Verify correct display of airspeed, altitude, TAT, TAS.	<input type="checkbox"/>	
ADC 2	Perform a system function test. Verify correct display of airspeed, altitude, TAT, TAS.	<input type="checkbox"/>	
HEATER / ECS	Operate in all modes.	<input type="checkbox"/>	



Aircraft System Under Test	Test Instructions	Passed	Observations
FUEL QUANTITY	Monitor for erroneous or erratic indications.	<input type="checkbox"/>	
FUEL SYSTEM	Monitor for erroneous or erratic indications.	<input type="checkbox"/>	
HYDRAULIC SYS	Cycle hydraulic pumps. Monitor for erroneous or erratic indications.	<input type="checkbox"/>	
FUEL CONTROL	Cycle system to manual and back to auto. Monitor for erroneous or erratic indications.	<input type="checkbox"/>	
FIRE DETECTION SYSTEM(S)	Monitor for erroneous or erratic indications.	<input type="checkbox"/>	
ENGINE INDICATING	Run engines. Verify proper functioning. Monitor for erroneous or erratic indications. Transfer electrical busses to all engine driven generator(s).	<input type="checkbox"/>	
AC/DC ELECTRICAL SYSTEMS	Configure the electrical systems in different modes. Verify no interference when switching loads from one bus to another.	<input type="checkbox"/>	
MAST MOMENT INDICATOR	Monitor for erroneous or erratic indications.	<input type="checkbox"/>	
FADEC / DECU	Run engines in all modes. Monitor for erroneous or erratic indications.	<input type="checkbox"/>	
VEMD	Run engines in all modes. Monitor for erroneous or erratic indications.	<input type="checkbox"/>	
PITOT STATIC HEAT	Confirm correct operation.	<input type="checkbox"/>	
EMERGENCY LIGHTS	Monitor for inadvertent activation.	<input type="checkbox"/>	
PARTICLE SEPERATOR	Monitor for erroneous indications.	<input type="checkbox"/>	
CYCLIC TRIM	Verify for normal operation and monitor for inadvertent activation.	<input type="checkbox"/>	
ENGINE TRIM	Verify for normal operation and monitor for inadvertent activation.	<input type="checkbox"/>	
CARGO HOOK	Verify for normal operation and monitor for inadvertent activation.	<input type="checkbox"/>	



Aircraft System Under Test	Test Instructions	Passed	Observations
LONG LINE RELEASE	Verify for normal operation and monitor for inadvertent activation.	<input type="checkbox"/>	
		<input type="checkbox"/>	
		<input type="checkbox"/>	
		<input type="checkbox"/>	

Comments

Indicate any deviations from the test procedure, or observations regarding the test results:

LAME conducting testing:

PRINT NAME

SIGNATURE

LICENSE
NO

Pilot conducting testing:

PRINT NAME

SIGNATURE

LICENSE
NO



(D) Wiring Diagram - Power Lead

