



Installation Manual



Slingshot® Base Station 2.0

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As with all wireless and satellite signals, several factors may affect the availability and accuracy of wireless and satellite navigation and correction services (e.g. GPS, GNSS, SBAS, etc.). Therefore, Raven Industries cannot guarantee the accuracy, integrity, continuity, or availability of these services and cannot guarantee the ability to use Raven systems, or products used as components of systems, which rely upon the reception of these signals or availability of these services. Raven Industries accepts no responsibility for the use of any of these signals or services for other than the stated purpose.

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CHAPTER

1

Important Safety Information

NOTICE

Read this manual and the safety information provided within before installing the Slingshot® base station 2.0.

- Follow all safety information presented within this manual.
- Be sure to review local building codes prior to erecting or modifying any structure for mounting the base station antenna. Contact a professional electrician for more information.
- If you require assistance with any portion of the installation, contact the Raven Network Operations Center for support.

FCC Statement:

This device complies with Part 15 of FCC rules. Operation of this device is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment generates, uses and may radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio or television technician for help

WARNING

- Only personnel qualified to work on raised platforms or trained to use fall protection equipment should install or perform maintenance on the base station antenna.
- Be sure to follow all safety guidelines when working on raised platforms or elevation. Contact a qualified training facility for additional information.

CAUTION

- Raven Industries does not supply lightning arresting equipment. Refer to local building and electrical codes and contact a professional electrician for more information regarding lightning arresting equipment.
- Make sure the entry point into any building or structure is properly sealed to prevent moisture from migrating into the building and causing damage to the Slingshot base station or other property.
- Ensure that the power cable is the last cable to be connected.

CHAPTER

2

Introduction & Preparation

Introduction

The Slingshot base station 2.0 is designed to provide subscribed field hubs with RTK level GNSS (Global Navigation Satellite System) corrections via a cellular service provider. Correction information is sent from the Slingshot base station 2.0 to the Raven Slingshot server and back to a field hub to supply the guidance correction information to the guidance device.

The Slingshot base station will be delivered and installed in two phases:

1. Preparation and set up for a new base station.
2. Delivery and commissioning of the Slingshot base station.

Review and complete the instructions in this chapter prior to delivery of the Slingshot base station 2.0.

Base Station 2.0 Installation

Site Requirements

The following items are required before the Raven Slingshot base station 2.0 may be set up:

- A dedicated, broadband internet connection (DSL, cable, etc.) with DHCP support is preferred, but a business network can be used.
- A dry, temperature controlled environment suitable for computer equipment with a connection to a dedicated internet line and adequate power receptacles.
- A location within reach of the base station antenna mounting location and cable (maximum cable length 150' [45 m]).

Note: *The base station tray is compatible with a 1U 19" [48 cm] server rack for optional mounting.*

Installing the Base Station 2.0

Before mounting the Slingshot base station 2.0 antenna, select a site which meets the following conditions to ensure optimal performance:

- Ensure the antenna location provides a clear, 360° view of the sky.
- Antenna should be mounted as far from reflective objects (i.e. metal buildings, water bodies) as possible and should be higher than surrounding obstructions (i.e. tree lines, power lines, etc.).
- If obstructions or reflective surfaces are within 100' [30 m], mount the Slingshot base station as high as possible to minimize interference and/or multipath reflections. If no obstructions or reflective surfaces are within this range, mount the antenna as low as possible.
- Use a sturdy mounting bracket with a 5/8" -11 NC thread. The thread must be between 3/8" to 7/8" [9.6 mm to 22 mm] long to ensure proper mounting and avoid damage to the antenna casing. If the thread length is longer than 7/8" [22 mm], use two jam nuts to shorten the exposed thread.

FIGURE 1. Example Antenna Mounting with Jam Nuts



- The antenna mount should provide a solid base for the antenna and should not allow the antenna to move in any direction.
- Mount the antenna with the thread adapter and TNC cable connector facing toward the ground.
- Make sure the entry point into any building or structure is properly sealed to prevent moisture from migrating into the building and causing damage to the Slingshot base station or other property. Use a drip loop to keep moisture away from the entry point.

Note: *It is recommended to contact a qualified electrician to route the cable into the building.*

FIGURE 2. Drip Loop Example



- To prevent damaging the antenna cable, do not route cables through potential crimp points such as doors or windows. Avoid severe bends in the cable as this may also cause damage to the cable.

FIGURE 3. LMR 400 Antenna Cable Bending Specifications

Specification	Units
Bend Radius (Installation)	1.0 in [25.4 mm]
Bend Radius (Repeated)	4.0 in [101.6 mm]
Bending Moment	0.5 ft.-lb. [0.68 N-m]

Base Station Antenna Mounting

To install the Slingshot base station antenna:

1. Verify that the thread on the antenna mount does not extend more than 7/8" [22 mm] to ensure the plastic inside the antenna receptacle is not damaged when the mount is inserted. If the thread length is longer than 7/8" [22 mm], use two jam nuts to shorten the exposed thread.
2. Thread the metal adapter on the bottom of the antenna onto the mount.

Note: *The metal adapter is fixed to the antenna body. Do not attempt to remove this piece.*

3. Using a wrench, tighten the antenna adapter to the mount to secure the base station antenna.
4. Remove the dust cap from the TNC connector on the antenna.
5. Attach one end of the provided base station antenna cable to the antenna and route to the selected base station location.

Note: *If the antenna will be mounted on a tower structure, be sure to leave enough slack in the antenna cable to allow for expansion and contraction of the structure to avoid damaging the cable. Raven recommends contacting a certified electrician to assist with cable installation and routing.*

If the antenna cable will be routed into a building, be sure to use a drip loop to prevent moisture from entering the building by wicking along the cable. Also be sure to seal any building penetrations properly to prevent moisture and condensation.

Care & Maintenance

The base station antenna is designed to withstand the elements, including rain, snow, and dust. To ensure that the antenna continues to perform as desired, keep the radome (top surface of the antenna) clear of snow and ice and clear any debris as necessary.

Ensure that the TNC antenna cable connector remains clean and dry. If the cable will be disconnected from the antenna for any length of time, replace the dust cap on the antenna.

CHAPTER
3

Base Station 2.0 Installation & Start Up

Contact your regional Raven Sales or Precision Agriculture Specialist to coordinate installation and set up of the Slingshot base station 2.0.

Note: Be sure that all required items outlined in Chapter 2, Introduction & Preparation, have been completed prior to installing the base station.

Base Station 2.0 Connections

1. Setup the Slingshot base station 2.0 unit in the prepared location.

Note: The base station tray is compatible with a 1U 19" [48 cm] server rack for optional mounting.

FIGURE 1. Base Station 2.0 Connectors



2. Connect the base station antenna cable to the TNC connector on the base station.
3. Connect the supplied Ethernet cable from the internet source to the Ethernet port on the base station.
4. Connect the square, four-pin connector on the power adapter cable to the power plug on the base station.
5. Route the power adapter cable to one of the battery backup plugs on the UPS or power source.

Startup

1. Power up the base station.

Note: *As soon as the Slingshot base station is powered up and receiving GNSS, the base station will begin convergence to determine the base station location. This process may take up to 15 minutes. Once complete, the base station is pre-programmed to begin communicating with the Raven Slingshot server and will begin broadcasting corrections for use by rover units within the coverage area.*

2. After the first fifteen minutes, the “RTK” LED indicator should blink once per second if corrections are being sent to the Raven Slingshot server.

Fixing the Base Station Location

After the initial installation and convergence, the Slingshot base station 2.0 will continue to broadcast corrections to the Slingshot server in a demonstration mode. This mode is adequate for conducting client demonstrations of the Slingshot system and will provide RTK level corrections to any subscribers so clients may begin using RTK guidance from the Slingshot base station 2.0 immediately.

To provide the best possible corrections over time, the Slingshot base station 2.0 position should be surveyed and set to a fixed operation mode. The Raven Network Operations Center will assist with this transition to process the base station location, fix the position and permanently program the location into the base station 2.0.

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Limited Warranty

What Does this Warranty Cover?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service when used for intended purpose.

How Long is the Coverage Period?

Raven Applied Technology products are covered by this warranty for 12 months from the date of retail sale. In no case will the Limited Warranty period exceed 24 months from the date the product was issued by Raven Industries Applied Technology Division. This warranty coverage applies only to the original owner and is non-transferable.

How Can I Get Service?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including proof of purchase) must be included inside the box to be sent to Raven Industries.

What Will Raven Industries Do?

Upon confirmation of the warranty claim, Raven Industries will (at our discretion) repair or replace the defective product and pay for the standard return freight, regardless of the inbound shipping method. Expedited freight is available at the customer's expense.

What is not Covered by this Warranty?

Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit, labor, or other damages. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.



Extended Warranty

What Does this Warranty Cover?

This warranty covers all defects in workmanship or materials in your Raven Applied Technology Division product under normal use, maintenance, and service when used for intended purpose.

Do I Need to Register My Product to Qualify for the Extended Warranty?

Yes. Products/systems must be registered within 30 days of retail sale to receive coverage under the Extended Warranty. If the component does not have a serial tag, the kit it came in must be registered instead.

Where Can I Register My Product for the Extended Warranty?

To register, go online to www.ravenhelp.com and select Product Registration.

How Long is the Extended Warranty Coverage Period?

Raven Applied Technology products that have been registered online are covered for an additional 12 months beyond the Limited Warranty for a total coverage period of 24 months from the date of retail sale. In no case will the Extended Warranty period exceed 36 months from the date the product was issued by Raven Industries Applied Technology Division. This Extended Warranty coverage applies only to the original owner and is non-transferable.

How Can I Get Service?

Bring the defective part and proof of purchase to your Raven dealer. If the dealer approves the warranty claim, the dealer will process the claim and send it to Raven Industries for final approval. The freight cost to Raven Industries will be the customer's responsibility. The Return Materials Authorization (RMA) number must appear on the box and all documentation (including proof of purchase) must be included inside the box to be sent to Raven Industries. In addition, the words "Extended Warranty" must appear on the box and all documentation if the failure is between 12 and 24 months from the retail sale.

What Will Raven Industries Do?

Upon confirmation of the product's registration for the Extended Warranty and the claim itself, Raven Industries will (at our discretion) repair or replace the defective product and pay for the standard return freight, regardless of the inbound shipping method. Expedited freight is available at the customer's expense.

What is Not Covered by the Extended Warranty?

Raven Industries will not assume any expense or liability for repairs made outside our facilities without written consent. Raven Industries is not responsible for damage to any associated equipment or products and will not be liable for loss of profit, labor, or other damages. Cables, hoses, software enhancements, and remanufactured items are not covered by this Extended Warranty. The obligation of this warranty is in lieu of all other warranties, expressed or implied, and no person or organization is authorized to assume any liability for Raven Industries.

Damages caused by normal wear and tear, misuse, abuse, neglect, accident, or improper installation and maintenance are not covered by this warranty.

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