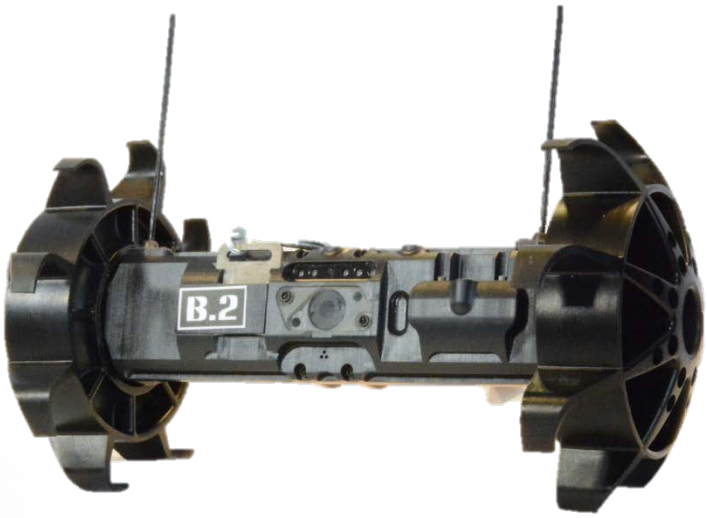


Throwbot® 2 Robot and OCU User Manual

Version 1.1, February 2018

Product Identification

This User Manual applies to the ReconRobotics Throwbot® 2 Robot and Operator Control Unit (OCU).

Notice:

Any changes or modifications, whether to the physical equipment, software, or firmware, that are not expressly approved by ReconRobotics, will void the user's warranty and license to operate the equipment.

All materials contained in this document are proprietary and confidential. Reproduction and duplication, without specific written permission, are strictly prohibited.

Failure to adhere to the terms of this manual (User Manual), or ignoring the safety warnings described on page 22 and 23, will void the user's license to operate the equipment and subject the user to liability.

Corporate Headquarters:

ReconRobotics, Inc.
5251 W 73rd Street, Ste A
Edina, MN 55439 USA
Phone: 1-866-697-6297 or 952-935-5515
Fax: 952-935-5508
Email: support@reconrobotics.com
Website: www.reconrobotics.com

Place Serial Number Sticker Here

Patent Notification

The devices described within this User Manual are protected under US Patent Numbers D637,217, D626,577, and 9,061,544 and other patents pending.

©2018 ReconRobotics

Table of Contents

Kit Contents 3
Accessories for the Throwbot 2 Robot 4
Throwbot 2 Robot Feature Overview 5
Operator Control Unit (OCU) Feature Overview 6
Throwbot 2 Robot's Video Overlay 7
OCU Audio/Video-Out Capabilities 8
Operational Specifications 9
Quick Start Guide 10
- Matching Radio Channels 10
- Basic Deployment Instructions 10

Instructions for Use: Setup 11
- Powering the OCU 11
- Powering the Robot 11

Instructions for Use: Charging 12
- Robot Charging 12
- OCU Charging 12
- General Charging Guidelines 13

Regular Maintenance 14
System Reconfiguration 15
- Converting to Different Configurations 15
- Attaching the Picatinny Rail 16
- Carry and Tow (CT) Configuration 17
- Rugged XL (RXL) Configuration 17

Troubleshooting / Frequently Asked Questions 18
Safety Information & Warnings 22
Warranty and Service 24
- Warranty 24
- Requesting Service or Repair 24

ReconRobotics Throwbot 2 Robot FCC Guidelines and Logbook 26

Kit Contents

Two styles of kits are available. See the table below for an overview of the differences. Please inspect the contents of this package to ensure that all materials are present. If any of the materials are missing, please contact support@reconrobotics.com.

Item	Base Kit	Deluxe Kit
Throwbot® 2 Reconnaissance Robot	●	●
Operator Control Unit (OCU) with lanyard	●	●
Throwbot 2 Charger with region specific power cord	●	●
OCU Charger with region specific power cord	●	●
Spare Activation Plate	●	●
Tether Kit	●	●
Volume Control Adapter	●	●
Hard Carrying Case	●	●
User Manual	●	●
Set of Rugged XL (RXL) Configuration wheels[1]		●
Set of Carry and Tow Configuration wheels		●
Tail for Rugged XL (RXL) and Carry and Tow Configuration[2]		●
Picatinny Rail[3]		●
Tow Disc Assembly		●
Spare Hex Nuts (2)		●
3/32” Hex Driver		●
5/16” Nut Driver		●
Soft Carrying Case		●

[1] While these wheels may look similar to the Recon Scout® XL wheels in size, they are a new design. They can be utilized on Recon Scout XL or Recon Scout CT with Flex Pack robots, but the Recon Scout XL wheels from the Recon Scout XL robot or Flex Pack will not afford the same drop ratings as the new wheels and should not be used on a Throwbot 2 robot.

[2] While this tail may look similar to the Recon Scout XL or Recon Scout CT tail, the mounting mechanisms are different and they cannot be interchanged.

[3] The Throwbot 2 robot’s Picatinny Rail is not interchangeable with the Recon Scout CT.

Accessories for the Throwbot 2 Robot

The following accessories are available for the Throwbot 2 robot. Please contact your local ReconRobotics representative for pricing and availability.

Rugged XL Conversion Kit
This kit provides the RXL style wheels and tail necessary to convert a Throwbot 2 base robot into the Rugged XL configuration. All necessary tools for performing the change are included in the kit.

Carry and Tow Conversion Kit
This kit provides the Picatinny rail, CT style wheels, and RXL tail to reconfigure the Throwbot 2 base robot into the Carry and Tow configuration. All necessary tools for performing the change are included in the kit.

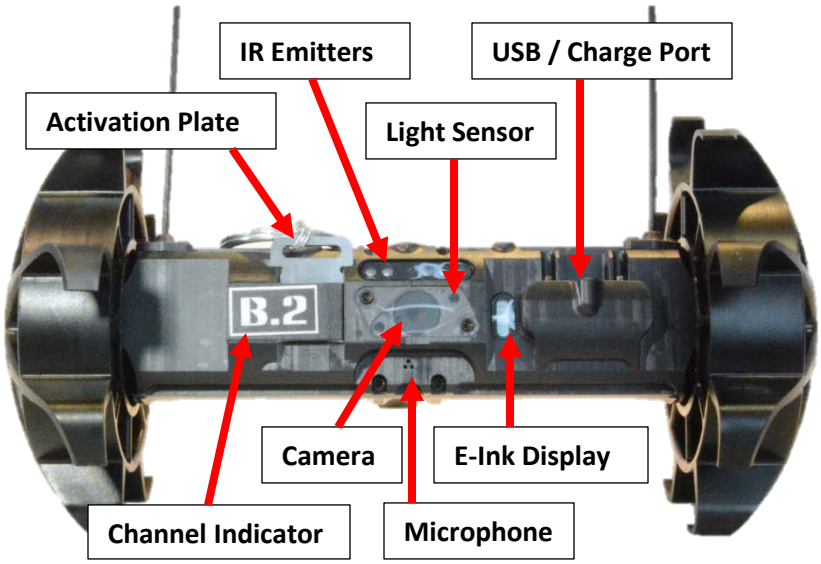
Deluxe Pack
This kit provides the capabilities of both the Rugged XL Conversion Kit and Carry and Tow Conversion Kit in a single package.

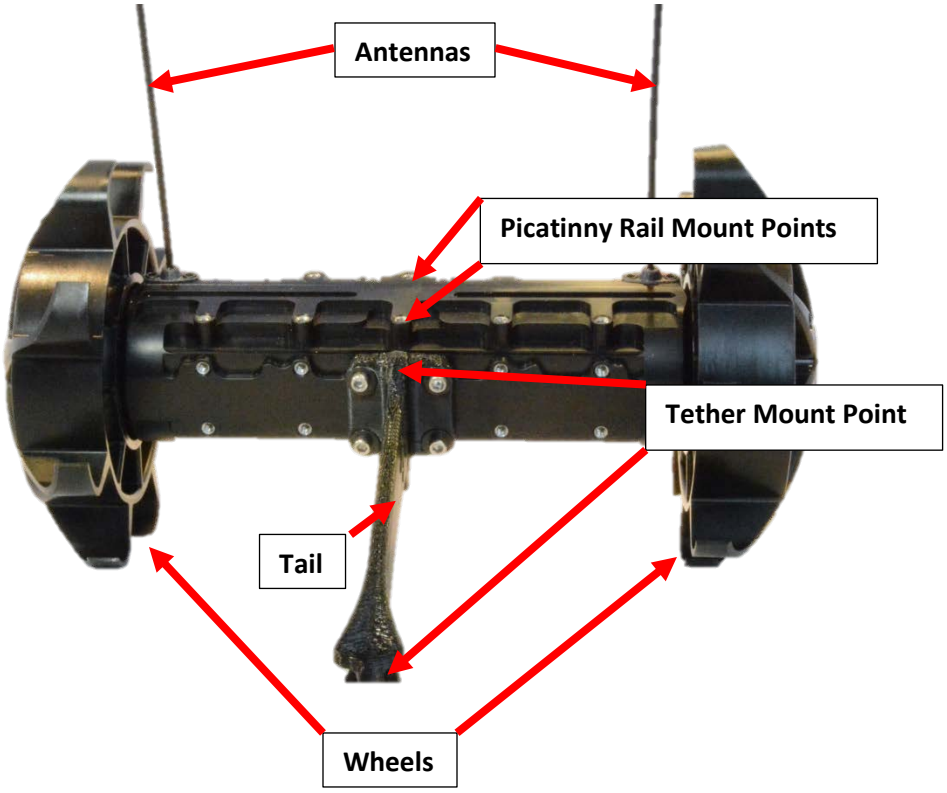
Audio and Video Out Cabling Package
This package allows you to capture video and audio from Throwbot 2 robot onto a 3rd party device via the outputs on the OCU. The cabling package includes RCA and BNC cables.

Recon Scout® SearchStick™
The Recon Scout® SearchStick™ device enables tactical and patrol personnel to instantly convert any Throwbot 2 robot into a versatile pole camera. The SearchStick pole has a collapsed length of 20.5" (52cm) and can be extended to a length of 72" (183cm).

Command Monitoring Station
The Command Monitoring Station 2.0 (CMS 2.0) enables a commander to monitor video and audio transmissions from Throwbot 2 robots operating on channels A.2, B.2, or C.2 from up to 1,000 feet (305m) away. Software included with the CMS 2.0 allows you to record the Throwbot 2 robot's video transmissions.

Throwbot 2 Robot Feature Overview

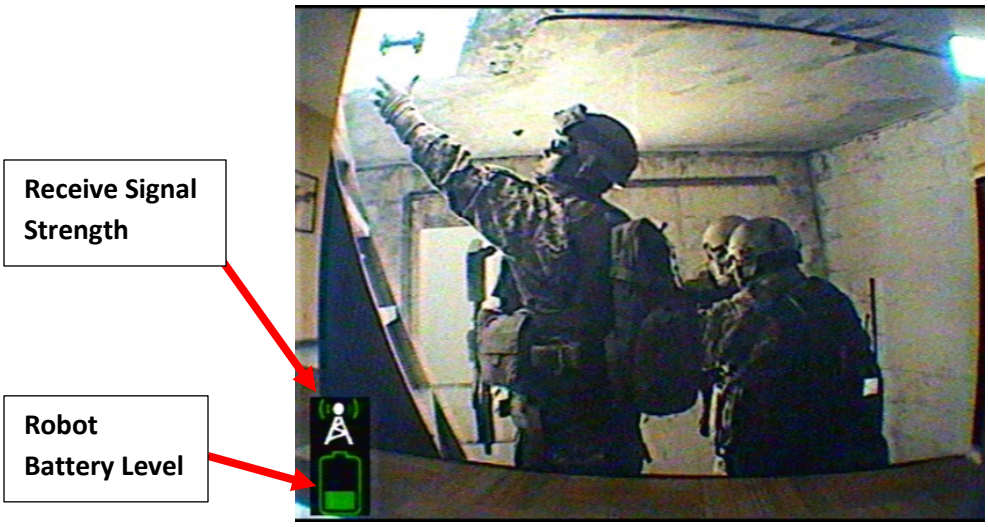




Operator Control Unit (OCU) Feature Overview

Throwbot 2 Robot's Video Overlay

The Throwbot® 2 robot incorporates icons for some useful operational information into the video signal which will be displayed on the OCU or Command Monitoring Station (CMS). **Note:** Earlier generation robots from ReconRobotics such as the Throwbot® XT and Recon Scout CT do not have this capability and will not transmit the same information, even if used with the OCU from a Throwbot 2 kit.



The robot's battery level is shown by an icon in the lower left corner of the video. The table below provides an overview of this icon and the robot's state of charge. **Note:** There is no indicator for the OCU's battery level.

State of Charge	Empty	10%	20%	40%	60%	80%	Fully Charged
Battery Icon	BLINKING						
Battery Icon (Charging)							

The robot's received signal strength is shown by an icon immediately above the battery level icon. There are three levels (marginal, fair, and good) for receive signal strength depicted below. With marginal signal, there is the potential for loss or interment control of the robot.

Marginal	Fair	Good

OCU Audio/Video-Out Capabilities

The OCU is capable of receiving audio transmitted from the Throwbot 2 robotic system. To listen, plug the provided volume control adapter into the appropriate jack on the left-hand side of the OCU. Then plug headphones into the volume control adapter. Headphones approved for Apple™ or Android™ devices may not work with the provided volume control adapter.

NOTE: Ensure you are using headphones with in-line volume control. There is no volume control on the OCU itself. Be careful to test the audio volume before using.

The ReconRobotics Audio/Video (A/V) Out Cabling Package (sold separately) can be used to connect the OCU to an external monitoring / recording device (not included). The A/V Out jack is located on the left-hand side of the OCU.

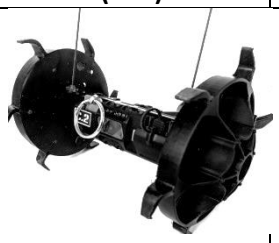
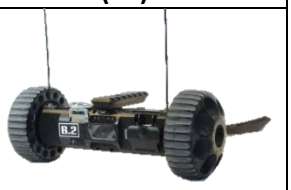
Once connected to the OCU, connect the other end of the A/V Out cable to the appropriate connector on an external device. Please refer to the instruction card provided with the A/V Out Cabling Package for more information.

NOTE: The A/V Out cables in the A/V Out Cabling Package are specifically designed to work with the OCU. Though they may look similar, cables manufactured by a third party may not work with the OCU.

NOTE: If the OCU is used with older ReconRobotics products that do not transmit audio, you will still be able to output a video signal using the appropriate cable.

Operational Specifications

The Throwbot 2 robotic system has been designed to provide immediate situational awareness in a variety of situations. The table below outlines performance characteristics in various configurations. For information on reconfiguring the system, see System Reconfiguration on page 15.

Specification	Base Configuration	Rugged XL (RXL)	Carry and Tow (CT)
Image			
Range[4]			
Line of Sight (LOS)	450 ft / 137 m		
Indoors / Non-Line of Sight (NLOS)	150 ft / 45 m		
RunTime[5]			
Typical	110 minutes		
Observation Mode	160 minutes		
Max Drop Height[6]	30 ft / 9.1 m		
Max Throw Distance[5]	120 ft / 36 m		
Max Obstacle Climb[5]	2” / 5 cm	4” / 10 cm	Not rated for climbing
Max Speed[5]	1.8 ft/s 0.6 m/s	2.2 ft/s / 0.7 m/s	1.5 ft/s / 0.4 m/s
Payload Capacity	None	None	Up to 2 lbs / 0.9 kg mounted on robot Up to 2 lbs / 0.9 kg towed behind robot
IP Rating[7] **(Robot)**	IP66, IP67		
IP Rating (OCU)	None		

[4] The Throwbot 2 robot and OCU have been tested to these ranges. Performance may vary depending upon local environmental conditions.
[5] Typical Runtime defined as 75% driving, 25% observation on flat terrain in a well-lit area. Towing weight, maneuvering over terrain, driving with the IR emitters on, etc. will reduce lifetime. Observation Mode is defined as remaining stationary and broadcasting video only.
[6] Rating does not apply when Picatinny Rail or other payloads are attached
[7] Does not include payloads

Quick Start Guide

Matching Radio Channels

Ensure that both devices are on matching frequencies. The operating frequency channel is indicated by a sticker on the robot and OCU. They must match for successful operation. To deploy multiple robots within the same area of operation, different channels must be used.

When pairing an OCU and a ReconRobotics robot for operation, the channel designations must match identically. For example, equipment labeled A may not be 100% compatible with equipment labeled A.2. When operating multiple systems simultaneously, make sure you are using two different letters, for instance A.2 and C. Robots on channel A.2 and on channel A will interfere with each other and not work well in the same environment (the same will also occur with B/B.2 and C/C.2).

Basic Deployment Instructions

1. Rotate OCU antennas to an upright position.
2. Switch OCU on.
3. Pull Activation Plate from Robot. Confirm that the robot is broadcasting video and accepting command from the OCU before deploying. If the video is noisy, it's possible that the OCU's video receiver is being overpowered. Try moving the robot and OCU further apart.
4. Test headphones at a low volume setting.
5. Drop or throw robot into target environment.
6. Wait two seconds after robot lands to allow gyroscope to stabilize before operating.

Instructions for Use: Setup

Powering the OCU

Flip the power switch at the base of the controller from the **Off** to **On** position. The Screen should light up indicating the unit is ready to use. If the robot is powered on, video from the robot should appear. Otherwise, the screen will display static.

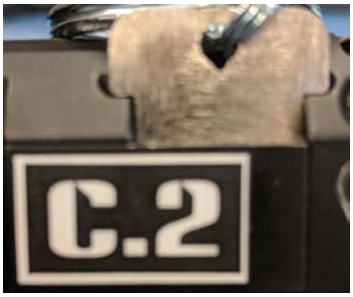
NOTE: Some OCUs have an optional dimming feature indicated with the presence of a sticker as shown below (left). When this feature is enabled, when powered on, the OCU will have as dim a screen as possible and may appear to be off. To change the brightness, press down and hold the joystick until a click is heard, then to increase the brightness move the joystick upward, and to decrease brightness move the joystick downward. Release the joystick to resume normal command operation.

Rotate antennas from the stored position (center) to an upright position (right) as shown below. The operator may rotate the antennas up or down as needed during use to receive the maximum range performance from the robot system while maintaining a comfortable view of the OCU screen.

NOTE: Modification of the antenna system will void your warranty and may violate your FCC authorization to operate this product.

Powering the Robot

To activate the robot, pull the activation plate. Reinserting the plate will turn the robot off. You will hear and feel a click when the activation plate is fully seated with the “shoulder” of the plate making contact with the housing as shown below.



NOTE: When not in use, always ensure the OCU is switched off and the robot activation plate is inserted.

Instructions for Use: Charging

Your kit includes two chargers, one for the OCU and one for the robot.

Robot Charging

The robot uses USB Type C connectivity for recharging. This enables it to charge from a variety of USB-based power sources. Charge rates will vary based upon the charging source and cable used. For maximum charge rates, use a USB Type C charger that supports Power Delivery 2.0 (or higher) capable of providing at least 9V @ 2A. The included charger and cable are rated for this. The Throwbot 2 robot does not support other charging systems like Quick-Charge.

NOTE: Some generic chargers and cables advertise more capability than they actually provide. This could result in damage to your equipment. If you have questions about chargers and charge cables, please contact support@reconrobotics.com for a list of tested and approved chargers and cables.

There is an e-ink indicator located on the front face of the robot which is used to display the robot's state of charge. When charging with the robot off, the e-ink background will flash. When the robot is operational and charging, the e-ink will have a solid black background. When the robot is operational, the state of charge is also visible as an icon located in the lower left hand corner of the video stream. The table below outlines the current state of charge for the robot.

State of Charge	Empty	10%	20%	30%	40%	50%	60%	70%	80%	90%	Fully Charged
E-Ink Readout	○ ○ ○ ○ ○	○ ○ ○ ○ ✧	○ ○ ○ ○ ●	○ ○ ○ ✧ ●	○ ○ ○ ● ●	○ ○ ✧ ● ●	○ ○ ● ● ●	○ ✧ ● ● ●	○ ● ● ● ●	✧ ● ● ● ●	● ● ● ● ●
Video Overlay	BLINKING										
Video Overlay (Charging)											

OCU Charging

The OCU comes with a dedicated charger.

NOTE: Only use the supplied OCU charger with the OCU.

			Blinking
Fully charged OR No Device Plugged in	Charging	No Power	Charger is not working properly. Please contact support@reconrobotics.com

General Charging Guidelines

1. Ensure the robot and OCU are off before charging.
2. Plug the AC electrical cord into charger and plug charger into the power source before charging.
3. Prior to charging ensure the charge plugs and receptacles are dry, debris free, and not damaged. If anything appears damaged, contact support@reconrobotics.com for assistance.
4. Fully insert the appropriate charger cord into the OCU and robot. Do not force a connection. Ensure connecting plugs are not bent during insertion or removal.
5. Remove robot and OCU from charger when charging is complete or keep everything connected to trickle charge and maintain a full battery. Charge your robot and OCU at least once per month to ensure the batteries are kept topped off to be ready for immediate deployment.
6. Always charge in a cool, ventilated, and fire-safe area.
7. Do not leave items charging unattended.
8. After charging, make sure that the Throwbot 2 robot's charge jack dust cover is in place over the charge jack.
9. If there is an unusual sound, smoke, or burning odor emitted from any of the components during charging, discontinue charging, unplug the equipment and contact support@reconrobotics.com for assistance.

Regular Maintenance

After each deployment, it is important to perform some basic maintenance:

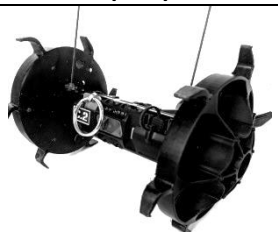
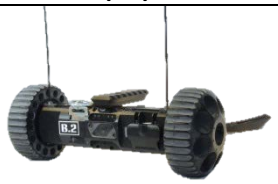
1. Always re-insert the activation plate in the robot and turn the OCU off.
2. Keep the system clean of dust and debris.
3. Ensure the system is fully dry before charging or storing.
4. Inspect the robot for wear on its tail, wheels, and antennas.
    a. Wheels – If the wheels are loose, tighten the nut with a 5/16" nut driver. The wheels should spin freely. Inspect the wheels for wear, rips, or tears.
    b. Tail – If the tail is loose, use a 3/32" hex driver to tighten the bolts holding the tail. Tighten until the tail just begins to deform under the screw pressure. Do not over-tighten.
    c. Antennas – Visually inspect for scuffing or cracking. If the wire is exposed or if the antennas have been severely kinked, antennas should to be replaced. The antennas should stand nearly vertical.
    d. If any of the above are missing and/or damaged, please contact support@reconrobotics.com to order a field maintenance kit or arrange for service.
5. Inspect the OCU for wear.
    a. Antennas – Ensure that the antennas are not bent or kinked and that they are able to be easily rotated.
    b. Joystick Bars – Rarely, (typically if the OCU is dropped or experiences excessive vibration), the joystick bars can be knocked loose. That loose screw can rattle loose and cause damage to the electrical systems.
    c. Screen – Check for scratches and other damage to the screen.
    d. If any of the above are damaged, please contact support@reconrobotics.com to arrange for service.
6. Recharge the robot and OCU as described on page 12.

NOTE: There are no user serviceable parts inside. DO NOT DISASSEMBLE YOUR ROBOT OR OCU. Service is available from the manufacturer or regional service centers only. Disassembly and/or modification of the product or its software and firmware will void your warranty and license to use the robot and OCU.

System Reconfiguration

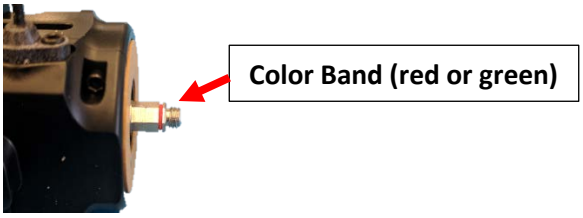
Converting to Different Configurations

The robot can be reconfigured to use various wheel and tail designs. Recommended configurations are shown below, and detailed specifications are provided in the Operational Specifications on page 9.

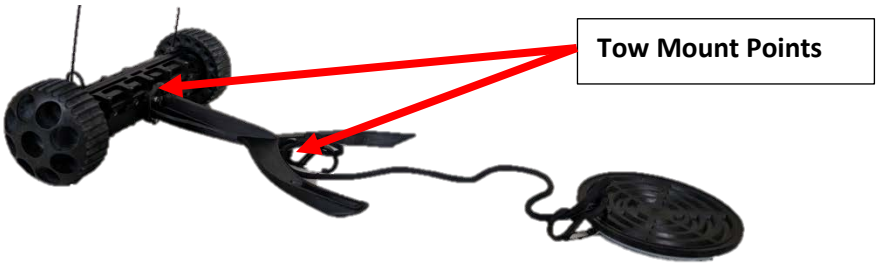
Recommended Configurations	**Base Configuration**	**Rugged XL (RXL)**	**Carry and Tow (CT)**
Image			
Components			
Base Wheels	X		
Base Tail	X		
RXL Wheels		X	
CT Wheels			X
RXL Tail		X	X
Picatinny Rail	Optional	Not recommended	Optional
Tow disc	Not recommended	Not recommended	Optional
Tradeoffs			
Recommended Use Case	General-purpose	Rough terrain	Stealth missions, payload delivery
Speed	Medium	Fastest	Slowest
Terrain capacity	Medium	Highest	Smooth terrain only
Noise level	Medium	Loudest	Quietest
Video stability	Medium	Shakiest	Smoothest
Ease of driving	Medium	Most difficult	Easiest

To reconfigure the robot, perform the following steps:

1) Remove the existing wheels by removing the hex nuts from both axles using the supplied 5/16" nut driver.
2) Slide the wheels off the axles.
3) Ensure that the gold-colored thrust washers on each side of the robot are in place before putting on new wheels.
4) Slide the new wheels onto the axles. If the wheels have colored hubs (red and green), ensure that the hub color matches the color band on the shaft.



5) Replace the hex nuts using the 5/16” nut driver.
6) Remove the tail using the 3/32” hex driver. The captive screws will be retained in the tail. If a screw becomes detached from the tail, push or screw it back into the hole in the tail until it can rotate freely.
7) Attach the new tail to the same mounting points using the 3/32” hex driver. If the tail has an arrow on the side, it should be pointed up for general use, or pointed down if a more ground-facing viewing angle is desired. If the tail does not have an arrow on the side, then it can only be installed one way; do not try to force it on upside-down.
8) If using the Carry and Tow configuration: Attach the Picatinny Rail (as described below) and the tow disc (if desired; see notes about the Carry and Tow configuration below). There are two mount points for the tow disc as shown in the picture below.



NOTE: Do not over tighten the nuts, the wheels should spin freely. Do not under tighten the nuts, it may cause the wheels to dislodge on impact.

Attaching the Picatinny Rail

The Picatinny Rail accessory comes with a Deluxe Kit or the Carry and Tow Conversion Kit. The Picatinny Rail can be used with any wheel configuration, but is only recommended for use with the smoother wheels in the Deluxe Kit.

To attach the Picatinny Rail, align the screws with either of the mounting positions on the top of the robot as shown in the figure below. Use a 3/32” hex driver to attach it. The screws are captive and will remain with the Picatinny Rail. Ensure that the long end of the rail points toward the back of the robot as shown on the left. Installing the rail in the wrong orientation as shown on the right may result in difficulty balancing a payload, or even cause the robot to tip forward during use.

Carry and Tow (CT) Configuration

The carry and tow configuration is designed to allow the system to transport up to 2 lbs (0.9 kg) mounted on top of the robot while towing up to 2 lbs (0.9 kg) behind. Some weight must be mounted on top of the robot in order to tow a full 2 lbs (0.9 kg), because wheel traction is increased with carried weight. When the Picatinny Rail and/or any payload is attached, the robot should not be thrown or dropped – this can result in damage or in the robot being unable to right itself if it lands upside-down. See page 9 for more performance differences in this configuration.

The ability to carry and tow payloads is heavily dependent upon terrain and how the payloads are mounted. User training and experimentation with payloads is essential prior to a real deployment. Some key usage tips are:

- When training, it is essential to practice driving without looking at the robot (use the OCU video only). However, occasionally observing the robot motion directly may help the user understand better how to interpret robot motion when viewing the video feed. Try to balance payload weights roughly equally between carried (mounted on top of the robot) and towed, or to carry more weight than is towed. Carried weight improves traction and doesn't affect speed or battery life as much as towed weight.
- Ensure that the center of gravity of any payload mounted to the top of the robot is somewhat behind the wheel axles. Placing the payload too far forward can cause the robot to tip forward.
- When towing, tether the towed payload to the tether point close to the robot's body (rather than the tether point at the end of the tail). This makes turning much easier.
- If towing from the tether point at the end of the tail, if a sharp turn needs to be made, the tow rope can be slackened by backing the robot up approximately 12" (30 cm). Then, the robot can freely turn.
- When towing, to prevent tangling of the tow rope, do not back the robot up any more than necessary to make turns.

NOTE: The payload mounting points on the back and top of the Throwbot 2 robot are designed for use with a standard 4-40 screw.

If the robot is used in Carry and Tow configuration without any payload or the Picatinny rail attached, it can be thrown. Sometimes, the robot may land with the antennas oriented in a way that makes it difficult for the robot to right itself. If this happens, rotating the robot and/or moving it backwards for some distance will push the antennas to a better position and allow the robot to self-right when moving forward. This is not an issue in the other configurations because the larger wheels give the antennas more room to bend out of the way.

Everything needed to convert to the Carry and Tow configuration comes with a Throwbot 2 Deluxe kit or the Carry and Tow Conversion Kit.

Rugged XL (RXL) Configuration

The extra terrain configuration is designed to allow the system to climb over 4" / 10 cm obstacles. See page 9 for more performance differences in this configuration.

Everything needed to convert to the Rugged XL (RXL) configuration comes with a Throwbot 2 Deluxe kit or the Rugged XL (RXL) Conversion Kit.

Troubleshooting / Frequently Asked Questions

- **How long will the robot run on a full charge?**
  In the default configuration, on a fully charged battery, the robot should operate for 60 minutes in standard use of driving and observation on flat terrain. Towing payloads, driving on irregular terrain or up inclines, driving in the dark (with the IR activated) can all affect battery life. See page 9 for information on other configurations.

- **How long will the OCU run on a full charge?**
  The OCU has a runtime of approximately 120 minutes.

- **How many times can the robot and OCU be recharged?**
  The robot and OCU use Lithium Polymer batteries which are expected to maintain at least 80% of their runtime after 300 recharge cycles.

- **How long does it take to recharge the OCU and robot?**
  The recharging times for the OCU and robot will vary depending upon usage and charger. A fully depleted Throwbot 2 robot or OCU will take approximately 2 hours to fully charge using the provided chargers. Charging a Throwbot 2 robot from a charger that does not support USB Power Delivery or does not supply the recommended power output may take as long as 10 hours.

- **The charge indicator lights do not light up when the OCU is connected to the battery charger.**
  Refer to page 12 for instructions on the charging.

- **The robot or OCU are not holding a full battery charge.**
  If you feel that your system is not running for a complete battery life on a full charge, try performing this test before contacting support:
  1) Fully charge both devices using the provided chargers. Ensure that the activation plate is inserted into the robot and the OCU is switched off during charging.
  2) Activate both devices and run both devices until
     a. The robot stops moving and sending video AND
     b. OCU screen goes blank and stops sending commands

     Be sure to record the start and stop time. Contact ReconRobotics for service if:
     - Robot runtime is under 50 minutes
     - OCU runtime is under 120 minutes

- **What types of batteries are in my ReconRobotics equipment? Are there any special shipping concerns?**
  ReconRobotics uses Lithium Polymer battery packs in the Throwbot 2 robot and OCU. These packs have been tested to meet the UN/DOT 38.3 shipping requirements. Please contact support@reconrobotics.com if you need more information.

- **I've been using the OCU for an extended period of time. Now the screen is black when I power on, and I cannot control the robot.**
  The battery is likely drained, you will need to recharge the OCU as described in the 'Instructions for Use: Chargers" section (page 12).

- **I've turned the OCU on and the screen is not displaying a solid video stream.**
  "Bad" video can have several causes:
  - The robot may be out of range. Try decreasing range between the robot and the OCU.
  - The robot may be too close and overpowering the OCU. Try to maintain a few feet between the devices.
  - The robot may be low on power or deactivated. Try recharging and/or activating the robot.
  - The robot or OCU may be experiencing interference caused by environmental factors (e.g. other radios in the area, proximity to metal buildings, etc.). Try using the system in another location.
  - There may be another robot operating nearby on the same channel, which will cause interference. For multi-robot operation, refer to page 10.

- **I have headphones plugged into my OCU, but all I hear is static.**
  The OCU will only transmit audio if you are using an active, audio-enabled ReconRobotics robot system on the same channel.

- **When I throw the robot, it does not drive straight when it lands.**
  The robot has electronic circuitry that self-calibrates after landing. Let it sit for a few seconds before driving. It will automatically recalibrate itself during this time and should resume driving as expected.

- **The robot's IR light is not turning on.**
  In order to conserve battery life, the IR LEDs will not turn on if the light sensor detects sufficient light. If your robot's IR LEDs are not activating when the robot is in a state of complete darkness, there may be an issue with the light sensor.

- **The robot's IR light stays on constantly, even in daylight.**
  If there is dust or debris present on the light sensor, the sensor may be fooled into thinking it is darker than it really is. Ensure the light sensor is free of dust or debris by wiping it with a soft towel.

- **The video stream loses color from time to time.**
  As the robot reaches the end of video range or in the presence of other interference, the color from the video signal may start to disappear. Try moving the OCU closer to the robot to restore the color.

- **The video stream from the robot is washed out, especially in the dark.**
  When the robot is close to other objects in the dark, the IR lighting may cause a spot-light effect causing distortion of the video. This version of the robot will attempt to automatically detect and lower the IR output in this scenario, however, it still may result in some washing out. To alleviate this issue, try backing up the robot slightly or turning it slightly to aim the "spotlight" away from the object of interest.

- **I have a Recon Scout XL or Recon Scout CT with a Flex Pack. Can I use those components with my Throwbot 2 robot instead of getting a Deluxe Pack?**
  While the larger wheels in the Deluxe Pack may look similar to the Recon Scout XL wheels in size, they are a new design. They can be utilized on older Recon Scout XL or Recon Scout CT robots, but the older Recon Scout XL wheels from the Recon Scout XL or Flex Pack will not afford the same drop ratings as the new wheels and **should not be used** on a Throwbot 2 robot. Similarly the wider tail on the Recon Scout XL or Recon Scout CT may look the same, but the mounting mechanisms are different and they are not interchangeable. Finally, the Picatinny Rail from the Recon Scout CT cannot mount onto the Throwbot 2 robot.

- **Can the robot be operated in wet conditions?**
  The Throwbot 2 robot system is both IP66 and IP67 rated which means that it can be sprayed with a hose to clean it off or submerged for up to 30 minutes in 3 feet (1 meter) of water. The OCU is not rated for exposure to water and should be kept dry. The warranty and Annual Maintenance Plan do not cover any damage resulting from exposure of the system to water, salt water spray, hazardous or caustic chemicals, etc.

- **The robot has been exposed to blood or other biological hazards. What can I use to clean it?**
  We recommend cleaning the robot with one of the following:
  - Bleach
  - Ammonia
  - Isopropyl Alcohol
  - SaniZide Plus®
  - Spray Nine® / Spray Nine® Heavy Duty
  - Fantastik® Heavy Duty
  - Simple Green®

  When cleaning, remember to do the following:
  - Spray or wipe down the robot with your preferred cleaner, then rinse under water.
  - It is best to dry off the robot as soon as possible; do not soak in a cleaning solution or in water more than necessary.
  - For the deepest clean, remove the wheels and tail and wash them separately.
  - Until the robot is completely dry, do not insert the dust cover into the USB connector.

- **Are there translations of this User Manual available?**
  For the most current version of the User Manual, along with all available translations of the User Manual, please visit our website at www.reconrobotics.com. User consents to abide by the terms and conditions of the most recent update/published version of the User Manual.

- **How do I request service if I am still experiencing problems with my ReconRobotics equipment?**
  See page 24 for instructions on returning kits for support.

- **Where can I find the serial numbers on my robot or OCU?**

Robot: Located on the bottom of the robot near the charge port.	OCU: Located on the back of the OCU near the lanyard attachment.

Safety Information & Warnings

Read these warnings before charging or using your robot or OCU. Failure to read and follow these instructions may result in fire, personal injury and/or damage to property.

Any negligent or reckless use, intentional misuse, or use of the robot or OCU for any purpose not authorized in this User Manual, including failure to request service for the Throwbot® 2 upon discovery of a malfunction, continued use of a Throwbot® 2 after signs of malfunction, or ignoring the safety warnings below, may terminate your license and the user assumes all risk and liability for damage, injury or loss that may occur.

Retain these instructions for future reference. To reduce the risk of injury or damage, keep these safety precautions in mind when setting up, using, and maintaining your equipment.

- To reduce the risk of electric shock, do not open the shell of the robot, Operator Control Unit (OCU) or the chargers. No user serviceable parts are inside. Refer servicing to qualified ReconRobotics service personnel.
- Do not attempt to operating the robot or OCU while operating a vehicle.
- Use caution if operating the robot or OCU in bad weather (i.e. strong winds, rain, sand/dusty storms, etc.)
- Do not attempt to service the robot or OCU yourself. Repairs of the physical equipment, software, or firmware not conducted by authorized personnel will result in the voiding of warranty and/or Annual Maintenance Plans.
- Do not attempt to use the robot or OCU with unapproved third party products, including accessories and third party software.
- Use caution if operating the robot or OCU in environments suffering from interference from other wireless devices (i.e. transmitter, video-downlink, WI-FI signals, etc.) or increased electromagnetic interference (i.e. in mining areas or close to radio transmission towers, high-voltage wires, substations, etc.)
- Keep loose clothing and hair away from the robot.
- Considerations for charging:
    - Always charge the robot with the activation plate inserted and the OCU turned off.
    - Always charge in a cool, ventilated, fire-safe area.
    - Always use a proper country-specific AC socket (120-240 VAC) with the battery charger. Do not force the plug into a socket.
    - Ensure the charger plug is not deformed, bent or otherwise damaged before inserting into the robot or OCU.
- Lithium Polymer batteries are volatile. Only charge the robot and OCU with the appropriate chargers. Failure to do so may cause fire, which could result in personal injury and/or property damage. Do not leave system unattended while charging.
- By purchasing a robot kit from ReconRobotics, the buyer assumes all risks associated with lithium polymer batteries. If you do not agree with these conditions, please return the robot kit to ReconRobotics.

- Do not attempt to disassemble or modify the robot or OCU. This may cause an electric shock, fire, or system failure.
- Keep the robot and OCU away from children. The robot and OCU contain small, sharp, and potentially dangerous parts which may be a safety hazard.
- Do not insert any foreign objects inside the robot or OCU. This may cause electric shock, fire or system failure.
- To reduce the risk of unauthorized use or frequency interference, contact ReconRobotics if the robot exhibits any signs that unauthorized parties may have accessed the operations frequency; signs include excessive lag time between commands and mechanical responses or unexplained mechanical movements.
- Do not immerse the OCU or chargers into water or liquids. If water or any liquid enters the inside of the OCU, immediately stop use to avoid electric shock, fire, or system failure.
- The following symptoms indicate a device may need technical attention and should not be used:
    - After a full charge, the OCU display intermittently turns ON and OFF.
    - The OCU or charger has been dropped and is malfunctioning.
    - There are exposed wires on a charger cable.
    - The robot, OCU, or charger becomes too hot to touch.
    - There is an unusual sound, smoke, or burning odor emitted from any of the components.
- This product emits small amounts of radiation which may cause cancer, birth defects, or other reproductive harm. It is the user's responsibility to take the reasonable care described in the section titled "FCC Radiation Exposure Statement" when using this product.
- This product may contain Formaldehyde or other similar substances or chemicals known to cause cancer, birth defects, or other reproductive harm. It is the user's responsibility to take reasonable care when using this product.

If you have questions or concerns regarding the use or operation of the robot or OCU, discontinue use and contact ReconRobotics or the vendor from whom you purchased your equipment.

Warranty and Service

Warranty

The full Manufacturer's Warranty documentation is appended to this User Manual/available at the following web address: www.reconrobotics.com.

Requesting Service or Repair

You can request service by contacting your ReconRobotics sales representative or by emailing support@reconrobotics.com. When you contact, please be prepared to provide the following information:

- Problem description
- Customer Agency Name and Address
- Point of Contact
- Contact Phone or Email, along with best times to reach you
- Serial number of the product that is experiencing difficulties
- You may also be asked to provide proof of purchase.

Our technical staff will attempt to troubleshoot and resolve the problem. If repair service is needed, we will setup an RMA (Return Material Authorization) and arrange for shipment of your equipment to the nearest repair facility. Please do not just ship equipment to us without an RMA in place as this will cause delays in processing.

If your issue cannot be resolved remotely, ReconRobotics may provide loaner equipment during the repair process.

If your issue is not covered under warranty or by an extended service plan or annual maintenance plan, we will provide a not-to-exceed (NTE) repair cost estimate for your approval before commencing repair. After repairs are complete, you will be invoiced for the actual cost of repairs up to the estimate.

Typical turnaround time for a repair is one week after receipt and approval to begin.

When sending equipment in for RMA, please include the entire kit (Robot, OCU, and chargers) to ensure all problems can be identified and necessary repairs can be completed.

NOTE: If, after remote troubleshooting, the system is sent back for maintenance and no problem can be identified, a diagnostic fee may be assessed.

Limitations of Liability and Warranty

Your exclusive remedy for the breach of the Manufacturer's Warranty shall be for ReconRobotics to repair or replace the product. Under no circumstances will ReconRobotics have liability for user's unauthorized used or intentional misuse of the product under this agreement. Unauthorized use includes use after user activity that voids that user's license to operate the product.

Under no circumstances shall ReconRobotics, its affiliates, suppliers, resellers, or service providers be liable for any of the following even if informed of their possibility and regardless of whether the claim is based in contract, warranty, negligence, strict liability, or any other theory of liability: (1) third party claims for damages; (2) loss, damage, or disclosure of data; (3) special, incidental, punitive, indirect, or consequential damages. In no case shall the total liability of ReconRobotics, its affiliates, suppliers, resellers, or service providers for damages from any cause stemming from any theory of liability exceed the amounts paid by you to ReconRobotics over the prior twelve (12) month period. For any jurisdiction that limits the limit or exclusion of liability by contract, this provision shall be interpreted to provide the greatest limitation on liability permitted by law. In no case shall the total liability of ReconRobotics, its affiliates, suppliers, resellers, or service providers for damages from any cause exceed the amount of actual direct damages, not to exceed the amount the user paid for the product.

TO THE EXTENT PERMITTED BY LAW, EXCEPT AS EXPRESSLY PROVIDED IN THE MANUFACTURER'S WARRANTY, RECONROBOTICS DISCLAIMS ALL WARRANTIES OF ANY KIND, WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING: (A) ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE; AND (B) ANY WARRANTY ARISING OUT OF COURSE OF DEALING, USAGE, OR TRADE. RECONROBOTICS AND ITS AFFILIATES, SUPPLIERS, RESELLERS, AND SERVICE PROVIDERS DO NOT WARRANT, EXCEPT AS EXPRESSLY PROVIDED IN ITS MANUFACTURER'S WARRANTY, THAT THE PRODUCT, PRODUCT ACCESSORIES, OR ANY PORTION OF THE PRODUCT, OR ANY MATERIALS, WILL BE UNINTERRUPTED, SECURE, OR FREE OF ERRORS, VIRUSES, OR OTHER HARMFUL COMPONENTS.

IF SUCH WARRANTIES CANNOT BE DISCLAIMED, RECONROBOTICS LIMITS THE DURATION AND REMEDIES OF SUCH WARRANTIES TO THE DURATION OF THIS EXPRESS WARRANTY AND, AT RECONROBOTIC'S OPTION, THE REPAIR OR REPLACEMENT SERVICES PROVIDED IN THE MANUFACTURER'S WARRANTY.

ReconRobotics Throwbot 2 Robot FCC Guidelines and Logbook

Version 1.4 January 2018

FCC Class B Product Compliance

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules except where waived by waiver DA 10-291. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communication. 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/TV technician for help.

This device may not interfere with Federal stations operating in the 420-450 MHz band and must accept any interference received.

Although this transmitter has been approved by the Federal Communications Commission, it must accept any interference received from Federal or non-federal stations, including interference that may cause undesired operation.

Operation of the Throwbot® 2 robot by eligible entities will require a separate Commission authorization. **Licensees must maintain a log of all ReconRobotics product use.** The log will include date of operation, start/stop times, location of operation, frequency segment of operation, reason for use, and point of contact. Licensees must provide this log to the Federal Communications Commission or to the National Telecommunications and Information Administration upon request of either agency.
When multiple Throwbot 2 robots are available on separate frequencies, the agency deploying them must deploy a Channel C Throwbot 2 robot first, followed by a Channel A, followed by a Channel B.

Operation of the Recon Scout or Throwbot® 2 robot in an unauthorized manner, or failure to maintain the log, will subject licensees to Commission enforcement action and license revocation.

Any modifications to the physical equipment, software, or firmware that are not expressly approved by ReconRobotics will void the user's warranty and license to operate the equipment. User assumes all liability for any injury or loss caused by a robot and/or equipment that is modified without express approval by ReconRobotics, whether or not the unauthorized modifications caused or contributed to the injury or loss.

FCC RF Radiation Exposure Statements:

To comply with FCC RF exposure compliance requirements, the antenna used for the robot's transmitter must maintain a separation distance of at least 20 cm from all persons during use and must not be co-located or operating in conjunction with any other transmitter except in accordance with FCC multi-transmitter product procedures.

The Operator Control Unit (OCU) complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operated in conjunction with any other transmitter except in accordance with FCC multi-transmitter product procedures.

FCC Guidelines

The usage of the Throwbot® 2 robot and related equipment is subject to the following conditions:

Eligibility is limited to state and local police and firefighters eligible for licensing under Section 90.20(a)(1) of the Commission's Rules, and security personnel in critical infrastructure industries.

The Throwbot® 2 robot may be used only during actual emergencies involving threats to safety of life, and for necessary training related to such operations. Security personnel in critical infrastructure industries may operate the Throwbot® 2 robot only in areas that are environmentally hazardous for entry by human personnel, and for necessary training related to such operations.

Training operations are not permitted within thirty kilometers of the following Federal radiolocation sites:

Site	Coordinates (degrees-minutes-seconds)
Beale Air Force Base	39-08-10 N / 121-21-04 W
Cape Cod Air Force Station	41-45-07 N / 70-32-17 W
Clear Air Force Station	64-55-16 N / 143-05-02 W
Cavalier Air Force Station	48-43-12 N / 97-54-00 W
Eglin Air Force Base	30-43-12 N / 86-12-36 W

The Throwbot® 2 robot will operate on a secondary basis (cannot cause interference and is not protected from interference) to all Federal users and licensed non-Federal users. **This device may not interfere with Federal stations operating in the 420-450 MHz band and must accept any interference received.**

The operation of the Throwbot® 2 may be impacted in the vicinity of the following radar and ionospheric research sites:

Site	Coordinates (degrees-minutes-seconds)
Arecibo, Puerto Rico	18-20-37 N / 66-45-11 W
Westford, Massachusetts	42-37-24 N / 71-29-18 W
Poker Flats, Alaska	65-07-47 N / 147-28-14 W

Any operation, modification or use of the Throwbot® 2 robot and related equipment that violates the guidelines or usage restrictions in this User Manual, including but not limited to the FCC guidelines and compliance terms above, will immediately void all warranties, terminate all licenses to use the Throwbot® 2 and related equipment, and the user will be liable for any consequences and loss that results from the unauthorized or incorrect use and violations of the terms of this User Manual.

FCC Logbook

The usage of and license for the Throwbot® 2 robot is expressly subject to maintenance of a logbook. Please use the following sheet to record the date of operation, the start and stop times, channel information, the location of usage, a brief reason for usage and a point of contact. This logbook must be made available upon request of the Federal Communications Commission or the National Telecommunications and Information Administration.

Refer to your User's Manual for serial numbers and channel information. The next page may be photocopied, or additional pages are available from your authorized ReconRobotics dealer.

Date	Start	Stop	Location	Reason	POC

Date	Start	Stop	Location	Reason	POC