



L5Q Installation Guide

APRIL 2021

© 2021 Motorola Solutions, Inc. All rights reserved



MN007598A01-AD

Legal and Support

Copyrights

The Motorola Solutions products described in this document may include copyrighted Motorola Solutions computer programs. Laws in the United States and other countries preserve for Motorola Solutions certain exclusive rights for copyrighted computer programs. Accordingly, any copyrighted Motorola Solutions computer programs contained in the Motorola Solutions products described in this document may not be copied or reproduced in any manner without the express written permission of Motorola Solutions.

© 2021 Motorola Solutions, Inc. All Rights Reserved

No part of this document may be reproduced, transmitted, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, without the prior written permission of Motorola Solutions, Inc.

Furthermore, the purchase of Motorola Solutions products shall not be deemed to grant either directly or by implication, estoppel or otherwise, any license under the copyrights, patents or patent applications of Motorola Solutions, except for the normal non-exclusive, royalty-free license to use that arises by operation of law in the sale of a product.

Disclaimer

Please note that certain features, facilities, and capabilities described in this document may not be applicable to or licensed for use on a specific system, or may be dependent upon the characteristics of a specific mobile subscriber unit or configuration of certain parameters. Please refer to your Motorola Solutions contact for further information.

Trademarks

MOTOROLA, MOTO, MOTOROLA SOLUTIONS, and the Stylized M Logo are trademarks or registered trademarks of Motorola Trademark Holdings, LLC and are used under license. All other trademarks are the property of their respective owners.

Open Source Content

This product contains Open Source software used under license. Refer to the product installation media for full Open Source Legal Notices and Attribution content.

European Union (EU) Waste of Electrical and Electronic Equipment (WEEE) directive



■ The European Union's WEEE directive requires that products sold into EU countries must have the crossed out trash bin label on the product (or the package in some cases).

As defined by the WEEE directive, this cross-out trash bin label means that customers and end-users in EU countries should not dispose of electronic and electrical equipment or accessories in household waste.

Customers or end-users in EU countries should contact their local equipment supplier representative or service centre for information about the waste collection system in their country.

Contact Us

For inquiries, see https://www.motorolasolutions.com/en_us/support.html > **License Plate Recognition (Vigilant)** or contact our 24 hours support staff at:

- Tel: 925-398-2079
- Fax: 925-398-2113
- Email: vigilantsupport@motorolasolutions.com

Document History

Version	Description	Date
MN007598A01-AA	Initial Release	October 2020
MN007598A01-AB	Compliance with the new Motorola Solutions design standard.	November 2020
MN007598A01-AC	The following sections are updated: • L5Q Overview on page 6 • Getting Started on page 10 • Placing the Camera Into the Security Enclosure on page 18 • Affixing the Front Faceplate on page 19	March 2021
MN007598A01-AD	The following sections are updated: • L5Q Overview on page 6 • Getting Started on page 10 The following section is added: • Setting the Camera Date and Time from Reconyx Connect on page 14	April 2021

Read Me First

Notations Used in This Manual

Throughout the text in this publication, you notice the use of **Warning**, **Caution**, and **Notice**. These notations are used to emphasize that safety hazards exist, and the care that must be taken or observed.



WARNING: An operational procedure, practice, or condition, and so on, which may result in injury or death if not carefully observed.



CAUTION: An operational procedure, practice, or condition, and so on, which may result in damage to the equipment if not carefully observed.



NOTICE: An operational procedure, practice, or condition, and so on, which is essential to emphasize.

Special Notations

The following special notations are used throughout the text to highlight certain information or items:

Table 1: Special Notations

Example	Description
Menu key or Camera button	Bold words indicate a name of a key, button, or soft menu item.
The display shows <code>Settings</code> <code>Applied</code> .	Typewriter words indicate the MMI strings or messages displayed.
<code><required ID></code>	The courier, bold, italic, and angle brackets indicate user input.
Setup → Settings → All Settings	Bold words with the arrow in between indicate the navigation structure in the menu items.

List of Figures

Figure 1: Attaching Antennas	10
Figure 2: Slide in the Spreader Bar	10
Figure 3: Removing Ball Portion	11
Figure 4: Inserting Ball Mount Threads	11
Figure 5: Securing Ball Portion	12
Figure 6: Securing the Ball Joint Mount	12
Figure 7: Power Cable Female Connector End	13
Figure 8: Exposing the Battery Compartment	13
Figure 9: Connecting the Battery Terminal	14
Figure 10: Setting the Camera Date and Time from Reconyx Connect	15
Figure 11: Mounting the Solar Panel to a Pole	17
Figure 12: Mounting the solar panel to a Flat Wooden Surface	17
Figure 13: Mounting the Security Enclosure to a Pole	18
Figure 14: Mounting the Security Enclosure to a Flat Wooden Surface	18
Figure 15: Plug in the Power Cable	19
Figure 16: Affixing the Front Faceplate	19
Figure 17: Locking the Cable Lock	20
Figure 18: Infrared Sensor Aiming Distance	22
Figure 19: Selecting the Camera	22
Figure 20: Configuring the Camera Aim Setting	23
Figure 21: Adjusting Camera Aiming Point	23
Figure 22: Aiming to the Center of the Image Frame	24
Figure 23: Shifting the Image	25
Figure 24: Selecting the Camera	26
Figure 25: Modifying the Time between Pictures	27

Chapter 1

L5Q Overview

The L5Q License Plate Recognition (LPR) camera is designed to perform license plate collection for low speed (less than 45 MPH) and low volume residential traffic (3500 Average Annual Daily Traffic).

L5Q Equipment List

Equipment supplied in the L5Q installation kit:

Table 2: List of L5Q Installation Equipment

Equipment	Photo
L5Q Camera	
L5Q Camera Antenna (two quantity with Horizontal Spreader Bar)	

Equipment

Photo

Security Enclosure



Solar Panel Kit



Shielded Power Cable



Equipment

Photo

Solar Panel Mounting Bracket



Security Enclosure Mounting Bracket



Master™ Cable Lock



Equipment**Photo**

Hose Clamps (four pieces) and 5 mm Hex Key



Optional Equipment (Sold Separately)

Required for use without Solar Panel or 12VDC input:

- AA Lithium Ion Batteries (12 pieces)

Required for installing a new pole:

- Ground Anchor/Lock Set
- (8X2.375) in. Round Pole
- Sledgehammer or Power Hammer and Anchor Driving Adapter
- Wooden Blocks

Required for installation on a flat wood surface:

- Lag Bolts and Impact Wrench or Socket Wrench

Required Tools

- 0.5 in. Wrench
- 0.5 in. Socket Wrench
- 70 ft Tape Measure and Chalk or Paint (for marking aiming location)

Chapter 2

Getting Started

This section provides instructions to prepare the L5Q camera for use.

2.1

Attaching the L5Q Antennas

Procedure:

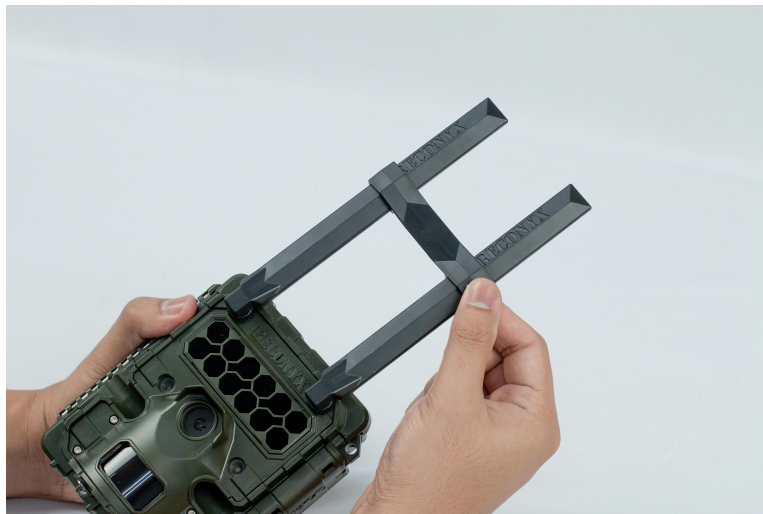
- 1 Screw both antennas onto the faceplate of the camera.

Figure 1: Attaching Antennas



- 2 Slide the Horizontal Spreader Bar into a place down to the stops on the back of the antennas, just above the spreader bar.

Figure 2: Slide in the Spreader Bar



2.2

Installing the Ball Mount

Procedure:

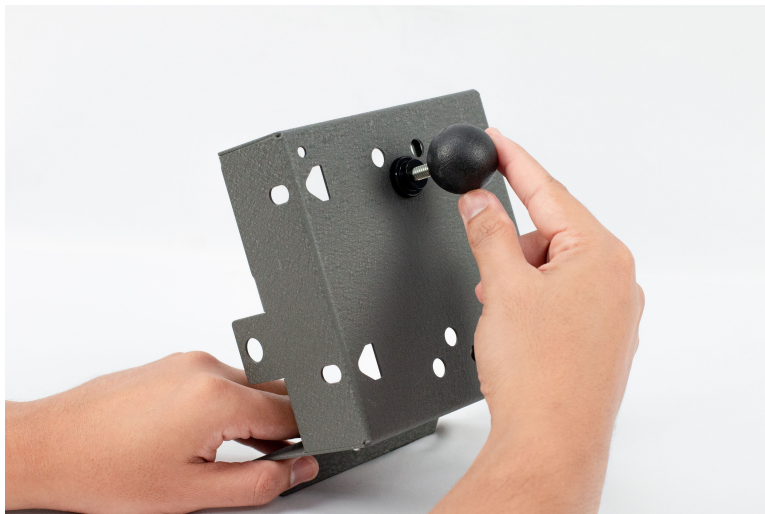
- 1 Loosen the ball lock and remove the ball portion from the security enclosure mounting bracket.

Figure 3: Removing Ball Portion



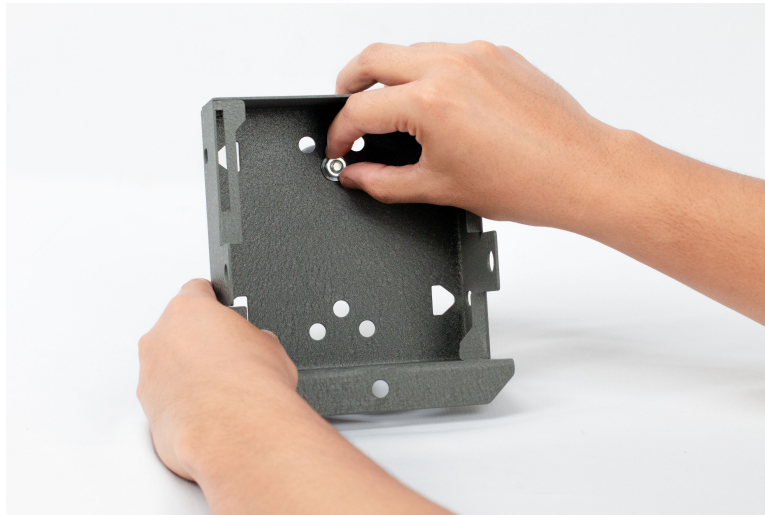
- 2 Insert the ball mount threads through the rear of the security enclosure.

Figure 4: Inserting Ball Mount Threads



- 3 Secure the ball mount with the second locking nut inside the Security Enclosure.

Figure 5: Securing Ball Portion



2.3

Securing the Ball Joint Mount

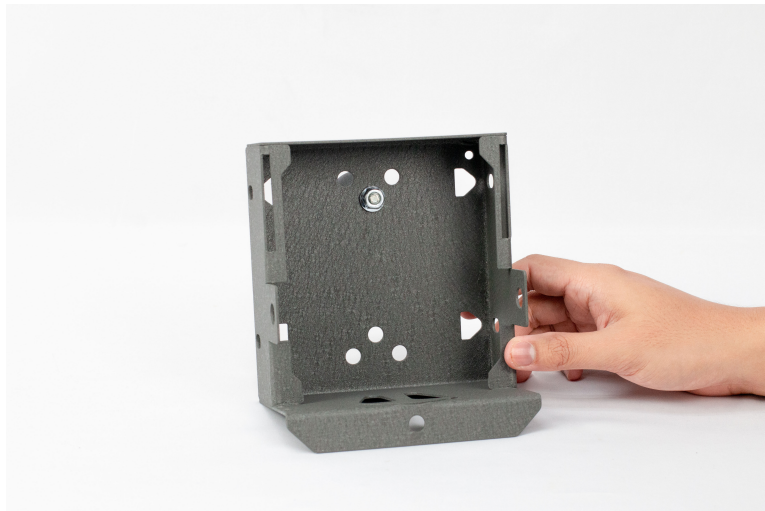
Procedure:

- 1 Tighten the outer nut with the 0.5 in. Wrench .
- 2 Use the 0.5 in. Socket Wrench to hold the inner nut in place.
- 3 Check the threads of the bolt, to ensure that they do not extend past the edge of the nut on the inside of the Security Enclosure, as shown in the following image.



NOTICE: The camera will not fit inside the enclosure if the bolt threads protrude past the locking nut.

Figure 6: Securing the Ball Joint Mount



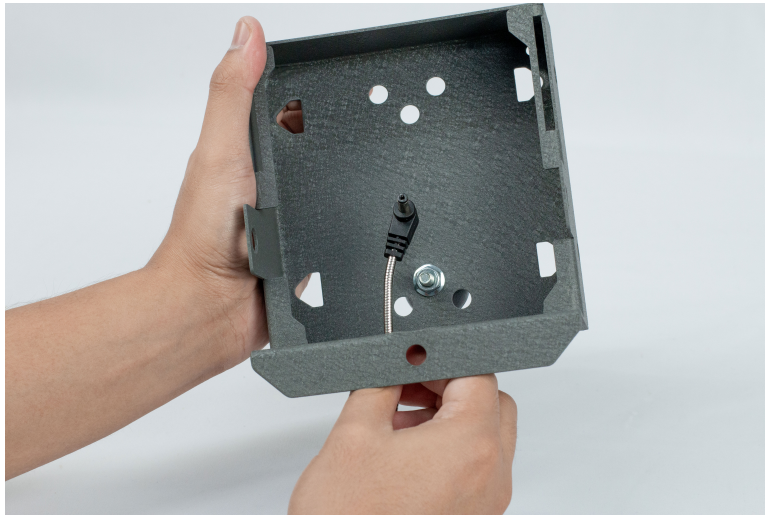
2.4

Installing the Power Cable

Procedure:

- 1 Remove the shielded power cable from solar panel housing.
- 2 Slide the female connector end of the shielded power cable through the bottom left hole of the security enclosure.

Figure 7: Power Cable Female Connector End



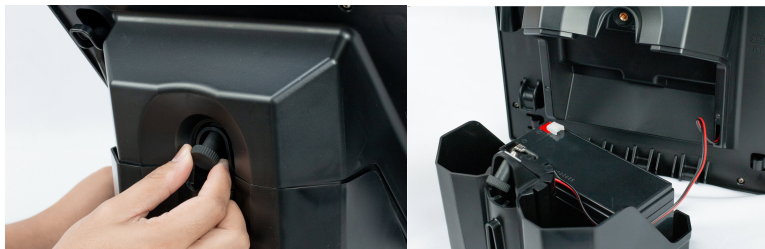
2.5

Connecting the Solar Panel Battery Lead

Procedure:

- 1 Unscrew the bolt from the rear of the solar panel.
- 2 Rotate the solar panel forward to expose the battery.

Figure 8: Exposing the Battery Compartment



- 3 Slide the red battery lead onto the red terminal.



NOTICE: Make sure the hinge engages on the rear of the battery compartment and rotate the solar panel back.

Figure 9: Connecting the Battery Terminal



- 4 Replace and tighten the bolt on the rear of the solar panel.

2.6

Setting the Camera Date and Time



NOTICE: For firmware version 0224a and application version 1.1.0, the camera date and time can also be set remotely from the Reconyx Connect application.

Procedure:

- 1 Perform one of the following actions:
 - Open the camera and install 12 AA Lithium Ion Batteries.
 - Connect the camera to the Solar Panel with the power cable.
-  **NOTICE:** If you are connecting the camera to the Solar Panel, do not install the 12 AA batteries. Place the included desiccant pack into the battery compartment to protect it from moisture.
- 2 To power on the camera, slide up the power switch to the right of the LED display.
- 3 Press the **Right** button to scroll through the menu options to **CHANGE SETUP**.
- 4 Press **OK**.
- 5 Press the **Right** button to scroll to **DATE/TIME**.
- 6 Press **OK**.
- 7 Press **Up** or **Down** button to change numbers and **Right** or **Left** button to scroll through settings for year, month, date, and time accordingly.
- 8 Press **OK** to exit.
- 9 Power off the camera.
- 10 Remove power cable from camera if plugged in.

2.6.1

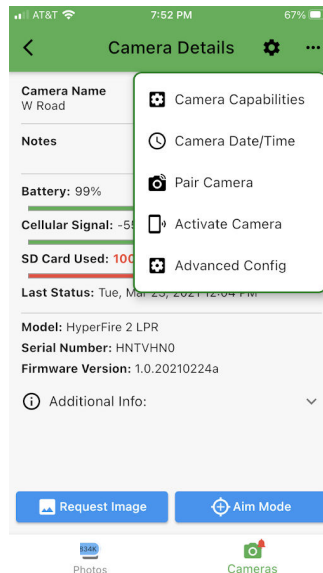
Setting the Camera Date and Time from Reconyx Connect

Prerequisites: This procedure is only working with a firmware version 0224a or later and application version 1.1.0 or later.

Procedure:

- 1 Open the Reconyx Connect application.
- 2 Tap **Cameras**.
- 3 Select the camera that needs its date or time changed.
- 4 Tap **⋮ More**→**Camera Date/Time**.

Figure 10: Setting the Camera Date and Time from Reconyx Connect



- 5 To adjust the hour, tap **Up** and **Down** arrows.
- 6 Tap **OK**.

Chapter 3

Hardware Installation

This section provides the instructions to mount the L5Q Camera and Solar Panel.

The ideal mounting location for the camera and Solar Panel is on a pole closest to the lane of traffic being captured that also offers the Solar Panel a southern-facing unobstructed view of the sun. The recommended mounting height of the camera and solar panel is at least 8 ft to place the installation out of reach from street level. Generally, the installation can be placed between 4 to 14 ft from the street level .

3.1

Installing a New Pole

Prerequisites: If you are using an existing pole, skip to the [Camera Adjustment on page 21](#) section.

Procedure:

- 1 Locate a proper installation site for the Ground Anchor and Round Pole.
- 2 Using the Sledge Hammer or Power Hammer and Anchor Driving Adapter, drive the Ground Anchor into the ground until it is flush with the surface.
 **NOTICE:** Do not hit the anchor directly with a Sledge Hammer or Power Hammer. Use either a wooden block or an Anchor Driving Adapter to prevent damage to the anchor.
- 3 Insert the Round Pole and secure it with the Lock Set.

3.2

Mounting a Solar Panel

Procedure:

Perform one of the following actions:

Option	Actions
Mounting the solar panel to a poll.	- a Insert two Hose Clamps through the slots in the solar panel Mounting Bracket. - b Mount the solar panel Mounting Bracket to the pole with the Hose Clamps. Tighten with the 5 mm Hex Key. - c Hang the solar panel on the solar panel Mounting Bracket as shown in the following figure.

Option	Actions
	Figure 11: Mounting the Solar Panel to a Pole 
Mounting the solar panel to a flat wooden surface.	a Mount the solar panel mounting bracket to the wooden surface using the Lag Bolts and Impact Wrench or a Socket Wrench. b Hang the solar panel on the bracket. Figure 12: Mounting the solar panel to a Flat Wooden Surface 

3.3 Mounting the Security Enclosure

Procedure:

Perform one of the following actions:

Option	Actions
Mounting the security enclosure to a pole.	a Insert two Hose Clamps through the two sets of slots in the Security Enclosure Mounting Bracket. b Mount the Security Enclosure Mounting Bracket to the pole with the Hose Clamps . Tighten the clamps with the 5 mm Hex Key. c Reinsert the ball on the rear portion of the Security Enclosure into the Security Enclosure Mounting Bracket and tighten the ball lock to secure it. d Plug in the female barrel connector of the power cable to the rear of the Solar Panel.

Option	Actions
	e Wrap the excess cable length on the back of the Solar Panel as shown in the following figure. Figure 13: Mounting the Security Enclosure to a Pole 
Mounting the Security Enclosure to a Flat Wooden Surface.	a Mount the Security Enclosure Mounting Bracket to the wooden surface using the Lag Bolts and Impact Wrench or a Socket Wrench. b Reinsert the ball on the rear portion of the Security Enclosure into the Security Enclosure Mounting Bracket and tighten the ball lock to secure it. c Plug in the female barrel connector of the power cable to the rear of the Solar Panel . Wrap the excess cable length on the back of the Solar Panel as shown in the following figure. Figure 14: Mounting the Security Enclosure to a Flat Wooden Surface 

3.4

Placing the Camera Into the Security Enclosure

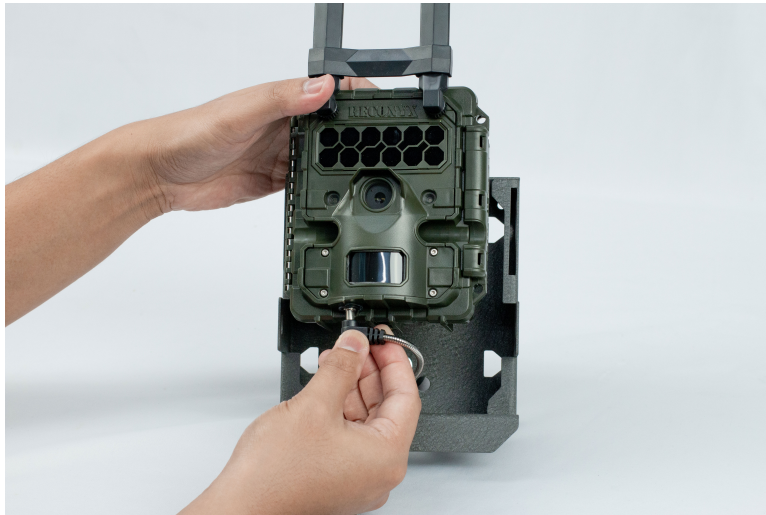
Procedure:

- 1 Place the camera into the security enclosure.
- 2 Plug the male barrel connector on the power cable into the bottom of the camera.



NOTICE: Ensure the power cable is run into the lower left and rear corner of the security enclosure and that the male barrel connector end fits securely into the camera.

Figure 15: Plug in the Power Cable



3.5

Affixing the Front Faceplate

Procedure:

- 1 Affix the front faceplate of the Security Enclosure to the camera by sliding it over the antennas.

Figure 16: Affixing the Front Faceplate



- 2 Secure any excess power cable with a zip tie.

3.6

Locking the Security enclosure

Procedure:

- 1 Secure the Security Enclosure and the camera with the Master Cable Lock by wrapping the cable around the pole or wooden surface.



NOTICE: Make sure to leave enough slack in the cable to enable the Security Enclosure to articulate for aiming the camera.

- 2 Feed one looped cable end through the other looped cable end. Slide the lock through the latch hole in the bottom of the Security Enclosure and through the free looped cable end.
- 3 Lock the Master Cable Lock and remove the key.

Figure 17: Locking the Cable Lock



Chapter 4

Camera Adjustment

This section provides the instructions to adjust the L5Q Camera after the camera is mounted.

4.1

Measuring the Camera Height

Procedure:

- 1 Use the Tape Measure to measure the height from the camera infrared sensor to the ground.
- 2 Use the Tape Measure to measure the distance from the ground below the infrared sensor to the aiming distance in the road that corresponds to the measured height.

Table 3: Infrared Sensor Aiming Distance

Infrared Sensor Height	Aiming Distance
4 ft	55 ft
6 ft	56 ft
8 ft	57 ft
10 ft	58 ft
12 ft	59 ft
14 ft	60 ft



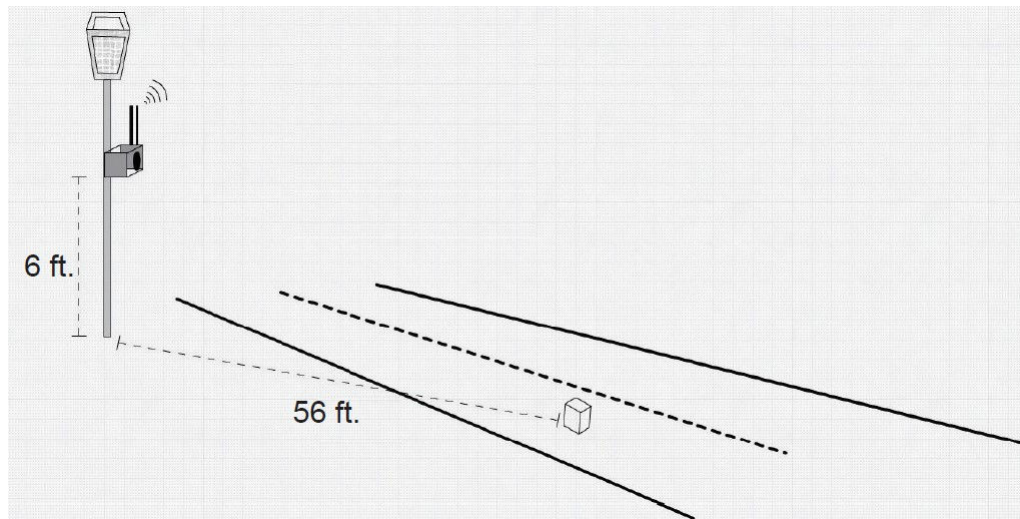
NOTICE: Aiming at a point in the road that is farther than 60 ft away from the camera decreases the license plate character recognition accuracy as the pixel size of the resulting image decreases beyond acceptable levels. Aiming at a point that is less than 55 ft away decreases vehicle detection rates.

- 3 Aim the camera at the end of the Tape Measure out to the aiming distance.



NOTICE: Aiming for distance calibrates when the camera captures images because of the Motion Activation. Configuring the placement of License Plates in the image frame is addressed in the Reconyx app in the Windowing tab.

Figure 18: Infrared Sensor Aiming Distance



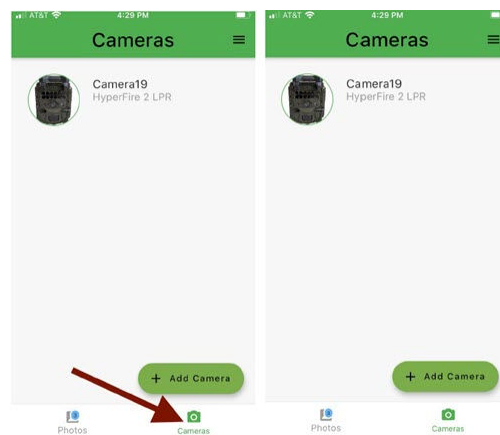
4.2

Testing the Camera with the Application

Procedure:

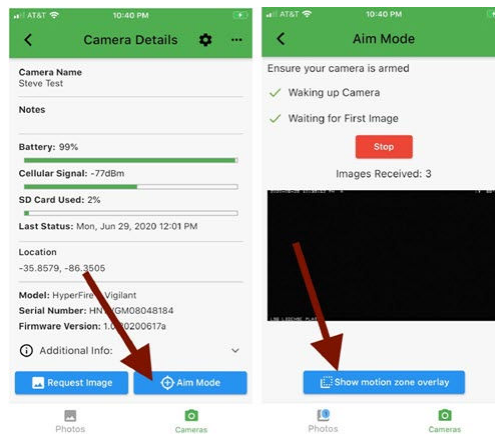
- 1 Open the Reconyx Connect application.

Figure 19: Selecting the Camera



- 2 At the bottom of the screen, tap **Camera**.
- 3 From the list, select the camera that you want to aim.
- 4 At the bottom right corner of the screen, tap **Aim Mode**→**Show motion zone overlay** .

Figure 20: Configuring the Camera Aim Setting



NOTICE: Tapping **Aim Mode** wakes up the camera and places it into aim mode. Images continue to populate for two minutes at a rate of approximately six seconds between each image.

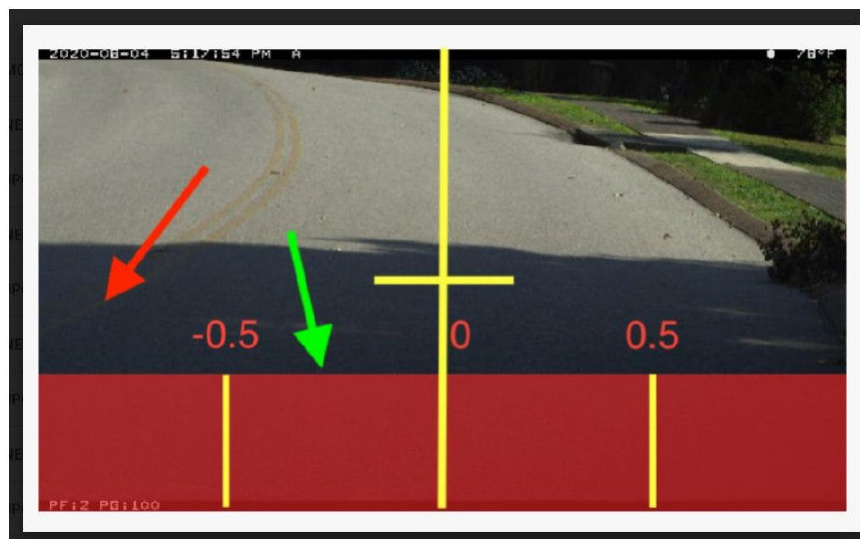
4.3

Adjusting the Aiming Point

Procedure:

- 1 Loosen the ball lock on the Security Enclosure to adjust the camera positioning while watching the the view of the camera in the application.
- 2 Adjust the camera until the aiming point is centered on the top of the red line (indicated by the green arrow), and halfway between the center line (marked 0) and either 0.5 or -0.5 depending on the camera's mounting location and the direction of vehicle travel.

Figure 21: Adjusting Camera Aiming Point



NOTICE: For lanes of travel away from the camera, use (0, 0). For lanes of travel exiting the left of the image frame, use (0, 0.5). For lanes of travel exiting the right of the image frame, use (0, -0.5). Allowing the red aim bar to overlap additional lanes of traffic results in false positives.

- 3 When the aiming point is established, rotate the camera to level the image as much as possible by using the bottom of the image frame as a guide.
- 4 Retighten the ball lock to secure the camera in place.



NOTICE: The windowing configuration below is used to center the aiming within the image frame.

Figure 22: Aiming to the Center of the Image Frame



Chapter 5

Application Configuration

This section provides the instructions to adjust the image capture by using the Reconyx Connect application.

5.1

Shifting the Image

Prerequisites: Depending on camera placement, the image may need shifting to accommodate proper plate capture.

Procedure:

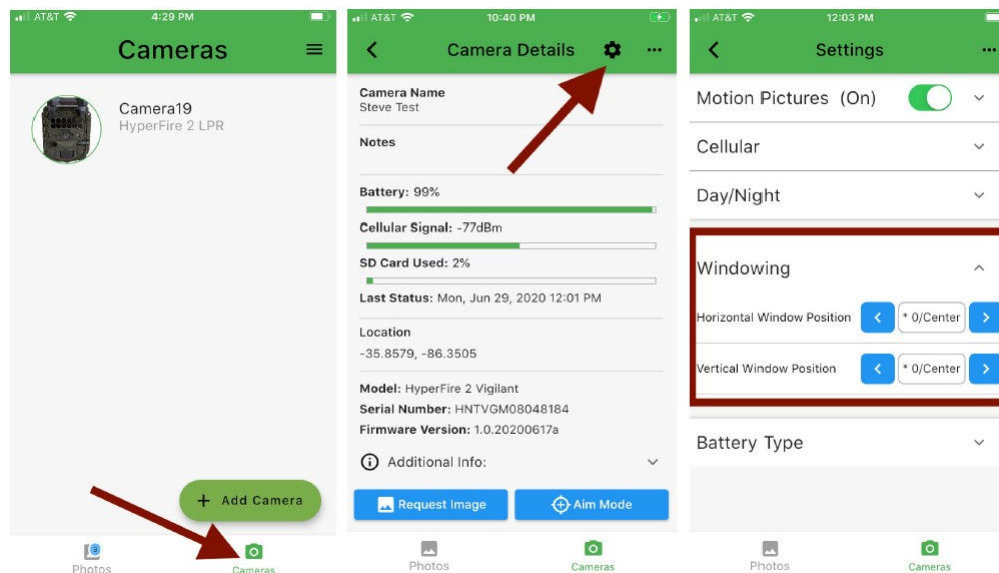
- 1 At the bottom of the screen, tap **Camera**. Select the appropriate camera from the list.
- 2 To open camera settings, tap  **Settings**.
- 3 Tap the **Windowing** heading. Shift the image horizontally and vertically as needed to center the license plate capture zone.

A negative windowing value shifts the image to the left or down. A positive windowing value shifts the image to the right or up.



NOTICE: Windowing only shifts the object in the frame and does not change the motion trigger.

Figure 23: Shifting the Image



5.2

Modifying the Image Capture Timing

Prerequisites: Depending on the speed of the vehicle and camera placement, the timing between image captures you may need to shorten the timing to accommodate a proper license plate image capture. Refer to the following table for different timings based on the posted speed limit.

Table 4: Speed Limit Timing Offset

Posted Speed Limit	Timing Offset
40+ MPH	0.2–0.4 seconds
30–40 MPH	0.4–0.6 seconds
20–30 MPH	0.6–0.8 seconds
< 20 MPH	0.8 seconds

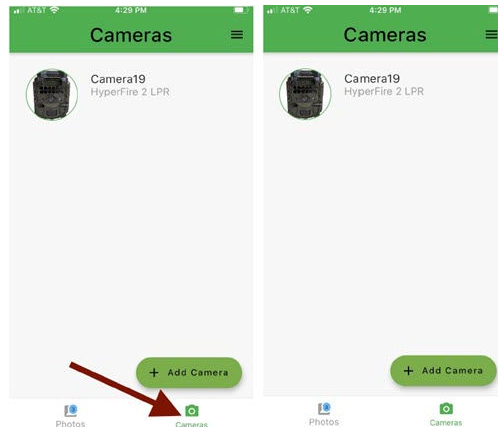


NOTICE: The default timing value is 0.4 seconds. This value can be set in increments of 0.2 seconds from 0.2 seconds up to 1.0 second. If the third image of the vehicle is out of frame, reduce this number.

Procedure:

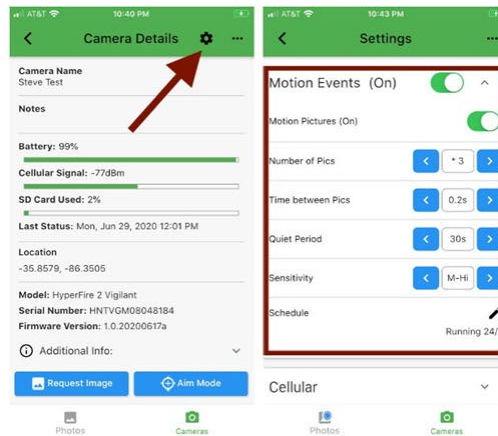
- 1 At the bottom of the screen, tap **Camera**.

Figure 24: Selecting the Camera



- 2 Select the appropriate camera from the list.
- 3 To open camera settings, tap  **Settings**.
- 4 Tap **Motion Events**.
- 5 Modify the Time between pictures as needed to capture more images of the vehicle plate per motion event.

Figure 25: Modifying the Time between Pictures



5.3

Motion Events Settings

Other settings in the **Motion Events** menu can be adjusted to optimize image capture.

Table 5: Motion Events Settings Descriptions

Settings	Description
Motion Pictures	Enables the capturing of multiple images. This setting should always be set to on.
Number of Pics	Sets the number of images to capture per capture event. This should be set to the default of 3.
Quiet Period	Sets the minimum time to wait between capture events. This should always be set to zero for no delay. This should only be changed if there is an excessive amount of empty frame images.
Sensitivity	Sets the event detection sensitivity. This should be set to the default of Medium-Hi.
Schedule	Sets the times the camera will be active and capturing. This setting should set the camera to run 24/7 unless the use case calls for a specific schedule.

To prevent false positive events, the **Total Event Time** should be 2 seconds or greater. This value is calculated by the firmware of the camera which automatically updates the Motion Events settings accordingly. However, if false positive events are being captured, this formula can be used to manually calculate the **Total Event Time**:

$$\text{Total Event Time} = 0.2 \text{ seconds} + ((\text{Number of Pics} - 1) * (\text{Time Between Pics})) + \text{Quiet Period}$$

EXAMPLE :

Number of Pics = 3

Time Between Pics = 0.8 seconds

Quiet Period = 0

$$\text{Total Event Time} = 0.2 \text{ seconds} + ((3 - 1) * 0.8 \text{ seconds}) + 0 = 1.8 \text{ seconds}$$

Because the **Total Event Time** is only 1.8 seconds and is 0.2 seconds less than the recommended 2 seconds, the Quiet Period should be increased. Therefore, the Quiet Period should be increased by at least 0.2 seconds. Therefore, for this example, the Quiet Period is set to 1 second because only 1 second increments are possible.

5.4

Other Settings

Table 6: Other Settings Descriptions

Settings	Description
Battery Type	This setting indicates to the camera what the normal voltage level should be to accurately report battery levels. Use SC10 by default. If the camera is using the Lithium batteries only, change this setting to Lith.  NOTICE: This setting is also used to notify the user that the camera is entering a low power state. Setting the value to External shows the current voltage and does not allow low voltage notification. Set the value to NiMH when used with NiMH batteries.
Cellular, Day/Night	Do not modify these settings.

5.5

Viewing images

Procedure:

- 1 Select **Photos**.
- 2 Tap ***** More**→ **Filter**
- 3 Select the appropriate camera from the camera list. Tap **Apply**.
- 4 Check the images for readable license plates. If the license plates are present, the camera is properly configured.