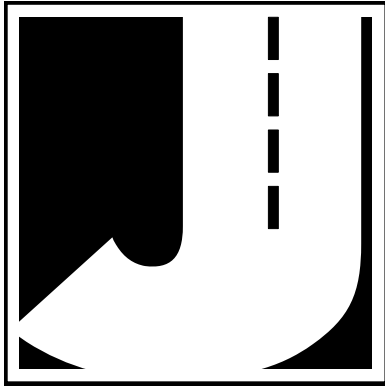


Black Cat II Plus Radar Recorder

User's Manual





LIMITED WARRANTY

JAMAR Technologies, Inc. warrants the Black Cat II Plus Radar Recorder against defects in material and workmanship for a period of one (1) year limited warranty on parts and one (1) year limited warranty on labor from the date of purchase. For information on extended warranty call 1-800-776-0940.

JAMAR Technologies, Inc. warrants each new instrument manufactured by the company to be free from defective material and workmanship and agrees to remedy any such defect. At its option, it may furnish a new part in exchange for any part of any instrument of its manufacture which, under normal installation, use and service discloses such defect. The instrument must be returned to our factory or authorized service agent intact, for examination, with all transportation charges prepaid.

This warranty does not extend to any products which have been subject to misuse, neglect, accident, vandalism or incorrect wiring not our own. This warranty does not extend to damage caused by improper installation in disregard of the instructions furnished by us. This warranty does not extend to products which have been repaired or altered outside our factory or authorized service agent. There is a 90 day warranty on the rechargeable battery of the Black Cat II Plus Radar Recorder.

In no event shall JAMAR Technologies, Inc. be liable for any damages arising from the use of this product including damages arising from the loss of information.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale or use of our products.

JAMAR Technologies, Inc. reserves the right to make improvements on the product and/or specifications at any time without notice.

Questions concerning this warranty or any JAMAR Technologies, Inc. product should be directed by mail or telephone to:

JAMAR Technologies, Inc.
1500 Industry Road, Suite C
Hatfield, PA 19440
215-361-2244

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If you have any questions about the Black Cat II Plus Radar Recorder that you cannot find answers for in this manual, there are several ways to get additional information.

For the latest support information on the Black Cat II Plus Radar Recorder, please visit our web site at:

www.jamartech.com/blackcatiandiisupport

Support is also available by e-mail at:

support@jamartech.com

Support is also available by phone at:

1-215-361-2244

Monday — Friday, 8:00 AM to 5:00 PM Eastern time

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Quick Setup Guide for the Black Cat II Plus Radar Recorder

1. Install the STARnext software for use with the Black Cat II Plus Radar Recorder, following the instructions that came with the software.
2. Check the battery voltage of the battery to be used for your study. If the charge is sufficient (13.4 or higher), connect the battery to the Black Cat II Plus Radar Recorder.
3. Install the Recorder in the field, following the directions in Chapter 2.

For the best results, the Black Cat II Plus Radar Recorder should be installed:

- Six to ten feet back from the road.
- At least six feet above the ground.
- At a 45 degree angle to the flow of traffic.
- Where the far side lane is no greater than 50 feet away.
- Where traffic is free flowing.

The unit should not be installed:

- At an intersection.
- Near where vehicles are likely to park.
- In a position that causes the radar head to be at an extreme angle.
- Near where pedestrians are likely to be crossing.
- Where the Radar's "view" is obstructed.

4. Use the STARnext software to setup the Black Cat II Plus Radar Recorder as described in Chapter 3. Use the LiveView feature of the software to check that data is being recorded properly.
5. Leave the Black Cat II Plus Radar Recorder to record data for the time period you would like. A fully charged battery will record data for approximately 6 days.
6. Download the data using the STARnext software.
7. Use the STARnext software to view your data and produce reports.

Chapter 1

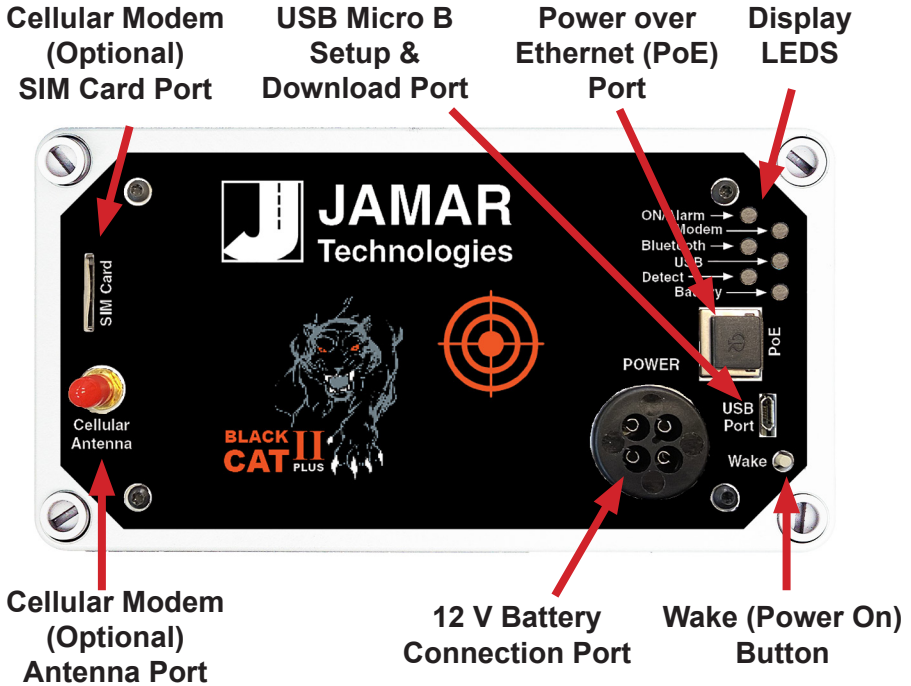
Introduction

What is the Black Cat II Plus Radar Recorder?

The Black Cat II Plus Radar Recorder is an automatic traffic data collector distributed by JAMAR Technologies, Inc. It is designed for ease of use, but contains many options and features to provide comprehensive traffic data collection. This device is a non-invasive data collector that uses radar to gather highly accurate traffic data, which means there is no need to install any road tubes, loops or other type of sensor in the road.

With the Black Cat II Plus Radar Recorder, you can gather data that includes vehicle speed, length, gap and volume. At any convenient time, you can transfer the data from the Black Cat II Plus Radar Recorder to your computer for processing. Data can be collected for either bidirectional roads or two lanes going the same direction. The Black Cat II Plus Radar Recorder contains 2 GB of memory, allowing you to record up to 200,000,000 vehicles.

The head unit of the Black Cat II Plus Radar Recorder contains several connection ports and LED lights with which you should familiarize yourself. These are shown below.



Display LEDs

ON/Alarm Indicator – This light illuminates a solid blue color during boot-up. It also illuminates when a fault is detected. Wait for this light to go off before attempting to connect to the STARnext Software. While the LEDs are in sleep mode, this light will flash a blue light every three seconds.

Modem Indicator - This light will be solid green if there is no current connection and the modem is available. It will turn solid blue when a valid modem connection is made. The light will be off if the unit is not equipped with a modem.

Bluetooth Indicator – This light will be solid green if there is no current connection and the port is available. It will turn solid blue when a valid Bluetooth connection is made.

USB Indicator – This light will be solid green if there is no current connection and the port is available. It will turn solid blue when a valid USB connection is made using a USB Micro B cable. It will turn solid red if an invalid connection is made.

Detect Indicator – This is normally on solid blue, and flashes off when a vehicle is detected.

Battery Indicator– This light flashes green when a 12V battery with an adequate charge is connected. The light will be off if the unit is off or being powered through the PoE port.

*The Display LEDs may time out after approximately 1 minute. Simply push the Wake button to again see the indicators.

Wake (Power On) Button

This button is multi-functional. Pressing the button will activate the indicators for a period of approximately 1 minute. If the button is pressed and held for approximately 10 seconds, it will shut down the Black Cat II Plus Radar Recorder. Pressing it again will restart it.

How is the Black Cat II Plus Radar Recorder Powered?

There are two ways to power the Black Cat II Plus, using either a 12V battery or using a Power over Ethernet (PoE) connection.

Battery Power

The Black Cat II Plus Radar Recorder is powered by a 12 Volt rechargeable battery. The standard battery used with the device is a 12V 12A lithium battery. In general, a fully charged battery (13.4 volts or higher) will record data for 7 to 10 days before needing to be recharged. The battery voltage can be seen when the unit is connected to the STARnext Software.

An optional solar panel is also available for long-term installations.

When the Black Cat II Plus Radar Recorder is first shipped to you the battery is disconnected and will need to be connected before first use. We recommend that you check the voltage level of the battery when it is first connected. A fully charged battery should register at 13.4 or higher. If your battery is lower than this, we recommend that you charge it before the first use.

Note that the Black Cat II Plus will not turn on if the battery voltage is below 12.0. Also note that the Black Cat II Plus will stop collecting data once the battery falls to 11.2 volts.

We recommend that you disconnect the battery whenever the Black Cat II Plus Radar Recorder is not in the field collecting data.

Keeping your battery properly charged is very important. The rechargeable battery will begin to decay and become less effective if it is allowed to fall below 11.0 volts. To avoid having to replace your battery prematurely, keep it consistently charged. A well-maintained battery will last for years without having to be replaced. Refer to Chapter 5 *Battery Care* for more information on battery maintenance.

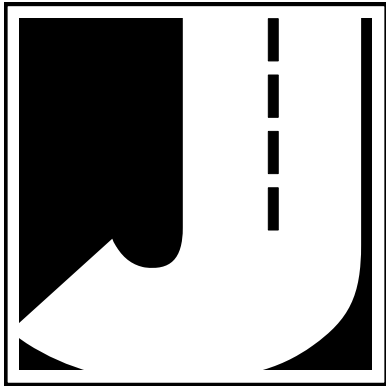
Power over Ethernet (PoE)

The Black Cat II Plus Radar Recorder can be powered without a battery by using a Power over Ethernet (PoE) connection. If you have an available powered Ethernet connection, plug it into the PoE port of the Black Cat II Plus to power the unit. Use of this option typically requires the involvement of IT or network administrators to set up devices within your network.

Before You Begin

Before you attempt to collect important data with the Black Cat II Plus Radar Recorder we strongly recommend that you familiarize yourself with both the operation of the Black Cat II Plus Radar Recorder, and the software that is used with it, by reading all of the documentation that came with the equipment.

Whenever possible, we recommend that you perform a test study if you are new to the Black Cat II Plus Radar Recorder. This will help you become comfortable with the operation of the equipment and how the data is both collected and analyzed. This should make things easier for you when you have to do your first real study.



Chapter 2

Site Installation

Installation

Before going to the site to install the Black Cat II Plus Radar Recorder, check that you have the following items from the installation kit:



Pole mounting bracket



Locks with keys



Chain

Clamp Bands



You will also need a standard flat-head screwdriver or 5/16 inch nut driver (not included with kit) to tighten the mounting clamp.

Check that your laptop is fully charged, has the latest version of the STARnext software installed, and that the date and time on the laptop are correct. You will synchronize the Black Cat II Plus Radar Recorder's time and date to that of the laptop during setup.

Selecting a Site

When choosing a location to install the Black Cat II Plus Radar Recorder, keep in mind that it will need to be mounted to a pole (typically a utility pole) or tree, so the site will need to have one of these available for use. Use of the optional square pole mounting bracket allows for installation on street signs like speed limit signs, yellow cautionary signs, etc.

For the best results, the Black Cat II Plus Radar Recorder should be installed:

- Six to ten feet back from the road.
- At least six feet above the ground.
- At a 45 degree angle to the flow of traffic.
- Where the far side lane is no greater than 50 feet away.
- Where traffic is free flowing.

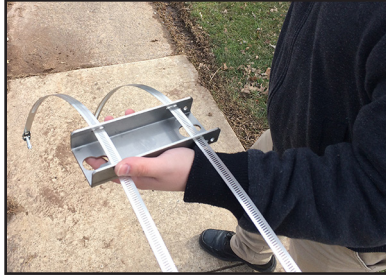
The unit should not be installed:

- At an intersection.
- Near where vehicles are likely to park.
- In a position that causes the radar head to be at an extreme angle.
- Near where pedestrians are likely to be crossing.
- Where the Radar's "view" is obstructed.

Mounting the Black Cat II Plus Radar Recorder

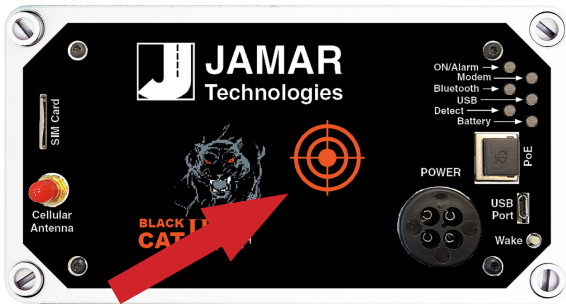
Once a site has been selected, the Black Cat II Plus Radar Recorder can be easily mounted using the installation kit.

Step #1 - Thread the SnapLock clamp bands through the openings on the pole bracket.



Step #2 - For the most accurate results, the bracket should be installed so the Black Cat II Plus Radar Recorder is facing traffic on a 45 degree angle.

IMPORTANT: The area of the Black Cat II Plus Radar Recorder that you are aiming toward the road on a 45 degree angle is the cross-hairs on the front of the Radar head, as shown in the picture here.



Once you have determined the 45 degree angle for the bracket, wrap the bands around the pole and place the bracket.



Step #3 - Snap down the screws on the clamp bands and tighten the clamp with a flat-head screwdriver or 5/16 inch nut driver.



Step #4 - Insert the pegs on the back of the Black Cat II Plus Radar Recorder's mounting bracket into the large holes of the pole mounting bracket and slide the Black Cat II Plus Radar Recorder down to secure it in place. Note that it is the front of the Black Cat II Plus Radar Recorder that you are aiming toward the road at a 45 degree angle.



Step #5 - Lock the unit into the mounting bracket using the hole at the bottom of the bracket. Once the Black Cat II Plus Radar Recorder has been setup using the STARnext software (refer to the next chapter), close and lock the lid. If you wish to add further security to the installation, the chain that was provided with the recorder can be used. We recommend wrapping the chain around the pole above the unit, then feeding the chain down through the open in the bracket and locking it into place using the lower lock hole of the radar's case.



Step #6 - Depending on how high you mount the Black Cat II Plus, you may need to tilt the unit so it is facing down into the traffic lane. This is done by adjusting the bracket on the back of the Black Cat II Plus. Loosen the top bolt on the bracket (there is one on each side) using the provided hex head allen wrench. Once loosened, the unit can be tilted down. The allen wrench can then be used to retighten the bracket.



Chapter 3

Programming the Radar Head

Connecting the Black Cat II Plus Radar to Your Computer

There are four ways to connect the Black Cat II Plus Radar Recorder to your computer:

- Direct hardwire USB connection.
- Local wireless Bluetooth connection.
- Direct hardwire Ethernet connection.
- Remote modem connection (optional).

Connecting to Your Computer – USB Port

Once you have the Black Cat II Plus Radar Recorder installed, it needs to be programmed to record the data you want. To do this you'll need to connect a USB cable from your computer to the Black Cat II Plus's USB Port. The Black Cat Plus II uses a Micro B USB port.

Note that **BEFORE** you connect your computer to the Black Cat II Plus for the first time, run the USB Driver Installation Program, which can be found on the STARnext software flash drive.

STEP 1 – Open the case of the Black Cat II Plus Radar Recorder. (Note that you will need to connect a charged battery to the Black Cat II Plus before attempting to connect to it.)



STEP 2 – Press the *Wake* button to ‘wake up’ the Black Cat II Plus. The *On/Alarm* light will be on when the unit is awake. **Note that you must always ‘wake up’ the Black Cat II Plus before you connect when using the USB cable.**



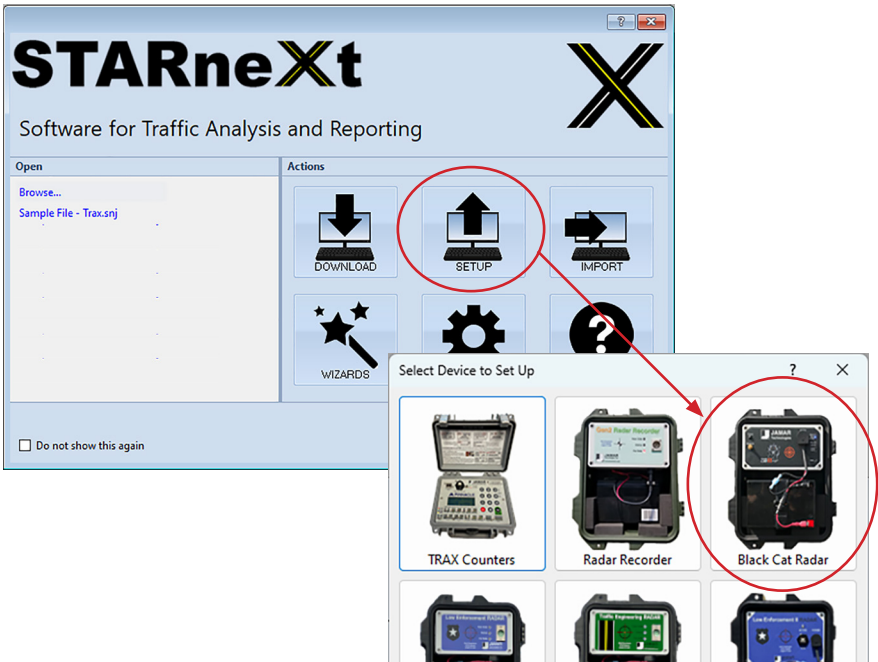
STEP 3 – Once the Black Cat II Plus is awake, plug the USB cable into a standard USB port on your computer.



STEP 4 – Plug the other end of the USB cable into the Micro USB port on the Black Cat II Plus. If the connection is successful the *USB* LED on the Black Cat II Plus will turn from green to blue.

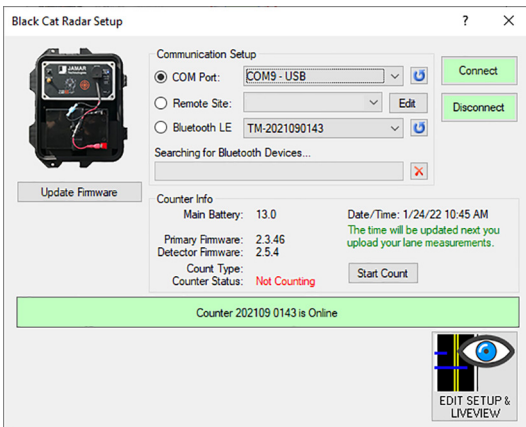
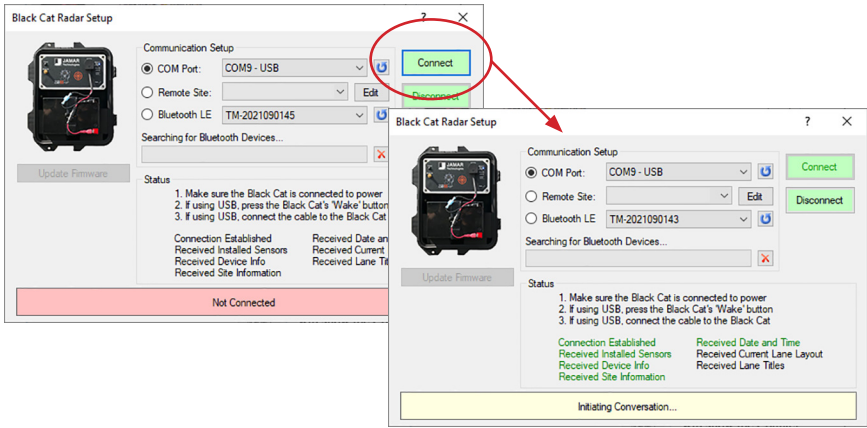


Start the STARnext software on your laptop and select **Setup** from the Actions section of the Quick Start screen. You'll then see a screen showing the different devices for setup. Select **Black Cat Radar** on the right.



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Once the Black Cat Radar Recorder Setup screen appears, select the COM Port from the dropdown box and click the **Connect** button.



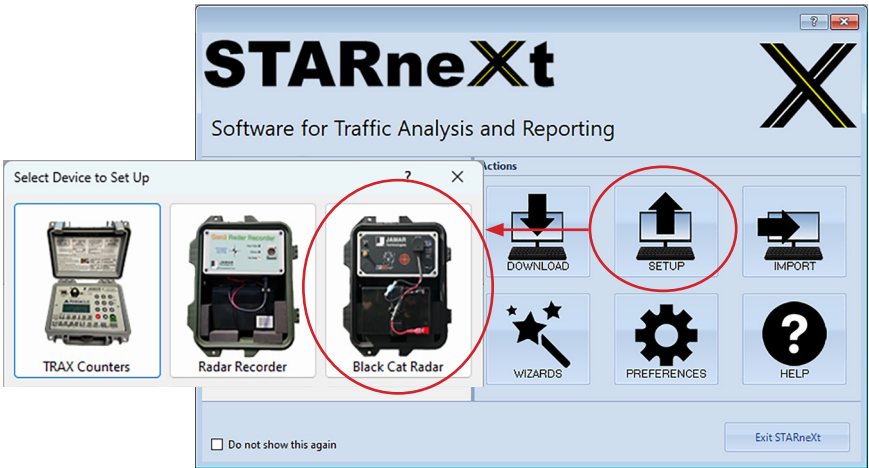
STARnext will attempt to connect to the Black Cat II Plus Radar Recorder and, if successful, show the current status of the unit.

Once connected, the middle of the screen will show the Counter Info, which includes:

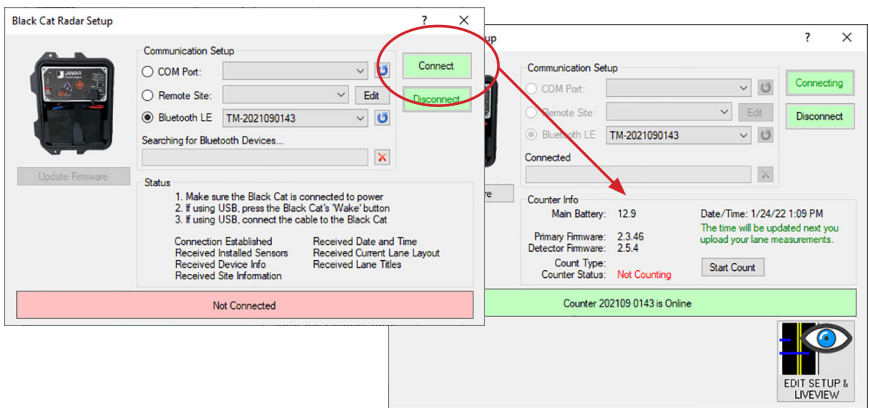
- **Battery voltage** – the current voltage of the battery. A fully charged battery should be around 13V or higher. The Radar will not be able to start if the voltage is below 12V.
- **Primary firmware & Detector firmware number** – updates for these are posted periodically at www.jamartech.com.
- **Count Type** – defaulted to Per Vehicle
- **Counter Status** – this will be either *Not Counting* if no count is in progress or *Counting...* if a count is in progress.
- **Date/Time** – this is the date & time current programmed in the unit. You will be shown a warning that the date and time are not correct if they are not within a minute of the computer's date and time. This will be automatically corrected the next time you upload settings to the unit.

Connecting the Black Cat II Plus Radar to Your Computer – Wireless Bluetooth

The Black Cat II Plus Radar Recorder has wireless Bluetooth capability which allows you to connect without a hard wire. To do this, first start the STARnext software on your laptop and select **Setup** from the Actions section of the Quick Start screen. You'll then see a screen showing the different devices for setup. Select **Black Cat Radar** on the right.



Once the Black Cat Radar Recorder Setup screen appears, select the serial number of your unit from the **Bluetooth LE** dropdown box and click the **Connect** button. STARnext will attempt to connect to the Black Cat II Plus Radar Recorder and, if successful, show the current status of the unit, including the Counter Info, which is described on page 3-4.

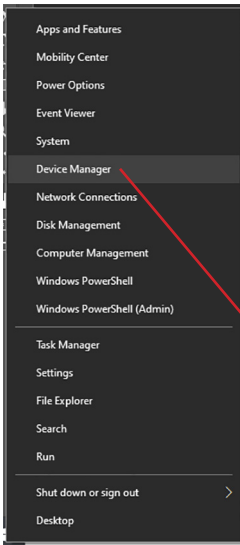


Black Cat II Plus Radar Recorder User's Manual

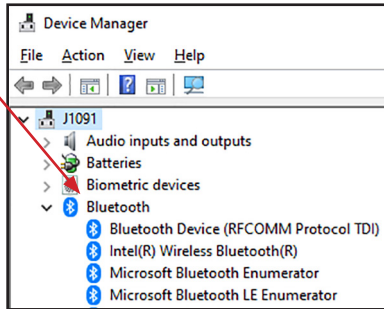
Note that with the Bluetooth Low Energy capability of the Black Cat II Plus, you **do not** have to pair the unit to the computer as had to be done with earlier models that used Bluetooth Classic.

If you do not see your unit listed in the Bluetooth LE dropdown box, verify that your computer is equipped for Bluetooth and that it is enabled.

To check if your computer is Bluetooth Enabled, access the computer's



Device Manager. In Windows 10 you can get to Device Manager several ways, the easiest is to simply right-click (that's the other mouse button) the Start button in the lower left, and select "Device Manager" from the menu that appears.



In Device Manager we are looking for the presence of Bluetooth. If it appears, then we have the Bluetooth hardware we need on the computer.

If your computer did not come Bluetooth enabled, an aftermarket Bluetooth antenna, like the one shown to the right, which plugs into a USB port, can be purchased and installed.



Connecting the Black Cat II Plus Radar to Your Computer – Hardwire Ethernet

The Power over Ethernet (PoE) port of the Black Cat II Plus can be used to connect your Radar directly to a local network.

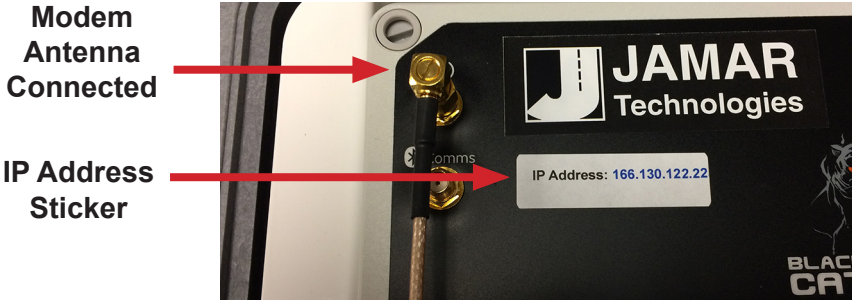
To do this, plug an Ethernet cable into the PoE port of the Black Cat.



To connect to your computer using the Ethernet connection, your Black Cat must have an IP address assigned to it. For a PoE connection, this would typically be assigned by your IT or network administrator. When connecting to the Black Cat you will then use the **Remote Site** selection in the STARnext software, as described in the next section of this manual.

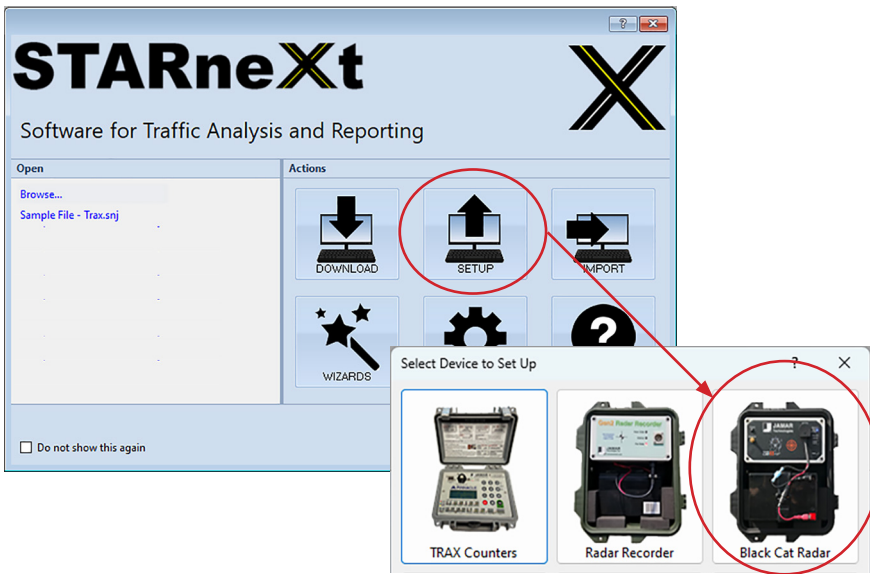
Connecting the Black Cat II Plus Radar to Your Computer – Remote Modem

The Black Cat II Plus Radar Recorder has optional modem capability which allows you to connect to a unit remotely via an Internet connection. If your unit has the option available, you should see a sticker on the front panel showing the IP Address of the unit. You should also see the modem antenna port of the Black Cat II Plus connected to the antenna, as shown below.



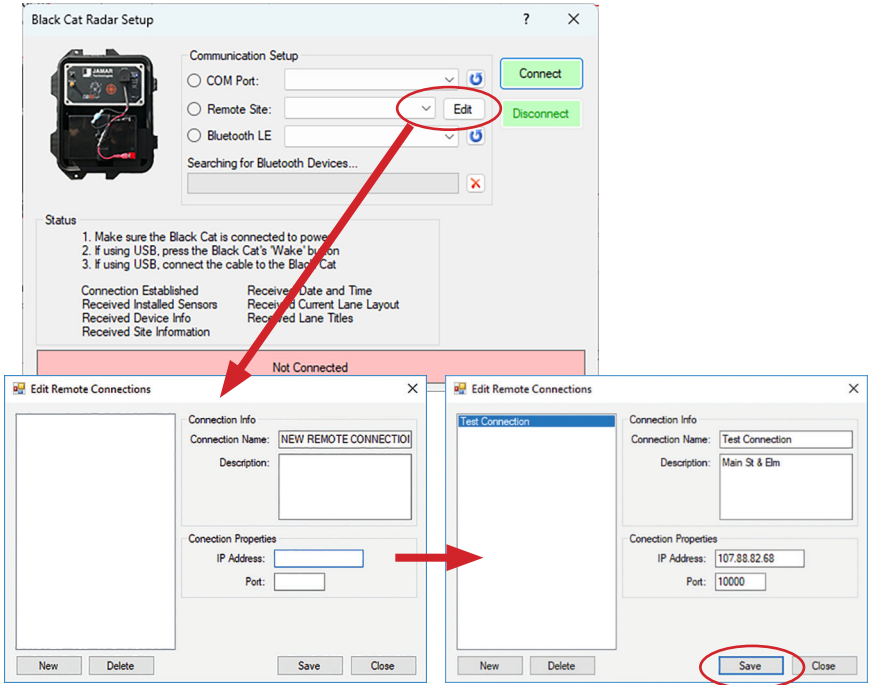
To use the Remote Site feature, follow the steps below.

Start the STARnext software on your laptop and select **Setup** from the Actions section of the Quick Start screen. You'll then see a screen showing the different devices for setup. Select **Black Cat Radar**.



Once the Black Cat II Plus Radar Recorder Setup screen appears, you'll see options for *COM Port* or *Remote Site* connection.

To connect to a Black Cat II Plus remotely, you need to create a Site Listing for the Black Cat II Plus in question. To do this, click the *Edit* button and the Radar Lane Setup form will appear.



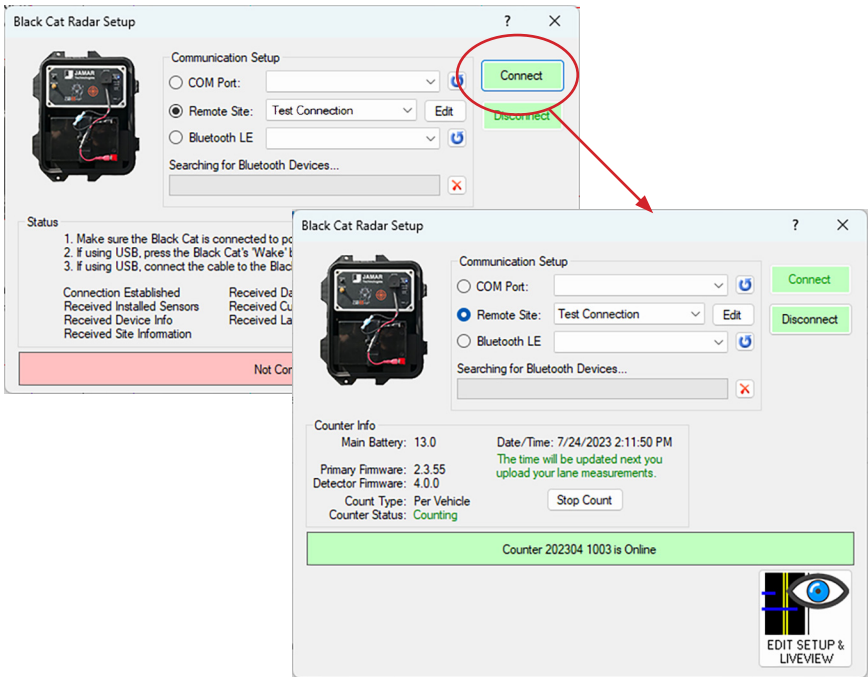
To create a new site, fill in the following information:

- **Connection Name** - The name that will appear on the initial connection screen.
- **Description** - (Optional) for site identification
- **IP Address** – (Required) the connection address usually found on a sticker on the front of the Radar head. (For PoE connection this would typically be assigned by your IT or network administrator.)
- **Port** – (Required) the connection port used by the computer, this is typically 10000.

Once you have entered the information, click the *Save* button to save the site listing, then close the screen and return to the initial radar connection screen. There will then be a new listing under Remote Site with the connection name you assigned.

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Once back on the connection screen, select the site you just created and click Connect. STARnext will attempt to connect to the Black Cat II Plus Radar Recorder and, if successful, show the current status of the unit.

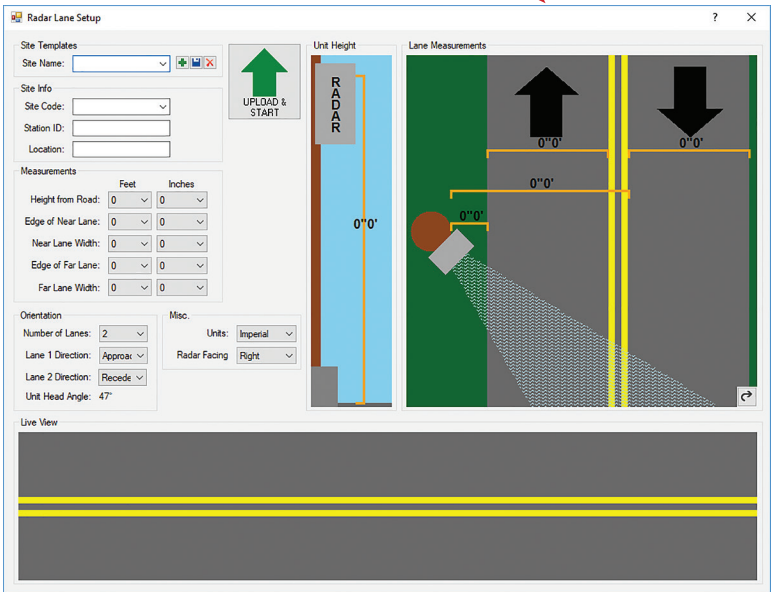
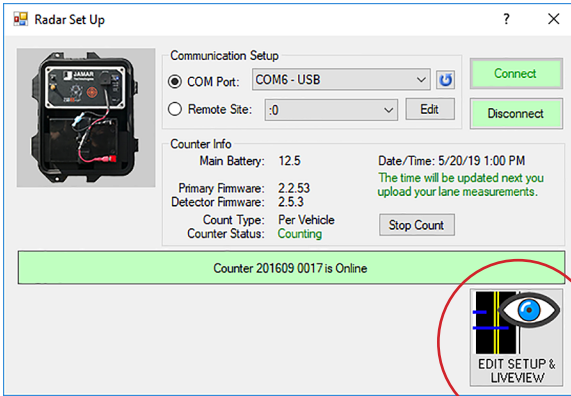


Once connected, the middle of the screen will show the Counter Info, which includes:

- **Battery voltage** – the current voltage of the battery. A fully charged battery should be around 13V or higher. The Radar will not be able to start if the voltage is below 12V.
- **Count Type** – typically either Per Vehicle or Realtime
- **Counter Status** – this will be either *Not Counting* if no count is in progress or *Counting...* if a count is in progress.
- **Date/Time** – this is the date & time current programmed in the unit. You will be shown a warning that the date and time are not correct if they are not within a minute of the computer's date and time. This will be automatically corrected the next time you upload settings to the unit.

Setting Up a Study

To setup a study, click the *Edit Setup & LiveView* button on the Radar Setup screen.



Once the Radar Lane Setup screen appears, you will need to enter the details of how the unit is installed.

The **Site Templates** fields can be used to enter location details of where the data is being collect.

The **Measurements** fields can be used to enter the details of how the radar is installed. These include:

Height from Road – Enter how high the Radar is mounted above the road.

Edge of Near Lane – Enter the distance from the Radar to the START of the first lane.

Near Lane Width – Enter the width of the near lane.

Edge of Far Lane – Enter the distance from the Radar to the START of the far lane.

Far Lane Width – Enter the width of the far lane.

The **Orientation** fields can be used to enter how the Radar is set up with respect to traffic.

Number of lanes – select either 1 or 2

Lane 1 Direction – select either Approach or Recede. (Lane 1 is the lane closest to the Radar.)

Lane 2 Direction – select either Approach or Recede (Lane 2 is the lane furthest from the Radar).

Unit Head Angle – provides the angle the radar head should be pointed based on the height from the road and the distance to the road.

The **Misc.** fields can be used to enter two specific settings for the radar:

Units – Select either Imperial (US) or Metric.

Radar Facing – Enter which direction the Radar is pointing, either Right or Left.

Once you have the settings you want, click the *Upload & Start* button.

LiveView

After settings have been uploaded into the Black Cat, the Liveview section of the setup screen allows you to view and verify the accuracy of the data you are currently collecting, compared to what you are actually seeing on the road.

As a vehicle passes the detection zone you will see the details of that vehicle appear.



Note that if the vehicle information appears with a red box around it, this indicates that the vehicle is traveling in the opposite direction of what the radar is expecting, based on the direction of the lane it is detected in.

IMPORTANT: The area of the Black Cat II Plus Radar Recorder that you are aiming toward the road is the bulls eye target, as shown in the picture here.

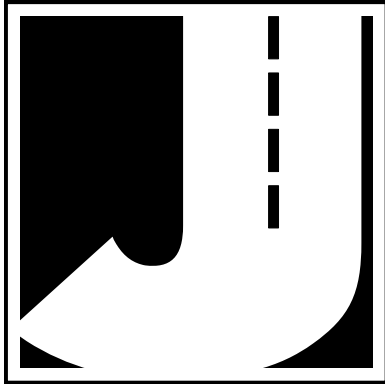
If you are not seeing vehicles in Liveview, make sure the Radar is properly aimed toward traffic.



We highly recommend that you use the LiveView to verify that the Radar is correctly recording vehicles before you leave the site. If the LiveView is not showing vehicles as they pass, the recorder is not getting good data. Double check all setup settings.

Troubleshooting

If vehicles are not showing up in LiveView, first try disconnecting and reconnecting to your radar. This can sometimes refresh LiveView with the new settings and display the data correctly.



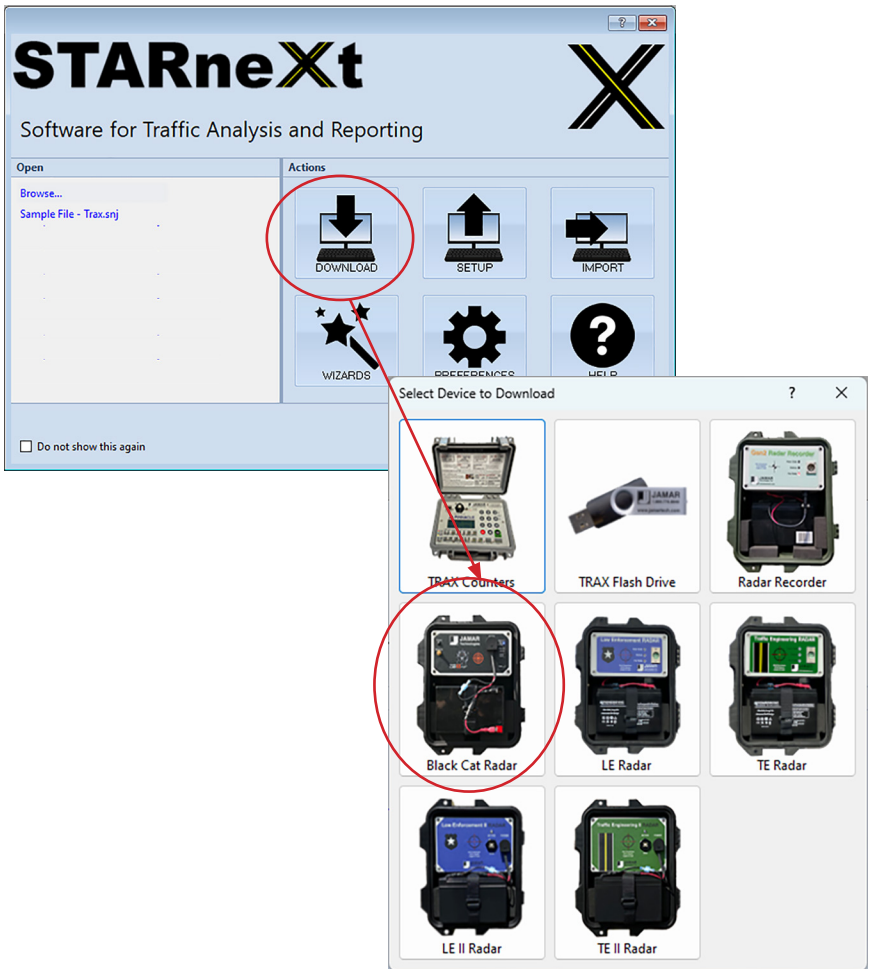
Chapter 4

Downloading & Deleting Data

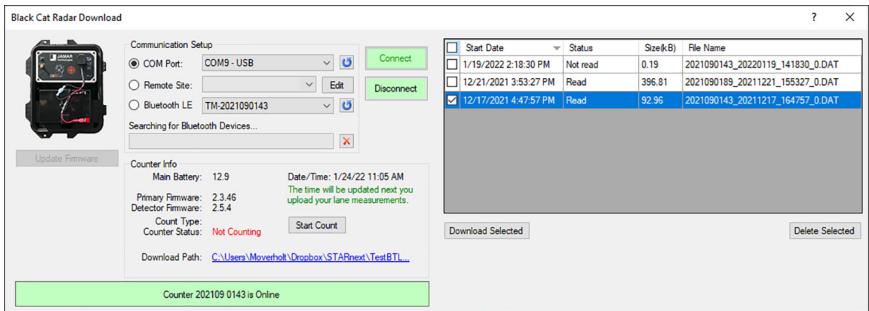
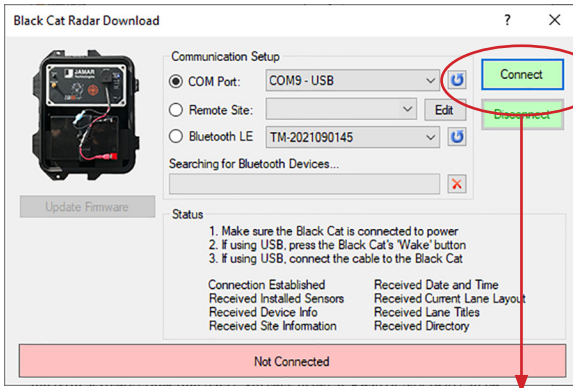
Downloading Data

Once the data collection is complete, you can retrieve the data from the Black Cat II Plus Radar Recorder using your computer and the STARnext software. To do this you will need to connect the Radar to the STARnext software, using one of the three methods found in Chapter 3 of this manual.

However, instead of selecting Setup, as referenced in Chapter 3, you will now select Download. After selecting Download, select Black Cat Radar.

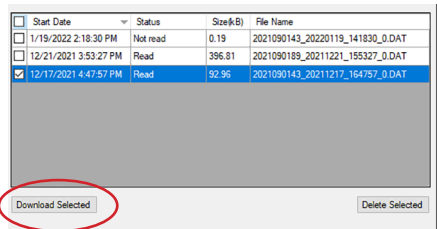


Click the Connect button and STARnext will then attempt to connect to the Black Cat II Plus. If the connection is successful, you'll see the screen shown below, listing the data files available for download.



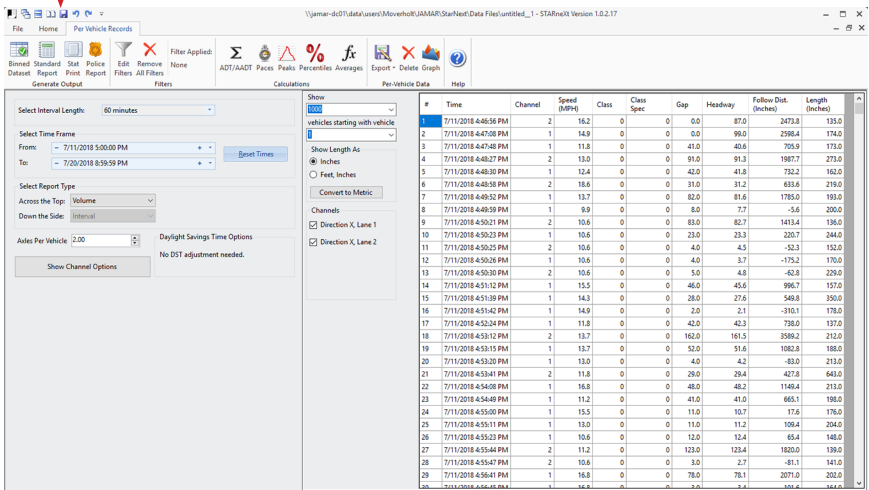
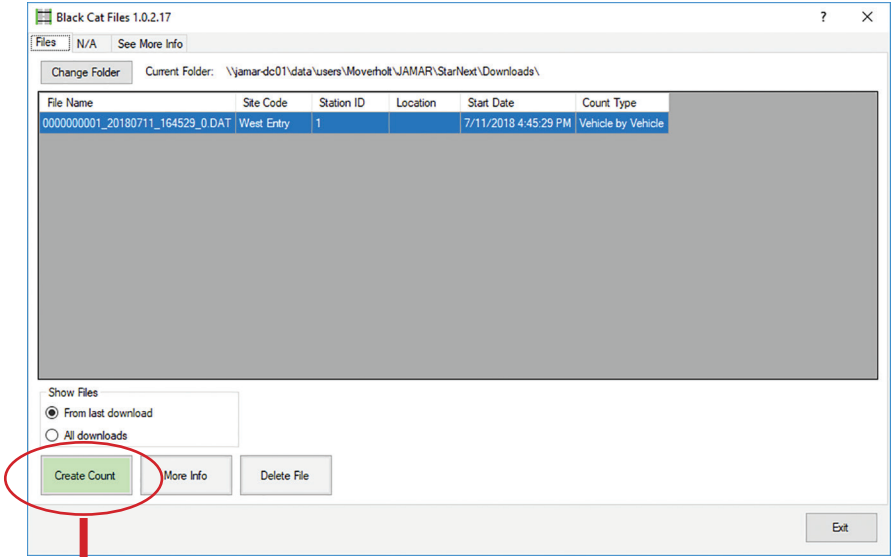
The data files listed will all have a status of either Read (has been previously downloaded), Not read (has not yet been downloaded) or Currently Counting (still actively collecting data). Surveys listed as Read or Not read can be directly downloaded. Surveys listed as Currently Counting must be stopped before they can be downloaded. To do this, click on the *Stop Count* button.

Check off any of the surveys you want to download, then click the *Download Selected* button (Note the Download Path location and change it if needed). The status message at the bottom of the screen will show 'Download in Progress' as the data is being downloaded to the computer.



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You'll then see a list of files to choose from. Click the *Create Count* button and you'll see the data file appear on the screen.



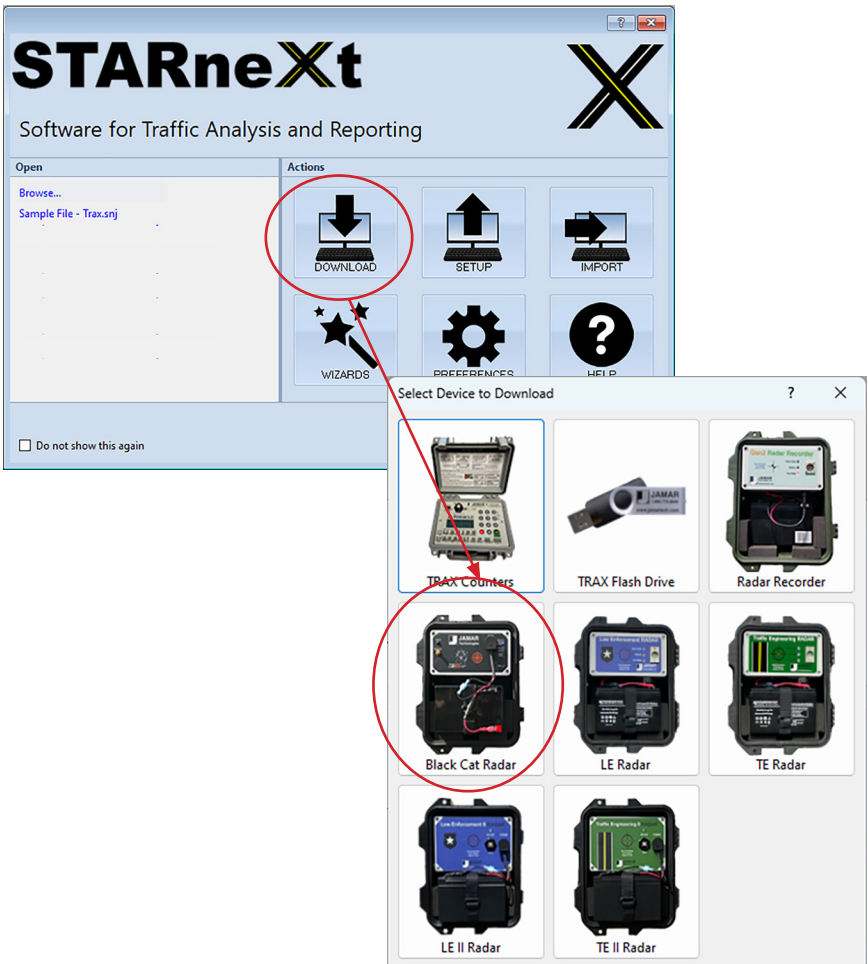
From this point, refer to the STARnext manual for information on how to process the files and produce reports.

Deleting Data

Data files that have been downloaded and processed should be periodically deleted from memory. Problems with Bluetooth connectivity can occur if too many files are left in memory.

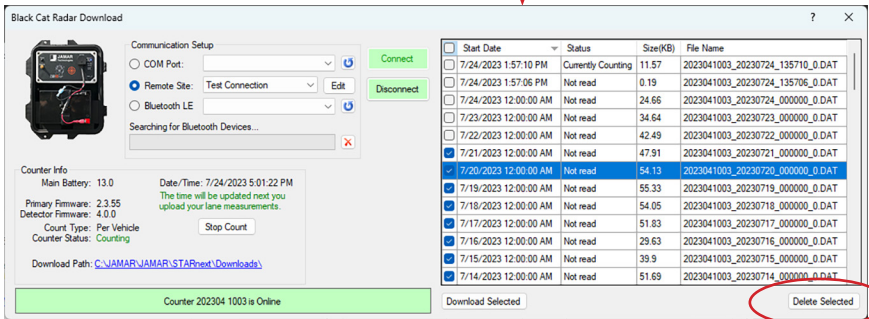
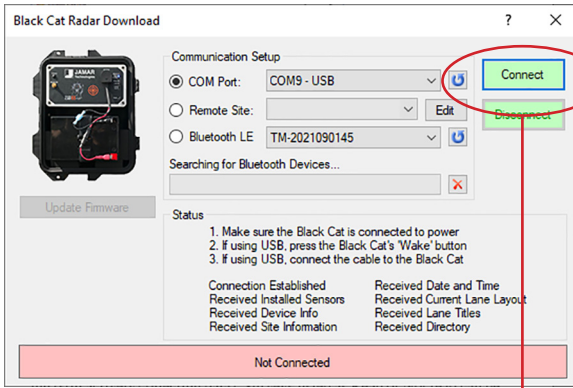
Note that the process for deleting data files from memory is similar to the process for downloading files described on the previous pages.

In STARnext, click the Download icon then select Black Cat Radar.



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Click the Connect button and STARnext will then attempt to connect to the Black Cat II Plus. If the connection is successful, you'll see the screen shown below, listing the data files available for deletion.



To delete a file from memory, select the file you want to delete and click the **Delete Selected** button. Multiple files can be selected and deleted, as needed.

Chapter 5

Battery Care

Maintaining Your Battery

The following information regarding battery care is furnished to assist you in the use and maintenance of rechargeable batteries. Battery life is dependent on the user's preventative maintenance procedures. Establish regular routines for all of your batteries regardless of their usage.

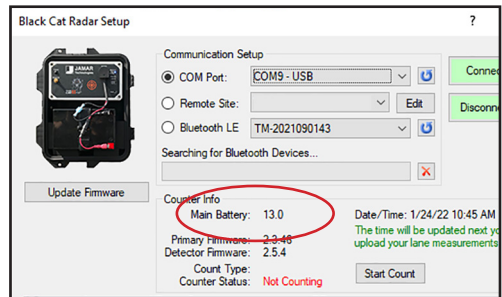
Charging a battery is very important. Your Black Cat II Plus Radar Recorder depends on a fully charged battery to operate efficiently and to produce reliable and correct data. Batteries should not be allowed to sit in a discharged state for any length of time. Once the battery discharges below 11.0 volts, damage to the cells has already begun. Symptoms of a damaged battery are:

1. The battery will not charge to its full capacity of 13.4 volts or higher.
2. The battery will only hold a charge for a short time under load conditions.
3. The battery will discharge faster than normal during storage under no load.

With this in mind, recharge the battery to its highest potential (normally from 13.4 volts and up) once it has fallen between 11.2 and 11.5 volts. The battery can be charged using the NOCO Genius 2 Battery Charger that came with the unit.

Battery Charging

Monitor your battery voltage by checking the *Black Cat II Plus Setup* screen of the STARnext software. We recommend that the battery be recharged to its highest charge level (usually 13.2 volts and above) once it discharges to between 11.2 & 11.5 volts. A good battery may charge as high as 13.6 volts or better. A defective battery may not charge any higher than 13.0 volts after a reasonable charge time. Charge time will vary with the level of the battery voltage. Usually, a battery of 11.2 volts can be charged to its highest potential in 12 hours or less.



To charge the battery, first remove it from the Black Cat II Plus Radar Recorder. Plug the NOCO Genius G1100 Battery Charger (shown below) into an outlet, then connect it to the terminals of the battery.



*Note that the NOCO Genius charger can charge several types of batteries, including both 6V and 12V batteries. If the charger is set to 6V, press and hold the **Mode** button until the battery lights are flashing. Then press the Mode button until 12V Lithium is selected.*

*****CAUTION*****

Never plug a charger into a battery unless you are absolutely sure of the voltage output and polarity.

The charger has four (4) Charge LEDs - 25%, 50%, 75% and 100%. These Charge LEDs indicate the connected battery's state-of-charge as shown in the chart below.

After a battery has been charged, allow it to sit for several hours then check the voltage to determine if the battery kept its charge. Some reduction in voltage is acceptable. However, if the battery falls below 13.0

Understanding Charge LEDs.

LED	Explanation
25% Red LED	The 25% Charge LED will slowly pulse "on" and "off", when the battery is less than 25% fully charged. When the battery is 25% charged, the red Charge LED will be solid.
50% Red LED	The 50% Charge LED will slowly pulse "on" and "off", when the battery is less than 50% fully charged. When the battery is 50% charged, the red Charge LED will be solid.
75% Orange LED	The 75% Charge LED will slowly pulse "on" and "off", when the battery is less than 75% fully charged. When the battery is 75% charged, the orange Charge LED will be solid.
100% Green LED	Pulsing Green LED - Bulk charge complete, optimizing battery for extended life. Solid Green LED - When the battery is 100% charged, the Charge LED will be solid green.
Maintenance Green LED	After the battery is fully charged, the charger will continue monitoring the battery, and provide ongoing maintenance and optimization. The 100% Charge LED will pulse "on" and "off" slowly during these cycles. The charger can be left connected to the battery indefinitely.

Understanding Error LEDs

Error Conditions will be indicated by the following LEDs.

LED	Reason/Solution
Solid	Charger is in Standby mode or Battery voltage is too low for charger to detect.
Solid	Battery voltage is too high for the selected charge mode. Check the battery and charge mode.
Solid	Possible battery short / Battery will not hold a charge. Have battery checked by a professional.
Solid	Reverse polarity. Reverse the battery connections.
Flashing	Charger internal temperature too high / Charger will resume function once the Charger internal temperature drops. Charger ambient temperature too cold / Charger will resume function once the Charger ambient temperature rises.

volts, recharge it for a longer period of time. If this does not improve the charge, the battery is most likely defective and should be replaced.

Monitor your battery voltages frequently, charging when necessary, and you will extend the life of your battery.

Additional Notes

- **Do not** expose the battery to moisture or rain.
- **Do not** drop, hit or abuse the battery — it may break and expose the contents, which are highly corrosive.
- **Do not** short circuit battery terminals. Some batteries are protected with self-resetting fuses, but short circuits may still cause severe damage to the battery.
- It is normal for a battery to become warm to the touch during charging.
- It is normal for a battery to “self discharge” during prolonged storage. Always fully charge a battery prior to storage. While in storage, periodically check the batteries with a voltmeter to ensure they have not discharged below a level that may cause permanent damage.
- Always store in a cool, dry location.
- Keep batteries away from fire and do not incinerate — they may explode.
- Under no circumstances should you attempt to open the battery case.
- Always observe polarity when connecting your battery to any electronic/electrical device. If your device is not protected from improper battery hookup, you may cause severe damage to the electronic circuitry. The positive terminal may be indicated by a plus (+) sign or red mark. The negative terminal may be indicated by a minus (-) sign or black mark.
- The effectiveness of the solar panel can be reduced if it is dirty or scratched up. For best results, keep the panel clean and in good condition.

Appendix

Specifications

Configuration: 2 Lanes, bi- or same direction

Memory Size: 2GB (approx. 200,000,000 vehicles)

Data Storage: Up to 256 Data Files

Speed Range: 5 – 130mph

Radar Range: 100 Feet

Operating Temperature: -40 F (-40C) to +158 F (+70C)

Count Accuracy: (98%, ignoring obscuration)

Speed Accuracy: +/- 2% at 95% confidence

Length Accuracy: +/- 16 Inches or +/- 5% which ever is the greater

Software: STARnext

Remote Access: Optional Modem

Wireless Access: Bluetooth Low Energy

Battery: 12 Volt

Battery Charge Life: 7 to 10 Days

Power Option: Optional Solar Panel

Weight: 7 lbs.

Weight (with 12V Lithium Battery & Bracket): 13 lbs.

Dimension: 10" x 12" x 5"

Approval: CE and FCC Approved

