**Tech Note**

**Motion/Heat Sensor**

**Models:** All Cuddeback cameras

This tech note will help you if you think your camera is not detecting all the animals it should, or is taking pictures of things it should not. It also explains how you can test your camera to verify that its motion/heat sensor is working correctly.

**How a motion/heat sensor works**

A motion/heat sensor is technically known as a Passive Infrared (PIR) detector. For simplicity, in this document we will call the motion/heat sensor a PIR sensor. First, let’s discuss some basics on PIR operation.

- PIR devices are capable of detecting animals or people by sensing changes in infrared light that occurs when an animal or person enters the PIR’s field of view.

- PIR sensors work best when there is a large difference between the air temperature and the animal. In warm temperatures, say above 80 degrees Fahrenheit, the detection range will be reduced. In cold temperatures, below 40 degrees, the detection distance will increase. The one exception to this is that in very cold temperatures a white-tailed deer can be so well insulated that snow will not melt off the deer’s back. In these cases the animal may have to be closer to the camera to be detected.

- Large animals, such as deer and bear, are easier to detect than small animals, such as fox and birds. The PIR sensor will detect small animals at close range, but may miss them at farther distance.

- In our experience we have learned that the wider the field-of-view of the PIR sensor the more likely the camera is to generate false images that are triggered by environmental and non-target activity.

- Cuddeback cameras utilize a unique technology that is designed to center the subject in the photograph. The PIR’s detection zone is cone shaped and extends out from the camera. At a distance of 10 feet from the camera the detection zone is about 5 feet wide. We believe that a cone shaped detection zone has fewer false or non-target detections and will result in the subject being centered in the photograph.

**Camera PIR Sensitivity**

Cuddeback cameras do not have a sensitivity adjustment. We have spent over 25 years developing scouting cameras and have taken 10s of thousands of images. Over this time we have determined what we believe is the optimum sensitivity level to accurately and reliably detect large animals without excessive triggers by non-target animals, such as rodents and small birds. Cuddeback cameras do not have sensitivity adjustment as we believe that the customer should not have to experiment with their camera to achieve optimum performance.
Setting Up Cuddeback to Maximize Motion/Heat Sensor Performance

Here are a few things to keep in mind when setting up your Cuddeback.

- You want to install your camera such that the height of the camera is at the same level as the target animal’s chest. For white-tailed deer, this means you should install the camera about 3 feet off the ground. A little lower is ok, but be careful if you install the camera higher as you may be aiming the sensor over the top of the deer.

- Take into account the terrain and make sure the subject will be in the sensor’s field of view. If the ground is hilly, you will have to improvise to aim the camera correctly.

- Always clear out twigs, branches, and brush from in front of the camera. These things can block the infrared signals from reaching the camera and will result in animals not getting detected.

*The shaded area represents the area where plants and brush should be removed.*
• The detection distance of the motion/heat sensor can exceed the illumination range of the flash or LEDs. This means at night it is possible for the camera to detect an animal and trigger a picture when the animal is too far from the camera to be properly illuminated. Careful placement of the camera can reduce the likelihood of this happening (see Tech Note – Flash Images).

![Diagram](image)

*In this setup the camera can detect images a long distance from the camera. This can lead to poorly illuminated images.*

*In these setups the animals will be closer to the camera and illumination will be improved.*

• Remember these three things when installing your camera and you will have trouble free operation:
  1. Waist High – waist height is optimum for almost all big game animals, so align the camera with your belt line.
  2. Level Aim – a level aim is best for flat ground, adjust the aim accordingly when on a hill
  3. Clear of Brush – remove all brush from in front of the camera
Using Cuddeback’s Test Mode

Once you setup your camera, use the Test Mode to verify the PIR detection range. Keep these things in mind when using test mode.

1. Move completely through the detection zone when doing the walk test.
2. After the LED illuminates there is a few second delay before the LED will light up again, so walk past the camera, stop and wait for 10 seconds, then walk back again.
3. This diagram depicts the best walk pattern to test the detection zone.

4. Because of the insulation characteristic of clothing, the camera may not sense humans as far as it can detect animals.

If you think your camera’s PIR is defective

A defective PIR will manifest itself in one of three ways:

1. Not detect any animals or people (always off)
2. Continuously generate detections (always on)
3. Intermittent incorrect performance (false detections & missed detections)

Here are some steps you can use to determine if your camera’s PIR is operating correctly.

1. Before doing anything, replace the batteries with brand new Rayovac, Duracell, or Energizer batteries. We cannot stress enough the importance of quality batteries. When batteries get weak, the lower power available to the camera can cause the PIR to create false detections which results in no-subject images. In fact, this is a good means to tell when it is time to replace batteries - if the last few images on your card are void of animals, it is time to replace the batteries.

2. Once you have new batteries installed, perform the tests described next to test the PIR operation. There are 2 parts of this test, one is to make sure the PIR is detecting correctly, and the second is to test for false detections. Before performing these tests we recommend you install new batteries just so you can be assured the batteries are not causing any problems.

3. **Test 1: Verify Detector can Sense Subjects.** Mount your camera in your yard, such that it will detect you as you move past the camera. Enable TEST mode. (For Capture series cameras, make sure you close the cover and completely tighten the thumb screw). Starting at 5 feet from the camera, slowly walk perpendicular to the camera, while watching the red test LED. The LED...
should illuminate when you move past the camera. Once you get beyond the camera, wait 10 seconds, then move past the camera again at a distance 5 feet farther away. Continue this process of walking, pausing, and walking each time adding about 5 feet. Continue this process until you get about 30 feet from the camera. If the red LED illuminates all or most of the time the camera’s PIR sensor is working correctly. See the walk test diagram above.

4. **Test 2: Check for False Detections.** Install a blank media card into your camera. Make sure the SD or CF card is completely blank with no images on the card. Arm the camera and place the camera in a cardboard box or suitable enclosure, then close the box to prevent light from entering the box. The idea is to prevent the camera from sensing any object or people. Wrapping the camera in a towel or blanket will also work. Leave the camera secured like this for 24 hours, then remove the camera from the box. The camera will probably trigger when you remove it from the box. View the images on the card. The card should only have no images or just the one image that you triggered when you removed the camera from the box. If there are multiple images on the card the PIR sensor may be generating false detections.

5. If your camera failed either of the above tests, call our customer support department for assistance.

**Some common problems we have seen**

Here is a list of some of the more common issues we have seen and what you can do to solve the issue.

1. Not getting any pictures or not getting enough pictures.
   a. First, test the camera as explained above to make sure the PIR is working correctly.
   b. Second, try taking pictures in your home or yard to make sure the camera is functioning.
   c. If the PIR is working correctly and the camera is taking pictures at home, then how the camera is installed in the field may be causing the problem. Make sure the camera is installed correctly, not too high, not too low, and aimed correctly. Carefully following the guidelines in this document should solve the problem.
   d. If you are still not getting any images you need to consider that there may not have been any activity in the area. It is not uncommon for activity on a game trail to be very low, for example, a deer trail may have as much as deer every day or as little as 1 or 2 per month or none.

2. Getting pictures of some animals but not others. For example, we had a customer once tell us he was getting lots of images of deer but none of turkey.
   a. Are there turkeys present? It is possible no turkeys showed up.
   b. The camera may be too high off the ground and doesn’t see the turkeys.
   c. The turkeys may not be getting close enough to the camera. Remember, small animals must be closer to the camera than large animals.

3. There are deer in front of the camera and the camera did not take any pictures.
   a. First, are the deer in front of the camera or off to the side? Are the deer close enough to the camera?
b. Is the camera set too high off the ground or aimed at the ground? Make sure the camera is waist high and aimed level with the ground.

c. Are the batteries ok? Is the camera programmed correctly? Check the camera delay to see if it is what you want. For older model Cuddeback’s, verify all the settings, such as flash on/off, camera window, and motion vs. time lapse mode.

4. Camera is generating no-subject images. Images without a subject can occur with any scouting camera. Cuddeback’s takes pride that our fast trigger time and advanced PIR circuit will assure that most subjects detected will be in the image. However, it is possible for fast moving subjects and improper setup to cause no-subject images. For more information see Tech Note – Flash Images or Tech Note – IR Images.

5. Using a camera in very HOT temperatures, say, over 80 degrees. The motion sensors functions by sensing the difference between an animal and the air temperature. The greater the difference that farther the sensor will detect. However, when it is very hot there may be only a few degrees difference between the air and the subject (animal or person) which will result in a greatly reduced detection range, perhaps as little as 10 feet. This is normal operation and there is no a problem with the camera. This is a technical limitation of motion/heat sensors.
Tips for optimum performance

The thick, dense, cloudy air associated with fog, rain, and snow can reduce detection distance.

In these images the deer were detected, but it is possible for the fog to be so thick that it blocks the signal from animals.

Objects, such as trees and brush, will interfere with the PIR’s ability to detect animals.

In these images there is brush directly in front of the camera. This brush will hinder animal detection and may result in many missed animals. Always remove brush from in front of the camera.

Setting up the camera too high will result in missed animals.

In these images the camera was installed high off the ground. Having the camera installed this high can result in many missed animals. The problem is much worse if the camera is tilted up, in which case it may not detect any animals. Be careful when setting up the camera to assure the camera is about chest level of the target animal, and that the camera is level with the ground. For the most reliable and best detection, install the camera even with your belt line, waist high.
Setting a Camera at a High Vantage Point

If you want to install the camera high in a tree, make sure you aim the camera down to where animals are expected. Keep in mind that this will limit detection range. Our Genius brackets make it easy to mount cameras high and aim them down.

A high vantage point can create an interesting perspective. But a high camera aimed down limits the detection range. In these images the animals needed to be close to the camera to be detected.