TruFlight
TRACKING SYSTEM

# TRUFLIGHT INSTALLATION GUIDE

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# TruFlight™ Camera Tracking System
# Setup & Installation


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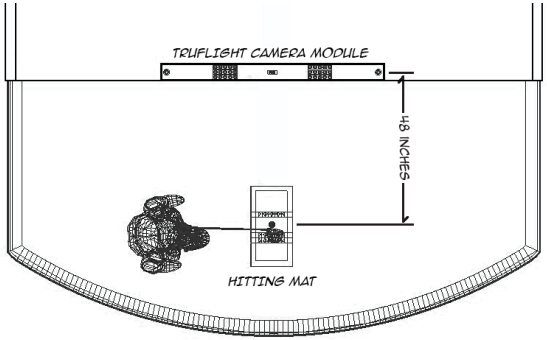
# TruFlight™: How It Works

The TruFlight camera tracking system works in conjunction with the TruTrack™ hitting mat.



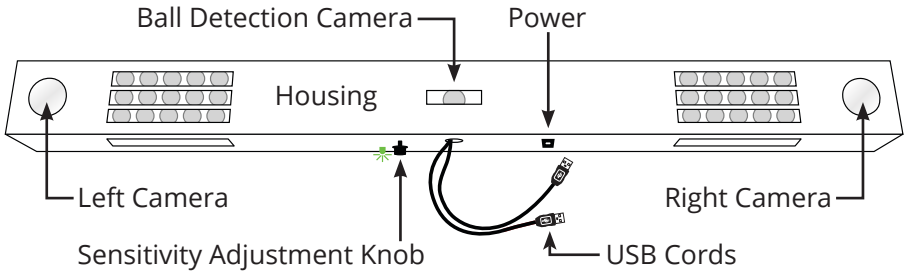

When a shot is taken, the TruTrack hitting mat uses three rows of ten PHOTO sensors to detect **club head data** at the point of impact. TruFlight's two cameras—working in a stereo configuration—then take an image of the ball in flight. This image is instantly analyzed to derive **ball speed**, **direction** and **launch angle**.

Together, TruFlight and TruTrack combine to provide extremely accurate shot data, whether you're hitting a drive, an iron, a chip or a putt.

> ***Important!*** *When using the TruFlight camera system, the ball is placed in the tee position when hitting a full shot; when putting, the ball must be placed behind the tee position.*

# TruFlight™ Components

- Housing
- Sensitivity Adjustment Knob
- Ball Detection Camera
- Left Camera
- Power Cord
- Right Camera
- USB Cords






# TruFlight™ Installation

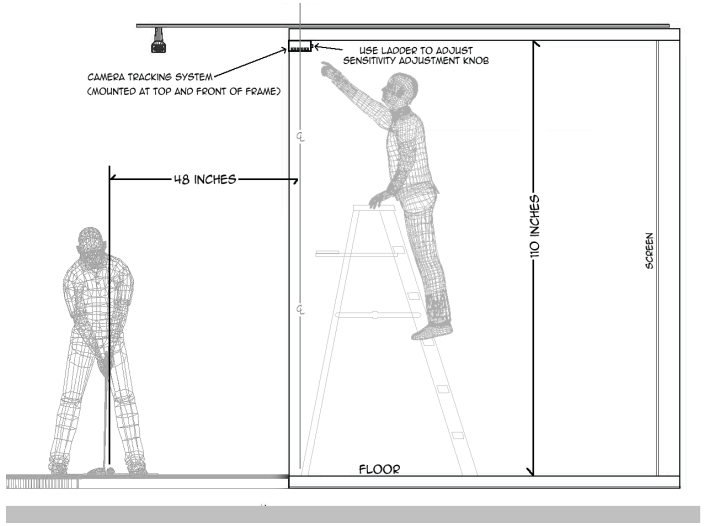
Before installing, you must have:

- A computer with **two open USB ports on the motherboard**
- **110 volt power** (a standard electrical outlet)
- A **halogen spotlight** mounted just forward of the tee position on the hitting mat (to illuminate the sensors properly)
- **Dark floor covering** (the more contrast between the dark floor and white golf ball, the better)
- A drill
- A plumb bob
- A piece of masking tape

## INSTALLATION:

1. Position the camera housing:
   a. **48"** in front of the tee position (where you place the ball for a full shot)
   b. Centered with the tee position
   c. Parallel to the screen
   d. **110"-124"** above the floor and level

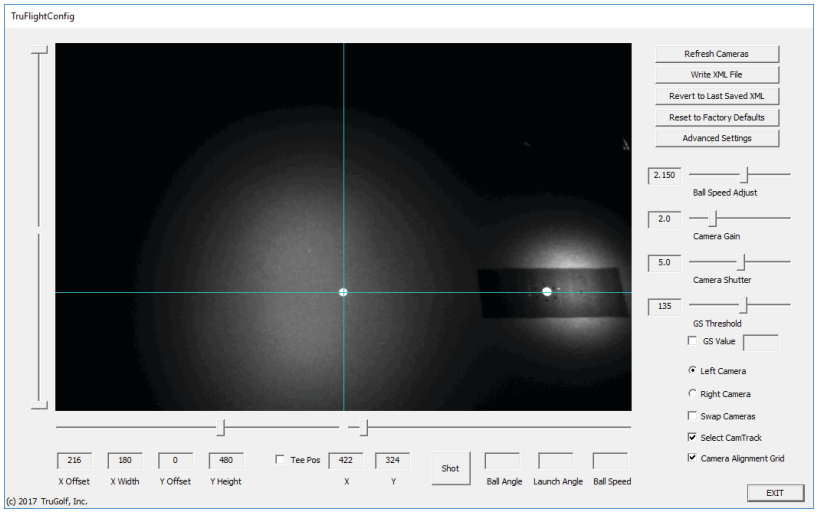
*Figure 1*




***Important!*** *110" is the default height – see "Adjusting Settings for Custom Booth Heights" (page 7) if your inside height booth is taller.*

2. Verify that the **Sensitivity Adjustment Knob** is pointing toward the screen (away from the tee position) and then secure the camera housing to the ceiling (with the supplied mounting screws).
3. Using a plumb bob, determine the exact center (both side-to-side and front-to-back) of the camera housing and mark that location on the floor with a small piece of masking tape.
4. Place one golf ball on the masking tape and another golf ball in the exact center of the tee position as shown in *Figure 2*.
5. Attach the power cable.
6. Plug both cameras into the appropriate USB ports.

*Figure 2*

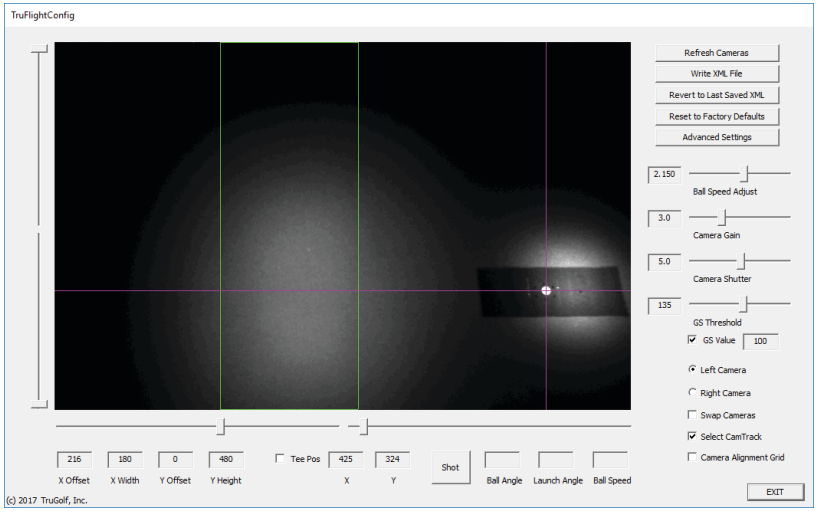





## ADJUSTING THE CAMERA & BACKGROUND SETTINGS:

1. Run the **TruFlight utiltiy software** on the computer.
2. With the TruFlight utility software running on the computer, click the **Refresh Cameras** button (in the upper-right corner).
3. Select the **GS Value** checkbox.
4. Move the mouse cursor in the center of the lighted area onscreen (the area under the camera housing, illuminated by the infra-red lights in the housing).
   a. As you do, note the values shown in the **GS Value** box (*see Figure 5*).

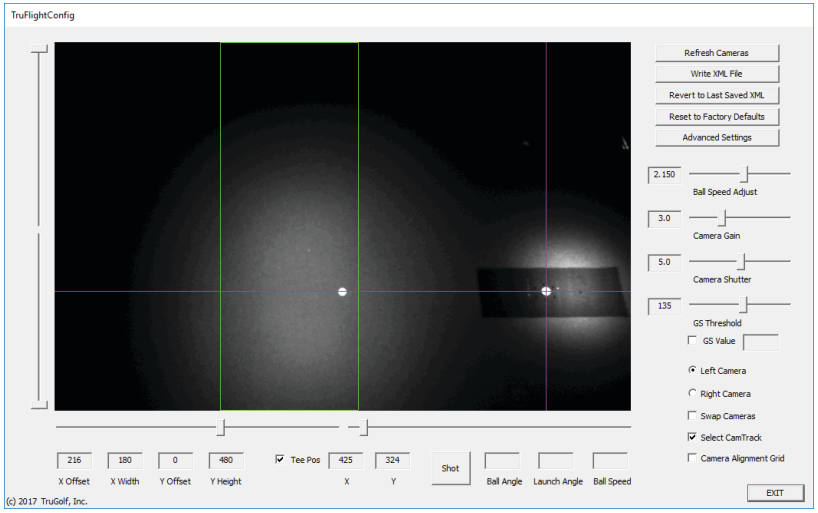
*Figure 5*




5. For best results, the GS Value should be just under 100. If the GS Value is too high or low, move the **Camera Gain** slider left or right, click the **Refresh Cameras** button and then move the mouse cursor around the lighted area while noting the GS Value numbers.
   a. For more precise adjustments, click on the Camera Gain slider, and then use the left/right arrows on the keyboard.
6. Set the **GS Threshold** slider to 125.
7. Click the other (right or left) camera button and repeat.
8. Leave the **Camera Shutter** slider at the default setting (5.0).
9. Leave the **Ball Speed Adjust** slider at the default setting. This will be adjusted at a later time, if necessary.
10. Place a golf ball in the exact middle of the tee position.

11. Select the **Tee Pos** checkbox (left-center, bottom of the screen).
12. Move the mouse cursor over the golf ball (this will turn the cursor into "crosshairs"), and then click in the exact center of the golf ball. Repeat, if necessary, until the crosshairs are over the exact center of the ball (*see Figure 6*).

*Figure 6*




13. Click the other (right or left) camera button and repeat.
14. To save these settings, click the **Write XML** File button (in the upper-right corner).

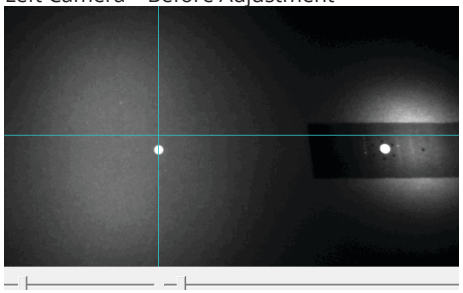


## CAMERA ALIGNMENT

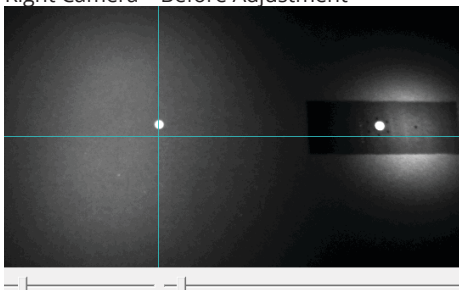
1. Select the **Camera Alignment Grid** checkbox, and then click the **Refresh Cameras** button (in the upper-right corner).
2. The tee position should be on the right side of the display (*see Figure 2*). If it isn't, select the **Swap Cameras** checkbox, and then click the **Refresh Cameras** button.
3. Toggle between the **Left Camera** and **Right Camera** radio buttons to confirm that both show the tee position on the right side of the screen.
4. Using your computer keyboard, use the **Up/Down Arrows** to move the LIGHT BLUE horizontal line and center it through both golf balls.
5. Toggle between the **Left Camera** and **Right Camera** radio buttons. If the camera housing is properly aligned, there should little-to-no change in the position of the two golf balls.
6. If the balls are approximately the same distance from the vertical line—but not on the same horizontal line—the camera housing must be moved right or left (*see Figure 3*).

*Figure 3*

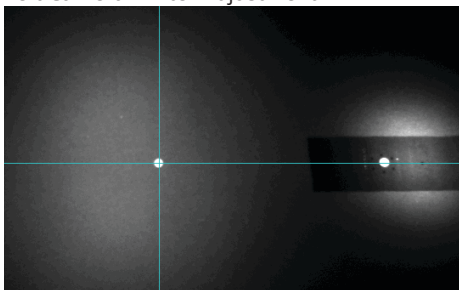
Left Camera – Before Adjustment



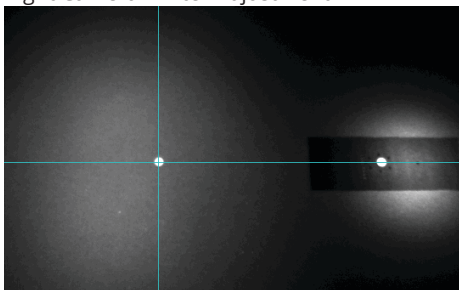
Right Camera – Before Adjustment



Left Camera – After Adjustment



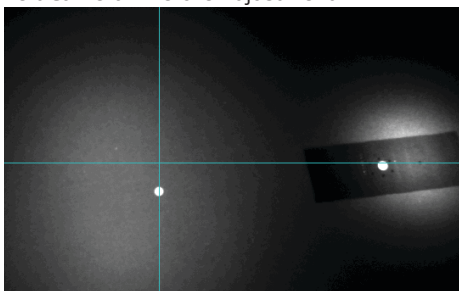
Right Camera – After Adjustment



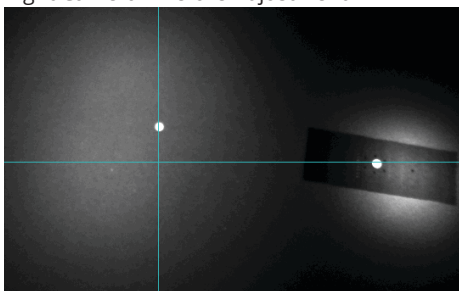
7. If the balls are not parallel to the horizontal line, the camera housing is not perfectly perpendicular (90 degrees) to the tee position; move one end of the camera housing forward or backward until both balls are parallel to the horizontal line (*see Figure 4*).

*Figure 4*

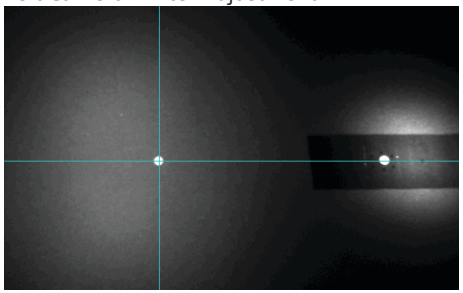
Left Camera – Before Adjustment



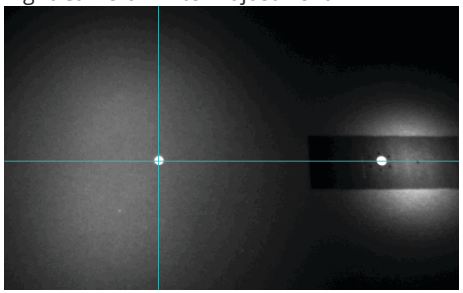
Right Camera – Before Adjustment



Left Camera – After Adjustment



Right Camera – After Adjustment



8. Remove all objects (balls, tee, etc.) from the area below the camera housing.
   a. If you're using a **ladder** to reach the Sensitivity Adjustment Knob, place it on the "screen" side and as far away as you can to still reach the knob (*see Figure 1*).
9. Turn the Sensitivity Adjustment Knob fully clockwise until it stops. Now turn the knob back counter clockwise until the green light barely comes on and stop turning. Then carefully turn the knob clockwise again until the green LED turns off and continue in the same clockwise direction a quarter turn.
10. To confirm that the camera system is "triggering" properly, toss a golf ball under the camera (as if taking a golf shot). The green LED should turn on and then reset (turn off).



## ADJUSTING SETTINGS FOR CUSTOM BOOTH HEIGHTS:

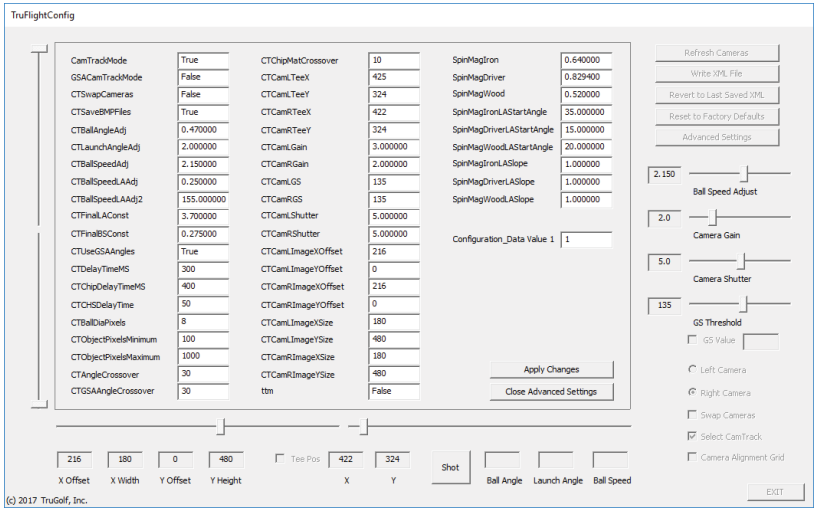
1. The default settings shown in the previous sections are for a booth ceiling height of 110". For other heights, refer to the table below (*see Figure 7*).

*Figure 7*

| | 48" Camera Spacing | | | | | 72" Camera Spacing | | |
|---|---|---|---|---|---|---|---|---|
| **Tee to Ceiling Height** | **103"** | **110"** | **113"** | **118"** | **122"** | **110"** | **118"** | **124"** |
| CTBallAngleAdj | 0.45 | 0.45 | 0.46 | 0.47 | 0.48 | 0.48 | 0.49 | 0.50 |
| CTLaunchAngleAdj | 5.05 | 6.50 | 6.25 | 6.25 | 6.30 | 2.30 | 2.70 | 3.00 |
| CTBallSpeedAdj | 2.25 | 2.15 | 2.25 | 2.35 | 2.44 | 2.40 | 2.49 | 2.56 |
| CTBallSpeedLAAdj | 0.05 | 0.20 | 0.20 | 0.20 | 0.20 | 0.30 | 0.19 | 0.05 |
| CTBallSpeedLAAdj2 | 225 | 158 | 159 | 165 | 172 | 155 | 170 | 180 |
| CTFinalLAConst | 3.40 | 4.40 | 4.35 | 4.15 | 4.00 | 2.85 | 3.23 | 3.00 |

2. To change the settings for your custom height, click the **Advanced Settings** button (in the upper-right corner).
3. Be careful to edit the values in only the specified fields.

*Figure 8*




4. When finished, click the **Close Advanced Settings** button.
5. To save these settings, click the **Write XML File** button (in the upper-right corner), and then confirm by clicking **OK** in the pop-up dialog.

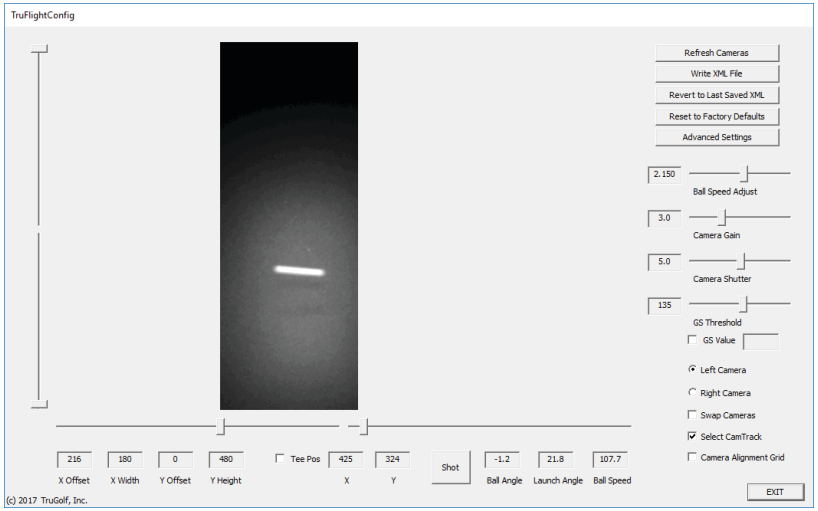
## SHOT TESTING & FINAL ADJUSTMENTS:

1. Place a golf ball in the tee position.

   ***Important!*** *When hitting a full shot, the ball is placed in the tee position; when putting, the ball must be placed behind the tee position.*

2. With the TruFlight utility software running on the computer, click the **Shot** button (in the bottom-center of the screen).
3. You will have 20 seconds to hit a shot before the system "times out", forcing you to start over.
4. After hitting a shot, a "snapshot" image appears. Ideally, there should be a buffer the width of three golf balls or so to the right of the streak (*see Figure 9*):

*Figure 9*




5. A **message** may be displayed on screen if the entire length of the ball "streak" is not visible.
6. To adjust the spacing, start by clicking the **Refresh Cameras** button (in the upper-right corner).
7. There are two sliders below the image. Move the **slider on the right** to get the desired spacing.
8. Click the other (right or left) camera button and repeat.
9. Next, move the slider on the left until the **X Width** number (in the lower-left corner) shows 180.
10. Click the other (right or left) camera button and repeat.



11. Click **Refresh Camera** to view the new settings.
12. To save these settings, click the **Write XML File** button (in the upper-right corner).

## MISCELLANEOUS:

- Ball speed can be adjusted by moving the **Ball Speed** slider.
- To restore the default settings, click the **Reset to Factory Defaults** button (in the upper-right corner).
- To exit the program, click the **EXIT** button (in the lower-right corner).

## TROUBLESHOOTING AND ERROR MESSAGES:

There are two settings that, if they are not properly configured, can cause the camera to not capture the ball properly. Those are: **Sensitivity Adjustment of the Center Trigger Camera** on page 7 starting with Step 8 and **GS Threshold** found on page 4 in the *Adjusting the Camera & Background Settings.*

When you have a no shot occur, meaning you make a normal, good shot and it is not detected by the camera system indicated by the Waiting for Shot screen timing out after a shot is hit, the first thing to check is that the green light is turning on when a roll a ball under the center trigger camera. If trigger light does not turn green when a ball passes through but does when you walk under it then the Sensitivity Adjustment is too low and needs to be re-calibrated. Please follow the directions on page 7. If the green trigger light is staying on or flickering on and off then the Sensitivity Adjustment is too high and needs to be re-calibrated as per the instructions on page 7.

If other error messages pop up like, *Ball Speed Exceeds Limits or Launch Angle Exceeds Limits* or other similarly worded messages while you are hitting shots in the TruFlight Configuration Utility then it is likely the GS Threshold is not set correctly and/or the Center Trigger Camera Sensitivity is not set correctly and is false triggering on the background rather than on a ball. Please follow the steps on page 4, Adjusting the Camera & Background Settings to adjust the GS Value for each camera and save those changes when complete and double check the Sensitivity Adjustment for the Center Trigger Camera that it is set correclty.

**Sensitivity Adjustment and GS Threshold** settings being set correctly are critical to the software being able to accurately analyze and/or capture a ball streak and are the first settings to check when the system is missing shots.

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