

## Tip Sheet for using the Garmin Hand Held GPS Model ETREX H with the *iWitness* Close-Range Photogrammetry Software

### Basic steps for using the ETREX H...

1. Turn unit on (lower right side button) – “**PWR**”
2. Depress the “**PAGE**” button (upper right side button) clicking it 4 times.
3. The MENU displays the “**MARK**” as highlighted.
4. Depress the “**ENTER**” button (it is the lowest of 3 on the left side)

NOTE: The menu will display a “cartoon image of a guy staking a flag”, and the waypoint number will be presented as “001”.

5. Depress the “**ENTER**” button again and that sets the waypoint. *Also noteworthy is the Elevation, and Latitude / Longitude (in Degrees Minutes and Seconds) is displayed at the bottom of the menu.*
6. To “back out” of this menu, simply depress the PAGE button, one time, and that takes you back to the MARK/WAYPOINTS/... menu.
7. Depress the **down arrow button one time** (the middle button on the left side.) NOTE: if you make a mistake, just click the PAGE button and that scrolls you through the menu options.
8. The WAYPOINTS are now highlighted. Depress the **ENTER** button one time.

NOTE: the waypoint is now displayed on the right side of the menu...but the highlighted area is on the “0-9” field.

9. Click the **ENTER** button one time and the “001” waypoint is selected.

NOTE: as you enter in more waypoints, to access them, you simply scroll through the e.g. 001, 002, 003 waypoints by using the “up/down” arrows on the left side of the unit.

10. Click the **ENTER** button, will select waypoint 001, and the menu will now display the flag-pole and the GOTO selection will be highlighted.
11. Click the **ENTER** button again and the compass will be displayed.

NOTE: The direction of the arrow is the direction to the waypoint. You simply follow the arrow and watch the distance at the top of the menu. The unit will report feet to about 524’, then converts to tenths of a mile. When you take

the readings, make sure you let the unit sit at the location for at least 60 seconds before recording the waypoint.

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## **USING THE GPS COORDINATES IN PROGRAMS LIKE GOOGLE EARTH**

### **Background:**

This tip sheet was created to **“re-establish” the police investigator back to the incident using an inexpensive hand held GPS unit** for global positioning of an *iWitness photogrammetry survey*. For example, let’s say the Nevada Highway Patrol was investigating a multiple fatality on Hwy 15 in the middle of the desert. To “index” the required scene evidence measurements, the typical method used would be to *total station survey* an “anchor point” from a highway milepost marker, or other established monument were the total station survey was indeed accomplished.

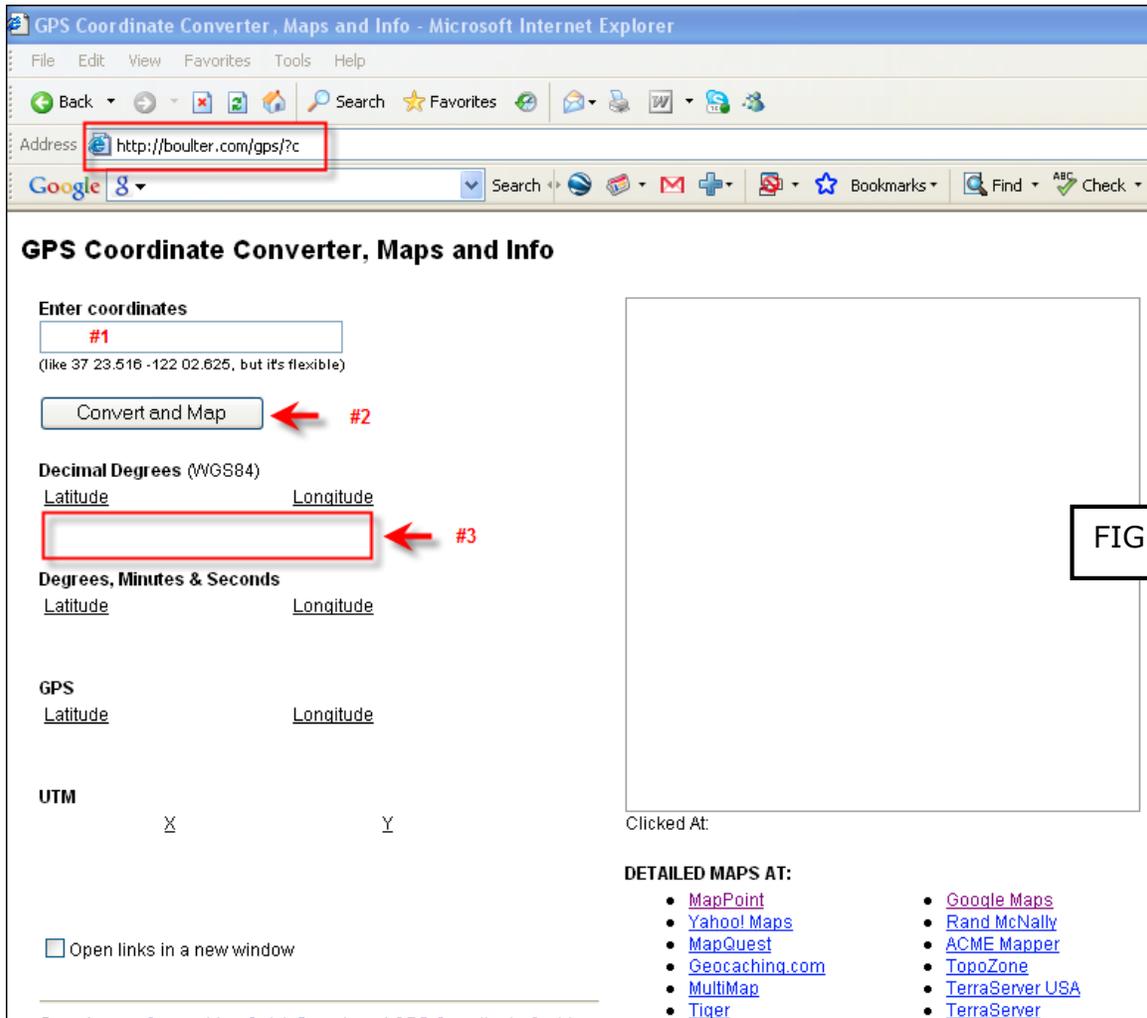
### **Using Hand Held GPS and Close-Range Photogrammetry:**

An alternative and effective method using state-of-the-art technology which is far less costly and faster on scene, is the procedure identified on page 1, in combination with the following...

- I) At the incident, establish an **origin point for the iWitness 3-2-1** coordinate system (e.g., a PK nail on the highway’s white fog line).
- II) Use the hand held **GPS unit, placing it over the PK nail**, and set the GPS waypoint. *Remember to let it sit there for at least 60 seconds before recording the waypoint.*
- III) **Drive another PK nail** on the same fog line (e.g. 50’ from the item PK nail – *this 50’ distance is not critical for an exact length between way points.*) **Do the same GPS reading;** so you now have set: “001, and 002” way points in the GPS unit.
- IV) **Use iWitness and your digital camera** to “image-base map” the incident as you normally would, except **make sure you image both PK nails** for iWitness measurement at item II) and III locations.

### **BACK IN THE OFFICE:**

- V) Go to the ETREX H waypoints menu, for item II) and III) recordings and **write down the latitude and longitude readings** on a piece of paper, or in a Word document, etc. NOTE: these reading are in Degrees Minutes and Seconds, (**DMS**) and will need to be **converted to Decimal Degrees** (WGS84).
- VI) **Convert the ETREX H DMS readings to Decimal Degrees:** A good free application is here: <http://boulter.com/gps/?c> -- Book Mark it in your Web Browser. See the three steps in **Figure 1**.



VII) Launch Google Earth. If you do not have Google Earth installed on your computer, go here and get it for free: <http://earth.google.com/>

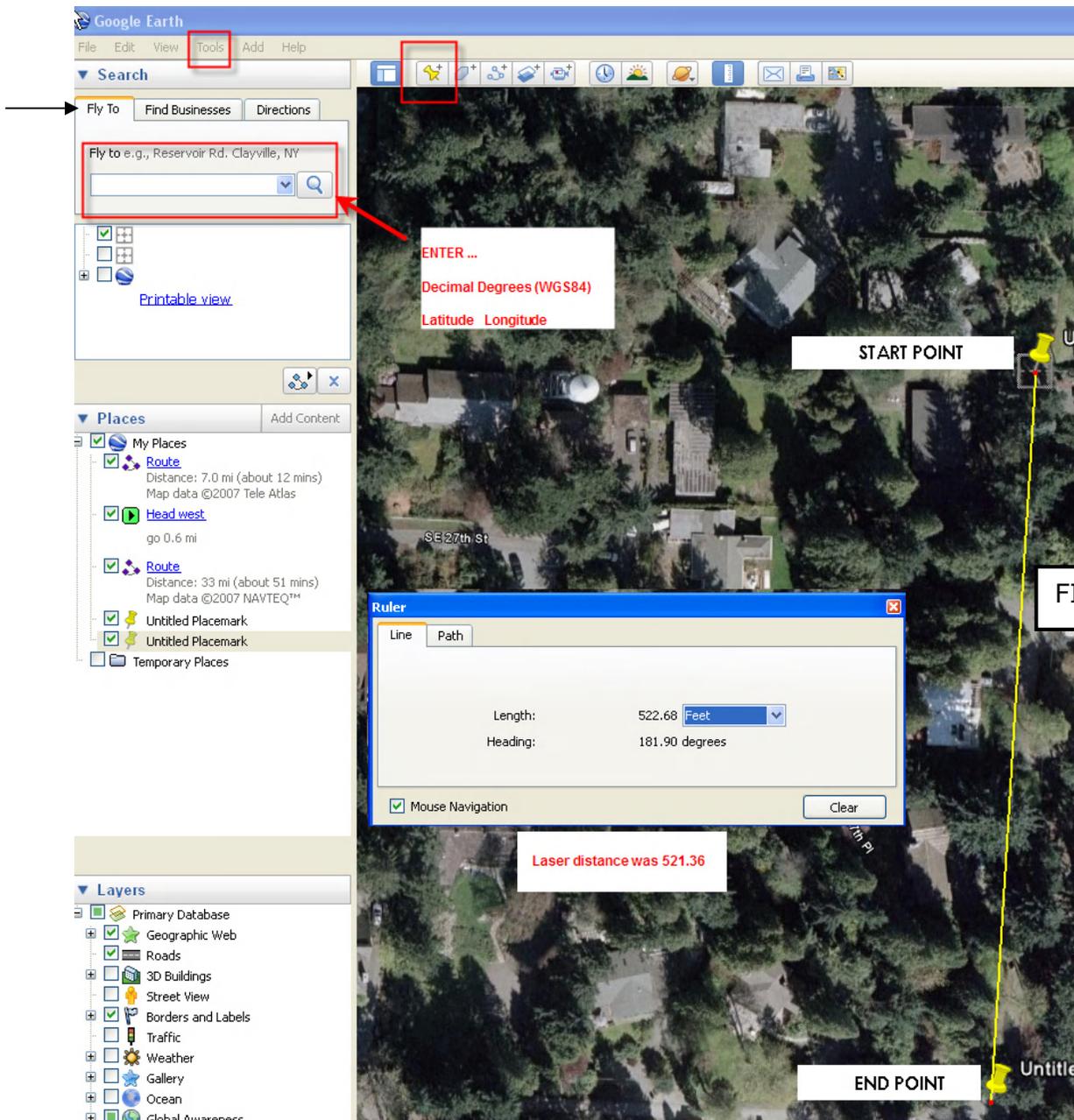
**Figure 2** serves two purposes... It shows you how to use Google Earth to place your photogrammetry scene measurements at the Latitude and Longitude coordinates with a "Satellite View". It also shows you how to enter two sets of Latitude and Longitude coordinates and measure a distance between the two sets of coordinates.

NOTE: the Google Earth Aerial can be scaled in your favorite CAD program. Once the image is scaled in CAD, the iWitness DXF can be imported and layered on top of the aerial for accurate scene modeling and a good "birds-eye" view of the incident and surroundings.

VIII) In **Figure 2**, enter the **Figure 1, item #3 coordinates** in the "FLY to" box. **NOTE:** it is important that the longitude starts with a minus "-"

sign, e.g. -122.xxx. The latitude and longitude numbers are simply separated by a single space in the "Fly to" dialog box. **Click the enter key** on your keyboard and Google Earth will travel to your GPS entered decimal degree coordinates.

**Optional:** You can click on the "Directions" tab and enter two sets of **decimal degree coordinates** and add a Placemark (i.e. click the yellow pin in the dialog.) Measuring between the placemarks is accomplished by using the Google Earth menu for **Tools + Ruler**.



**Summary:**

In our example, we measured the same location 3 times and repeated similar latitude and longitude readings. We also used a laser and measured the same distance independent of the GPS recordings, with the GPS Vs Laser only about 1-foot difference over the 522 feet.

It is import to note that hand held GPS units with WASS are typically accurate to better than 3 meters, so the aforementioned "1-foot" repeatability to a set waypoint is not always going to be achievable; but certainly accurate enough to "*reacquire*" a PK nail monument set on the road, using low-cost GPS technology.

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