Tips for Recording Your Turnback

Recording Device.

Many pilots have asked if other EFBs or other devices can be used other than ForeFlight, or a G1000. The answer is, yes, and we have already worked with pilots to accept their recordings. There are only a few requirements that need to be met for the data analysis tools to use the data:

1. The device needs to accurately capture data at a rate of at least 1 "record" per second (see Data Capture Rate below). Higher data capture rates are OK as well.
2. Each data record should contain the following information:
    - Timestamp — Data, Time (hour, minutes, seconds) with at least 1 second resolution. Decimal seconds are preferred.
    - Latitude / Longitude — The location of the plane at that moment.
    - Altitude — MSL altitude.
    - Course — The course along the ground. Should reference true north.
    - Speed_kts — The speed along the ground in knots.
    - Bank Angle — (optional)
    - Pitch Angle — (optional)

Data Format

The data can come in the form of a .CSV file, or a KML File, or any other format. It just needs to be text (human-readable) so a proper driver can be written to read the data and convert it to our standard output.

Data Capture Rate

Using a device which cannot capture data at a high rate accurately will result in turnback recordings that are "jittery" when viewed in Google Earth. For example:

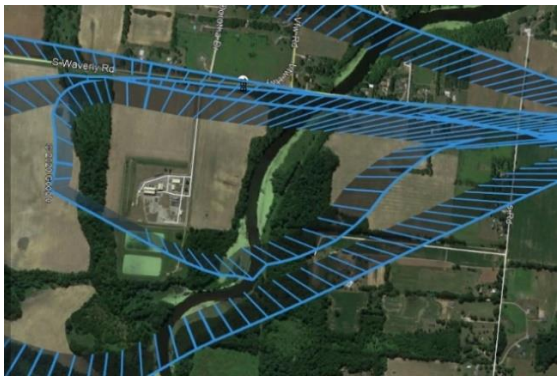

Figure 1. ForeFlight alone

Figure 2. ForeFlight with Sentry

We have tried both ForeFlight alone and ForeFlight connected to a Scout. Both have shown to be inadequate. During the rapid, tight turnbacks, Foreflight alone (or ForeFlight with the Scout) are not able to give accurate location readings. The path of the flight appears to be "jittery" around the turn. Using ForeFlight with a Sentry (for example), will result in smooth curves during the turnback.

To test your device, try recording a turnback maneuver, and if possible, display the data on Google Earth (not in the manufacturer's display since the data path may be smoothed to make it look good). If the turnback curves appear smooth, the data capture rate is adequate.

If you have any specific questions or would like to send in sample data for us to evaluate, please contact RickM@InflightMetrics.com

Keep the Recorder ON.

You should turn on the recording before your flight and turn it off after you land. All maneuvers can be captured in one recording. It is not necessary (nor desired) to separately record each maneuver. The auto-processing algorithm goes through the entire flight and picks out the maneuvers.

You can fly over the same area for all maneuvers.

You can perform all your maneuvers over the same practice area. The recording, although it will look like the maneuvers overlap, are separated in time. The processing algorithm can pick out the maneuvers across time.

Winds aloft

Try to find a day when the winds aloft are as low as possible, preferable **less than 15 knots and no more than 20.** The winds aloft are estimated and subtracted out of the flight recording. To get an accurate resulting flight path, the winds aloft should be less than 20 knots.

When doing the winds aloft maneuver, you just need to hold a constant heading, constant speed, and constant altitude. **You should hold it for around a minute** so the auto-algorithm can find the straight line and analyze it.

Capture the time of the straight and level winds aloft maneuvers. The time helps when locating the straight and level maneuves in the data.

Ground Winds

The procedure says to take a snapshot of the METAR for the ground winds. If you are at a towered airport, a better way is to ask the tower for a winds report just before you take off.

Takeoff

It is especially important that you write down both your **heading and speed** once you establish a steady climb on takeoff. Besides the reported winds, these values are used to estimate the ground winds.

It is important to hold the takeoff heading until you reach **1000 feet AGL**, if possible. A straight line is fit through the steady-state climb path. The longer the line the better the estimate of average climb angle. If you can't hold the heading because of the tower, hold the heading for as long as possible.

Vx vs. Vy

The procedure says to takeoff and climb at either Vx or Vy. The intent is to allow flexibility if you want to explore both. The best choice would be to takeoff using the speed you usually use for a normal takeoff. This way, the recording will reflect your typical practice. Most pilots choose Vy.

Glide after Turnback

It is important to capture the accurate **heading and speed of your glide** during the steady-state glide. These are used to estimate winds aloft.

Hold the glide for **at least 1000 feet** below where you started the power out. After coming out of the turn, there usually is a transition period while you establish a steady-state Vg. It isn't enough to just reach Vg. You should then hold it until you descend approximately 1000 feet below from where you started (but stay safe!). A straight line is fit through the steady-glide portion to estimate the glide parameters. The longer the line the better the estimate.

Recording the Time

Write down the time the maneuvers occurred in the worksheet. If you are recording using an iPad, **use the iPad time**. The recording software uses the iPad times as well when it timestamps the records. If you use your watch or a clock in the cockpit, make sure it is reading the same time as the recording device. An accurate time helps to manually find maneuvers if needed.