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# Holding Pattern Computer v2.0

## User Guide

For Apple iPhone, iPad & iPod Touch - iOS 9.1 or later

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<http://www.HoldingPattern.com>

# Introduction

Congratulations, you have purchased the finest, most advanced Holding Pattern Computer available. This computer shows which entry procedure is appropriate and helps the pilot remain mentally oriented to the aircraft's relative position to the pattern, to magnetic north, and to any effects of wind.

Additionally, taking winds and speed into account, this computer calculates which way to turn, left or right, which heading to maintain, and exactly how long to fly a heading before initiating a turn. Not only standard rate turns with bank limitations (30° manual flying and 25° with a Flight Director) but arbitrary turn rates too!

This holding pattern computer employs a sophisticated, patent-pending analytic solution developed by a 51-year Aerospace Industry veteran and FAA Safety Team Representative Les Glatt, Ph.D. ATP/CFI-AI, AGI/IGI. It automatically calculates ground track, wind correction angle, headings, and required timings, given the assigned fix, your true airspeed, and virtually any wind direction and wind velocity up to 99.99% of TAS. Not even aircraft GPS units and flight directors are as accurate as this app and since the outbound time is measured from the point the aircraft turns to the outbound heading, it is no longer necessary to locate the abeam point. How's that for reducing pilot workload!

This app takes a step-by-step approach when entering holding data, using individual screens for each component which makes it easier to focus on one element at a time while continuing to fly the aircraft. We've also included a built-in timer, an onboard user guide, and the seminal paper: *A Treatise on the Holding Pattern: Expelling the Myths and Misconceptions of Timing and Wind Correction*.

If you want that perfectly timed inbound leg, while rolling out precisely on to the inbound course, every time, then this app is for you!

## Important information regarding how we differ from FAA recommendations

The primary goal of this app is to provide the specific headings and timings needed to fly a holding pattern whereby the aircraft will roll out precisely onto the inbound leg and fly it for exactly for 1-minute, or other user-defined leg time or distance.

To accomplish the above goal, we differ from the FAA recommendation in two important areas involving wind correction and the start of outbound timing.

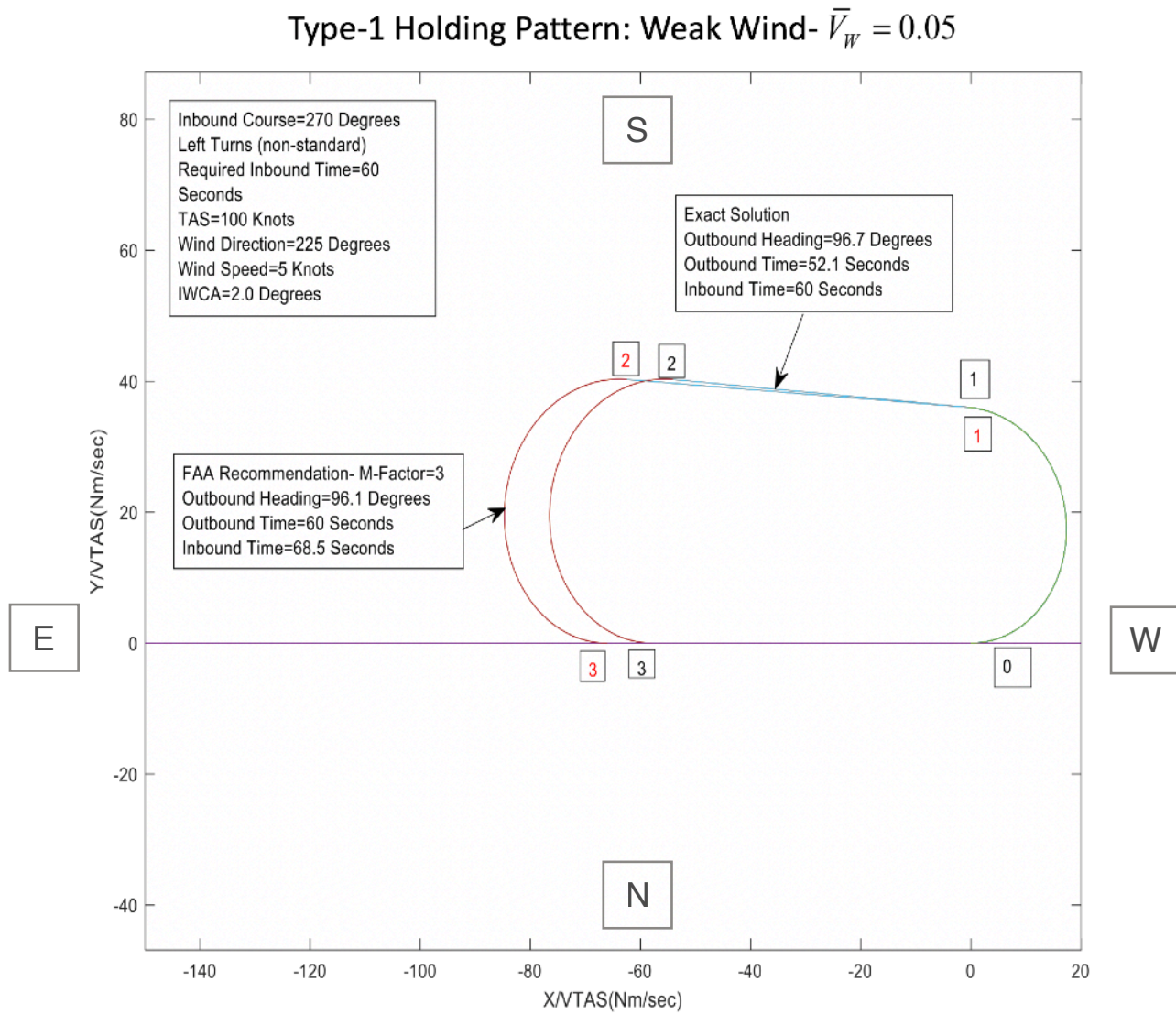
Regarding wind correction, the FAA Aeronautical Information Manual recommends that we should compensate for wind effect by drift correction on the inbound and outbound legs. They say, when outbound, we should triple the inbound drift correction to avoid major turning adjustments; e.g., if correcting left by 8 degrees when inbound, correct right by 24 degrees when outbound. **This app differs in that we do not use rule-of-thumb estimates, instead, we use an exact analytic solution to determine wind correction angles.**

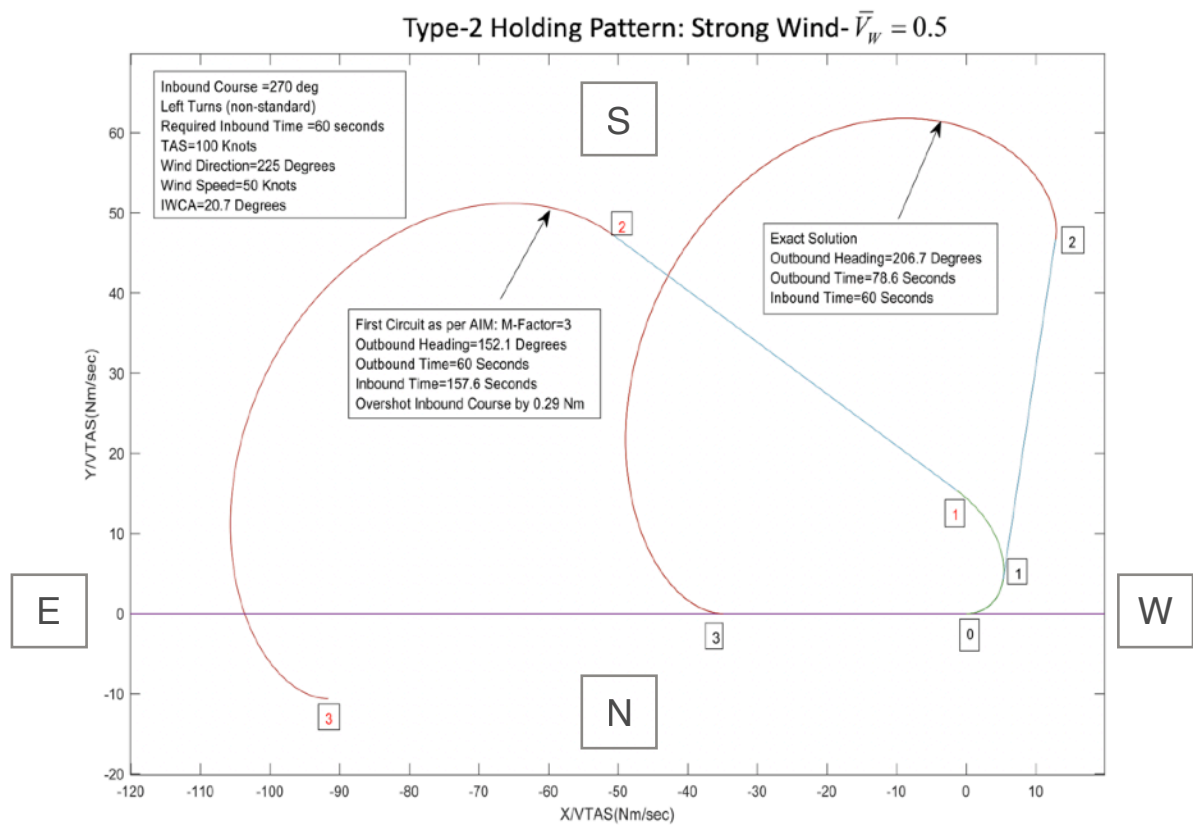
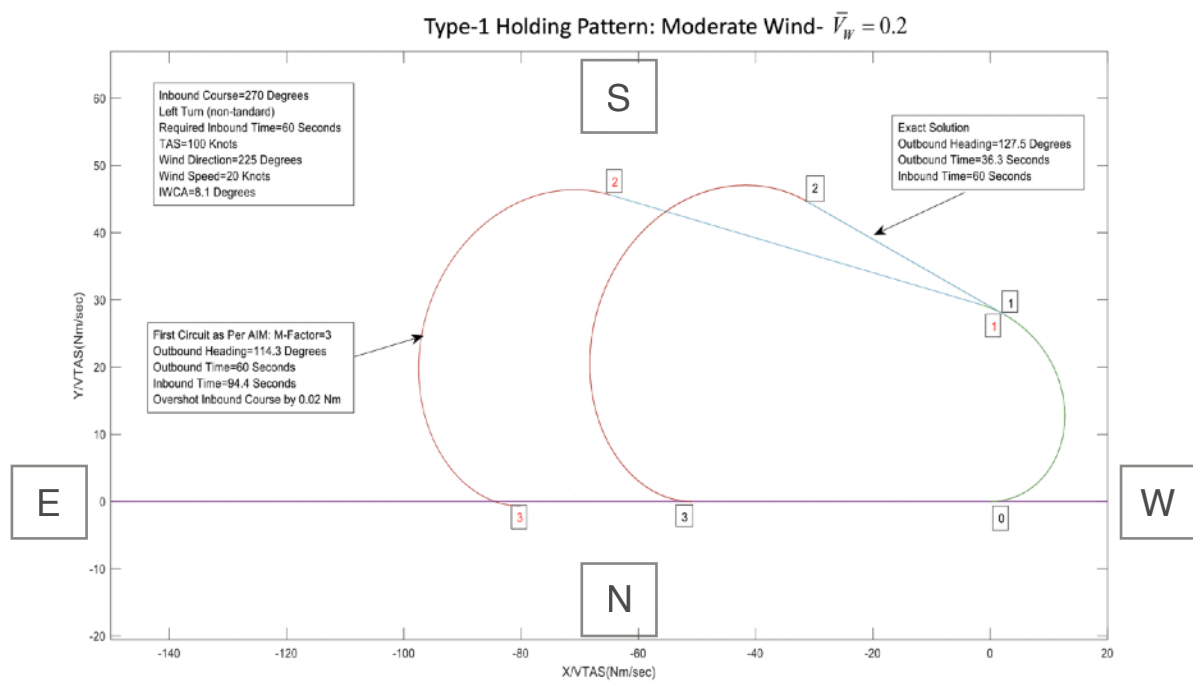
Regarding outbound timing, the Aeronautical Information Manual says outbound leg timing begins over/ abeam the fix, whichever occurs later. If the abeam position cannot be determined, start timing when the turn to the outbound leg is completed. ICAO says the outbound timing begins over or abeam the fix, whichever occurs later. If the abeam position cannot be determined, start timing when the turn to outbound is completed. **This app measures outbound time starting at the point where the aircraft turns to the outbound heading, making it no longer necessary to locate the abeam point.**

For a detailed analysis that explains why our method is better, review the included paper titled: *A Treatise on the Holding Pattern: Expelling the Myths and Misconceptions of Timing and Wind Correction*, by Les Glatt. PhD ATP/CFI-AI, AGI/IG.

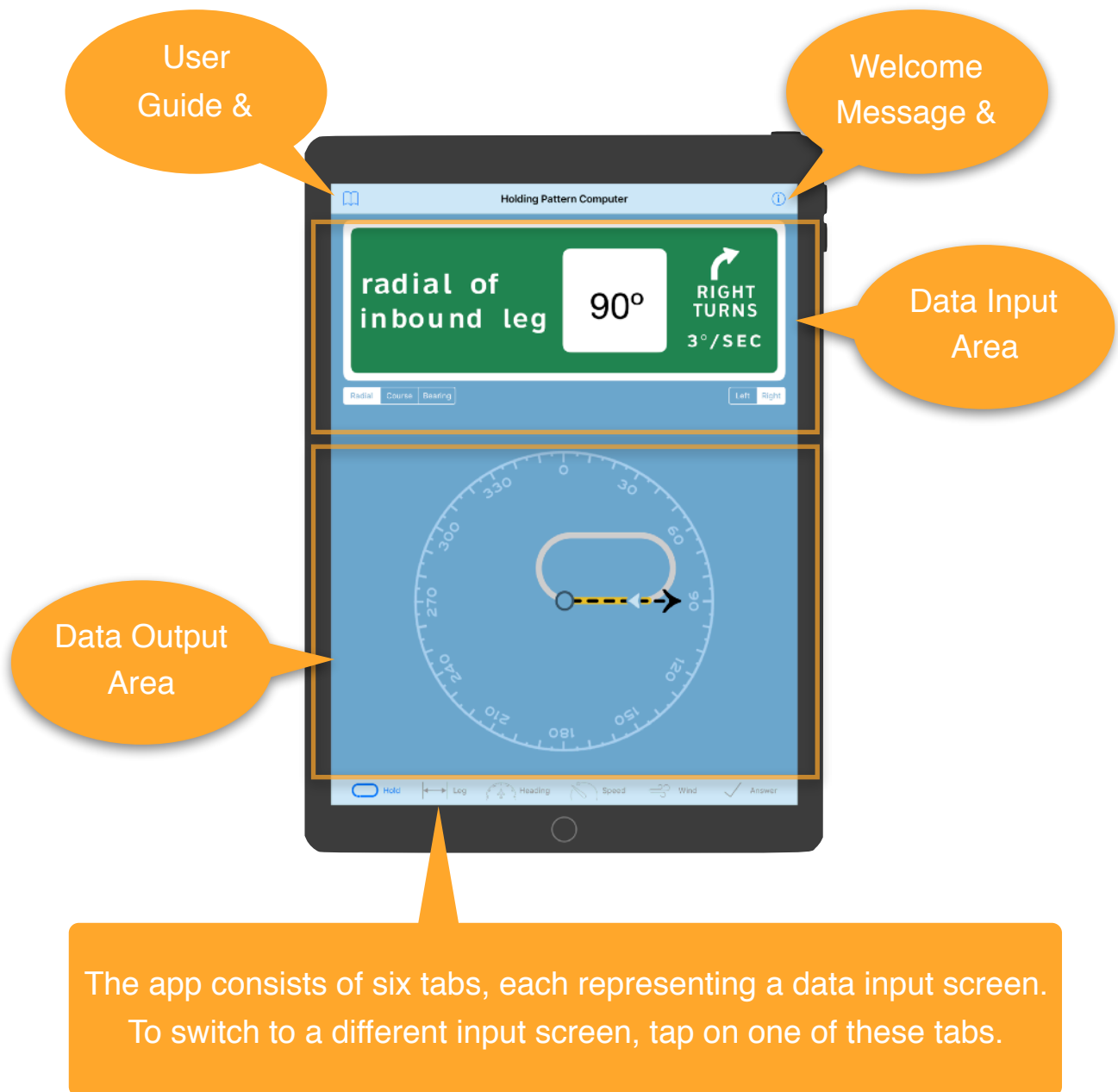
The paper is also available at <http://www.BetterHolds.com>

The following figures show your track when using the FAA recommendations and the track when you use the exact solution produced by this app. Marker **0** is the position of the fix, **1** is the start of the outbound leg, **2** is the starting point of the turn to the inbound leg, and **3** is the position at the conclusion of the turn to the inbound leg. As you can see, the stronger the winds, the larger the error in the first circuit when following FAA recommendations. The number of circuits the pilot requires to converge depends on the estimate of the first circuit flown. **With our solution the aircraft rolls out precisely onto the inbound leg exactly 1-minute from the fix, avoiding the trial and error method as suggested by FAA recommendations.**





## Screen Layout



In the pages that follow we will review each screen and explain what the calculator is expecting for input.

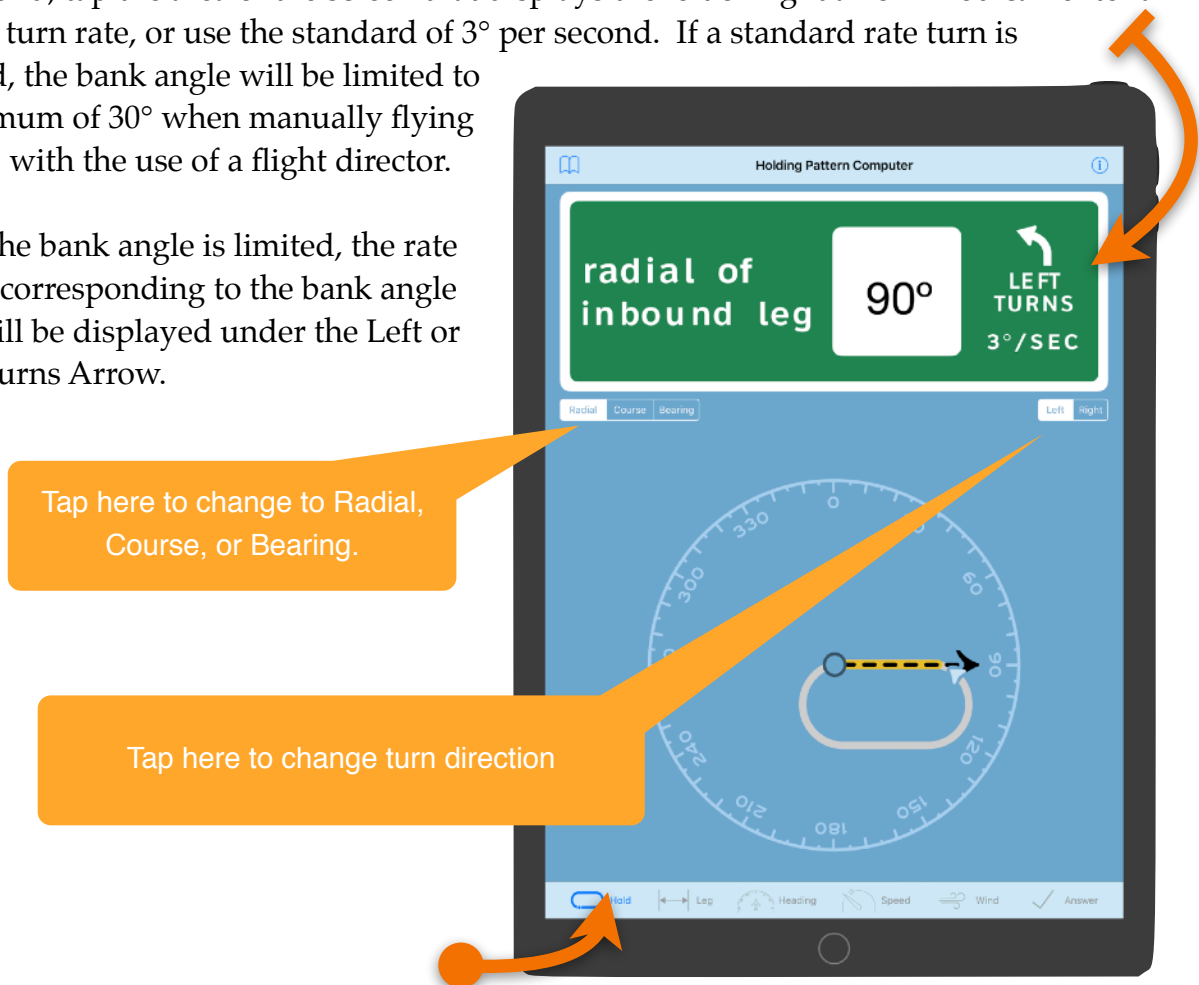
## Hold Tab

The hold screen allows you to set the inbound radial, course or bearing to the fix and to set if the turns in the holding pattern are standard right-hand turns or non-standard left-hand turns.

Entering information is easy. To enter the heading of the inbound leg, tap one of the buttons titled Radial, Course, or Bearing. Then, tap on the white box at the top of the screen displaying the degree value to display an on-screen numeric keyboard, or you can rotate the dial in the middle of the screen using your finger. Next, set the turn direction by tapping one of the buttons titled Left or Right.

If you are using a flight director, or if you wish to use a turn rate other than the standard 3° per second, tap the area of the screen that displays the left or right arrow. You can enter a custom turn rate, or use the standard of 3° per second. If a standard rate turn is selected, the bank angle will be limited to a maximum of 30° when manually flying and 25° with the use of a flight director.

When the bank angle is limited, the rate of turn corresponding to the bank angle limit will be displayed under the Left or Right Turns Arrow.



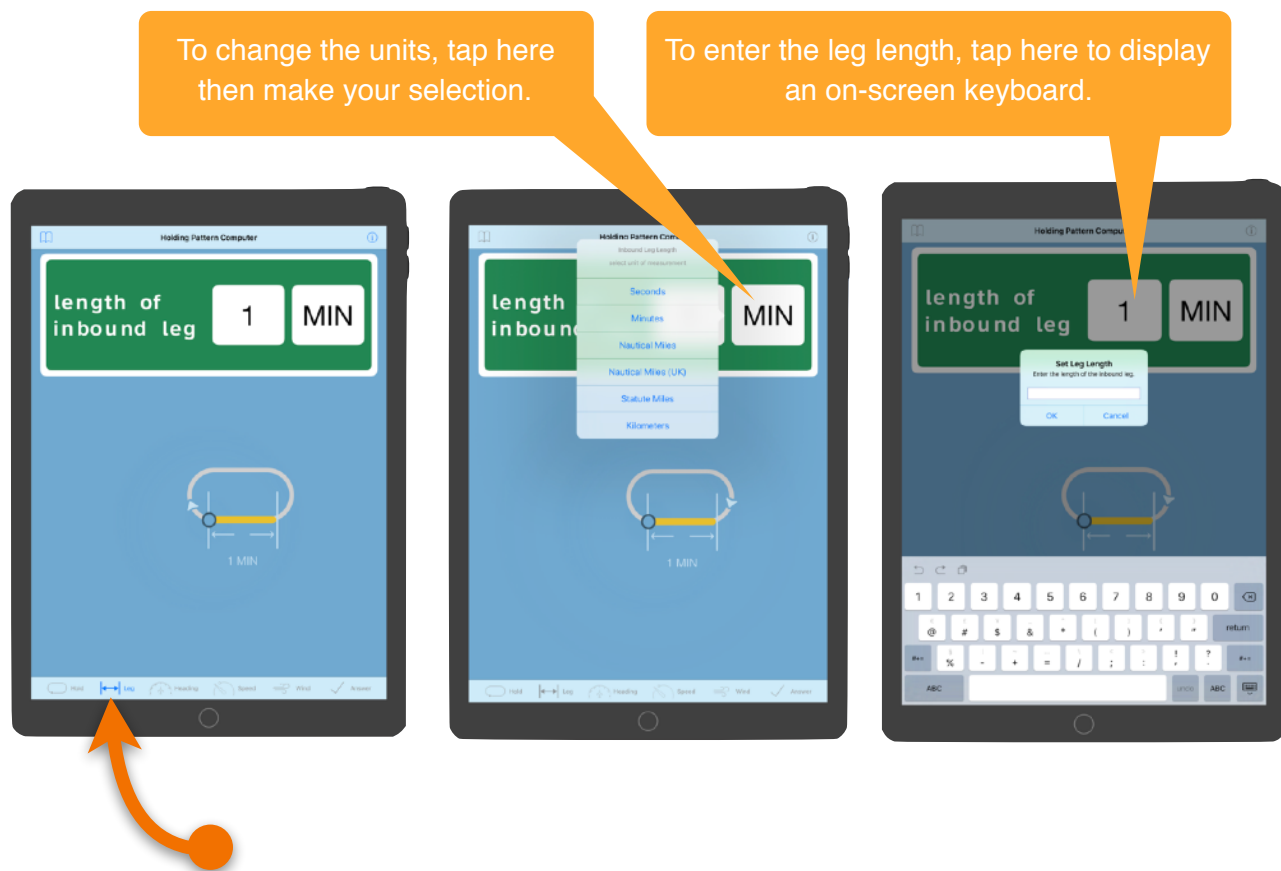
## ↔ Leg Tab

This screen is where you define the length of the inbound leg.

Many holding patterns define the length of an inbound leg in terms of time, such as 1 or 1.5 minutes depending on altitude, but some holds define the leg in terms of distance, such as six nautical miles.

This holding pattern computer supports inbound leg lengths expressed in either time or distance using any of the following units:

- Seconds
- Minutes
- Nautical Miles
- Nautical Miles (UK)
- Statute Miles
- Kilometers

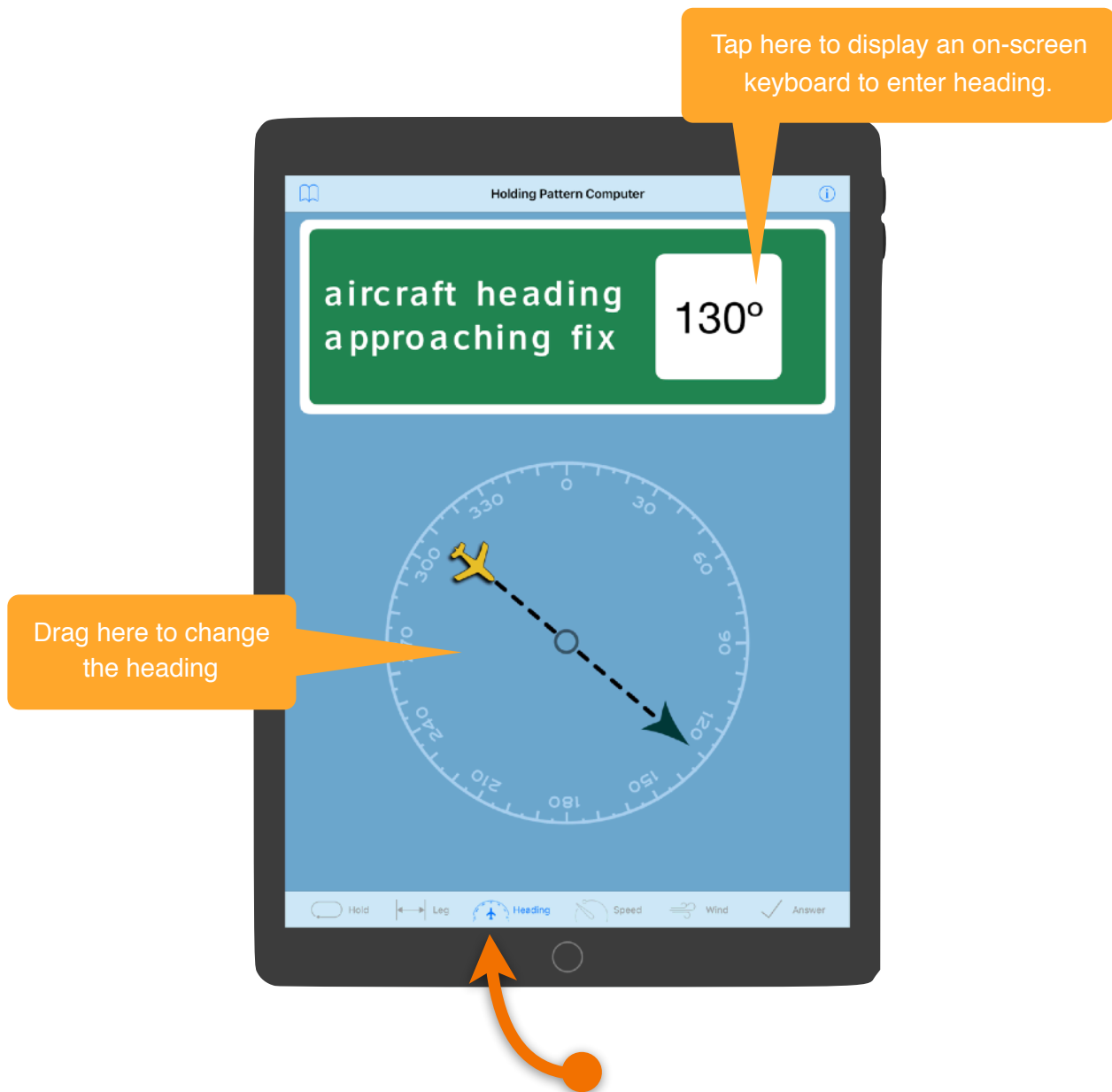




## Heading Tab

This screen allows you to set the heading of your aircraft approaching the fix. The computer will use this value to determine the recommended Entry Procedure for the hold and to guide your turns further.

You can change the value displayed in the heading field by tapping it to display an on-screen keyboard. You can also change the heading value by rotating the heading dial using your finger.



Use this screen to enter the aircraft true airspeed.

Along with wind data, the computer uses your true airspeed to determine your ground speed, wind correction angles, and the perfect length and heading of the outbound leg.

You can enter speed expressed in any of the following units:

- Knots
- Knots (UK)
- Miles per hour
- Kilometers per hour
- Meters per second

To change the units, tap here then make your selection.

To enter TAS, tap here to display an on-screen keyboard.



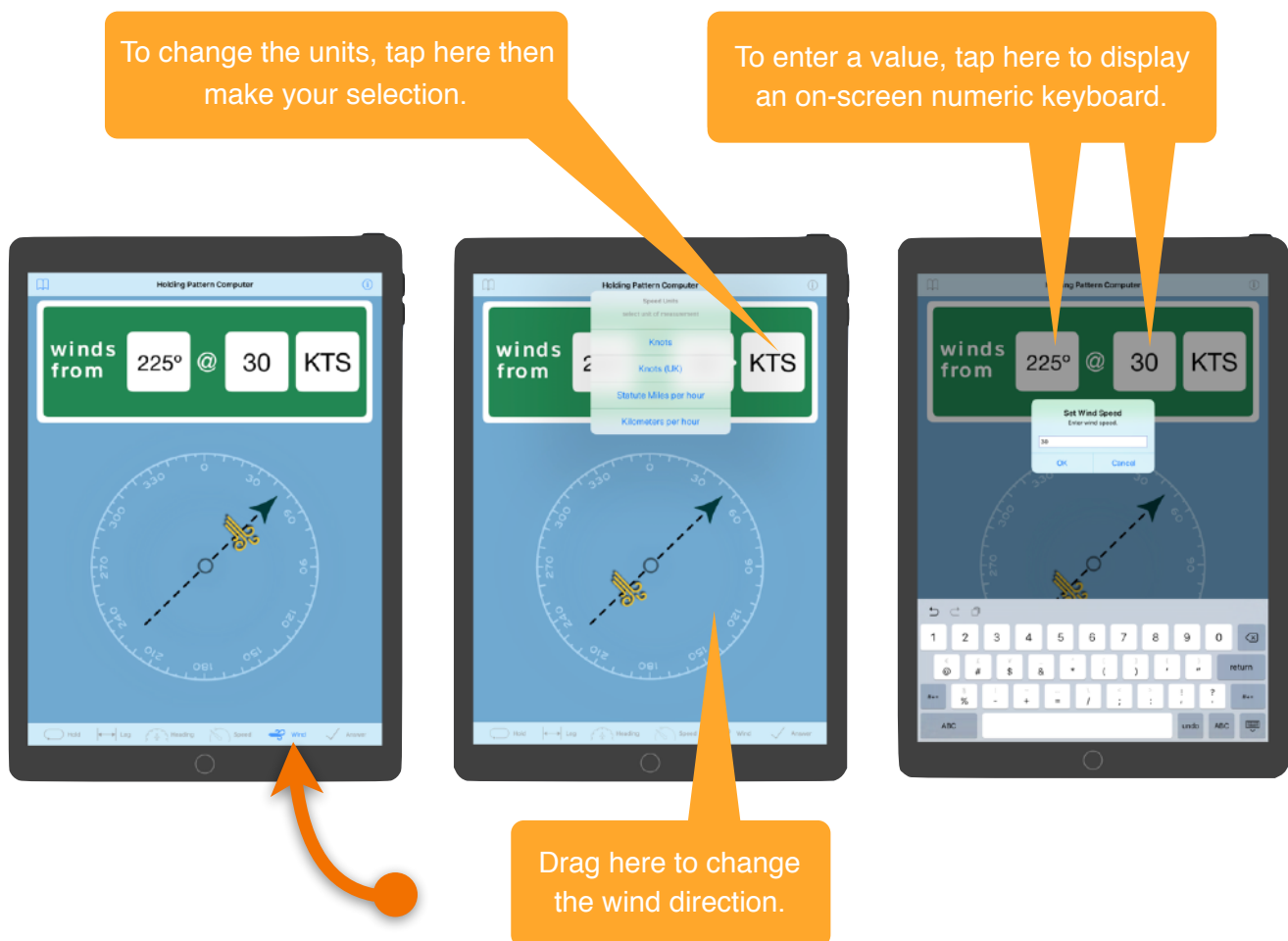
## Wind Tab

With our wind correction calculation, you can fly an outbound leg that will enable you to intercept the inbound leg with a neat standard-rate turn, or custom rate - every time!

Use this screen to enter the direction and speed of the wind. You can rotate the dial to change the wind direction, or tap the value to display an on-screen keyboard.

Wind speeds can be expressed in the following units:

- Knots
- Knots (UK)
- Statute miles per hour
- Kilometers per hour

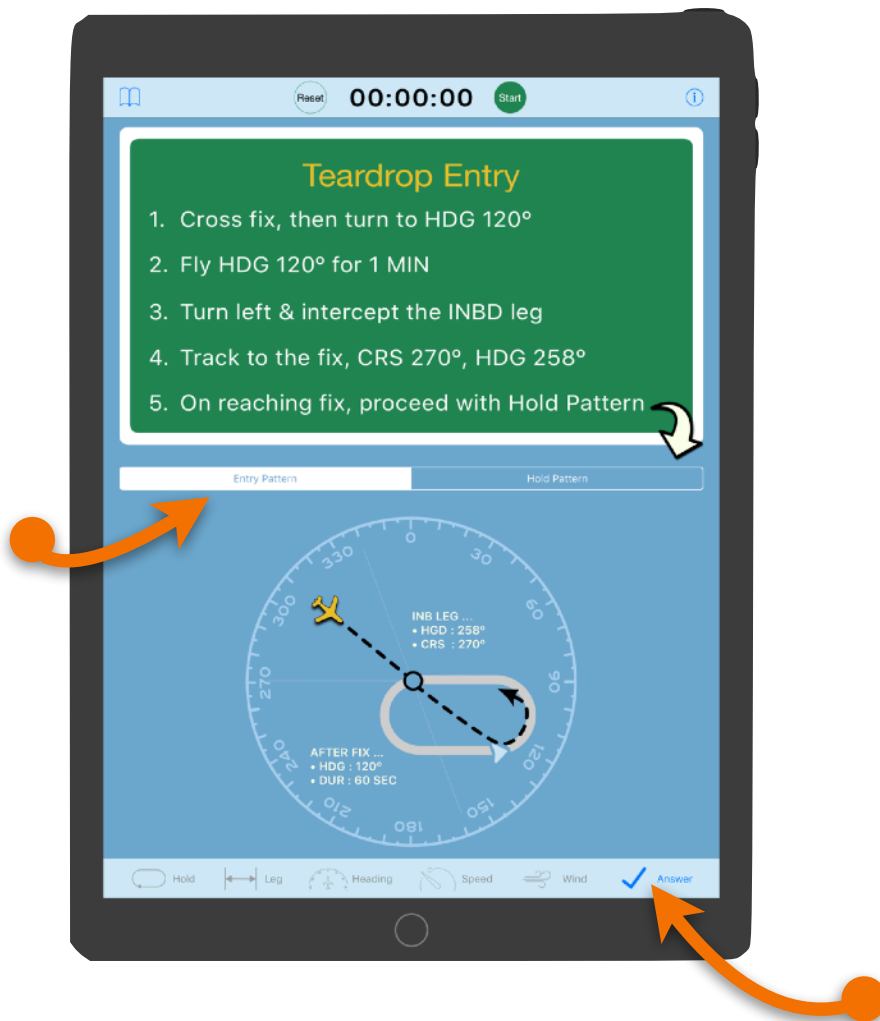


## ✓ Answer Tab - (Entry Pattern)

The "Entry Pattern" sub-tab on the answer screen graphically depicts the recommended Entry Procedure and lists the steps necessary to fly it.

Direct, Parallel or Teardrop, the appropriate Entry Procedure is selected based on where the tail of the aircraft is located when it passes over the holding fix.

Additionally, the computer calculates which way to turn, left or right, which course and heading to maintain, and how long to fly a heading before initiating a turn.



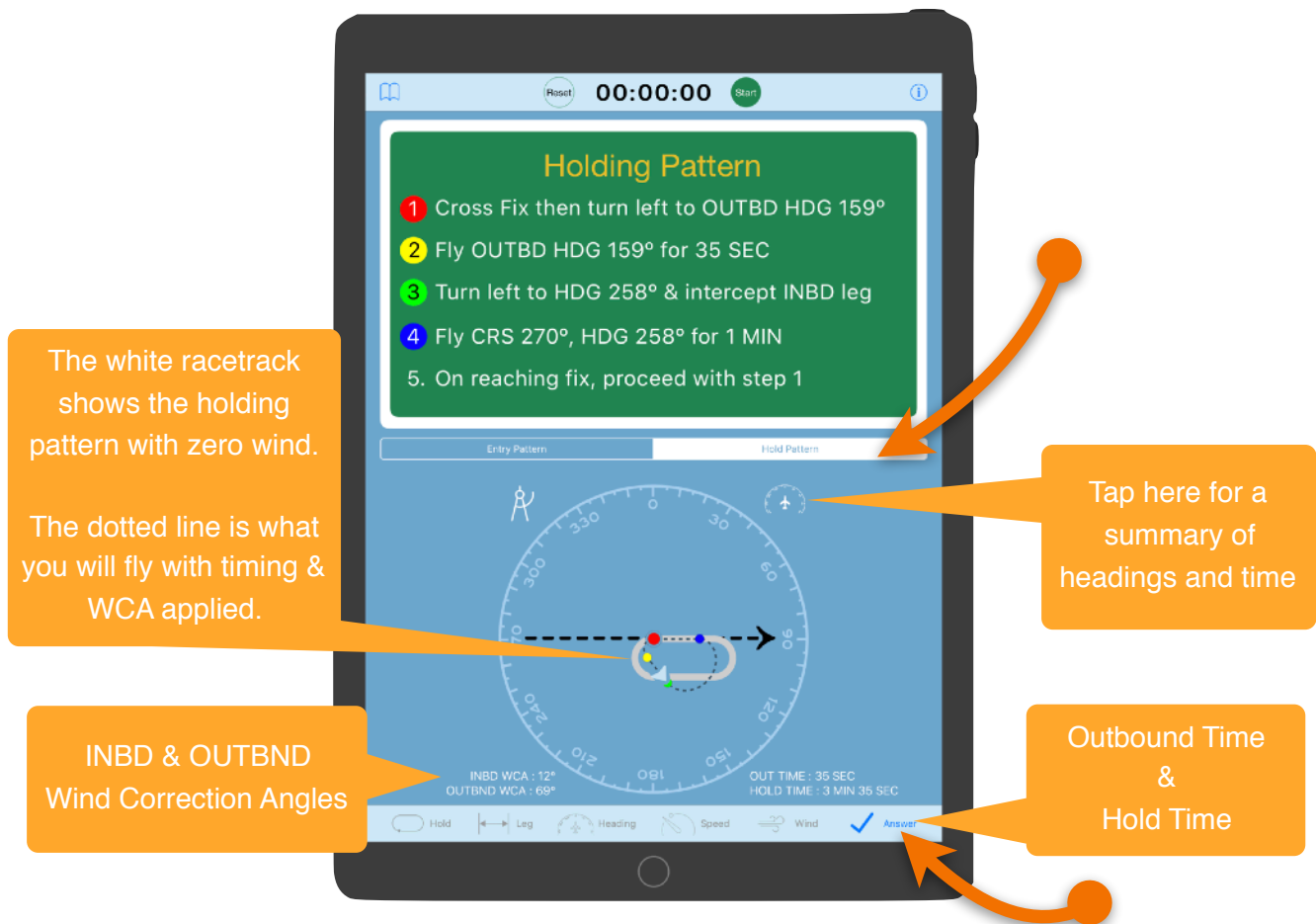


## Answer Tab - (Hold Pattern)

The "Hold Pattern" tab on the answer screen graphically depicts the calculated Holding Procedure and lists the steps necessary to fly it.

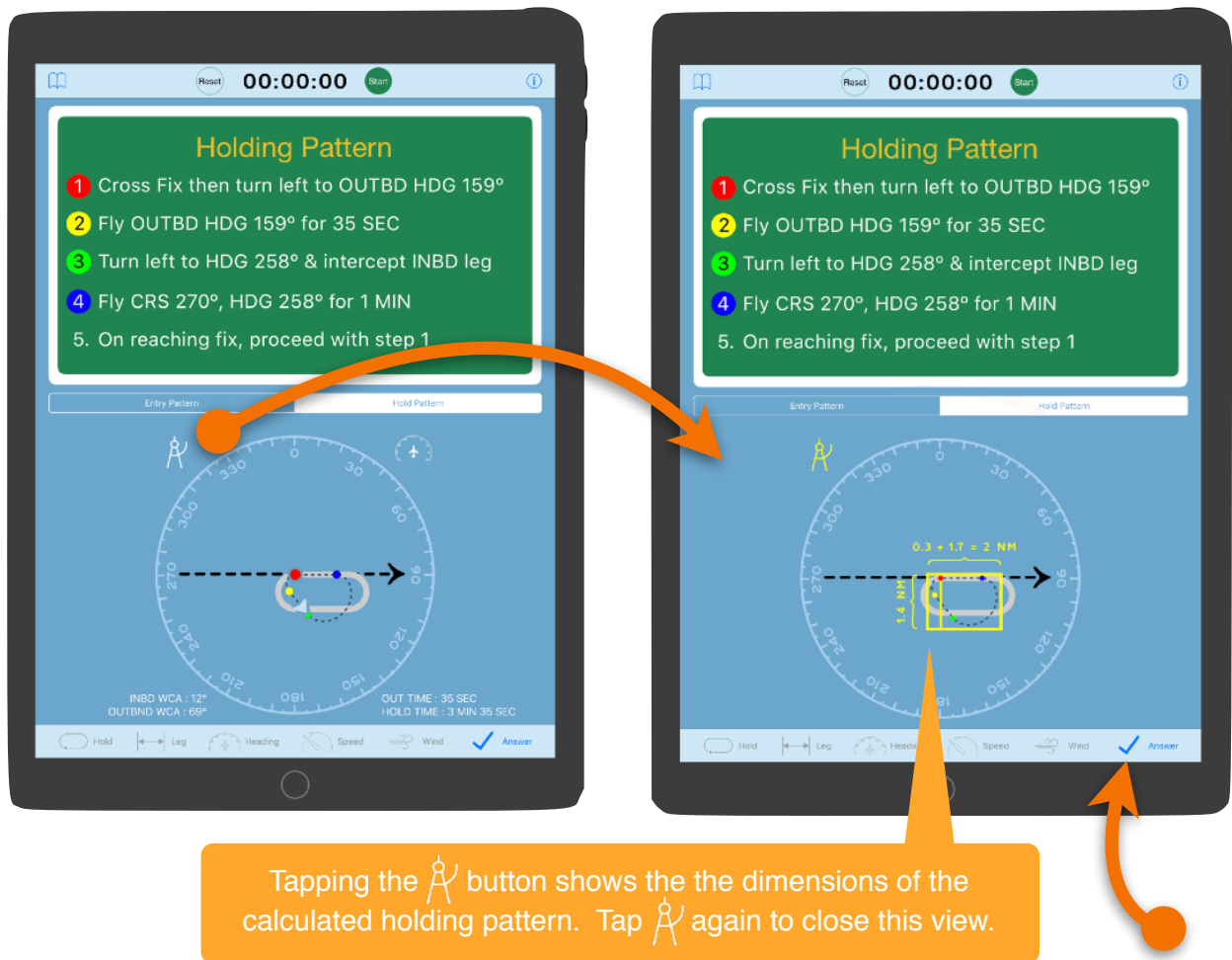
The holding pattern computer calculates which way to turn, left or right, which course and heading to maintain, and how long to fly a heading before initiating a turn.

The shape of the holding pattern depicted on this screen is derived from a completely analytic solution, rather than rule-of-thumb formulas, and is more accurate than the recommendations found in the Airman Information Manual, especially when in the presence of strong winds. You can find a detailed explanation of the equations used within this application and why this solution is better at <http://www.BetterHolds.com>.



## Holding Pattern Dimensions

You can view the dimensions of the holding pattern by tapping the measure button. The results show Nautical Miles of the X and Y axis. The X axis includes the length of segments to the left and right of the fix.



## Timer Function

Located at the top of the screen on the answer tab, there is a convenient count-up timer. Tap the green Start button to start the timer.

While the timer is executing, the green button is replaced with a red button titled Stop. Tap the Stop button to stop the timer. If you tap the green button again, the timer will continue from the original start time. When you tap the Reset button, the timer is reset to 00:00:00.

