INSTRUCTIONS

Version 1.9 Build 4
6.9.21

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SET UP:

1) Download ergo180 from the App store.

2) Using either Wi-Fi or cellular data, open the ergo180 iPad app using the login credentials provided by Aeronautical Data Systems (ADS). This will open the iPad to a flashing menu icon (not shown) prompting the user to select this only option. Touching the menu icon will display 3 new icons, Manual Input (flashing), Exit, and Map Options (Figure 1).

Figure 1

MANUAL INPUT ICON

Touching the **Manual Input** button opens a data window (Figure 2).

Aircraft Tail Number: The tail number entered during registration will auto populate into the entry window.

Fuel Type & Consumption Type: Enter the metrics specific for your aircraft. Fuel type allows the user to select either AVGAS or JET FUEL. Consumption choices are either GALLONS (per hour) or LBS (pounds per hour).

Diversion Airport 1 & 2: These airports represent two points where you would like to display ship location information. These two points can be departure and destination airports or can be used as emergency airports during critical phases of flight such as flying over water. The four-letter ICAO airport code is required. Touching the blue index icons next to the airport entry fields will open up an airport drop down menu in alphabetical order.

Glide Ratio: This can be found in the aircraft flight manual. This ratio results in an airspeed that represents the best lift/drag profile. Flying this airspeed in a no-thrust situation will result in the greatest glide distance flown in a no wind condition. The pilot should always consider the wind when estimating an airport or off airport landing opportunity during total loss of thrust.

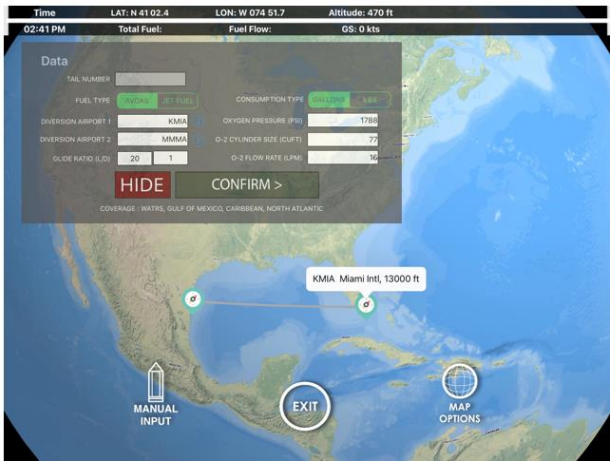
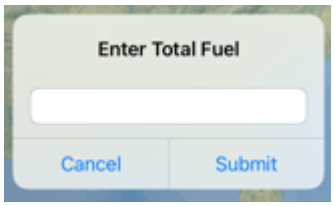


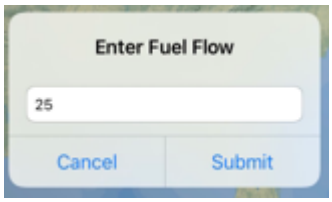
Figure 2

If an oxygen analysis is NOT required, then the user can select the “Confirm” tab to advance to the next data entry window. If an oxygen analysis is desired go to page 5 for more information.

Enter Total Fuel: Enter the planned dispatch fuel on board and select submit.



Enter Fuel flow: This is the total planned fuel flow used in cruise flight. If it is a multiengine aircraft remember to total the fuel flow for all engines. Select submit.



Speed/Wind Entry: This opens a data entry window to enter either TAS or a groundspeed. On the ground and during the preflight planning phase, this window will accept manual wind entries. One is a manual entry of TAS + a wind additive which results in ground speed. The other is to enter a planned ground speed, which does not require a wind additive since it is already calculated. Wind Direction/Speed is only required if you enter TAS. If Ground Speed is entered it already calculates the wind additive and can be left at zero. Manual wind entries can be made anytime, but using the iPad GPS is preferred airborne since ergo180 will update the calculations automatically.

The wind data entry box appears after the fuel flow submit button is selected. The first row of data defaults to Ground Speed and the ON/OFF **USE GPS** button is green (ON). Placing the cursor inside that data entry box will automatically change the label to TAS. It will automatically deselect the **USE GPS** button to off (white) or to the manual mode and a warning symbol in the form of a yellow triangle with an exclamation mark located in the top right corner of the ergo180 app will appear. Anytime that yellow icon is visible, it means the speed is NOT generated automatically from the iPad GPS and may require manual wind entry updates. Once a speed is entered this will generate distance range rings for fuel, oxygen and glide solutions.

Any time after the initial data entry sequence, the speed/wind entry page can be opened by touching the TAS or GS in the black data banner at the top of the app page.

COURSE: The course is the magnetic heading of the iPad and the purple aircraft icon. The course is also displayed as the direction the aircraft icon is pointing towards.

When finished select Confirm. This will display the predicted range rings that have been selected (made active) under the “Map Options” icon. (Figure 3) At the top of the map is a black data banner that displays tabulated data entered manually or automatically uploaded. Each value

Figure 3

may be manually updated (with the exception of time) by touching any of the data fields which will open data entry boxes.

Ground Operations: The above description is to be used for preplanning, preflight situational awareness and to be able to visually see the effects these variables can have on your flight. Fuel distance of course is more obvious since it is the focus of every flight but oxygen and glide distances are not often calculated.

Inflight Operations: Once airborne, ergo180 will begin to automatically calculate the fuel being used and adjust the fuel distance range ring. The Glide distance range ring will vary with altitude only and the oxygen range ring must be updated manually. Remember a best glide speed from the aircraft manufacturer should be observed/used during a total loss of power situation. Ergo180 is set to begin calculating fuel remaining after the iPad GPS senses an altitude greater than 500 feet above airport elevation. At this time the total fuel on the overhead data banner will begin to reduce as will the fuel distance range ring. This can be observed on the ground if the user changes the altitude of the field elevation plus 500 feet or greater. This will start ergo180 fuel calculations to begin to countdown.

MAP OPTIONS

Selecting Map Options displays **Overlay** selections, **Supplemental Data** and a **Legend**. (Figure 4)

Overlays: This function provides on/off toggle button for a variety of overlays. (Green is on and white is off.)

- **Fuel:** The fuel analysis is a range ring based on the fuel on board, the fuel flow and the ground speed entered in the manual input window earlier. The fuel range is all fuel entered and calculated to dry tanks, no fuel reserve is included. An **orange** ring will depict the fuel range around the aircraft with an optional numerical distance option.
- **Glide:** The **yellow** glide range ring is based on aircraft altitude and the glide ratio entered in the initial manual input screen. This calculation is based on the aircraft altitude, glide ratio, and the best glide speed for that aircraft found in the flight manual. There is no requirement to enter airspeed since the glide ratio is

Figure 4

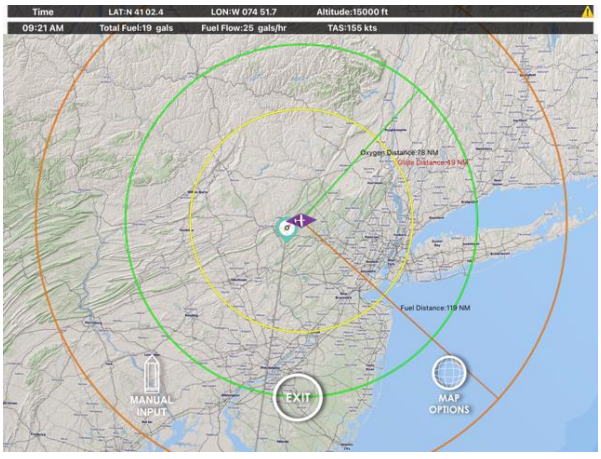
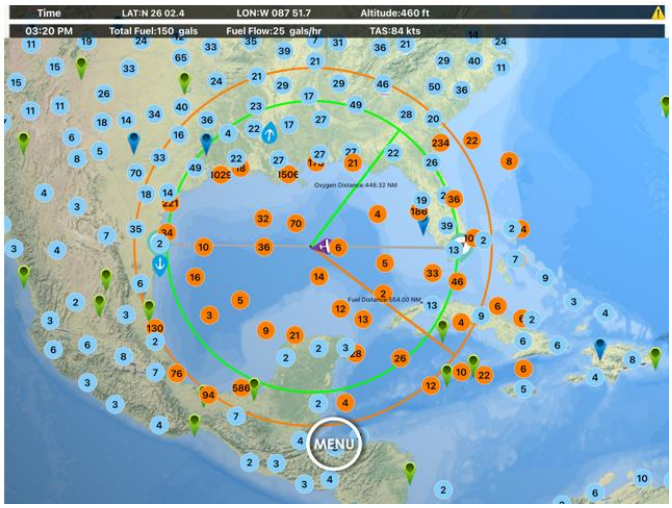


Figure 5

dependent on the speed and should be known by the pilot. The range ring calculated by ergo 180 will provide a visual reference the pilot can use to determine best emergency landing options within the aircraft's glide range. A numerical distance will also be displayed. Should the pilot not fly the best glide speed suggested by the aircraft manufacturer, the glide ring analysis will be in error.

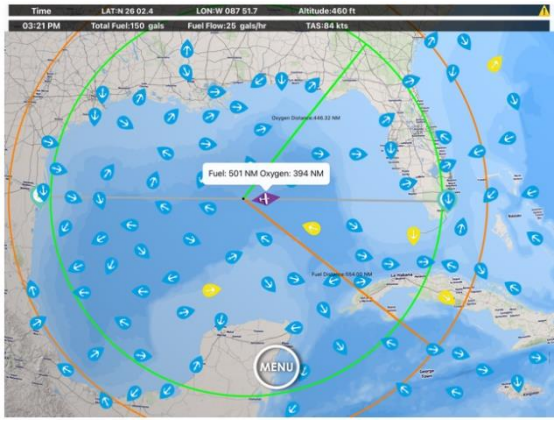
- **Oxygen:** The oxygen On/Off button will only display if data for the oxygen system was entered in the manual input window. The oxygen bottle size is entered in cubic feet and is stamped on the oxygen cylinder. If unsure, refer to the aircraft documentation or call the oxygen cylinder manufacturer to determine the correct cylinder size. Oxygen flow rates must be entered correctly as total liters per minute. This means each flow rate for each aircraft occupant/mask must be known and totaled prior to takeoff. This should be done as part of preflight/ preplanning. The last required entry is the cylinder pressure or PSI. As per regulations, the pilot must have a means to determine this on the flight deck. If there is more than one oxygen cylinder or more than one pressure gauge, then contact ADS tech support (973-223-7648) for more information prior to departure.
- The **green** oxygen range ring converts PSI into distance that can be flown without calculating unusable oxygen. As with the fuel, unusable oxygen is not calculated and should be known and considered by the pilot.
- **Distance Info**: If selected, this will display tabulated nautical miles for the fuel, glide and oxygen calculations.
- **Clusters:** This function can be a valuable tool for map readability for both Vessels and Airports. Selecting **clusters** in high density areas will condense multiple ships and airports under one colored tab. Ships are condensed under an orange icon while airports use a blue icon. The number inside that orange/blue icon represents the number of ships/airports packed under that symbol. That number will change as you zoom in and out. As you zoom in, these icons will begin to unpack and the number inside the icon will decrease. The reverse happens when you zoom out.



- **Airports:** The airports tab is simply an on/off button to display an information layer of airports contained in the ergo 180 database. The Airport tab display contains three different colored icons. Each color represents the longest runway listed at that airport. Red icons represent the longest runway at that airport is less than 3000 feet. Blue

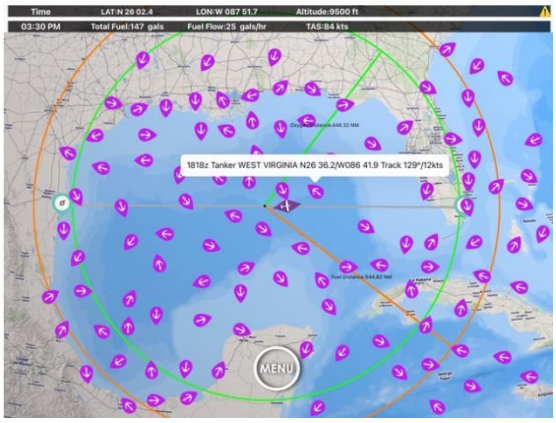
airport icons mean the longest runway at that airport is between 3000 feet and 6000 feet long. Green airport icons have a least one runway greater than 6000 feet in length. This is to help the pilot when making a quick decision during emergency situations.

- **Ships:** This on/off button can display an information layer of ships contained in the ergo 180 database. Touching a vessel/ship icon will open an information banner specific to that ship. The information banner includes the following:



  - The last UTC time the ship reported its position. There is no structured time a ship will report (for instance on the hour or once every 6 hours). Ships can report anytime. Knowing the last time the ship reported is important, especially if the pilot is intending to use this ship as a point of rescue.
  - If a ship has not updated its position in 10 hours and the ship is traveling 10kts/hour, it is conceivably 100 miles from the position displayed. Conversely, a ship that updated one hour ago is only 10 miles from the displayed position. The good news is most deep-water vessels travel in a relatively stable heading.

- This brings us to the other Ship mode selection: **Predicted**. The predicted mode will display the ships as purple or magenta in color. The predicted mode uses the last reported ship position, track and velocity (reported further along in the ship information banner) and calculates a new Latitude/Longitude, a new distance from the aircraft to the ship and also displays the ship icon with a new predicted (calculated) map position. This is an important feature since the aircraft icon is moving in real time and this updated position will provide a more accurate ship display. Knowing how and when to use the predicted mode is a very important feature during an emergency situation.



- The next sequential data in the ship banner is the **type of ship** (tanker, cargo, military, cruise, pleasure, etc.). These can be important to know when selecting a ship to use for a water landing/rescue operation as each type will have its own set of

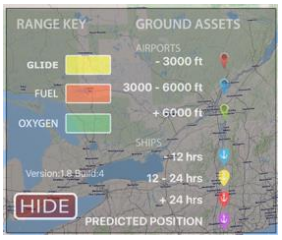
advantages/disadvantages. Knowing what they are will improve your chances of a successful rescue. For example, if you have many passengers on board, choosing a larger ship to land by could be more helpful than choosing a smaller vessel.

- Next is the **ship name**. Use this to communicate using a handheld marine band radio to broadcast over the maritime emergency channel 16.
- Next is the **ship position** in Latitude and Longitude. If the ship icons are blue, the ship position is being updated by the internet. If the Ship icons are purple/magenta the ship position is predicted as explained earlier in this document.
- The next block of information is the **ship's last reported course and velocity** which is used to predict the ships position.
- The last data is the **distance from the aircraft to the ship**. It is extremely important to understand that ship position is first dependent on when it was last transmitted to the satellite. Just because you have internet access does not mean ergo 180 is displaying the latest ship position. Ship position (AIS Data) is totally dependent on the ship transmitting that information. Compare the current UTC time with the ship position time displayed in the ship banner. If the time difference is greater than a few hours, consider using the predicted mode (purple ships) to update the ship position since it will update the ship position on the map display as well as the Latitude/Longitude and distance. If your aircraft is not internet equipped, ergo 180 will be using the predicted mode at all times. Selecting a ship with the smallest difference between current UTC and updated ship position is always preferable if there is a choice.

SUPPLEMENTAL DATA

This section indicates which regions are available to display ship location. Only one region at a time can be selected and each region overlaps into other regions for display continuity. In this example, the user has subscribed to four ship regions, but only one region can be displayed at a time.

LEGEND



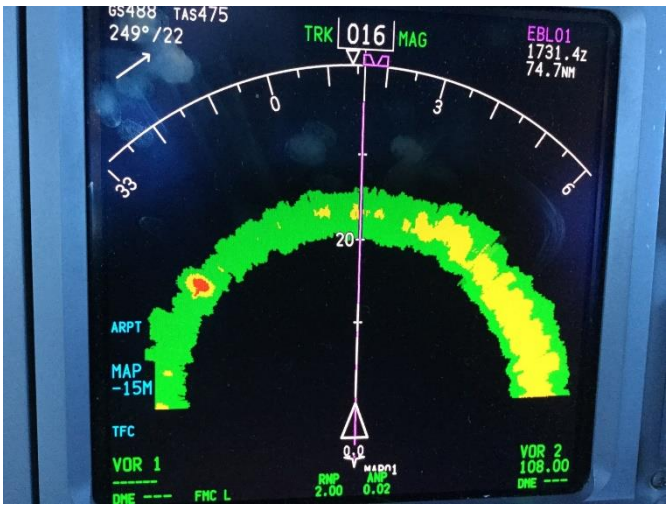
This color key depicts the colors used for range rings, ground assets (airport icons) and ship icons. Selecting the HIDE box will close these display windows.

EXIT ICON

Selecting the EXIT icon will hide the 3 icons into the MENU icon. Pressing the MENU icon will display MANUAL INPUT and MAP OPTIONS icons again.

OPERATIONAL CONSIDERATIONS

WEATHER RADAR

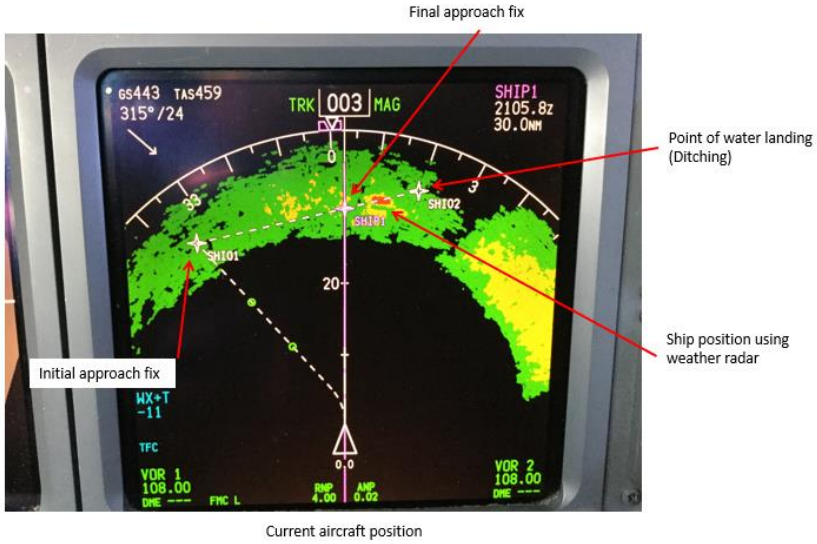


Understanding and using AIS data is relatively new to the aviation industry and it will take some time to implement and realize all the benefits this technology provides. Currently using AIS data is similar to using weather data in that the information received prior to departure is planned information. Live streaming of AIS information is not practicable, nor currently available. Once airborne, technology is available for real time feedback using weather radar. Most weather radars can be used to paint ships on the open water. This is a learned technique and can be quite useful in confirming the AIS information is accurate. Developing this procedure to validate ship position can help in maneuvering the aircraft in an optimal position to plan for the shortest exposure time in the water thus increasing the survivability of a water landing.

It significantly expands the ditching envelope from day VFR to ditching at night or in low visibility or low ceiling conditions without ever having to visually acquire the ship. Ergo 180 can help reduce time of rescue and pilot task saturation while at the same time increasing situational awareness and survivability.

As a matter of fact, some radar manufacturers are beginning to provide ship displays as an added option.

Instrument Approach to a Ditching



UNDERSTANDNG AIRCRAFT/APP CONNECTIVITY

Understanding what visual display has been created on the iPad screen is essential to making the best decision during an emergency. If the visual iPad display does not correctly characterize the actual situation then this tool is useless and should not be used in the decision-making process.

Knowing how each app is designed to work and knowing the limitations are very important especially if the application is designed to be used under aircraft emergency conditions. The internet is a great example. The internet can provide seamless updates using a variety of data sources to provide app continuity. Its only when the internet is not available quite often in an emergency that the user becomes aware or notices these limitations.

The aircraft design and architecture can also affect the iPad GPS reception inside the cockpit and this should be thoroughly tested and vetted when using any app. Window size, window material, iPad location mounts, are a few examples that will affect iPad GPS connectivity and can vary from aircraft type to aircraft type. Knowing how often the iPad GPS signal is lost will determine if using an external GPS is necessary. Also know how to use the external GPS in conjunction with ergo 180 and the capabilities of the external GPS are equally important.

Should the external GPS fail what resources for that application are still available? Does the app have any stand-alone capabilities? Most importantly is the display I am looking at valid, or just a source of confusion? This should be known prior to flight.

HANDHELD RADIO TRANSMISSIONS

Similar to knowing the capabilities of the iPad the same should be known as to the capabilities of using a handheld marine band radio in flight for emergency transmissions. Aircraft architecture, radio antenna design and operation can all affect voice and data transmission distances. These factors could determine which ship is optimal for a water landing. Knowing how far you can transmit from the cockpit at high altitudes again may vary from aircraft to aircraft and should be determined and incorporated into a ditching SMS protocol/procedure.

HIGH ALTITUDE VISUAL ACQUISITION

Another technique that should be practiced as part of emergency training is visually acquiring a vessel at high altitude. Trying to locate a ship in open water at high altitude can be challenging even in good visibility. Using other assets in the aircraft such as ergo 180 (AIS) data display along with the aircraft FMS map and weather radar can be helpful but there are additional methods that may be employed. (For example, knowing where to look in the windscreen using altitude and ship distance.) Using the sun and time of day, shadows and looking on the water for ship wakes are but a few tools that can help pick out a ship from high altitude. This is something almost never practiced but once you have engaged in this process it will significantly improve your ship finding skills.