



INSTRUCTIONS

Version 6.3 Build 11
5.27.21

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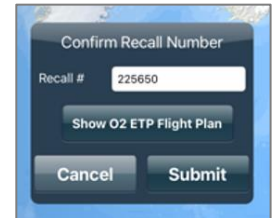
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SET UP:

Automatic Data Upload

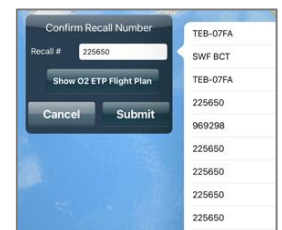
- 1) Ensure Wi-Fi or cellular data access and download ERGO 360 from the App store.
- 2) Upload the flight plan (PDF file) from the flight plan provider to the ADS website: www.adsopp.com
- 3) Open the app on a GPS-enabled iPad and log in using the credentials provided by Aeronautical Data Systems (ADS). This will open the **Confirm Recall Number** window.



Confirm Recall Number:

This window is designed to reduce pilot workload, data entry errors and improve the user overall operating experience by automatically retrieving data from a flight plan and automatically inserting it into the ERGO 360 app. The app will source this information from the PDF flight plan previously uploaded to the ADS website.

The last flight plan recall number loaded on the ADS website should match the recall number in use for that flight. If the recall number does not match, tap on the white recall number box to open a drop-down menu with other flight plan recall numbers to choose from. If the correct number is not found inside this dropdown menu, reload the flight plan on the ADS website and repeat this step.



Once the recall number is confirmed, two options are available:

- 1) Select **Submit** to proceed to the next step, OR
- 2) Select **Show O2 ETP Flight Plan**

Option 2 will display the oxygen requirements as shown here:

OXYGEN REQUIREMENTS FOR ETP 3

ETP DIVERSION AIRPORTS: **CYGX** / **EIDW** DEPRESSURIZATION ALTITUDE: 10000

REGULATORY O-2 USED TO ETP: 180 PSI ESTIMATE O-2 REMAINING ETP: 1670 PSI

REGULATORY O-2 USED TO DESTINATION: 278 PSI ESTIMATE O-2 REMAINING DESTINATION: 1572 PSI

ACTUAL ON BOARD OXYGEN: 1850 PSI MINIMUM REQUIRED OXYGEN: 892 PSI

FUEL & OXYGEN CALCULATION WORKSHEET DEPRESSURIZATION AT ETP					FUEL CALCULATION WORKSHEET ENGINE INCORPORATIVE AT ETP					FUEL CALCULATION WORKSHEET HIGH ALTITUDE FLIGHT AT ETP				
10000 FEET					FL 280					FL 450				
TIME	FUEL (LBS)		OXYGEN		TIME	FUEL (LBS)				TIME	FUEL (LBS)			
PLANNED	ACTUAL	%	STEP	PSI	PLANNED	ACTUAL				PLANNED	ACTUAL			
03:35	14880		90	6266	1670					03:35				
3:20	14127		87	6057	1614					3:20				
3:05	13374		84	5848	1558					3:05				
2:50	12621		81	5639	1502					2:50				
2:35	11868		78	5430	1446					2:35				
2:20	11115		75	5221	1390					2:20				
2:05	10362		72	5012	1334					2:05				
1:50	9609		69	4804	1278					1:50				
1:35	8856		66	4595	1222					1:35				
1:20	8103		63	4386	1166					1:20				
1:05	7350		60	4177	1110					1:05				
0:50	6597		57	3968	1054					0:50				
0:35	5844		54	3759	998					0:35				
0:20	5091		51	3551	942					0:20				
0:05	4338		48	3342	886					0:05				
0:00	3585		45	3133	830					0:00				

After reviewing the flight plan, return to the **Confirm Recall Number screen** by touching the iPad HOME button and then selecting the ERGO 360 icon on the desktop.

Back at the Confirm Recall Number screen, simply verify the recall number and select **Submit**. A **Confirm Data** window will appear. After confirming the flight plan data, click **Submit**.

Figure 1: O2 ETP Flight Plan

Visual Flight Plan Verification

The next step is Visual Flight Plan verification. ERGO 360 converts fuel and oxygen quantities into the distance that can be flown with these resources, making it easy for the pilot to confirm there are adequate quantities for the planned flight. Visually confirm that the fuel (blue) and oxygen (green) ranges extend beyond both diversion airport icons.



After confirming, select **Submit**.

The screen will display the pilot's present position (as determined by the iPad GPS) and the iPad cover (not the app) can be closed and carried onboard.

This completes the Login and Planning steps. The app is now ready to be used in real time.

Since the pilot is already logged in, to view the app in flight, merely open ERGO 360 and the fuel and oxygen ranges will be displayed around the aircraft icon.

Manual Data Input

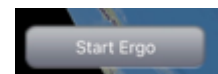
As an alternative to Automatic Data Upload, flight plan information can also be entered manually.

- 1) Ensure Wi-Fi or cellular data access and download ERGO 360 from the App store.
- 2) Open the app on a GPS-enabled iPad and log in using the credentials provided by Aeronautical Data Systems (ADS). This will open the **Confirm Recall Number** window.
- 3) Select Cancel and this window will disappear, allowing manual flight plan data entry using the MENU tabs along the bottom.

MENU:

START ERGO

Select the **Start Ergo** tab to open the data **Init Process** window.



The first line in this window is **O₂ Units**, which defaults to PSI. Touching the window will open a dropdown menu where PSI, Liters or Percentage of full can be selected. This selection will depend on how the quantity is displayed on the flight deck but remember all gaseous oxygen systems are serviced in PSI.

Next is the **aircraft registration number**. Touching inside the white data window will display all aircraft registered with that ADS user.

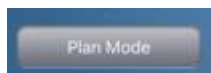
Once the aircraft registration is selected, the maximum Zero Fuel Weight (ZFW) for that aircraft will be displayed. Enter the actual ZFW for that flight from the flight plan.

Next, enter the number of flight crew members (pilots) and the number of passengers plus cabin crew.

Finally, enter the time to the furthest diversion airports from the ETP. (Planning to have enough oxygen for the longest ETP for a specific flight will ensure there is adequate oxygen for any ETP with a shorter diversion time.

Once all data fields are filled in touch *Submit*.

PLAN MODE



All data can be found in the flight plan ETP analysis. The **ETP altitude** box is the planned altitude for a depressurized flight at the ETP.

The **ETP time** can be found in the ETP analysis in your flight planning documentation. Remember this time should be the longest of all ETP diversion times calculated for this flight. Enter the digits in hours and minutes. The time colon will autofill.

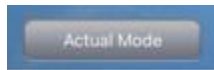
ETP fuel is the planned fuel burn from the longest ETP to the diversion airport also found in this analysis.

O₂ Quantity is the dispatch oxygen quantity planned for that flight. If the Oxygen quantity on the flight deck is read in liters then enter that value in this data box. Also remember the units must be correctly selected in the first entry in the Start Ergo tab or your oxygen calculations will be incorrect if you are using mismatched metrics.

Latitude is automatically filled in, but can be updated from the longest diversion time latitude found in the flight plan ETP analysis. The ERGO 360 app automatically assumes a great circle route between the two diversion airports and places the aircraft icon in the geographical middle of the diversion airports in the plan mode. If the route of flight is a significant distance away from the coast-out or coast-in diversion airport the pilot can more accurately position the aircraft icon by inserting the latitude found in the flight plan for those diversion airports. Since ERGO 360 does not calculate ETPs, but rather displays tabulated data from your flight planning provider, updating this latitude has no effect on the ETP calculation. The Fuel and Oxygen Range rings should always extend past the diversion airports indicating that these fuel and O₂ ranges are greater than the distance to the diversion airport.

Select **Submit** to complete manual data entry.

ACTUAL MODE



The first box under actual mode is a **copy from plan mode** button. This allows the user to copy information from the plan mode (which represents a worst-case scenario) and transfer that data into this active real time window. This reduces chances of errors in entering data multiple times. **Remember that selecting the recall number during login will automatically copy all entries electronically from the flight plan to ERGO 360.**

The **Actual Mode** is the preferred display mode normally used in flight. Any changes in the input data will update and display these changes in distance providing the pilot with increased accuracy and situational awareness.

Data can be automatically entered as well. **Aircraft Altitude** is the altitude entered in the plan mode, but is designed to be used for any altitude between 10,000-25000 feet. No valid fuel or oxygen data is provided for flight outside those parameters.

Next enter a **Wind Direction** and **Velocity**. This will display the effect on the range rings so the pilot can assess the effect ground speed will have on diversion airports and maritime assets.

Fuel Flow is automatically displayed based on the zero fuel weight entered in **Start Ergo** and the fuel remaining at the ETP (worst case) entered in the **Plan Mode**. A fuel flow and a true airspeed based on single engine

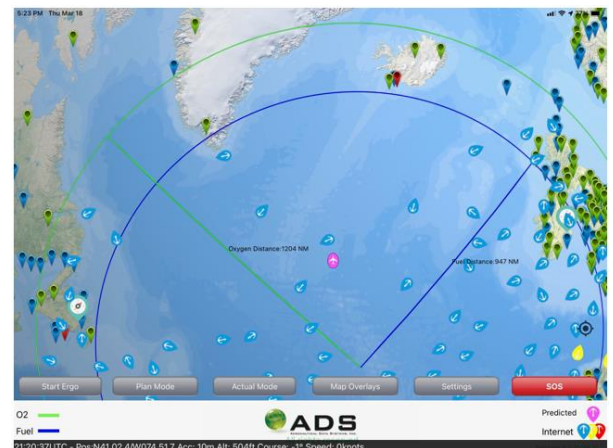
LRC/MSR is retrieved from a database for that aircraft at a specific weight and altitude.

Temperature is ISA. These entries can be changed with new data based on actual conditions.

For example, if the aircraft has increased drag due to a loose cowling or other structural failure after loss of an engine, entering the fuel flow and TAS will help the pilot understand the effects that drag is playing on the aircraft and how it will affect the range of fuel and oxygen in real time.

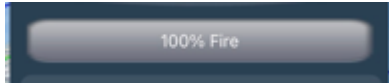
Oxygen Quantity should be entered/updated in the data entry box if O₂ is being used. Otherwise it will display the dispatch oxygen that was entered in the **Plan Mode**.

Latitude and **Longitude** will change in real time as the aircraft travels. A black data banner that displays actual GPS information. Should the GPS fail latitude and longitude can be manually updated in this window. This data will place the aircraft icon in the correct location on the app mapping program. If the signal is lost and then begins receiving a valid signal after a manual update entry, the icon and the Lat/Long number will continue to change and the aircraft icon will turn green, no longer requiring manual updates.



MAP OVERLAYS

The Map Overlays menu option provides the pilot with various options for what is displayed on the iPad screen.



100% Fire can be used to analyze two different inflight emergencies: 1) a decompression where immediate use of 100% pure oxygen is required and 2) addressing an inflight smoke/fire event.

It is important to understand most crew demand oxygen masks have several functions. One function of the mask is to deliver pure 100% oxygen without diluting the delivery with ambient cabin air. The other function is to fight an onboard smoke/fire. Both these functions increase the flow of oxygen to the pilot, which will result in a decrease in remaining oxygen duration and distance. Since flow rates used for this analysis are the same for both situations, the results are the same for planning purposes.

Touching the **100% Fire** tab will open a data entry window where two variables are required: the altitude where the fire is being fought and the number of crew masks to be used in the calculation. Enter and select **Submit**. (This does not apply to passenger masks).

The display will show a distance ring around the aircraft to illustrate how far the aircraft can travel before the O₂ is depleted at these high oxygen flow rates.

To clear this display, press the **Actual** mode and then **Submit**.

The remainder of this data window is for user readability only.

The **Vessel** tab has an on/off selection. Should you want to display ships, that function can be enabled using the vessel on/off button. This same function is also available for the **Airports** tab below.

Next to the Vessels and Airports tab is a **Clusters** selection.

This 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.

If you do not wish to use this function, simply deselect the Cluster tab to the off position (white).

The Vessels tab also has a selection to change the size of the ship icons for readability only. The Airports tab does not have this option and will display only one size airport icon.

Multiple ships are represented under an orange Cluster icon while airports use a blue icon. The number inside that orange/blue icon represents the number of ships/airports represented by that icon.

That number will change as you zoom in and out using the iPad. 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.



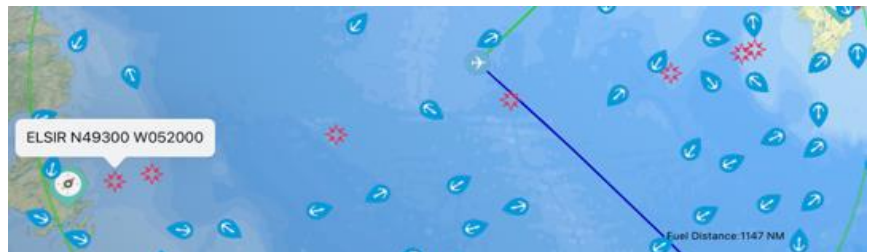
The Airport tab display contains three different colored icons to represent the longest runway listed at that airport. This is to help the pilot when making a quick decision during emergency situations.

- **Red** icons represent that 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.

Waypoints

If this button is active and selected, it will display waypoint symbols.

When the waypoint icon is touched a data banner will display the waypoint name and the Latitude/Longitude. The remaining selections are under development.



SETTINGS



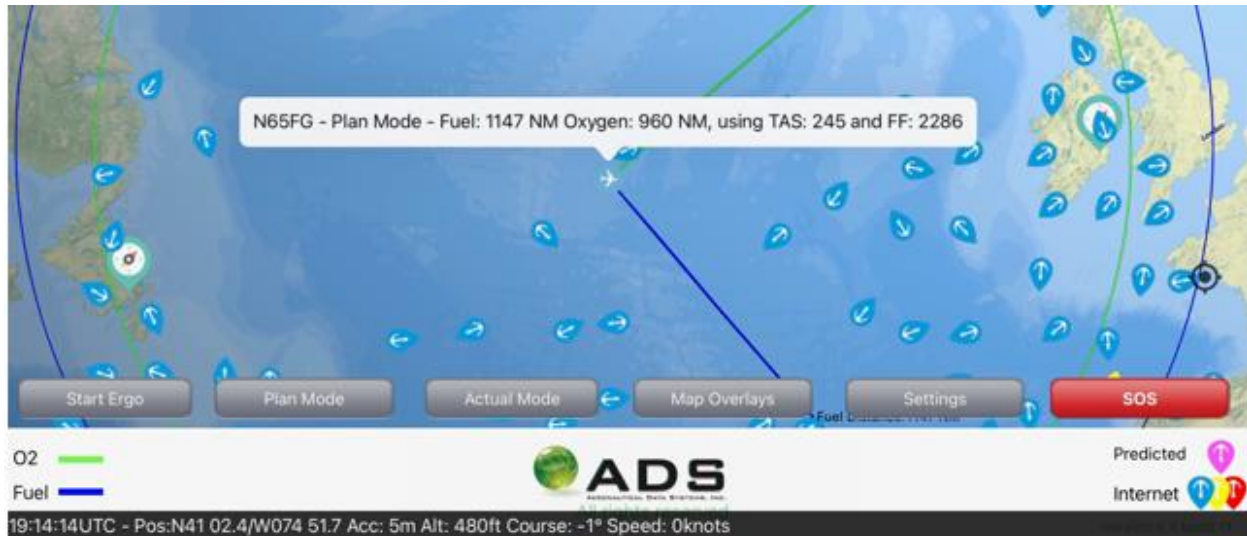
The first line in the **Settings** tab is the last vessel update from the ADS server and is an indication how recent the ship location data is. Some ships do not update their position on a regular basis. It is not unusual to see ships last update time greater than 3 hours since ships do not change position rapidly. **Vessel Update** times are only active with internet service.

The next active data entry box is **Vessels Mode**, with **Last Known** and **Predicted** selections. **Last Known** displays ship locations that have been updated via the internet. The **Predicted** mode disconnects from the internet and can be useful for most ships on great circle routes between ports. Selecting **Predicted** mode will take the last updated ship position, and using the course and velocity found under its information banner, it will project where that ship should be on

the map display. It will also update the latitude and longitude so it can be entered into the aircraft FMS for improved situational awareness. If internet lost for any reason, ships will turn purple automatically, indicating that ship position is being predicted.

GPS details

GPS details are displayed on a black data banner at the bottom of the screen.



This banner will remain black as long as the data continues to change, indicating that the iPad is receiving GPS information. Should the information stop updating/changing for longer than 2 minutes, the black banner will change to a purple color banner as will the aircraft icon indicating the iPad is not receiving GPS information.

17:50:21UTC - Pos:N41 00.2/W074 50.3 Course: 139° Speed: 17knots reserved Version 1.5 build 4

If the iPad does not receive GPS reception after 8 more minutes (a total of 10 minutes) without GPS reception, the purple data banner will turn yellow as will the aircraft icon alerting the pilot that ERGO 360 needs to be manually updated.

17:51:29UTC - Pos:N40 59.9/W074 50.1 Course: 139° Speed: 17knots reserved Version 1.5 build 4

If there is another valid Latitude/Longitude source on board, the pilot can manually update ERGO 360 by inserting a new Latitude/Longitude in the **Actual Mode**. Once this is completed, the yellow data banner will turn to black and the aircraft icon will turn green, indicating a valid manual update. If the numbers in the black data banner are not changing, the pilot can expect to update again as the color sequence just described above will repeat. The on/off button in the **Setting** tab will hide the data banner if desired.

The **Online Maps** on/off button displays a very detailed map when the app is zoomed in (with internet service). Should the internet fail, the user will notice the mapping will raster and be

slow to focus. If online maps are selected off (white), it will be replaced with another database map which is less detailed.

ADS O₂ ETP will allow the flight plan data from the website to auto-load to ERGO 360 and will also provide a detailed oxygen analysis and a fuel/oxygen ladder to be referenced during an emergency. This data can be accessed here or during the startup mode on the very first entry screen below the “Confirm Recall Number” data entry box. If the **ADS O₂ ETP** is selected off ERGO 360 will open in the manual mode and all data entries will be blank.

The **Change Recall #** button opens the **Confirm Recall Number** data entry box where the user can open the **Recall#** window and select past flight plans if desired. Flight plan information can only be entered online within internet service. If out of internet service the user may be able to recall a similar flight plan to be uploaded or always have the option to load flight plan data manually.

X-Plane GPS Integration button and the associated IP address are for training purposes only and are not discussed in this document.

The **O₂ ETP Flight Plan** tab will open up the Oxygen ETP to view all oxygen flight planning calculations along with a fuel and oxygen ladder. This is also used for SMS compliance, SAFA, and FAA ramp checks. To return to the **Settings** page, press the iPad home button (which will open the iPad desktop) and then select the ERGO 360 app icon.

The **Manual Flight Plan** tab is used to determine the performance health of the aircraft after an engine failure or any catastrophic event where the aerodynamic integrity of the airfoil may have been compromised and induced drag could affect the planned range of the aircraft. Inserting known aircraft parameters will result in an updated fuel range to compensate for any induced drag. The output can be viewed pictorially on a geospatial map or in an organized fuel ladder depicted in 15 min time segments. Closing this screen will return the user to the **Settings** page.



TIME -15	FUEL (LBS.)	OXYGEN		
		%	LITERS	PSI
03:35	14880			
03:20	13942	95	3092	1752
03:05	13004	89	2897	1654
02:50	12066	84	2734	1556
02:35	11128	79	2571	1458
02:20	10190	74	2408	1360
02:05	9252	68	2213	1262
01:50	8314	63	2050	1164
01:35	7376	58	1888	1066
01:20	6438	52	1692	968
01:05	5500	47	1530	870
00:50	4562	42	1367	772
00:35	3624	36	1172	674
00:20	2686	31	1009	576

Selecting the **Logout** tab will log out of the ERGO 360 app and bring the user back to the initial login page where the username and password must be re-entered. To close this screen, touch the OK button.

SOS

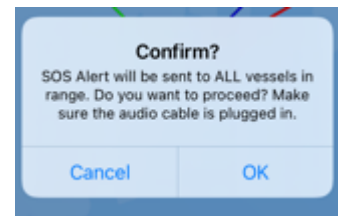


The SOS button is designed to be used in an emergency in conjunction with a handheld marine band radio connected to the iPad using an audio cable. If the cable is not connected to the radio, the SOS portion of this app (the distress call) will not transmit.



To familiarize oneself with the operation of the SOS, the pilot can take these steps without the radio connected. In an actual emergency, the radio must be connected to the iPad

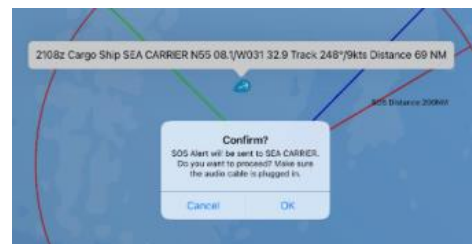
Selecting the red **SOS button** will open a message window confirming that a distress message should be sent. It should be assumed that prior to this the Captain has decided that ditching the aircraft is the only viable option left for him and his crew and passengers to survive.



Once the Captain confirms the message and the (DSC) data frequency is correct, select OK.

A data (text) message will be sent to the bridge of all ships within VHF range and will sound an alarm on the same bridge radio that must be silenced manually by a crew member. (If you are testing the iPad app without the radio and cable you will hear a sound similar to that of sending a fax.) If the message is sent in real conditions, a transmitting icon will appear in the white lower banner indicating the message is being transmitted. Crews can become familiar with what they can expect to see if the audio cable is plugged into the iPad microphone port but is left unconnected to the radio.*

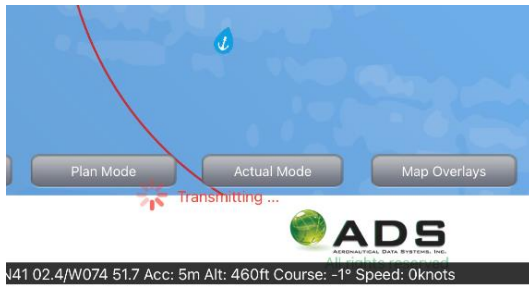
Once the OK button is pressed, the message will transmit and the display will reduce to a 200nm view to display all vessels and airports within that area. The pilot then selects a ship they believe is best suited for their ditching needs by touching that ship's icon. This will open up an information banner for the pilot to review. If the vessel is still acceptable, another message will inform the crew of the ship they have chosen to ditch by. If the ship is unacceptable, press the cancel button on the popup message and select another ship.



If the ship is acceptable to use in the ditching, then press the OK button. If the cable is not plugged in the crew will hear a computer-generated voice distress call written in the maritime

vernacular that will be broadcasted to all ships in voice VHF range. It is good to listen to the message so you will know what is being sent for training purposes only. Once the crew starts sending the voice distress message, the process will repeat itself automatically every 2.5 minutes with updated information (e.g. position, altitude, airspeed, time to a water landing, etc) without further input from the crew. The voice messages will continue until the app is shut down, or the iPad stops working. This process can be accomplished in less than 8 seconds

allowing the crew maximum time to manage all SOP and emergency procedures.



Remember that in an actual emergency with the radio plugged into the iPad and the marine band radio selected to the maritime emergency frequency (Channel 16), you will not hear any transmission but will see the same transmitting icon that was viewed for the data transmission. You will also be able to

hear incoming calls on channel 16. Should you hear your call sign and want to speak directly to that ship you must unplug the audio cable to transmit through the handheld radio. If you leave the audio cable plugged into the handheld radio you will not be sending any transmissions.

*Transmission of data messages is pending FCC approval. In the meantime, ADS has developed this procedure which transmits the voice message.



OPERATIONAL CONSIDERATIONS

WEATHER RADAR



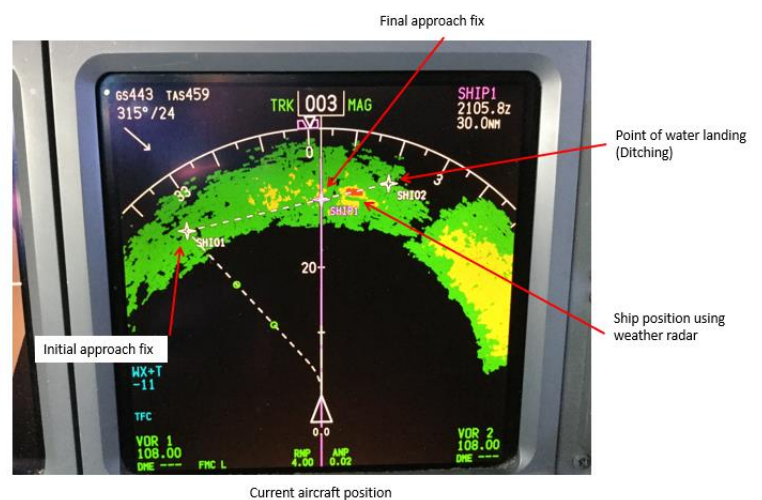
Understanding and using AIS data is relatively new to the aviation industry. It will take some time to realize all the benefits this technology provides. Currently, using AIS data is similar to using weather data in that the information received prior to departure is planned information. Live streaming of AIS information is not practical, nor currently available. Once airborne, technology is available for real time feedback using weather radar. Most weather radar 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 to 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 360 can help reduce pilot task saturation and improve situational awareness, while at the same time aiding rescue efforts and improving survivability.

Some radar manufacturers are beginning to provide ship displays as an added option.

Instrument Approach to a Ditching



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, it 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. It's only when the internet is not available -- quite often in an emergency -- that the user becomes aware or notices these limitations.

Aircraft design and architecture can also affect the iPad GPS reception inside the cockpit. This should be thoroughly tested and vetted when using any app. Window size, window material, and iPad location mounts are a few examples of specifications that will affect GPS connectivity. Knowing how often the iPad GPS signal is lost will determine if using an external GPS is necessary. Knowing the capabilities and operation of the external GPS in conjunction with ERGO 360 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 valid or just a source of confusion?

ERGO 360 uses color coding (aircraft and ships) to alert the pilot of any failures and levels of app degradation. The aircraft icon is green if the iPad is generating a reliable GPS signal. There is a black data banner at the bottom of the iPad displaying tabulated GPS information. If the iPad GPS signal is lost for longer than 2 minutes, the aircraft icon and the GPS data banner turn purple and the aircraft icon continues to update a predicted position on the iPad mapping program using the last known GPS course and velocity. After 8 more minutes (total of 10 minutes without a reliable iPad GPS signal) the aircraft icon and the GPS data banner turn yellow, warning the pilot that the ERGO 360 aircraft icon continues to update its position using only a course and velocity. Making any aircraft heading changes will decrease position accuracy.

HANDHELD RADIO TRANSMISSIONS

One must also know the capabilities 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.

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 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, learn 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 a few techniques that can help pick out a ship from high altitude. This is something almost never practiced, but will significantly improve ship-finding skills.

END