PHI Inc. is the first operator in the Gulf of Mexico to equip its IFR fleet with ADS-B technology. With bases spanning the entire Gulf Coast region, PHI meets the needs of more than 1 million passengers each year and serves installations more than 200 miles offshore.

Photo courtesy of PHI Inc.

Freeing Flight

FAA Moves Ahead with Gulf of Mexico ADS-B

STORY BY DAVE HIGDON

If you could take a snapshot of air traffic over the Gulf of Mexico on a day of typical VFR operations, the track lines would rival those of some of our busiest Class Bravo airports, except spread out across about 580,000 square miles of watery area.

On a typical VFR day, about 2,000 helicopter flights move more than 10,000 workers between shore and approximately 3,800 offshore platforms, which help supply the nation's voracious appetite for energy.

Powered with the byproducts of those very same platforms, the helicopters also deliver fresh water, food, hardware supplies, spare parts and medical sundries.

Every day, those platforms produce more than 1.5 million barrels of crude oil and approximately 7.8 million cubic feet of natural gas.

But this airborne support system works only as good as the weather. The theoretical air-traffic snapshot looks dramatically different when the weather begins to deteriorate and instrument meteorological conditions and instrument flight rules come into play. Depending on how bad the weather becomes, the track lines might fall to as few as 10 each hour — maybe none if conditions get bad enough.

Until recently, nothing could show the flight tracks of most low-flying helicopter traffic.

On a typical VFR day, about 2,000 helicopter flights move more than 10,000 workers between shore and approximately 3,800 off-shore platforms, which help supply the nation's voracious appetite for energy.

Radar coverage doesn't exist in the Gulf of Mexico beyond about 50 miles off shore and below 5,000 msl, which is where the majority of those offshore helicopter flights operate. No radar, no tracks, no seeing the operations at work.

Try to picture the continental airspace system early on in aviation's development, one in which you flew VFR or you didn't fly, and even with VFR you basically were wholly on your own for safely navigating between origin and destination. No radar and no safe, efficient, almost-all-weather functional IFR.

These issues changed for good this past December, thanks to a strong push under a cooperative effort of the offshore operators, the energy producers, contractors and the Federal Aviation Administration.

Their collaboration helped bring automatic dependent surveillance–broadcast (ADS-B) to the entire expanse of the Gulf of Mexico in the FAA's biggest step toward the transition to air traffic services from the Next Generation Air Transportation System envisioned.

No Gaps, Low Floor, Big Benefits

As this was being written in early December, the FAA maintained that initial operational capability would mark the beginning of ADS-B coverage throughout the Gulf of Mexico.

Initial operational capability, or IOC, means the data from aircraft with ADS-B Out shows up on the screens of controllers in Houston Center, just the same as traffic detected through the squawks from a transponder in this vast expanse of over-water airspace lacking in radar coverage.

ADS-B Out automatically delivers a GPS-determined position fix — as precise as the wide area augmentation system can make it — to the listening ground-station network. But ADS-B does more, with the aircraft itself generating the information, while the network merely relays the received data to controllers' screens.

The ADS-B Out data stream also includes ground speed, GPS/air-data-derived altitude information and direction of flight. And it does this with far greater precision than radar and far faster, with multiple updates every second.

How do aircraft data packets make the trip to controllers? It's a major piece of technology investment from the parties involved.

It starts with the ground stations that receive the ADS-B Out signals. Twelve of those ground stations actually sit on 12 of those 3,798 platforms scattered across the Gulf of Mexico. Another 10 stations are on the ground along the Gulf coastline between Corpus Christi, Texas, and Port St. Joe, Fla.

The new network also includes 35 automated weather observation system stations, or AWOS, and 22 VHF communications relay stations. The VHF com relays support three new frequencies covering part of the Gulf previously out of reach of VHF radio.

In addition to providing the space and power support for all of this hardware, the platform owners provide data network bandwidth on the underwater cable networks they operate between platform and shore. The system uses these cable lines to route the received data to the operations at Houston Center.

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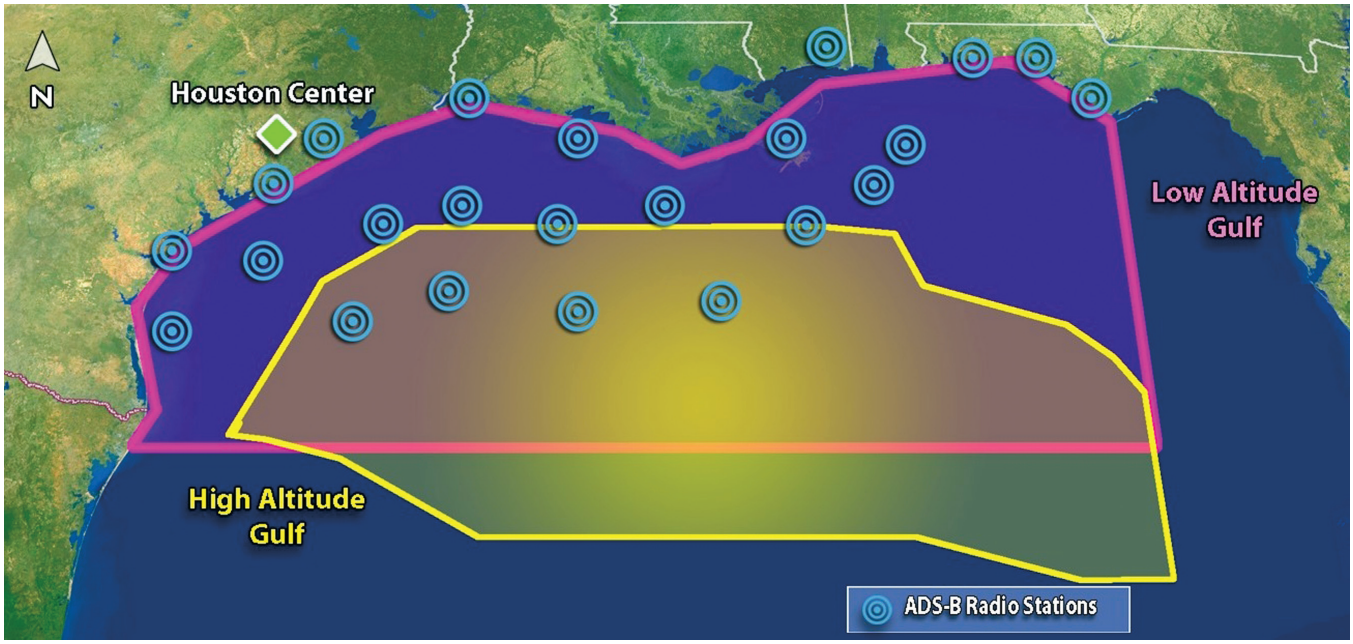

FREEING FLIGHT

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ADS-B: Eyes on the Skies Over the Gulf

To understand the benefit potential of the new ADS-B Gulf of Mexico network, it helps to understand the system in place prior to this new system's implementation. Without radar coverage over the vast majority of the Gulf, the FAA employed a grid structure for air traffic management of IFR flights.

An aircraft had to file a route that connected grid-square-by-grid-square the flight's point of origin and its destination. The FAA required period position reports as pilots transited one grid to the next, and it plotted the aircraft's progress to ensure no other aircraft were in the same grid at the same time — or in any grid adjoining a grid with an aircraft transiting.

Between the lack of surveillance and the limited voice communications possible — much of the com messaging was relayed via intermediary stations — the FAA basically worked to keep the airspace free of possible conflicts for hundreds of square miles at a time.

With 580,000 square miles of airspace, capacity could drop to 20, even 10 at a time, according to operators, which limited a day's flying to a few dozen flights versus the typical 2,000 or more. And if the weather deteriorated, virtually nothing moved.

With ADS-B operational, and with surveillance and communications available, equipped aircraft can be handled similar to or better than what the FAA provides over the continent with its radar-based system.

The system offers the potential to be even better, part of the standards being explored as the agency moves closer to full implementation of NextGen. With ADS-B's accuracy and update speed, in-trail separations could drop to 5 miles from 50 on en-route segments and to as little as 1.5 in terminal areas.

For the Gulf, the change can be described as nothing less than a sea change.

Couple the ADS-B-based benefits of NextGen with the new landing guidance technology in development, and the potential for major capacity gains across the system looks promising. And this is the point of the whole exercise.

Gulf Experience Underpins Continental Expansion

While the point of advancing the Gulf of Mexico was to bring the positive-control and surveillance benefits of ADS-B to an area devoid of radar as quickly as possible, the point for the rest of the country is to divorce the ATC system from its need for radar.

The goal is for ADS-B to serve as the foundation for the NextGen ATC network.

With NextGen and ADS-B being topics of aviation conversation for so long — more than a decade now — it's sometimes difficult to recognize progress actually is occurring.

For example, the ADS-B Gulf of Mexico network isn't the FAA's first to achieve IOC. It is, however, the largest, most complex and most chal-

lenging of the ADS-B networks to go operational so far.

In October, the FAA declared IOC for the airspace around Louisville International Airport (SDF) in the Ohio River Valley, where United Parcel Service (UPS) has been supporting ADS-B development for about a decade.

Additionally, the FAA declared IOC for the Southern Florida network in August 2008, with special-interest areas around Philadelphia, Pa., and Anchorage, Alaska, expected to achieve IOC in April of this year.

With most of the ground-station network hardware already sited, the FAA's plan anticipates the full complement of 320 ADS-B ground stations and their support network in place and powered up for work by year's end 2010.

Yes, this year, with full national operation by the end of 2012.

Equipping with Both ADS-B Out and ADS-B In

The FAA's Capstone and Ohio River Valley projects helped prove the viability and potential of ADS-B during a decade of experimentation and testing.

United Parcel Service operates a sizeable fleet of cargo-liners already making advance use of ADS-B's potential to control sequencing of arrivals into SDF. In Alaska, the FAA invested in equipment for hundreds of general aviation aircraft and proved ADS-B could work where radar was not practical and, in so working, improve the safety of flight for participating aircraft.

In the Gulf of Mexico, offshore helicopter operators have been equipping with both ADS-B In and ADS-B Out in anticipation of IOC and in light of the benefits of both sending and receiving ADS-B data.

Later this year, the FAA expects to issue a final rule on ADS-B equipage for the NextGen transition, which the Gulf IOC has marked. This rule will provide the catalyst for aircraft opera-

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tors to equip — at least this seems to be the agency's assumption.

An RTCA panel recently completed a look at the required NextGen transition steps. Among its recommendations was for the government to provide more incentives for operators to convert, possibly in the form of financial assistance but also by improving the services available by choosing to install ADS-B In as well as the ADS-B Out that will be required.

As initially published in the FAA's notice of proposed rulemaking, ADS-B Out will be required to continue filing IFR in any airspace and for access to Class A (IFR-required), Class B and Class C airspace. Full compliance for any airspace in IFR won't come until 2020, per the FAA's NPRM. The RTCA panel and others suggest sooner — and to get operators and owners to adopt sooner there should be some sharing in the costs.

Exactly what those costs will be has been a tough number to pin down because of a lack of standards for the equipment required for both ADS-B Out and ADS-B In, as well as the different types of ADS-B Out hardware the FAA's rulemaking proposal covers.

The FAA resolved this problem in early December (see sidebar), clearing the way for the final rules to be opened up for public comment in April.

However the FAA resolves to make the best use of its new system, the success of the partnership in the Gulf of Mexico helps illustrate the potential benefits of NextGen — and how it has never seemed more real. ❑

If you have comments or questions about this article, send e-mails to avionicsnews@aea.net.

MOPS, TSOs and the Day That Launched a Product Line

For years, the RTCA's Special Committee 186 has been at work developing equipment and performance standards for the hardware required by Next Generation Air Transportation System — specifically, the gear to make automatic dependent surveillance–broadcast work.

On Dec. 4, 2009, the organization released standards for the onboard equipment, which avionics companies had long awaited.

The RTCA's minimum operational performance standards (MOPS), covering everything from the way traffic is displayed to the two different types of transceivers aircraft need for ADS-B Out and ADS-B In capability, pave the way for avionics companies to finish work on their new hardware — work already years in progress.

The MOPS covers standards for how displays show traffic, for resolving traffic conflict and for the standards applying to the two links the FAA wants to use: the 1090 MHz extended squitter hardware and the broader-bandwidth universal access transceiver, which is meant for smaller, non-turbine aircraft.

These MOPS certainly didn't catch the FAA unawares. Scant hours after the RTCA issued its MOPS, the FAA signed the technical standards orders for the same ADS-B equipment, paving the way for avionics makers to submit their designs for approval.

With receipt of the technical standards orders and some related supplemental type certificates, aircraft owners will be free to begin buying and installing the gear for which access to the NextGen ATC system will depend.

Although some equipment has been available, it was made, sold and approved under different approvals than the ones issued in December. But the issuance of MOPS and TSOs ensures buyers the ADS-B hardware they buy in the future will do the job. ❑