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A M E R I C A

NEXT-GEN SATELLITES

through robotics and
additive manufacturing

Page 20

Tech help for clean-plane research/10

Exelis' Matthews
on telescope tech/14



2015: The year of flight tracking?/40

GETTING CREATIVE ABOUT AIRLINER TRACKING

Representatives at a global aviation safety conference in Montreal liked the idea of requiring flight crews to report their positions to airline operations centers every 15 minutes, but it could take years to see the standards fully blessed and reflected around the world in laws and regulations. This is true despite the Montreal target date of November 2016.

Rather than trying to tame a bureaucracy that might not be tameable, the U.N.'s International Civil Aviation Organization and its air navigation chief, Nancy Graham, are getting creative. They want the airlines and aviation authorities to just do it.

ICAO views "voluntary implementation of global tracking using available technologies as a matter of urgency, which underscores the sector-wide consensus on tracking priorities." ICAO's 36-member state governing council plans to do its part by approving the new standards by the end of 2015, she adds.

Doing something fast is not a technical problem.

"There's no reason to drag heels," says Ann Heinke, president of Overlook Consulting of Loveland, Colorado, and one of the original developers of Future Air Navigation System FANS 1/A, a widely used avionics suite that links pilots with air traffic controllers. "The technology is out there. The technology can do it. It's just a matter of willpower."

If ICAO can get the airlines to fall in

line, the odds of more cases like the disappearance of Malaysia Airlines flight 370 could be reduced by tapping existing communications technologies and without requiring most airlines to install new equipment. Airlines and aviation authorities would then need to decide the best long-term technical solution and consider the views of outliers, like the U.S. National Transportation Safety Board, which wants reporting every minute, not every 15.

Tracking big planes

The 15-minute rule approved at ICAO's Second High Level Safety Conference in Montreal puts the responsibility on operators to track all aircraft with more than 19 seats and a takeoff mass of more than 27,000 kilograms — aircraft larger than Bombardier Q400 NextGen turboprops, for example. The rule would only apply to airliners that have equipment capable of reporting locations, which experts say is most of them. The rule does not encompass business jets flying over oceans, polar regions and vast unpopulated areas like Siberia where ground-based radar can't track planes.

Malaysia Airlines flight 370 disappeared a year ago, and aviation authorities say the coming months could be a turning point in the effort to get some kind of airliner tracking system in place quickly, while longer-term technical questions are sorted.

Debra Werner

explains.

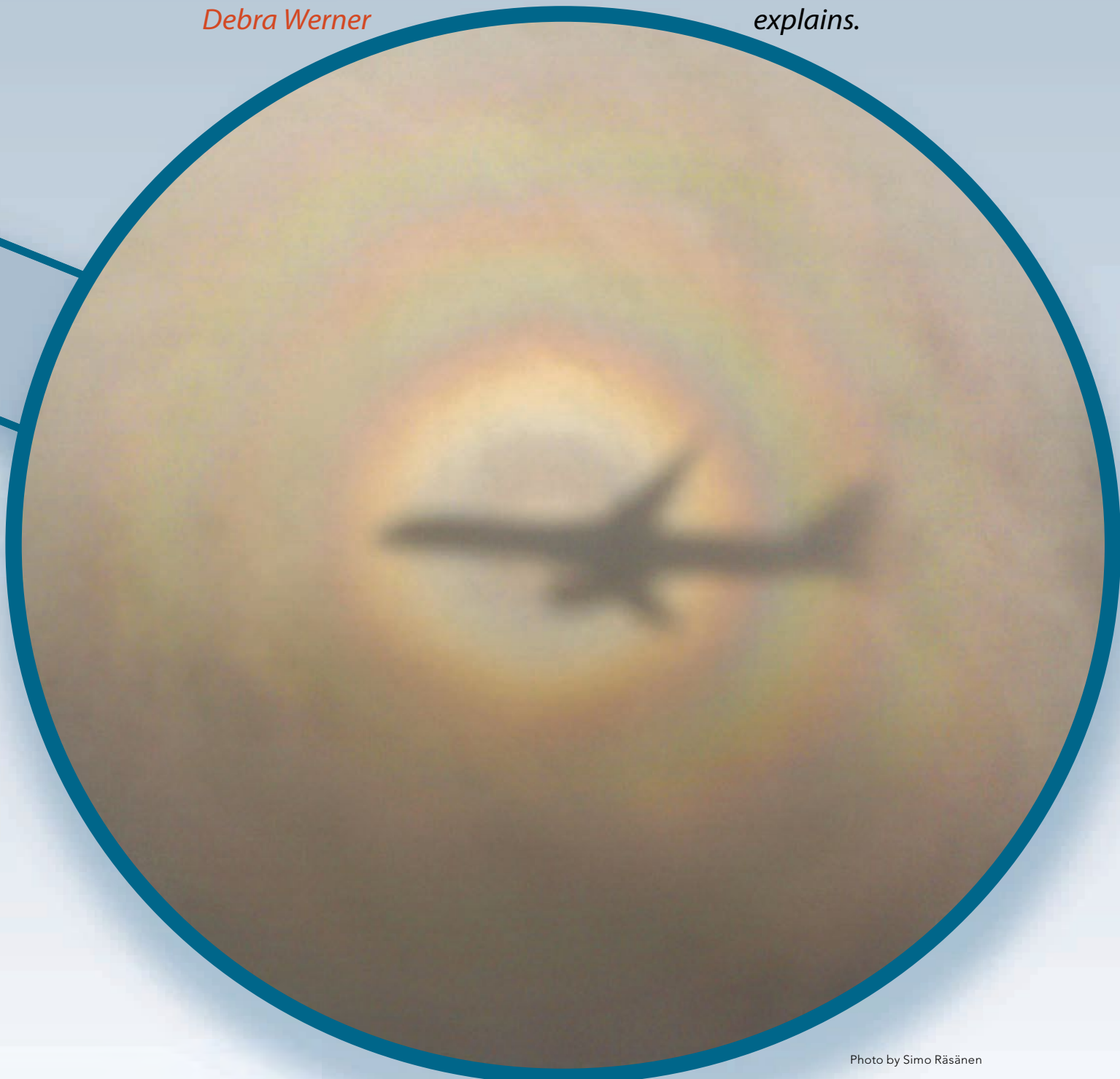


Photo by Simo Räsänen

For commercial airliners, position reports every 15 minutes still isn't enough, according to the National Transportation Safety Board, which would be responsible for locating a missing plane in U.S. airspace and investigating the accident. NTSB wants aircraft to voluntarily report their position once per minute so that the location of a downed plane could be traced to within six nautical miles of the point of impact, NTSB said in a January safety recommendation to the FAA.

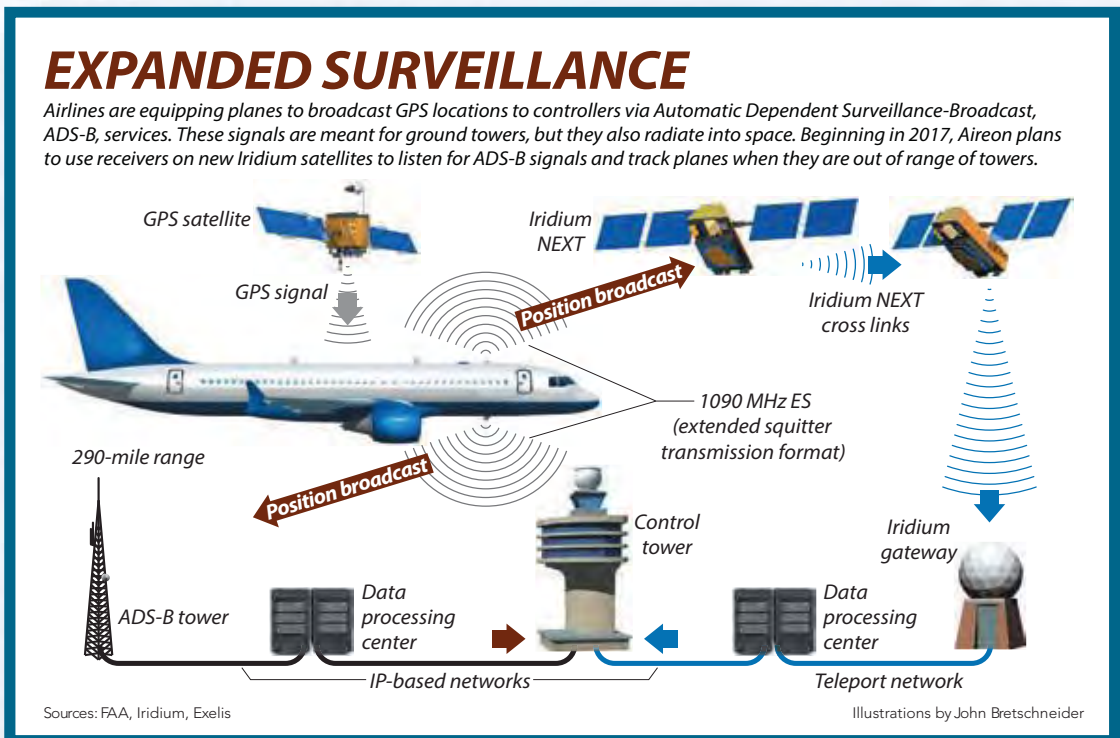
At the Montreal meeting, ICAO's member countries also approved a longer-term goal of requiring aircraft to report their position every minute, but only when they divert from their intended flight plan by making an unanticipated altitude change or exhibiting other unusual behavior. The target date for implementing that rule is January 2021. That's considered speedy in an industry that often takes more than a decade to certify technology for aircraft.

The new tracking systems will have to be as fault-tolerant and fail-safe as flight data recorders and cockpit voice recorders, cautions Robert Mann, an airline industry analyst and principal at R.W. Mann & Co. of Port Washington, New York.

Many major carriers already have equipped their widebody jets with transponders and communications systems that

can meet the 15-minute standards and even announce their position every 64 seconds. Most use Automatic Dependent Surveillance-Contract, which is part of FANS 1/A. ADS-C enables air traffic controllers and airline operators to request detailed information from aircraft at specified intervals. An air traffic controller could establish a "contract" with an aircraft in its airspace to report its exact location every five minutes, for example, or to report any deviation from its planned flight path. Even if an aircraft is already using ADS-C, operators may incur additional expenses if they are not already reporting their location every 15 minutes as required by the new standards.

Mobile satellite communications provider Inmarsat is alleviating cost concerns for some carriers by offering to transmit tracking data free of charge for the 11,000 passenger jets already equipped to send data through its geostationary constellation of L-band satellites. The Inmarsat proposal will not eliminate all satellite data expenses because carriers still will have to pay to send the tracking information from Inmarsat ground stations to their home bases. Not to be outdone, rival Aireon, a joint venture among satellite operator Iridium and air traffic managers in Canada and Europe, announced in September that it will provide a service called ALERT, for Aircraft Lo-



cating and Emergency Response Tracking, for free in the event an airliner were lost. This would be separate from Aireon's planned money-making service of providing real-time tracking information to airlines so they can save fuel by planning more efficient routes over mountains and oceans. ALERT would not be available until the Iridium NEXT satellites are in orbit and the tracking service is operating, which Aireon hopes to do by the end of 2017. The first batch of Iridium NEXT satellites is scheduled for launch in June on a Russian Dnepr rocket, a converted ICBM.

ADS-C is not the only short-term option for complying with the 15-minute standard. Airliners also could rely on their Aircraft Communications Addressing and Reporting System, or ACARS, datalinks, which are widely used to send aircraft performance data to maintenance facilities. Those links could be augmented with software to expand tracking and reporting capabilities. ACARS is not as comprehensive as ADS-C because it is not designed to highlight changes to an aircraft's planned route, but it will allow carriers to meet the 15-minute tracking standards, according to a report issued last year by the Aircraft Tracking Task Force. That panel was established after the Malaysia Airlines flight 370 disappearance in another case of creativity by ICAO. The U.N. group asked the International Air Transport Association, a global organization of airlines, to form the task force in the name of expediency.

Longer term tech

Another technology, called ADS-B, for broadcast, could bring dramatic improvements to surveillance. Airlines are installing ADS-B transponders to comply with the FAA's NextGen air traffic control modernization initiative and the Single European Sky Initiative. The transponders broadcast GPS signals to ground controllers and other aircraft through a feature known as ADS-B Out. A feature called ADS-B In lets aircrews receive reports from other planes or air traffic and weather information from aviation authorities. ADS-B's signals are directed at land towers, but some of the energy radiates into space, which is where the Iridium NEXT satellites come in. They will carry ADS-B receivers to listen for those signals. The

MAKE IT TAMPER PROOF?

No one knows exactly what happened aboard Malaysia Airlines flight 370 last March, but speculation that someone intentionally disabled tracking and communications devices on the jetliner has prompted contentious debate among aviation experts over whether aircraft should be equipped with autonomous flight tracking systems that cannot be turned off without physically ripping out circuitry.

The National Transportation Safety Board and some airline executives endorse the idea of tamper-proof tracking equipment. Pilots vehemently reject it, saying they must be able to turn off any electrical system on board the aircraft in case it malfunctions or starts a fire. But in a January safety recommendation, the NTSB noted that on some planes the circuit breakers for flight recorders are not easily accessible to pilots. The NTSB recommends that the FAA require all transport aircraft to have protections against disabling flight recorders. Flight tracking equipment should also be "tamper-resistant," NTSB said.

While no definitive answer on the tamper question came out of the ICAO safety conference in Montreal in early February, member states inched toward resolution by approving a long-term goal of requiring aircraft operators to report their position every minute when certain events occur, such as an aircraft diverting from its flight path. Those minute-by-minute reports could be activated "automatically based on flight behavior, manually from the air by the flight crew, or manually from the ground," Nancy Graham, ICAO Air Navigation Bureau director, says by email. "It could only be de-activated by the same means by which it was activated, and power and position information provision would also be autonomous from other aircraft systems."

That means an aircraft that exhibits unexpected behavior could be tracked every minute at the request of air traffic controllers even if the aircrew does not initiate the frequent reports.

In January, the NTSB recommended that airplanes operating more than 50 nautical miles from shore be equipped with a "tamper-resistant method" to broadcast their location to ground stations with enough frequency to find an aircraft that crashes within six nautical miles of its point of impact. In practice, that means most planes would announce their position once per minute.

Emirates Airline President Tim Clark and Qatar Airways CEO Akbar Al Baker have been lobbying for flight tracking systems that cannot be shut off while an aircraft is flying. Those systems must "continue uninterrupted, irrespective of who is controlling the aircraft," Clark told the German magazine Spiegel in an October interview.

"If you have that, with the satellite constellations that we have today even in remote ocean regions, we still have monitoring capability."

Debra Werner

Aircraft Tracking Task Force predicts that space-based ADS-B will have a significant impact on global aircraft tracking.

Using data drawn from onboard ADS-B receivers and transmitted over Iridium's constellation of low-Earth-orbit satellites, Aireon plans to tell rescue agencies the location and last flight track of any 1090 MHz ADS-B equipped aircraft flying in airspace without surveillance. Aireon announced Feb. 4 that the ALERT service will be managed from the Irish Aviation Authority's North Atlantic Communications Centre in Ballygirreen on the west coast of Ireland.

"Aircraft operators would not be required to make any additional investments in avionics and won't have to pay any additional service fees," says Don Thoma, Aireon president and chief executive officer. "If air navigation services providers are customers of Aireon or have a similar service, they already have the infrastructure to deal with this; if they are not customers, through the ALERT service they will be able to get access to the informa-

tion in an emergency situation."

New rules for emergencies are the focus of another international panel, the Ad Hoc Working Group on Aircraft Tracking, established by ICAO to help air carriers and air traffic control agencies improve their ability to identify aircraft that divert from their intended flight path or exhibit any unexpected behavior. In an October report, the group called on airlines to adopt a Global Aeronautical Distress and Safety System, which in addition to tracking aircraft in emergencies would promote frequent autonomous tracking of aircraft in distress, flight data recorders designed to eject from the aircraft and a comprehensive list of organizations worldwide responsible for coordinating rescue efforts.

"There is a growing consensus in the aviation community that more needs to be done to ensure the location of an aircraft and its flight recorders will always be known," according to the ad hoc panel's report, "Global Aeronautical Distress and Safety System: Concept of Operations." ▲



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