

What is the future of traffic advisory systems?

B Y R I C P E R I

Discussions about the shut-down of traffic information systems at various sites around the country have created quite a stir, and many pilots have questions, such as: What traffic advisory systems are available to light general aviation aircraft? What are the differences in the systems? And where are the 23 sites projected to be shut down?

Traffic information service (TIS), automatic dependent surveillance-broadcast (ADS-B) and traffic information service-broadcast (TIS-B) all provide traffic advisory information.

TIS

TIS provides information to the cockpit via data link, which is similar to visual flight rule (VFR) radar traffic advisories normally

used by air traffic control (ATC). This data is uplinked to the client aircraft on each radar scan, normally about every 5 seconds.

A maximum of eight intruder aircraft can be displayed. If more than eight aircraft match intruder parameters, the eight "most significant" intruders are uplinked. These "most significant" intruders usually are the ones in closest proximity and/or the greatest threat to the TIS-equipped aircraft.

ADS-B

ADS-B, a surveillance technology being deployed in selected areas of the National Airspace System (NAS), broadcasts a radio transmission approximately once per second containing the aircraft's position, velocity, iden-

tification, along with fleet operator monitoring of aircraft. No ground infrastructure is necessary for ADS-B-equipped aircraft to detect each other.

TIS-B

TIS-B is the broadcast of traffic information to ADS-B-equipped aircraft from ADS-B ground stations. The source of this traffic information is derived from ground-based air traffic surveillance sensors, typically radar. TIS-B service is becoming available in select locations where there are both adequate surveillance coverage from ground sensors and adequate broadcast coverage from GBTs.

The quality level of traffic information provided by TIS-B depends on the number and type of ground sensors available as TIS-B sources and the timeliness of the reported data.

See and Avoid

None of these systems are intended to be used as a collision avoidance system, and they do not relieve the pilot's responsibility to "see and avoid" other aircraft. In addition, the systems must not be used for avoidance maneuvers during IMC or other times when there

received over voice radio, and it provides ground-based surveillance information over the Mode S data link to properly equipped client aircraft to aid in visual acquisition of proximate air traffic. TIS surveillance data is derived from the same radar

tification and other information. ADS-B also can receive reports from other suitably equipped aircraft within reception range.

Additionally, these broadcasts can be received by ground-based transceivers (GBTs) and used to provide surveillance ser-

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TIS Program Office Decommissioning Dates

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|-------|-----|--------------------|----|-----|---------|
| ASR-8 | WRB | Warner Robbins AFB | GA | ASO | N/A |
| ASR-8 | BIL | Billings | MT | ANM | 8/4/04 |
| ASR-8 | SGF | Springfield | MO | ACE | 11/4/04 |
| ASR-8 | BGR | Bangor | ME | ANE | 9/1/04 |
| ASR-8 | PNS | Pensacola | FL | ASO | 11/1/05 |
| ASR-7 | GRB | Green Bay | WI | AGL | 11/1/07 |
| ASR-8 | SBA | Santa Barbara | CA | AWP | 2/1/06 |
| ASR-8 | FSM | Ft. Smith | AR | ASW | 1/1/06 |
| ASR-8 | LIT | Little Rock | AR | ASW | 6/1/06 |
| ASR-8 | ABI | Abilene | TX | ASW | 7/1/06 |
| ASR-8 | TRI | Bristol/Tri City | TN | ASO | 12/1/06 |
| ASR-7 | MAF | Midland | TX | ASW | 4/1/07 |
| ASR-7 | FAR | Fargo | ND | AGL | 7/1/07 |
| ASR-8 | ROA | Roanoke | VA | AEA | 6/1/07 |
| ASR-8 | GTF | Great Falls | MT | ANM | 2/1/09 |
| ASR-8 | DLH | Duluth | MN | AGL | 9/1/09 |
| ASR-8 | ILM | Wilmington | NC | ASO | 12/1/09 |
| ASR-8 | JAN | Jackson | MS | ASO | 5/1/10 |
| ASR-8 | EW | Evansville | IN | AGL | 7/1/10 |
| ASR-8 | CRP | Corpus Christi | TX | ASW | 8/1/10 |
| ASR-8 | TLH | Tallahassee | FL | ASO | 11/1/10 |
| ASR-8 | LCH | Lake Charles | LA | ASW | 2/1/10 |
| ASR-8 | BIS | Bismark | ND | AGL | 1/1/12 |

Source: Surveillance Program Office, December 2004

Note: This article was developed using information from a safety risk management report on the "Discontinuation of Mode S Traffic Information Service (TIS) at Sites Where ASR-7/8 Radars Are Replaced by ASR-11," dated, April 8, 2005, and the FAA's Aeronautical Information Manual.

is no visual contact with an intruder aircraft. Each of these systems also has its own unique limitations.

While TIS is a useful aid to visual traffic avoidance, it has some system limitations that must be fully understood to ensure proper use. Many of these limitations are inherent in secondary radar surveillance. In other words, the information provided by TIS will be no bet-

ter than that provided to ATC. Other limitations and anomalies are associated with the TIS predictive algorithm. The FAA's Aeronautical Information Manual contains a thorough list of system limitations.

TIS Sites Set for Closure

TIS, a product of the Mode S system, will be removed from ASR-7/Mode S and ASR-8/Mode S sites as a result of the ASR-

11 terminal radar replacement program. At the present time, the monopulse secondary surveillance radar (MSSR) of the ASR-11 system is not capable of providing this service, and there is no business case pending that supports adding the capability.

Currently, there are 23 Mode S systems that will be affected, including 22 FAA sites and one Department of Defense site. The

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FAA decided to replace the Mode S secondary radar with newer-technology ASR-11 MSSR radar at these 23 sites.

When the Mode S MSSR was developed in the 1970s, it includ-

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ed a two-way, ground-to-air data link. This data link was intended to provide a number of services, including a ground-based separation assurance capability known as the air traffic control traffic advisory and resolution service (ATARS). The ATARS was abandoned in the 1980s in favor of an airborne system known domestically as the traffic alert and collision avoidance system (TCAS).

The Mode S ground station (sensor) was produced and delivered with a functional data link with the anticipation of air traffic control and informational services being developed and deployed.

While both TIS and TCAS are intended to avert mid-air collisions, the TCAS has greater independence of other NAS systems, leading to a higher level of certification and more impact on NAS operations. TCAS directly interrogates surrounding aircraft, using the received ID, altitude and distance information to compute relative position and recommend avoidance maneuvers to the pilot.

Air carriers and most commuters are required to carry TCAS, and the pilot must follow TCAS advisories even when under ATC. In contrast, TIS relies on data uplinked from the Mode S and

is not equipped with resolution maneuver logic.

In 1999, TIS functionality was deemed unacceptable for certification for large Part 25 aircraft because of the potential for false targets during critical phases of flight. In keeping with its supple-

mental role, aircraft equipage is not required by regulation; it is available to Mode S transponder-equipped aircraft as a supplemental advisory service during visual flight rule operations.

In VFR conditions, TIS display of traffic is of an advisory nature since the pilot has the responsibility for seeing and avoiding nearby aircraft. TIS is not approved as a basis for providing separation, but only as an additional cue to aid the pilot in visually acquiring nearby traffic. While an additional safety tool in any VFR environment, TIS was envisioned to be most effective in complex airspace with high-density traffic operations.

In May 1995, TIS was tested at Dulles International Airport (IAD) to demonstrate situational awareness for the general aviation user in the terminal environment. The testing covered a three-year period from 1995 to 1998. TIS was included in the Mode S as part of the NAS upgrade approved in 1996. From late 2000 to the present, the FAA installed TIS software in approximately 110 Mode S terminal sensors. TIS service now is operational in all but three terminal Mode S sites.

In spite of the nationwide deployment of Mode S TIS, there

was no formal documented requirement for this service. In addition, the FAA Administrator's Flight Plan, ATO Business Plan, Air Traffic Services Plan and others make no mention of Mode S TIS as a terminal service offering requirement.

When the FAA contracted the upgrades from ASR-7/Mode S and ASR-8/Mode S to the ASR-11 radars, the contract did not include the inclusion of TIS functionality. Therefore, the MSSR of the ASR-11 system is not capable of providing TIS service, and 23 Mode S systems will be affected by the decommissioning.

TIS Program Office Decommissioning Dates

The table on page 65 is a list of facilities and target dates for its current surveillance radar to be decommissioned. Accordingly, these dates correspond to the discontinuation of Mode S TIS. Because of natural disasters and other unexpected events, the dates on this table are projected decommissioning dates; sites could be decommissioned sooner. ■