

time there is no system equivalent to TCAS.

This final rule provides the opportunity for future developments without requiring more rulemaking. It is not intended to discourage private-sector, on-going efforts. However, at this time, neither the FAA nor other regulatory authorities are sponsoring programs to develop alternatives to TCAS II/ACAS II (the international equivalent to TCAS II version 7.0) to meet U.S. or international requirements. Allowing for an equivalent system is meant to be helpful to affected parties.

The FAA is responding to Congress and cannot delay this rulemaking for future development. We have extended the compliance date as discussed; however, we cannot extend beyond the date imposed by Congress. It is not the FAA's intent to delay or cancel incentives for new development of systems. The FAA has established a commitment to the development of the ADS-B technologies and works in the international forum with ICAO, Eurocontrol, and others to further this promising technology.

In regard to the comment about Capstone, the FAA is very familiar with ADS-B use in Alaska under the Capstone program. FAA funds were used to equip certain airplanes in Bethel, Alaska, with ADS-B. So far there are approximately 150 participating airplanes. Other than the Cessna 208, which is turbine, all of the airplanes are piston-powered. Most are operated in accordance with part 135, which this rule does not address. Capstone is a demonstration under very controlled conditions where every airplane involved has the necessary equipment. Capstone has demonstrated the utility of an avionics suite containing GPS receivers, moving map display, terrain awareness feature and ADS-B. In Alaska, ADS-B has been approved for provision of radar like services by Air Traffic Control. The Capstone program is entering a second phase which will utilize the Wide Area Augmentation System (WAAS) to provide more precise and robust navigation capabilities and allow for new routes previously unavailable to operators and will continue to develop ADS-B capabilities.

In the lower 48 states, the Safe Flight 21 program office has entered into a joint government-industry effort to develop ADS-B applications that will provide an impetus for widespread equipage by commercial and general aviation operators in the United States. There are numerous applications of ADS-B that, when implemented, could improve safety through greatly

enhanced situational awareness. ADS-B installations have been approved in transport category aircraft utilizing the 1090 MHz (transponder) data link. Installations in the Capstone program have utilized the Universal Access Transceiver (UAT) as the data link for ADS-B transmissions. We currently do not have sufficient evidence showing that ADS-B would be a substitute for TCAS.

One commenter's reference to non-compliance to RAs ignores data analysis that shows such non-compliance occurs when pilots acquire the other aircraft visually and determine that a threat does not exist. In other words, there are times when non-compliance with an RA may be appropriate. When the pilot is in instrument meteorological conditions, the only action available to the pilot is to respond to the alert. This same commenter stated that TCAS could cause collisions. However, his statements are unsupported and contrary to the numerous airline pilots' comments received and FAA's experience. The commenter did not provide any data to support his claim that nuisance or unnecessary alerts are costly.

Comments on Other Equipment

In addition to the system alternative issues, three commenters addressed Mode S transponder issues. One commenter indicates that a Mode S is sufficient for collision avoidance without TCAS because it can continuously provide a "squitter" of barometric and GPS position with heading and speed, giving all aircraft and ground listeners the opportunity to locate and avoid the transmitter. He says British Airways has implemented this technology on an experimental basis. According to the commenter, adding a Mode S squitter would increase receiver-equipped aircraft four-fold within 6 years. He believes military and public aircraft without transponders could listen to position reports using the low-cost, uncertified receivers. He requests that all future mandates for collision avoidance systems include Mode S squittering of altitude, latitude, and longitude.

For clarification, the term "squitter" refers to a system designed to transmit and receive signals from a transponder, without active interrogation of the transponder. It also refers to a signal transmitted by the system. TCAS II requires a Mode S transponder, which is interrogated by other TCAS II equipment and replies to that equipment. A squitter system would be able to transmit and receive any information from the transponders, but

it would not actively interrogate other aircraft as a TCAS II would.

Ryan International Corporation (Ryan) suggests we include traffic advisory system (TAS) Class A as a less expensive equivalent alternative to TCAS I. It makes this suggestion on the basis of the high cost to install a Mode S transponder. Another commenter agrees with Ryan in that we should include a less expensive form of TAS in lieu of TCAS I. That commenter believes that while TCAS provides a very useful tool to improve the safety of our airways, it is also very costly.

Ryan also inquires as to whether Mode S is required for TCAS I installations. It states that that does not seem to be the case in the preamble of the proposal, but in the proposed regulatory text, it appears that Mode S is required for TCAS I, or equivalent.

FAA's Response Regarding Other Equipment

In response to Ryan's inquiry regarding whether Mode S is required for TCAS I, Mode S is not required for those airplanes that need only a TCAS I. It is not our intent to mandate Mode S in this rule for TCAS I installations because it is not an integral part of the TCAS I installation. The commenter's confusion may have resulted from the appearance of the table in the **Federal Register**.

It should be noted that there are Mode S requirements described in existing §§ 121.345(c)(2), 125.224(a), and 129.18(a)(2). In addition, an appropriate class of Mode S is required to be installed as a part of a TCAS II installation, which is consistent with the existing rule and the proposed rule. In the final rule, the Mode S reference will remain in §§ 121.356, 125.224, and 129.18 because it is a required element in a TCAS II system.

We did make one change to the Mode S reference from the proposed rule. We inserted, for clarification, that the Modes S must be an appropriate class. This is similar language to the existing TCAS II rule. There are multiple classes of Mode S transponders within TSO C-112 and currently TCAS II functions only with at least a class 2 Mode S transponder. At the time of the issuance of this final rule, there is still no system found to be equivalent to TCAS.

Exceptions/Applicability

Proposed Rule

The FAA proposed that part 121, 125, and 129 turbine-powered airplanes that weigh more than 33,000 lbs. MCTOW would require TCAS II, or equivalent. We proposed that part 121 and 125