DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 121 and 135

[Docket No. 28586; Notice No. 96–5]

RIN 2120–AE81

Air Traffic Control Radar Beacon System and Mode S Transponder Requirements in the National Airspace System

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes to rescind the Mode S transponder requirement for all aircraft operations under part 135 and certain aircraft operations under part 121 of the Federal Aviation Regulations (14 CFR parts 121 and 135). For part 121 operators, this amendment would affect only those aircraft not required to have Traffic Alert and Collision Avoidance System II (TCAS II). The initial mandate for Mode S equipage was based on the assumption that Mode S would provide the sole method for air traffic control data link. The FAA's revised strategy of multiple air-ground data links managed through an Aeronautical Telecommunications net work removes this requirement. Further, operational experience with the Mode S ground sensors has shown that most surveillance enhancements can be achieved by the Mode S ground sensors with the present mixed population of airborne transponders. In addition, the use of Mode S transponders for aircraft, other than those required to have TCAS II, does not offer, nor is it expected to offer, any significant safety advantage in the current or future airspace environment. Therefore, requiring all aircraft at this time to have Mode S transponders when those aircraft are not required to have TCAS II is not essential for a safe and efficient National Airspace System. In the current airspace operational environment, the public interest does not require that all transponders newly installed in certain aircraft operated under part 121 and all aircraft operated under part 135 after January 1, 1992, be Mode S transponders.

DATES: Comments must be received on or before July 22, 1996.

ADDRESSES: Comments on this NPRM should be mailed, in triplicate to: Federal Aviation Administration, Office of the Chief Counsel, Attention: Rules Docket (AGC–200), Docket No. 28537, 800 Independence Avenue, SW., Washington, DC 20591. Comments may also be sent electronically to the Rules Docket by using the following Internet address: nprmcmt@mail.hq.faa.gov. Comments must be marked Docket No. 28586. Comments may be examined in the Rules Docket in Room 915G on weekdays between 8:30 a.m. and 5 p.m., except on Federal holidays.

FOR FURTHER INFORMATION CONTACT: Mr. Daniel V. Meier Jr., Air Carrier Operations Branch (AFS–220), Air Transportation Division, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267–3749.

SUPPLEMENTARY INFORMATION:

Comments Invited

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Office of Rulemaking, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267–9677. Communications must identify the notice number of this NPRM. Persons interested in being placed on a mailing list for future FAA NPRM's should request a copy of Advisory Circular No. 11–2A, Notice of Proposed Rulemaking Distribution System, which describes application procedures.

An electronic copy of this document may be downloaded using a modem and suitable communications software from the FAA regulations section of the Fedworld electronic bulletin board service (telephone: 703–321–3339) or the Federal Register's electronic bulletin board service (telephone 202–512–1661). Internet users may reach the FAA's web page at http://www.faa.gov or the Federal Register's webpage at http://www.access.gpo.gov/su__docs for access to recently published rulemaking documents.

Availability of NPRM's

Any person may obtain a copy of this NRM by submitting a request to the Federal Aviation Administration, Office of Rulemaking, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267–9677. Communications must identify the notice number of this NPRM.

Persons interested in being placed on the mailing list for future NPRM's should request from the above office a copy of Advisory Circular No. 11–2A, Notice of Proposed Distribution System, which describes the application procedure.

History

In 1982, the FAA announced a comprehensive plan to modernize and improve air traffic control and airway facilities. One part of the comprehensive plan included introducing the Mode S system. In an advance notice of proposed rulemaking, the FAA stated that improved surveillance reliability and accuracy would be a central objective of the Mode S system (48 FR 48364, October 18, 1983). Mode S transponders were considered an integral link in the system, furnishing accurate, reliable, and positive air traffic control information on aircraft identity, position, and altitude. The plan envisioned that all groundbased secondary radars would be replaced by Mode S stations, and that Mode S would provide the exclusive medium for an air/ground data link. At that time, the first 137 Mode S ground sensors were expected to be on-line by 1991. Therefore, the Mode S transponder requirement was promulgated with a final rule published February 3, 1987 (Amendment Nos. 121–190 and 135–22; 52 FR 3380). This final rule provided that any transponder newly installed in aircraft used for operations under parts 121 and 135 of Title 14, Code of Federal Regulations (14 CFR 121 and 135), before January 1, 1992, could be a Mode A transponder provided the transponder was manufactured prior to January 1, 1990; only Mode S transponders could be newly installed in these aircraft after January 1, 1992.

Mode A and Mode S Transponders

The two kinds of aircraft equipment addressed by this rulemaking are the Mode A and the Mode S transponders. They are the airborne portion of the secondary radar system, which is not a true radar system but rather an interrogate/respond system used to establish aircraft position and identity.

The Mode A transponder consists of a radio transceiver that responds to a coded train of pulses from ground sensors (known as Air Traffic Control Radar Beacon Interrogators (ATCBI)). The Mode A transponder response encodes one of 4,096 discrete codes (set by the pilot) in response to a Mode A interrogation from the ground sensor. The ground sensor receives the reply message, and processors extract the aircraft's position and identity for display on the controller's radar scope. An enhanced transponder is capable of responding to Mode C interrogations from the ground station by reporting the aircraft's altitude derived from a suitable encoding altimeter.

The Mode S transponder is an advanced version of the Mode A transponder which responds to conventional Mode A and Mode C interrogations, but it is also capable of responding to a Mode S interrogation with a unique code based on the aircraft's tail number. When used in conjunction with Mode S ground sensors, a system of nearly interference-free radar transmission and reception will exist. This system provides for improved target information to be display on the controller's radar screen and enables the various air traffic control computers (ATC) to detect conflict and control aircraft flow. In addition, the Mode S ground station recognizes a conventional Mode A transponder and reverts to conventional ATCBI operation for that aircraft.

The Mode S System

The Mode S system was designed to rectify limitations in the current radar system. The limitations include synchronous garble, loss of target and altitude integrity, and restrictions on traffic management caused by the limited number of discrete beacon codes. Of the two components in the Mode S system (i.e., the ground sensor and the transponder), the ground sensor provides most of the capability to ameliorate these limitations.

Synchronous garble occurs when the ground sensor interrogating two aircraft near one another cannot distinguish between their respective replies. In this situation, the data cannot be reconstructed; the ATC computer will either not display information or display erroneous information on the air traffic controller radar scope. When this condition can occur any time aircraft are in proximity, it is most likely to hamper air traffic services in areas of high density aircraft activity such as Classes B and C airspace areas. Improved processing capabilities found in the latest monopulse secondary radars are able to resolve many garble situations without Mode S transponder equipage by the aircraft. Operational experience with the currently deployed Mode S systems indicates that the garble resolution provided with the current transponder population is sufficient to provide assured separation using today's separation standards.

Target and altitude integrity expresses the ability of the radar system to distinguish between transmissions received from two different aircraft. The ATCBI secondary radar system transmits interrogation signals, and all transponder-equipped aircraft receiving the signal reply with a distinct code and, if so equipped, report the aircraft's altitude. As described earlier, the ability of the current system to distinguish between two signals is affected by the proximity of the aircraft to each other. Terrain, signal strength of the aircraft transponder equipment, and environmental factors can also derogate the ability of the ground sensor to determine the position and altitude of an aircraft.

Azimuth accuracy is improved with the Mode S system. To illustrate, when two aircraft are equal distances from a sensor in the existing system, they must be at least .23° of azimuth apart before both targets are displayed. With the Mode S system, those same aircraft need only be apart by .06° of azimuth to be displayed. A 1976 FAA-sponsored study postulated that a homogeneous Mode S environment (Mode S ground sensors and transponders) would increase integrity to more than 99 percent. Recent FAA tests and operational experience with the Mode S ground sensors have verified these figures.

If the number of aircraft operating in the National Airspace System continues to increase, the number of codes needed may eventually exceed the current limit of 4,096 discrete codes. Controllers assign these discrete codes, used to track aircraft position and altitude, to aircraft receiving air traffic services. The unique code assigned by the Mode S reduces the controller's workload and computer processing burden, allowing positive identification of an aircraft as it passes from one air traffic facility to another, and as data link messages are associated with surveillance targets. However, without a nationwide network of Mode S ground sensors in place and enhanced ATC computers with complementary software, these productivity benefits cannot be fully achieved.

Although the Mode S system improves accuracy in the surveillance of aircraft position and reduces interference in identify reports transmitted to air traffic controllers, which allows for clear surveillance of aircraft that are minimally separated, studies with the Precision Runway Monitor show that a multitude of procedural, pilot training, and other issues must be addressed before a relaxation in aircraft separation standards may be approved. Therefore the capacity benefits envisioned initially from Mode S are not primarily dependent on improved surveillance capability.

In addition to surveillance, the initial strategy for Mode S deployment includes a data-link capability. All secondary radar ground stations were to be converted to Mode S, which was to be the sole data link used for critical ATC messages. The FAA has adopted a new data link strategy with two principle thrusts: (1) a second FAA data link will be deployed as part of the next-generation air-ground VHF radios; and (2) private data link services will be considered if they meet FAA performance requirements. The message itself will be routed through an Aeronautical Telecommunications Network (ATN), which will automatically select the best air-ground media based on the nature of the message. This strategy provides a much more flexible and market-driven approach, which allows the FAA to work with the aviation community to use the best available evolving technology.

The new data link strategy means that nationwide Mode S ground station deployment is no longer required to establish the air-ground link. Further, mandatory Mode S transponder equipage by aircraft is not required to achieve widespread data link equipage in aircraft. The number of Mode S ground stations will now be determined by surveillance requirements and the marginal benefit of the increased air-ground data link capability.

Mode S capability is an integral part of the Traffic Alert and Collision Avoidance System II (TCAS II) required by § 121.356 14 CFR for certain aircraft operating under part 121. This regulation requires such aircraft having a passenger seating configuration of more than 30 seats to be equipped with an approved TCAS II and appropriate Mode S transponder by December 30, 1993. Used with TCAS II, Mode S provides air-to-air data exchange between TCAS-equipped aircraft making coordinated, complementary resolution advisories (recommended escape maneuvers) possible. A TCAS II system is rendered ineffective unless a Mode S transponder is installed with the TCAS II component.

Traffic Alert and Collision Avoidance System I (TCAS I) does not require data from Mode S transponders to function. This system is intended for use by aircraft with passenger seating configuration between 10 and 30 seats that are operated under parts 121 and 135. TCAS I provides proximity warning only to assist a pilot in the visual acquisition of intruder aircraft.

The FAA has determined that the requirement to install Mode S transponders after January 1, 1992, in aircraft not required to be equipped with TCAS II exceeds the requirements of the present and immediate future for a safe and efficient National Airspace System. Studies and analysis are being

conducted on advanced methods of aircraft separation to support the FAA's goal of ''free flight.'' Free flight is an operational vision that will allow aircraft to cooperatively plan and execute their optimal flight paths with minimal interference from ground-based controllers. The overall infrastructure improvements to the airspace system (including surveillance) required to achieve operational benefits are being defined, and public comment will be sought on the benefits, procedures, and any new avionics requirements before they are implemented. The FAA further invites comment on whether future equipage of Mode S transponders should be mandatory for certain areas of operation.

Except for aircraft equipped with TCAS II, the presence of Mode S transponder capability on part 135 aircraft would not enhance the safety of flight in today's airspace environment. If the demand for air traffic services continues to increase, A mode S transponder may be necessary for aircraft operating under parts 121 and 135 to increase efficiency in some areas of the national airspace system.

The Proposed Rule

The FAA proposes to rescind the Mode S transponder requirement for aircraft operating under part 135 of the FAR and those aircraft operating under part 121 that are not required to have TCAS II.

Paperwork Reduction Act

This proposed rulmaking would rescind an agency regulation and would not change any reporting requirements. Therefore, no review or approval under the Paperwork Reduction Act is required.

Regulatory Evaluation Summary

The FAA has determined that this rulemaking is not a ''significant regulatory action'' as defined by Executive Order 12866 (Regulatory Planning and Review). The anticipated costs and benefits associated with this NPRM are summarized below. (A detailed discussion of costs and benefits is contained in the full regulatory evaluation contained in the docket for this NPRM.)

Overview

Although this proposal applies to operators under parts 121 and 135, the benefits and costs sections of this evaluation will only focus on part 135 operators. Of the part 121 operators, only those not required to install TCAS II would be affected by this proposed rule. The FAA is not able, at this time, to determine the number of these operators because there is no information readily available. For this reason, only the potential impact on part 135 operators will be analyzed in this evaluation. The FAA solicits comments from the aviation community as to the number of part 121 operators not required to have TCAS II.

This proposed Mode S rescission would apply to all part 135 operators regardless of what kind of transponder (remote-mounted or panel-mounted) they would purchase. For this evaluation, however, the FAA will consider only those part 135 operators who would install remote-mounted transponders. When the FAA estimated the benefits of the Mode S rescission for part 91 operators, it counted all of the panel mounted Mode S transponders since those transponders are predominantly installed in part 91 aircraft. The FAA has since learned that some panel-mounted transponders are also installed in part 135 aircraft, especially those with less than 10 seats. Thus, the FAA has not estimated the number of panel-mounted transponders that are being operated in part 135 aircraft for this proposed rule. The FAA has not estimated this number for two reasons. First, the proportion of new panel-mounted transponders that are installed in part 135 aircraft is very difficult to estimate. Second, even if that proportion could be estimated, it could not be used to calculate the benefits for the proposed rule since they were already used to calculate the benefits of rescinding the Mode S requirement for part 91 operators. Consequently, the benefits of the proposed rule are underestimated.

Benefits

The benefits of this proposed rule are the cost-savings to aircraft operators who would be allowed to purchase Mode A transponders instead of Mode 2 transponders. The FAA estimates the cost-savings to be approximately $10 million over the next 10 years. The present value of these cost-savings would be $7 million (discounted, 7 percent, 1992 dollars).

To estimate the potential cost-savings of this proposed rule, the FAA estimated the number of remote-mounted transponders that would be installed in part 135 aircraft with 10 to 29 seats. The FAA estimates that 780 such aircraft are being operated in the United States. These aircraft make up the vast majority of aircraft that would be affected by the proposed rule to rescind the Mode S requirements.

The potential benefits would be the cost-savings that these operators would realize when they replace an existing remote-mounted Mode A transponder. The proposed rule would allow them to purchase and install another remote-mounted Mode A transponder instead of a new remote-mounted Mode S transponder. To estimate these potential benefits, the FAA surveyed several transponder manufacturers, fixed-based operators, and regional airlines in an effort to ascertain information on the frequency of Mode A transponder replacement. According to these industry sources, a part 135 operator would purchase a new transponder, on average, once every 10 years. Thus, over the next 10 years, on average, each part 135 operator would have purchased a new Mode S transponder.

Currently, an estimated 780 part 135 aircraft would potentially be affected by this proposed rule. Therefore, the population of part 135 aircraft that would be affected by this proposed rule annually would be approximately 78 (780/10). This translates into approximately 78 remote-mounted Mode S transponders that would be sold annually over the next 10 years.

The difference in price (including installation) between the average remote-mounted Mode A transponder and the average remote-mounted Mode S transponder is $12,800. This price represents the average cost-savings that a part 135 operator could realize as a result of the proposed rule to rescind Mode S requirements. Multiplying this cost-savings estimate of $12,800 by the number of transponders expected to be sold over the next 10 years would result in total potential benefits of $10 million (or $7 million discounted).

Costs

The proposed rule would impose an estimated cost of $910,000 (or $640,000 discounted) over the next 10 years. This cost impact would only affect Mode S manufacturers and would be the reduction in profit earned from Mode S sales. (Sales from Mode S exports would not be affected by the NPRM.) This proposed rule would not impose costs in the form of either reduced aviation safety or operational efficiency. The expected aviation safety and operational efficiency benefits of the Mode S rule have not been realized because the ground sensors were never installed and tested. This assessment is based on the following analysis of each of the potential cost components.

Aviation Safety and Operational Efficiency

Rescinding the Mode S requirement would not decrease operational efficiency in the air traffic control

system. In addition, the rescission would not decrease safety to aircraft operators and the flying public. While areas of high density air traffic may benefit from the improved target and altitude integrity of the Mode S system, the benefit will derive primarily from the ground sensor component; the limited benefit expected from the transponder component by itself would appear not to warrant the current Mode S transponder requirement for part 135 aircraft. Since those potential benefits have never been realized, neither aviation safety nor operational efficiency would decrease as a result of this proposed rule.

Mode S Transponder Manufacturers

Another potential cost impact of this proposed rule would be the additional costs incurred by manufacturers of Mode S transponders in lost profits. The manufacturers of remote-mounted Mode S transponders have made investments in designing and developing such products. The potential costs to those manufactures would be: (1) The initial investment to develop Mode S transponders for part 135 aircraft and (2) the potential lost profit on each remote-mounted Mode S transponder sold in the future. In terms of the initial development cost, there would be no loss due to this proposed rule. These manufacturers have incurred costs for developing remote-mounted Mode S transponders in response to the Mode S rule. Such costs, which are in excess of $4 million (undiscounted), are sunk and cannot be considered as part of the proposed rule. Once an investment is made and cannot be altered, it is called a sunk cost. For this reason, sunk costs are not considered when evaluating the costs of regulatory actions.

In terms of profits on Mode S transponders sold in the future, the proposed rule would impose a cost. The proposed Mode S rescission would decrease the demand for remote-mounted Mode S transponders by part 135 operators; hence, the cost to manufacturers would be lost profit. This lost profit would represent the difference in profit earned from sales of Mode A rather than Mode S transponders over the next 10 years. Due to the proprietary nature of such information, the FAA was unable to ascertain specific rates of profit that manufacturers earn on the sale of Mode S transponders. However, the FAA did receive information that indicates the profit earned on the sale of Mode A transponders is 10 percent. The FAA contends that this rate is also a fair representation for Mode S transponders as well, since they are similar products installed in the same type of aircraft and purchased by the same part 135 operators.

The amount of potential lost profit (LP) is the amount of revenue (R) that would be earned from the sale of Mode S transponders (instead of Mode A transponders) less the cost (C) of manufacturing Mode S transponders (instead of Mode A transponders). The revenue is equivalent to the cost-savings incurred by aircraft operators, which is $7 million (discounted) over the next 10 years. The cost of manufacturing Mode S tranponders can be estimated based on the relationship between the rate of profit, the revenue and the manufacturing cost. In general terms, this relationship can be represented as R=C×P. In this instance, revenue is $7 million and profit is 1.10. To estimate the potential lost profit, the following calculation is made:

R=C×P=$7M
C=$7M/1.10=$6.36M
LP=R−C=$640,000

As shown in the above calculation, the estimate of $640,000 represents the present value lost profit from selling Mode A instead of Mode S transponders over the next 10 years. The FAA recognizes that there is some uncertainty in the accuracy of the rate of profit on transponder sales for manufacturers. This uncertainty is due, in large part, to the fact that the rate of profit varies among manufacturers of remote-mounted Mode S transponders. As the result of this uncertainty, the FAA solicits comments from manufacturers of remote-mounted Mode S transponders as to the accuracy of the 10 percent rate of profit estimate.

Conclusion

The potential cost-relieving benefits of this proposed rule are estimated to be $7 million (discounted). The potential costs are estimated to be $640,000 (discounted). Based on this assessment, the FAA has determined that this proposed rule is cost-beneficial.

Initial Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily burdened by government regulations. The RFA requires agencies to review rules that may have a ''significant economic impact on a substantial number of small entities.''

According to the FAA's *Regulatory Flexibility Criteria and Guidance (2100.14A),* a substantial number of small entities means a number that is not less than 11 and that is more than one third of the small entities subject to the proposed rule. The small entities that this proposed rule would potentially affect are aircraft flight instrument manufacturers that produce no more than 250 units annually. The FAA has identified the three manufacturers that produce remote mounted Mode S transponders. On average, these three manufacturers combined sell approximately 2,200 transponders annually. Each of the three manufacturers sell, on average, approximately 730 (2,200/3) Mode S transponders annually. Since 730 exceeds the annual size threshold of 250, none of the U.S. Mode S transponder manufacturers are considered to be small. Thus, this proposed rule would not impose a significant economic impact on a substantial number of small entities. For this reason, a regulatory flexibility analysis is not required.

International Trade Impact Assessment

The Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. This proposed rule would not have a competitive trade disadvantage on foreign companies that sell foreign aviation products or services in the United States. This proposed rule also would not have a competitive trade disadvantage on domestic companies that sell U.S. products or services in foreign countries. This assessment is based on the belief that the number and type of transponders sold to foreign operators by U.S. manufacturers would not change as a result of this proposed rescission. The FAA was not able to identify any foreign manufacturers that sell transponders in the United States. Based on this information, the FAA contends that there would be no impact on them. However, the FAA solicits any comments on the international trade impact.

Federalism Implications

The proposed rescission of the regulation herein would not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this proposal would not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion

For the reasons discussed in this preamble and based on the findings in

the Regulatory Flexibility Determination and the International Trade Impact Analysis, the FAA has determined that the proposed rescission of this regulation is not significant under Executive Order 12866. In addition,the FAA certifies that this rule will not have a significant economic impact on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. This proposal is considered not significant under DOT Regulatory Policies and Procedures (44 FR 111034; February 26, 1979). A regulatory evaluation of the regulation, including a Regulatory Flexibility Determination, and International Trade Impact Analysis, has been placed in the docket. A copy may be obtained by contacting the person identified under **FOR FURTHER INFORMATION CONTACT**.

List of Subjects

14 CFR Part 121

Air carriers, Aircraft, Aviation safety, Charter flights, Transportation.

14 CFR Part 135

Air taxis, Aircraft, Aviation safety.

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend parts 121 and 135 of Title 14, Code of Federal Regulations (14 CFR parts 121 and 135) as follows:

PART 121—CERTIFICATION AND OPERATIONS: DOMESTIC, FLAG, AND SUPPLEMENTAL AIR CARRIERS AND COMMERCIAL OPERATORS OF LARGE AIRCRAFT

1. The authority citation for part 121 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 40119, 44101, 44701–44702, 44705, 44709–44711, 44713, 44716–44717, 44722, 44901, 44903–44904, 44912, 46105.

2. Section 121.345(c) is revised to read as follows:

§ 121.345 Radio equipment.

* * * * *

(c) ATC transponder equipment installed after January 1, 1992, must meet the performance and environmental requirements of the following TSO's:

(1) For aircraft not required to be equipped with an approved TCAS II traffic alert and collision avoidance system pursuant to § 121.356, any class of TSO–C74b or TSO–C74c, as appropriate, or the appropriate class of TSO–C112 (Mode S).

(2) For aircraft required to be equipped with an approved TCAS II traffic alert and collision avoidance system pursuant to § 121.356, the appropriate class of TSO–C112 (Mode S).

PART 135—AIR TAXI OPERATORS AND COMMERCIAL OPERATIONS

1. The authority citation for part 135 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701–44702, 44705, 44709, 44711–44713, 44715–44717, 44722.

2. Section 135.143(c) is revised to read as follows:

§ 135.143 General requirements.

* * * * *

(c) ATC transponder equipment installed after January 1, 1992, must meet the performance and environmental requirements of any class of TSO–C74b or TSO–C74c, as appropriate, or the appropriate class of TSO–C112 (Mode S).

Issued in Washington, DC on May 15, 1996.

William J. White,

Acting Director, Flight Standards Service.

[FR Doc. 96–13030 Filed 5–22–96; 8:45 am]

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