

RULES AND REGULATIONS

reconsideration, the FAA has determined that this requirement can be deleted pending further experience and study. If that experience and study warrants, additional rule making action will be initiated in the future.

The Air Transport Association (ATA) recommended certain specific wording for the regulation, including rewording for clarity. The title has been reworded in consonance with that in the recommendation. The ATA further recommended that the controller-initiated request for deactivation of the equipment be limited, by the regulation, to those circumstances where the equipment is transmitting erroneous information, and not, for instance, to simply alleviate radar scope clutter. ATC will request deactivation of the automatic altitude reporting equipment only in those situations where erroneous data is being transmitted. The controller will have the capability of suppressing or inhibiting altitude information on his radar display without requesting deactivation. In the event that the altitude information displayed to the controller differs from an assigned altitude by an amount that exceeds control tolerances, the controller will initiate communications to verify actual flight altitude and to ascertain that the altitude reporting equipment is functioning properly. The FAA will issue internal instructions and procedures to limit the conditions under which deactivation of the equipment may be directed by ATC. Accordingly, it is not necessary to include that limitation in the regulation.

The ATA also recommended that the language of the rule be reworded to read " * * * on a 95 percent of occasions probability basis * * * " to clarify the intent. It is felt that "occurrence" is implicit in the word "probability" and that the additional language would not contribute to the clarity of the phrase. The purpose of the "95 percent probability" factor is to prescribe for the system an order of accuracy necessary for satisfactory ATC system operation. If the required correspondence value, at the time of installation, is determined by a statistical probability, then it must be at least 95 percent.

The Aircraft Owners and Pilots Association (AOPA) commented that since the controller is interested only in the actual altitude of the aircraft, it did not seem logical to require calibration standards for the digitizer that are more exacting than the calibration requirements for the instrument from which it gets its information. It was also suggested that the periodic maintenance check might be beyond the capability of most repair stations and that a simple accuracy check be substituted. As indicated earlier, the FAA has determined that the requirement for periodic calibration can be omitted at this time, since ATC will be able to monitor system performance and early experience should indicate whether such maintenance is necessary.

It is agreed that the controller's primary interest is in knowing the actual altitude of the aircraft. This is the basic reason for requiring a data correspond-

ence of plus or minus 125 feet. It is recognized that certain inaccuracies are inherent in aneroid systems. Notwithstanding these inaccuracies, it is essential to ATC system performance that the altitude data automatically reported corresponds closely with the altitude data upon which the pilot relies for control of the aircraft.

The Air Line Pilots Association (ALPA) commented that the rule making action might be premature and that it might be advisable to withhold rule making until such time as additional experience is gained from the operation of the Air Traffic Control Radar Beacon System (ATCRBS), utilizing Mode C altitude reporting in the New York area. The ALPA also expressed concern over the possibility that misunderstandings between pilots and controllers might be a basis for enforcement action against pilots.

As indicated in the notice of proposed rule making, the effectiveness of the ATCRBS program, including early evaluation and implementation, will depend heavily upon the integrity and reliability of airborne equipments. Accordingly, it is felt that this action is necessary and timely. As experience indicates a need for change or correction, additional rule making action may be initiated. The FAA sees no basis for the apprehension expressed with respect to enforcement actions. There seems to be no reason why a pilot would be reluctant to deactivate a malfunctioning system when advised of faulty altitude data by ATC and when deactivation is requested.

The ALPA further recommended a correspondence tolerance of plus or minus 50 feet at the transition points with an allowance of plus or minus 25 feet for coupling errors, and that this tolerance be maintained with a reliability-repeatability factor of 99.7 percent (3 sigma), instead of the proposed 125 feet at 95 percent (2 sigma). It was further observed that since correspondence differences as great as 650 feet had appeared in evaluation of the equipment (Report No. RD-65-10 on Project No. 242-006-03x, UAL/FAA ATC Radar Beacon Altitude Reporting Test, January 1965), the rule making would serve no useful purpose unless these values can be improved.

Assuming that the term "coupling error" refers to the accuracy with which the pressure altitude presented to the digitizer is displayed in the cockpit, the 25-foot tolerance recommended is the same tolerance contemplated by the notice, as is the 50-foot uncertainty which exists because of reporting in 100-foot increments. Further treatment of this point appears below in discussion of related questions raised by the Bendix Corp.

On the matter of requiring 99.7 percent (3 sigma) reliability for maintenance of the data correspondence, it is recognized that the higher, 3-sigma, probability might be of some advantage to the ATC system, but it is not considered necessary to require that high a degree of reliability. Added complexity and cost of manufacturing and calibra-

[Docket No. 6724; Amdt. 91-42]

PART 91—GENERAL OPERATING AND FLIGHT RULES

Data Correspondence Between Automatically Reported Pressure Altitude Data and Pilot's Altitude Reference

The purpose of this amendment to Part 91 of the Federal Aviation Regulations is to establish a tolerance for the correspondence of automatic pressure altitude reporting data and the pilot's altitude reference, and to provide for deactivation of the equipment when directed by air traffic control (ATC).

A notice of proposed rule making was published in the FEDERAL REGISTER on August 5, 1966 (31 F.R. 10538), stating that the FAA proposed amendment of Part 91 of the Federal Aviation Regulations to require that automatic pressure altitude reporting equipment associated with radar beacon transponders be tested and calibrated to transmit altitude data that will correspond within 125 feet, on a 95 percent probability basis, with the indicated or calibrated datum of the altimeter normally used to maintain flight altitude, with that altimeter referenced to 29.92 inches of mercury. The notice also proposed that the equipment be deactivated on direction of ATC and that the required testing and calibration be accomplished within 12 calendar months preceding the operation of that equipment.

Interested persons were afforded an opportunity to participate in the rule making through submission of comments. Due consideration was given to all relevant matter presented.

In general, the comments received acknowledged the need for a correspondence tolerance at a high reliability level. Objections to the proposed requirement for periodic testing and calibration of the equipment were expressed and, on

tion are factors in the selection of the 95-percent reliability level. This is a widely accepted engineering measure of performance, and study of available material indicates that it is an order of accuracy which is satisfactory for ATC system operation.

The Bendix Corp. suggested that an analysis of the elements which contribute to the 125-foot tolerance be presented, to facilitate a better understanding of the requirement.

The FAA selected the 125-foot correspondence value based on a recognition that this value was reasonable and easily achievable when the same source (aneroid) is used to feed analog information to the pilot's display and to the pressure altitude digitizer. The value is an accumulation of three elements: A variation of plus or minus 50 feet that may exist between the pressure information from the aneroid and the information actually digitized; and uncertainty factor of plus or minus 50 feet that can exist because of reporting in 100-foot increments; and in installations where the altitude reporting equipment has an optional pilot's display, the difference between the aneroid output feeding the digitizer and the pilot's display should not exceed 25 feet.

The digitizer can introduce an error of plus or minus 50 feet (the first 50-foot value mentioned above) into the automatic altitude reporting system. This possible error is a result of converting analog information (from an aneroid or other source) to electrical information (digital) for relay to the transponder. In other words, there is a possible mechanical error of plus or minus 50 feet inherent in the digitizing process which must be taken into account in determining the correspondence value of 125 feet.

One comment in opposition to the rule objected on the basis that the rule was severe, unnecessary, and imposed a monetary burden on private aircraft owners. It should be emphasized that, at this time, the installation of automatic altitude reporting equipment is purely voluntary. However, at some later date when the FAA ground installations are completed, it is the agency's intention to require this equipment when operating in certain airspace. In addition, the deletion of the requirement for periodic maintenance should contribute to minimizing the cost of the operation of this equipment.

In consideration of the foregoing, Part 91 of the Federal Aviation Regulations is amended, effective August 15, 1967, by adding the following new section after § 91.35:

§ 91.36 Data correspondence between automatically reported pressure altitude data and the pilot's altitude reference.

No person may operate any automatic pressure altitude reporting equipment associated with a radar beacon transponder—

(a) When deactivation of that equipment is directed by ATC; or

(b) Unless, as installed, that equipment was tested and calibrated to trans-

mit altitude data corresponding within 125 feet (on a 95-percent probability basis) of the indicated or calibrated datum of the altimeter normally used to maintain flight altitude, with that altimeter referenced to 29.92 inches of mercury.

(Secs. 307, 313, Federal Aviation Act of 1958; 49 U.S.C. 1343, 1354)

Issued in Washington, D.C., on June 15, 1967.

WILLIAM F. MCKEE,
Administrator.

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8:47 a.m.]