

Title 14—Aeronautics and Space
CHAPTER I—FEDERAL AVIATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

[Docket No. 14449; Amdt. 37-37]

PART 37—TECHNICAL STANDARD ORDER AUTHORIZATIONS

Ground Proximity Warning Equipment

The purpose of this amendment to Part 37 of the Federal aviation regulations is to add a new Technical Standard Order (TSO) for ground proximity warning equipment. This TSO prescribes the minimum performance standards that such equipment must meet in order for a manufacturer to identify it with the applicable TSO designation.

This amendment is based on a notice of proposed rule making (Notice No. 75-11) published in the FEDERAL REGISTER on March 10, 1975, (40 FR 11002). Eight commentators responded to the notice, all of whom were in basic agreement with the proposal. The FAA's disposition of comments is discussed below.

The RTCA Committee responsible for the preparation of RTCA Document DO-161 dated February 7, 1975, (hereinafter DO-161), submitted three recommendations for changes to the document which it considered to be necessary clarifications that would not alter the technical content. A change to paragraph 2.1.4 of DO-161 would more precisely define the operating portion of the envelope there under discussion and add a specific provision (not addressed in the document) to cover change in landing gear configuration occurring when operating within the envelope. A recommended change to the Mode 3 warning envelope would specify a definite flap configuration where the diagram is now silent. A change to the T4 Mode 4 test procedure would also specify flap configuration and simplify the statement of the test objective. The FAA agrees that in the areas cited the recommended changes would clarify the document by removing possible ambiguities, and the applicability paragraph has been amended accordingly.

One commentator recommended that the TSO contain a clear definition of the system and a list of the components included (radio altimeter, vertical speed sensor or air data computer, deactivation control, warning indicators, GPW computer, etc.) in order that the applicability of the TSO requirements relating to reliability, list of components, and marking can be precisely determined. Initially, it should be noted that a TSO is not a specification containing detailed hardware requirements but is a set of performance and related environmental standards which an article must meet in order to be identified with the applicable TSO marking. As explained in the introduction of DO-161, ground proximity warning equipment includes all the components or units determined by the equipment manufacturer to be necessary to perform its intended function. The TSO approval may be granted to an en-

tire system including interacting sensors or to a system limited to a major component such as the ground proximity warning computer where the sensor elements (i.e. radio altimeters) are governed by separate standards. The reliability, listing, and marking requirements apply to the system, including the component parts, for which TSO approval is requested.

The same commentator expressed the opinion that the warning envelopes contained in Appendix A of DO-161 permit tolerance limits that result in loss of capability of the equipment. In this connection, however, the activation envelopes were necessarily restricted to the values given in order to avoid an excessive rate of false warnings that would reduce the credibility of equipment output to the point where it would be operationally ineffective. The FAA believes that expansion of the operational envelopes to the maximum, as suggested by the commentator, would result in an unacceptable rate of false warnings during normal operations.

Four commentators objected to the inclusion of a reliability standard on the asserted grounds that reliability programs have not been successful in the past and that reliability can be negotiated between buyer and seller of the equipment. The FAA does not agree. Reliability is a factor closely related to safety and is therefore properly the subject of a regulatory standard affecting the public. Bases now exist for designing to the reliability level specified in the TSO.

Two commentators objected to the fire protection requirements contained in the proposed TSO on the grounds that such requirements have not previously been incorporated into minimum performance standards and may delay delivery of manufactured units. The FAA believes that fire protection is a necessary requirement in this TSO. Moreover, fire protection provisions are included in other TSO's, as for example §§ 37.132 and 37.136 which incorporate § 25.853, and § 37.178 which contains specific fire protection requirements. The commentators, neither of which are manufacturers, did not explain why delays might result and presented no reason why a delay would justify deletion of the fire protection requirement.

The FAA agrees with several comments to the effect that one data set is not necessary for each manufactured article. As pointed out in the comments, under the proposal a purchaser of several hundred articles would have to pay for and take delivery of a vast bulk of repetitive data that is of no value to him. The requirement has, therefore, been changed to require that one copy of the data and information be furnished to each person receiving for use one or more articles manufactured under the TSO. A user, of course, could arrange to receive additional data sets as needed.

The FAA does not agree with one commentator stating that proposals covering mean time between failure, fire protection, and expanded data requirements

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should be withdrawn from this TSO and be considered independently since their effect extends beyond this one TSO, and only minimal time for response was allowed. These requirements are not new for items of aircraft equipment, and a response directed to other TSO's would be beyond the scope of Notice 75-11. Moreover, as discussed above, each of these requirements has been established, after considering relevant comments, consistent with the needs for ground proximity warning equipment.

One commentator noted that some airlines object to the use of safety wiring on switch protective covers, and recommended that alternatives to safety wiring be permitted in applications not involving use of circuit breakers. The commentator did not recommend any specific alternatives. Safety-wired switch covers are currently used in many transport category aircraft applications without any adverse effect on safety. Moreover, safety wiring is the surest known means of making obvious the fact that the switch has been operated. The requirement is, therefore, being adopted as proposed.

Another commentator recommended that the automatic transfer from Mode 4 to Mode 3 be based on the 500 foot line rather than the lower height line as depicted on the Mode 4 envelope at page 5, Appendix A. The FAA does not agree. To the extent the recommendation may have been based on some misunderstanding on the part of the commentator, the changes discussed above, in connection with paragraph 2.1.4 of DO-161 and the redesignation of one area of the Mode 3 envelope, clarify the explanatory note on the Mode 4 envelope concerning automatic transfer. In addition, it is noted that the lower height was specified for automatic transfer because certain operational requirements of turboprop aircraft may cause undesirable nuisance warnings above that value.

The National Transportation Safety Board (NTSB) has indicated its support for Notice 75-11 but took exception to the omission of any mention of the FAA's planned glide path deviation alarm system as an add-on operational mode requirement. Subsequent to the NTSB (40 FR 17156, April 17, 1975) which invites public comment on the proposal to require a glide path deviation alarm system on large turbine-powered aircraft operating under Part 121. Under rules proposed in Notice 75-16, the glide path deviation alarm system may be integrated into the ground proximity warning equipment.

This amendment is made under the authority of sections 313(a) and 601 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a) and 1421) and section 6(c) of the Department of Transportation Act (49 U.S.C. 1655(c)). comment, the FAA issued Notice 75-16

In consideration of the foregoing, Part 37 of the Federal Aviation Regulations is amended by adding a new § 37.201, effective June 5, 1975, to read as follows:

(As published in the Federal Register [40 F.R. 19636] on May 6, 1975).

FS-75-156-RT

§ 37.201 Ground proximity warning equipment; TSO-C92.

(a) *Applicability.* This Technical Standard Order prescribes the minimum performance standards that ground proximity warning equipment must meet in order to be identified with the applicable TSO marking. Ground proximity warning equipment that is to be so identified must meet the minimum performance standards prescribed in Radio Technical Commission for Aeronautics (RTCA) Document No. DO-161, titled "Minimum Performance Standards, Airborne Ground Proximity Warning System" dated February 7, 1975, (DO-161), with the exceptions covered in paragraphs (a) (1), (2), and (3) of this section, and must meet the additional standards contained in paragraph (c) of this section.

(1) In complying with the second sentence of paragraph 2.1.4 of DO-161, the warning for the upper left portion of the envelope must be provided only when that portion of the envelope is entered from above with the landing gear configured other than for landing. There may not be a warning if the landing gear configuration changes from landing to not landing after entering the upper left portion of the envelope with the gear configured for landing, unless descent with the gear configured other than for landing continues into the lower portion of the envelope.

(2) For the purpose of this section, the lower right portion of the Mode 3, warning envelope diagram, Appendix A, page 4, DO-161, designated "WARNING (ALL CONFIGURATIONS)" is redesignated "WARNING (LANDING GEAR ANY CONFIGURATION, FLAPS NOT IN LANDING CONFIGURATION)".

(3) In complying with the second and third sentences of test procedure T4 Mode 4, paragraph (b), Appendix B, DO-161, with gear selected in landing configuration and flaps set in other than landing configuration, apply a terrain height signal of 300 feet. Then select gear not in landing configuration and verify that no warnings occur.

(b) *Environmental standards.* RTCA Document No. DO-138, titled "Environmental Conditions and Test Procedures for Airborne Electronic/Electrical Equipment and Instruments", dated June 27,

1968, including Change Number 2, dated October 29, 1969, must be used to determine the environmental conditions over which the equipment has been designed to operate.

(c) *Additional standards.* (1) *Reliability.* The design mean time between failure (MTBF) rate may not be less than 8000 hours. This must be shown by the use of analytical methods acceptable to the Administrator.

(2) *Fire protection.* Except for small parts (such as knobs, fasteners, seals, grommets, and small electrical parts) that the Administrator finds would not contribute significantly to the propagation of a fire, all materials used must be self extinguishing when tested in accordance with the requirements of §§ 25.853 and 25.1359(d), as applicable, and Appendix F to Part 25 except that the materials may be of a size and be mounted for the test in accordance with paragraph (b) of Appendix F or may be of a size and be mounted as used in the aircraft.

(3) *Aural and visual warnings.* The required aural and visual warnings must initiate simultaneously.

(4) *Deactivation control.* If the equipment incorporates a deactivation control other than a circuit breaker, the control must be a switch with a protective cover. The cover must be safety wired so that the wire must be broken in order to gain access to the switch.

(d) *Markings.* In addition to the markings specified in § 37.7(d), the equipment must be marked as follows:

(1) The environmental categories over which it has been designed to operate as set forth in Appendix B of RTCA Document No. DO-138 must be permanently and legibly marked on the equipment. Where an environmental test procedure is not applicable and the test is not conducted, an "X" must be placed in the space assigned for that category.

(2) Each separate component of equipment (computer, transducer, etc.) must be permanently and legibly marked with, at least, the name of the manufacturer, the TSO number, and the environmental categories over which it has been tested.

(e) *Data requirements.* In accordance with § 37.5, the manufacturer must furnish to the Chief, Engineering and Manufacturing Branch, Flight Standards Di-

vision (or in the case of the Western Region, the Chief, Aircraft Engineering Division) Federal Aviation Administration, in the region in which the manufacturer is located, one copy of the following technical data, except that additional copies must be furnished upon request:

(1) *Manufacturer's operating instructions and equipment limitations.*

(2) *Installation procedures with applicable schematic drawings, wiring diagrams, and specifications.* Any limitations, restrictions, or other conditions pertinent to installation must be included.

(3) *List of the components (by part number) that make up the equipment system complying with the standards prescribed in this section.*

(4) *Equipment data sheets specifying, within the prescribed ranges of environmental conditions, the actual performance of equipment of that type with respect to each performance factor prescribed in the standard.*

(5) *Manufacturer's test report.*

(f) *Data to be furnished with each manufactured unit.* One copy of the data and information specified in paragraph (e) (1), (e) (2), (e) (3), and (e) (4) of this section must be furnished to each person receiving for use one or more articles manufactured under this TSO.

(g) *Availability of referenced documents.* RTCA Documents Nos. DO-138, dated June 27, 1968, including Change Number 2, dated October 29, 1969, and DO-161, dated February 7, 1975, are incorporated herein in accordance with 5 U.S.C. 552(a) (1) and § 37.25, and are available as indicated in § 37.23. Additionally, RTCA Documents Nos. DO-138 and DO-161 may be examined at any FAA Regional Office of the Chief, Engineering and Manufacturing Branch (or in the case of the Western Region, the Chief, Aircraft Engineering Division) and may be obtained from the RTCA Secretariat, Suite 655, 1717 H Street, NW., Washington, D.C. 20006, at a cost of \$16.00 per copy for Document No. DO-138 and \$16.00 per copy for Document No. DO-161.

Issued in Washington, D.C., on May 1, 1975.

R. P. SKULLY,
Director,
Flight Standards Service.