

Title 14—AERONAUTICS AND SPACE

Chapter I—Federal Aviation Agency

[Docket No. 2073; Amdt. 37-2; Technical
Standard Order C-63a]

PART 37—TECHNICAL STANDARD ORDER AUTHORIZATIONS

Airborne Weather Radar Equipment

The purpose of this amendment is to incorporate new environmental test procedures, which were developed to be more compatible with existing and anticipated aircraft environmental conditions, into the present minimum performance standards for airborne weather radar equipment operating within the radio-frequency bands of 5,350 to 5,470 Mc. and 9,300 to 9,500 Mc. This amendment also revises the minimum performance standards to require a minimum range capability based on the cruising speed of the aircraft. This action was published as a notice of proposed rule making and circulated as FAA Notice No. 63-44 (28 F.R. 12669).

Interested persons have been given an opportunity to comment on this regulation and due consideration has been given to all relevant matter presented.

The title and applicability section of the TSO have been revised to delete the inadvertent inclusion of ground mapping radar that was in the notice. Also, the applicability section of the standard has been amended to show that these standards are only applicable with respect to air carrier aircraft. This has been done since only air carrier aircraft are required to have this equipment approved. This change is consistent with the change made to the final rule on TSO C-66a (DME).

Comments were received objecting to the proposed limits for emission of radio-frequency energy. The commentators felt that these more stringent limits would increase the weight and cost of the units and that the limitations in the existing TSO have proven to be adequate and have not caused interference problems. The proposed standards on emission of spurious radio-frequency energy were the result of a study to revise the standards on all electrical and electronic systems used in aircraft. It was recognized that the emissions of air-

borne electronic systems are additive and that the limitations on each should prevent the total effect of all systems on an aircraft from exceeding an acceptable limit. These standards, as established by the study, have been incorporated in six TSO's which have recently been revised. However, in further considering the proposal in the light of the comments received, the Agency has determined that it poses a special problem to manufacture weather radar equipment to the proposed specification and some relaxation is necessary. Accordingly, a change in § 2.14 has been made to allow a slight increase of the level of spurious radio-frequency energy. This slight increase in one system when added to the radiated energy from other equipment is not expected to seriously increase the overall energy level. This relaxation, however, cannot be allowed on other equipment as the additive effect of such a relaxation would cause a noise problem.

One commentator suggested that care be shown in keeping the minimum standards high and broad enough to insure reliability and maintainability. The Agency provides for reliability of equipment through conservative component ratings and by conducting prescribed tests which cover extremes of environmental conditions. The prescribed performance standards are made sufficiently exacting so that designers will consider maintainability of the equipment when designing it. Further, manufacturers are required to submit installation instructions to the Agency, so that when followed the equipment will perform in service as well as required in the performance tests. The Agency believes this procedure includes everything reasonably possible for the establishment of minimum standards to insure reliability and maintainability.

Comments were made that the TSO only covers the "c" and "x" bands of radar, and the TSO should not preclude the use of "k" band radar. Similarly, commentators suggested the TSO be expanded to include the "k" band. The Agency agrees that the TSO should not preclude the use of "k" band radar, and it does not. The "k" band was not included in the notice since an adequate basis for such standards was not available at that time. The Agency agrees that standards for "k" band radar should be provided and such standards are under consideration.

A final source of comment was a sug-

gestion that the range capability table be expanded to cover at least 200 miles. The range capability factor is based on aircraft operational cruising speeds so that a pilot can have sufficient time within which to detect and avoid dangerous atmospheric areas. The range capability has been designed to provide a minimum time of 12 minutes of warning at subsonic speeds. Eventually, with the advent of supersonic aircraft, an increase in the range will be necessary. However, at this time no change has been made.

In addition to the foregoing, certain editorial corrections have been made in the revised performance standards referred to in this TSO. They do not involve any change in substance.

In consideration of the foregoing, § 37.168 of Part 37 is amended to read as follows, effective September 27, 1965.

§ 37.168 Airborne weather radar equipment operating within the radio-frequency bands of 5,350 to 5,470 Mc. and 9,300 to 9,500 Mc.—TSO C-63a.

(a) *Applicability.* This TSO prescribes the minimum performance standards that airborne weather radar equipment, to be used on U.S. civil aircraft engaged in air carrier operations, must meet in order to be identified with the applicable TSO marking. New models of such equipment which are to be so identified and which are manufactured on or after September 27, 1965, must meet the requirements set forth in the FAA Standard entitled "Minimum Performance Standards for Airborne Weather Radar Equipment Operating Within the Radio-Frequency Bands of 5,350 to 5,470 Mc. and 9,300 to 9,500 Mc.", dated March 15, 1965,¹ and Federal Aviation Agency document, "Environmental Test Procedures for Airborne Electronic Equipment, dated August 31, 1962.¹

(b) *Marking.* (1) In addition to the markings specified in § 37.7, the equipment shall be marked to indicate the environmental extremes over which it has been designed to operate. There are six environmental test procedures outlined which have categories established. These should be identified on the nameplate by the words "Environmental Categories" or, as abbreviated, "Env. Cat." followed by six letters which identify the

¹ Copies may be obtained upon request addressed to Library Services Division, HQ-620, Federal Aviation Agency, Washington, D.C., 20553.

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categories designated in the FAA document. Reading from left to right, the category designations shall appear on the nameplate in the following order so that they may be identified.

(i) Temperature-Altitude Test Category;

(ii) Vibration Test Category;

(iii) Audio-Frequency Magnetic Field Susceptibility Test Category;

(iv) Radio-Frequency Susceptibility Test Category;

(v) Emission of Spurious Radio-Frequency Energy Test Category; and

(vi) Explosion Test.

(2) Six classes of equipment based on range capability have been established in the FAA Standard under paragraph 2.4, Range Capability. The equipment shall be marked to indicate the distance range declared by the manufacturer.

(3) In some cases such as under the Temperature-Altitude Test Category, a manufacturer may wish to substantiate his equipment under two categories. In this case, the nameplate shall be marked with both categories in the space designated for that category by placing one letter above the other such as "Env. Cat.

^ABAAAX Class 3."

^D(4) Each separate component of

equipment (antenna, synchronizer unit, indicator console, etc.) shall be identified with at least the manufacturer's name, TSO number, and the environmental categories over which the equipment component is designed to operate.

(c) *Data requirements.* In accordance with the provisions of § 37.5, the manufacturer shall furnish to the Chief, Engineering and Manufacturing Branch, Flight Standards Division, Federal Aviation Agency, in the region in which the manufacturer is located, the following technical data:

(1) Six copies of the manufacturer's operating instructions and equipment limitations;

(2) Six copies of the installation procedures with applicable schematic drawings, wiring diagrams, and specifications, indicating any limitations, restrictions, or other conditions pertinent to installation; and

(3) One copy of the manufacturer's test report.

(Sec. 313(a) and 601 of the Federal Aviation Act of 1958; 49 U.S.C. 1354(a), 1421)

Issued in Washington, D.C., on June 22, 1965.

G. S. MOORE,
Director, Flight Standards Service.