Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, DC

TSO-C54

Date: 10/15/61

Technical Standard Order

Subject: TSO-C54, STALL WARNING INSTRUMENTS

Technical Standard Orders for Aircraft Materials,
Parts, Processes, and Appliances

Part 514 contains minimum performance standards and specifications of materials, parts, processes, and appliances used in aircraft and implements the provisions of sections 3.18, 4a.31, 4b.18, 6.18 and 7.18 of the Civil Air Regulations. The regulation uses the Technical Standard Order system which, in brief, provides for FAA-industry cooperation in the development of performance standards and specifications which are adopted by the Administrator as Technical Standard Orders, and a form of self-regulation by industry in demonstrating compliance with these orders.

Part 514 consists of two subparts. Subpart A contains the general requirements applicable to all Technical Standard Orders. These provisions are summarized below for the convenient reference of the public. Subpart B contains the technical standards and specifications to which a particular product must conform, and each Technical Standard Order is set forth in the appropriate section of Subpart B. The subject Technical Standard Order is printed below. ANY TECHNICAL STANDARD ORDER MAY BE OBTAINED BY SENDING A REQUEST TO FAA, WASHINGTON 25, D.C.

SUBPART A--GENERAL

This subpart provides, in part, that a manufacturer of an aircraft material, part, process, or appliance for which standards are established in Subpart B, prior to its distribution for use on a civil aircraft of the United States, shall furnish a written statement of conformance certifying that the material, part, process, or appliance meets the applicable performance standards established in this part. The statement of conformance must be signed by a person duly authorized by the manufacturer, and furnished to the Chief, Engineering and Manufacturing Division, Flight Standards Service, Federal Aviation Agency, Washington 25, D. C.

Subpart A also requires appropriate marking of materials, parts, processes, and appliances as follows:

(a) Name and address of the manufacturer responsible for compliance,

(b) Equipment name, or type or model designation,

(c) Weight to the nearest pound and fraction thereof,

(d) Serial number and/or date of manufacture, and

(e) Applicable Technical Standard Order (TSO) number.

In addition, Subpart A provides that no deviation will be granted from the performance standards established in Subpart B, and that the Administrator may take appropriate action in the event of noncompliance with Part 514.

SUBPART B

§ 514.53 Stall warning instruments - TSO-C54-- (a) Applicability - (1) Minimum performance standards. Minimum performance standards are hereby established for stall warning instruments which specifically are required to be approved for use on civil aircraft of the United States. New models of stall warning instruments manufactured for installation on civil aircraft on or after October 15, 1961, shall meet the standards as set forth in SAE Aeronautical Standard AS 403A, "Stall Warning Instrument", revised July 15, 1958,[1/] with exceptions, and additions to the standards listed in subparagraph (2) of this paragraph.

(2) Exceptions and additions. (i) The following specifically numbered parts in AS 403A do not concern minimum performance and therefore are not essential to compliance with this section: Parts 3.1; 3.1.1; 3.1.2; 3.2 (a), (b), (c), (d), (e), and (f).

(ii) In lieu of Part 7, it is a requirement that stall warning instruments covered by this section be capable of successfully passing the tests in Parts 7.1 through 7.7.

(iii) Thermal shock: This test shall apply to any hermetically sealed component. The component shall be subject to four cycles of exposure to water at 85° ± 2° C. and 5° ± 2° C. without evidence of moisture penetration or damage to coating or enclosure. Each cycle of the test shall consist of immersing the component in water at 85° ± 2° C. for a period of 30 minutes, and then within 5 seconds of removal from the bath, the component shall be immersed for a period of 30 minutes in the other bath maintained at 5° ± 2° C. This cycle shall be repeated continuously, one cycle following the other until four cycles have been completed. Following this test, the indictor shall be subjected to the Sealing test specified in (iv). No indicator leakage shall occur as a result of this test.

(iv) Sealing: This performance test shall apply to each hermetically sealed instrument. The instrument shall be immersed in a suitable liquid, such as water. The absolute pressure of the air above the liquid shall them be reduced to approximately 1 inch of mercury (Hg) and maintained for 1 minute, or until air bubbles cease to be given off by the liquid, whichever is longer. The absolute pressure shall then be increased by 2 ½ inches Hg. Any bubbles coming from within the indicator case shall be considered as leakage and shall be cause for rejection. Bubbles which are the result of entrapped air in the various exterior parts of the case shall not be considered as leakage. Other test methods which provide evidence equal to the immersion test of the integrity of the instrument's seals may be used. If the instrument incorporates

1/ Copies of these may be obtained from the Society of Automotive Engineers, 485 Lexington Avenue, New York 17, New York.

nonhermetically sealed appurtenances, such as a case extension, these appurtenances may be removed prior to the sealing test.

(v) Power malfunction indication: Means shall be incorporated in the instrument to indicate when adequate power (voltage and/or current) is not being made available to all phases required for the proper operation of the instrument. The indicating means shall indicate a failure or a malfunction in a positive manner, and be readily discernible under any lighting condition normally encountered in aircraft.

(b) Marking. In addition to the markings specified in Subpart A, range or rating (voltage) shall be shown.

(c) Data requirements. (1) The manufacturer shall maintain a current file of complete design data.

(2) The manufacturer shall maintain a current rule of complete data describing the inspection and test procedures applicable to his product.

(3) Six copies each, except where noted, of the following shall be furnished to the Chief, Engineering and Manufacturing Division, Flight Standards Service, Federal Aviation Agency, Washington 25, D. C.

(i) Manufacturer's operating instructions and instrument limitations.

(ii) Drawings of major components or photographs showing exploded views of instruments.

(iii) Installation procedures with applicable schematic drawings, wiring diagrams, and specifications, including any limitations, restrictions, or other conditions pertinent to installation.

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

(d) Quality control. Each stall warning instrument shall be produced under a quality control system, established by the manufacturer, which will assure that each stall warning instrument is in conformity with the requirements of this section and is in condition for safe operation. This system shall be described in the data required under paragraph (c)(2). A representative of the Administrator shall be permitted to make such inspections and tests at the manufacturer's facility as may be necessary to determine compliance with the requirements of this standard.

(e) Previously approved equipment. Stall warning instruments approved by the Administrator prior to October 15, 1961, may continue to be manufactured under the provisions of their original approval.

(f) Effective date. October 15, 1961.