



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

AC 20-41A
DATE: 4/5/1977

AC No: 20-41A

SUBSTITUTE TECHNICAL STANDARD ORDER (TSO) AIRCRAFT EQUIPMENT

Initiated by: AFS-130

Date: 4/5/77

1. **PURPOSE.** This circular sets forth an acceptable means for complying with the rules governing aircraft equipment installations in cases involving the substitution of technical standard order (TSO) equipment for functionally similar TSO approved equipment.
2. **CANCELLATION.** AC 20-41, dated August 30, 1965, is cancelled.
3. **REFERENCE REGULATIONS.** Parts 23, 25, 27, and 29, and sections 21.95, 21.113, 21.115, and 43.13 of the Federal Aviation Regulations.
4. **BACKGROUND.** Under the referenced rules, the determination of compliance with the regulations may require that an aircraft be flown for functional check of any replacement parts or installations. There have been discussions relative to the possibility of substantiating the acceptability of installations, without a flight check, when functionally similar TSO'd equipment is substituted for previously approved TSO'd equipment. The acceptable means of compliance in paragraph 5 deals with this question and is applicable to the evaluation of replacements under the alterations performance rules of section 43.13, a minor change in type design per section 21.95, or supplemental type certificate procedures of sections 21.113 and 21.115.
5. **ACCEPTABLE MEANS OF COMPLIANCE.** In the case of an aircraft alteration involving the substitution of TSO-approved equipment for functionally similar TSO'd equipment, an acceptable means of compliance with applicable airworthiness regulations, without the aircraft being flight checked, is to:
 - a. Show, by means of ground functional tests, analyses, drawings, descriptive data or combination of these that:
 - (1) The substitute equipment and its installation meet the airworthiness regulations which are applicable to the equipment to be replaced;
 - (2) The connections (electrical, electronic, mechanical, or

fluid) between the equipment under consideration and other equipment in the aircraft either remain the same or, if these connections are modified, the modification does not affect the TSO status of the equipment; and

- (3) The radiation system (including transmission lines) and other electrical or electronic aircraft equipment that connect to the equipment under consideration either remain the same, or if modified, the modification does not adversely affect the performance of such systems or equipment and the subject equipment.
- b. Include necessary information in the appropriate part of the Federal Aviation Administration approved Flight Manual concerning any significant change in equipment capability as determined from the evaluation outlined in items 5.a.
6. EXCLUDED EQUIPMENT. The substitution procedures provided by this circular should not be used in connection with auto pilots, flight directors, inertial navigation systems, stability augmentation systems, stall prevention systems, tires, wheel-brake systems, or any other equipment directly affecting flight controls or flight characteristics. Substitutions which affect equipment in the cockpit should be evaluated by appropriate flight test personnel.
7. FLIGHT TESTS. Flight tests may be necessary, in some cases, to adequately evaluate the effects of changes and this decision rests with the approving authority.

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