*English Translation Version for Reference Only*

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# China Civil Aviation Technical Standard Order

This China Civil Aviation Technical Standard Order (CTSO) is issued according to Part 37 of the China Civil Aviation Regulations (CCAR-37). Each CTSO is a criterion which the concerned aeronautical materials, parts or appliances used on civil aircraft must comply with when it is presented for airworthiness certification.

## Traffic Advisory System(TAS) Airborne Equipment

**1. Purpose.**

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for Traffic Advisory System(TAS) Airborne Equipment CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards(MPS) that Traffic Advisory System(TAS) Airborne Equipment must first meet for approval and identification with the applicable CTSO marking.

**2. Applicability.**

This CTSO affects new application submitted after its effective date. Major design changes to article approved under this CTSO will require a new authorization in accordance with section 21.353 of CCAR-21-R4.

**3. Requirements**

New models of TAS airborne equipment identified and

manufactured on or after the effective date of this CTSO must meet the MPS qualification and documentation requirements in Sections 2.1 and 2.2 of RTCA/DO-197A, Minimum Operational Performance Standards for An Active Traffic Alert and Collision Avoidance System I (ACTIVE TCAS I), dated September 12, 1994.

a. Functionality.

(1) This CTSO's standards apply to equipment intended to be used in transponder equipped aircraft to provide a reliable traffic alert and collision avoidance function.

(2) This CTSO supports two classes of TAS equipment.

(a) Class A. Equipment incorporating a horizontal situation display that indicates the presence and relative location of intruder aircraft, and an aural alert informing the crew of a Traffic Advisory (TA).

(b) Class B. Equipment incorporating an aural alert and a visual annunciation informing the crew of a TA.

b. Failure Condition Classifications.

(1) Failure of the function defined in paragraph 3.a of this CTSO has been determined to be a major failure condition for malfunctions causing the display or annunciation of hazardously misleading information in airborne aircraft.

(2) Loss of the function defined in paragraph 3.a is a minor failure condition.

(3) Design the system to at least these failure condition classifications.

c. Functional Qualification. Demonstrate the required functional performance under the test conditions specified in RTCA/DO-197A section 2.4 as modified by the changes in appendix 1 of this document.

d. Environmental Qualification. Demonstrate the required performance under the test conditions specified in DO-197A section 2.3 using standard environmental conditions and test procedures appropriate for airborne equipment. Applicant may use a different standard environmental condition and test procedure than RTCA/DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment, dated December 8, 2010, provided the standard is appropriate for the TAS airborne equipment.

Note: The use of RTCA/DO-160D (with Changes 1 and 2 only, incorporated) or earlier versions is generally not considered appropriate and will require substantiation via the deviation process as discussed in paragraph 3.g of this CTSO.

e. Software Qualification. If the article includes software, develop the software according to RTCA/DO-178C, Software Considerations in Airborne Systems and Equipment Certification, dated December 13, 2011, including referenced supplements as applicable, to at least the software level consistent with the failure condition classification defined in

paragraph 3.b of this CTSO. The applicant may also develop the software according to RTCA/DO-178B, dated December 1, 1992.

f. Electronic Hardware Qualification. If the article includes complex custom airborne electronic hardware, develop the component according to RTCA/DO-254, dated April 19, 2000, Design Assurance Guidance for Airborne Electronic Hardware, to at least the design assurance level consistent with the failure condition classification defined in paragraph 3.b of this CTSO. For custom airborne electronic hardware determined to be simple, RTCA/DO-254, paragraph 1.6 applies.

g. Deviations. For using alternative or equivalent means of compliance to the criteria in this CTSO, the applicant must show that the equipment maintains an equivalent level of safety. Apply for a deviation under the provision of 21.368(a) in CCAR-21-R4.

**4. Marking.**

a. Mark at least one major component permanently and legibly with all the information in 21.423(b) of CCAR-21-R4. The marking must include the serial number.

b. Also, mark the following permanently and legibly, with at least the manufacturer’s name, subassembly part number, and the CTSO number:

(1) Each component that is easily removable (without hand tools);

and,

(2) Each subassembly of the article that manufacturer determined may be interchangeable.

c. If the article includes software and/or airborne electronic hardware, then the article part numbering scheme must identify the software and airborne electronic hardware configuration. The part numbering scheme can use separate, unique part numbers for software, hardware, and airborne electronic hardware.

d. The applicant may use electronic part marking to identify software or airborne electronic hardware components by embedding the identification within the hardware component itself (using software) rather than marking it on the equipment nameplate. If electronic marking is used, it must be readily accessible without the use of special tools or equipment.

**5. Application Data Requirements.**

The applicant must furnish the responsible certification personnel with the related data to support design and production approval. The application data include a statement of conformance as specified in section 21.353(a)(1) in CCAR-21-R4 and one copy each of the following technical data:

a. A Manual(s) containing the following:

(1) Operating instructions and equipment limitations sufficient to describe the equipment's operational capability.

(2) Describe in detail any deviations.

(3) Installation procedures and limitations sufficient to ensure that the TAS airborne equipment, when installed according to the installation or operational procedures, still meet this CTSO's requirements. Limitations must identify any unique aspects of the installation. The limitations must include a note with the following statement:

"This article meets the minimum performance and quality control standards required by a CTSO. Installation of this article requires separate approval."

(4) For each unique configuration of software and airborne electronic hardware, reference the following:

(a) Software part number including revision and design assurance level;

(b) Airborne electronic hardware part number including revision and design assurance level;

(c) Functional description.

(5) A summary of the test conditions used for environmental qualifications for each component of the article. For example, a form as described in RTCA/DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment, Appendix A.

(6) Schematic drawings, wiring diagrams, and any other documentation necessary for installation of TAS airborne equipment.

(7) List of replaceable components, by part number, that makes up the TAS airborne equipment. Include vendor part number cross-references, when applicable.

b. Instructions covering periodic maintenance, calibration, and repair, for the continued airworthiness of the TAS airborne equipment. Include recommended inspection intervals and service life, as appropriate.

c. If the article includes software: a plan for software aspects of certification (PSAC), software configuration index, and software accomplishment summary.

d. If the article includes simple or complex custom airborne electronic hardware: a plan for hardware aspects of certification (PHAC), hardware verification plan, top-level drawing, and hardware accomplishment summary (or similar document, as applicable).

e. A drawing depicting how the article will be marked with the information required by paragraph 4 of this CTSO.

f. Identify functionality or performance contained in the article not evaluated under paragraph 3 of this CTSO (that is, non-CTSO functions). Non-CTSO functions are accepted in parallel with the CTSO authorization. For those non-CTSO functions to be accepted, the applicant must declare these functions and include the following

information with CTSO application:

(1) Description of the non-CTSO function(s), such as performance specifications, failure condition classifications, software, hardware, and environmental qualification levels. Include a statement confirming that the non-CTSO function(s) don't interfere with the article's compliance with the requirements of paragraph 3.

(2) Installation procedures and limitations sufficient to ensure that the non-CTSO function(s) meets the declared functions and performance specification(s) described in paragraph 5.f.(1).

(3) Instructions for continued performance applicable to the non-CTSO function(s) described in paragraph 5.f.(1).

(4) Interface requirements and applicable installation test procedures to ensure compliance with the performance data defined in paragraph 5.f.(1).

(5) Test plans, analysis and results, as appropriate, to verify that performance of the hosting CTSO article is not affected by the non-CTSO function(s).

(6) Test plans, analysis and results, as appropriate, to verify the function and performance of the non-CTSO function(s) as described in paragraph 5.f.(1).

g. The quality system description required by section 21.358 of CCAR-21-R4, including functional test specifications. The quality system

should ensure that it will detect any change to the approved design that could adversely affect compliance with the CTSO MPS, and reject the article accordingly.

h. Material and process specifications list.

i. List of all drawings and processes (including revision level) that define the article's design.

j. Manufacturer's CTSO qualification report showing results of testing accomplished according to paragraph 3.c of this CTSO.

**6. Manufacturer Data Requirements.**

Besides the data given directly to the authorities, have the following technical data available for review by the authorities:

a. Functional qualification specifications for qualifying each production article to ensure compliance with this CTSO.

b. Equipment calibration procedures.

c. Schematic drawings.

d. Wiring diagrams.

e. Material and process specifications.

f. The results of the environmental qualification tests conducted according to paragraph 3.d of this CTSO.

g. If the article includes software, the appropriate documentation defined in the version of RTCA/DO-178 specified by paragraph 3.e of

this CTSO, including all data supporting the applicable objectives in Annex A, Process Objectives and Outputs by Software Level.

h. If the article includes complex custom airborne electronic hardware, the appropriate hardware life cycle data in combination with design assurance level, as defined in RTCA/DO-254, Appendix A, Table A-l. For simple custom airborne electronic hardware, the following data: test cases or procedures, test results, test coverage analysis, tool assessment and qualification data, and configuration management records, including problem reports.

i. If the article contains non-CTSO function(s), the applicant must also make available items 6.a through 6.h as they pertain to the non-CTSO function(s).

**7. Furnished Data Requirements.**

a. If furnishing one or more articles manufactured under this CTSO to one entity (such as an operator or repair station), provide one copy or technical data and information specified in paragraphs 5.a and 5.b of this CTSO. Add any data needed for the proper installation, certification, use, or for continued compliance with the CTSO, of the TAS airborne equipment.

b. If the article contains declared non-CTSO function(s), include one copy of the data in paragraphs 5.f.(1) through 5.f.(4).

## 8. Availability of Referenced Documents.

Order RTCA documents from:

Radio Technical Commission for Aeronautics, Inc.

1150 18th Street NW, Suite 910, Washington D.C. 20036

You may also order them online from the RTCA Internet website at:

www.rtca.org.

# APPENDIX 1. Changes to RTCA/DO-197A, Minimum Operational Performance Standards for an Active Traffic Alert and Collision Avoidance System I (Active TCAS I) applicable to Traffic Advisory System (TAS) airborne equipment.

Note: This appendix changes several sections of DO-197A that the DO-197A Change 1 document does but it adopts different requirements than those which are contained in the Change 1 document.

## 1.0 Changes Applicable to Both Class A and Class B Equipment.

### 1.1 Receiver Characteristics.

**1.1.1 In-band Acceptance.** In lieu of paragraph 2.2.2.1 of RTCA DO-197A, substitute the following requirement:

Given a valid transponder reply signal in the absence of interference or overloads, the minimum trigger level (MTL) is defined as the input power level that results in a 90% ratio of decoded to received replies.

The MTL over the frequency range of 1,087 to 1,093 MHz shall be no greater than -70 dBm.

**1.1.2 In-band Acceptance.** In paragraph 2.4.2.2.1 of RTCA DO-197A, eliminate the following:

under Intruder Aircraft eliminate the last line: “Scenario C and D ⩾ -78 dBm.”

under Test Description Success:, eliminate the last sentence: “For scenarios C and D, the ratio of correctly decoded intruder replies to total

input replies shall not exceed 10%.”

**1.2 Transmission Frequency.** In lieu of paragraph 2.2.3.1 of RTCA/DO-197A, substitute the following requirement:

“The transmission frequency of Mode C interrogations shall be 1,030 ±0.2 MHz.”

**1.3 Transmitter RF Output Power.** In lieu of paragraph 2.2.3.2 of RTCA/DO-197A, substitute the following requirement:

When transmitting at full (unattenuated) output power, the peak RF output power delivered to a quarter wave stub antenna shall be within the following limits:

Maximum RF Power: 54 dBm (250W)

Minimum RF Power: 50 dBm (100W)

In the event that antenna gain differs from that of a quarter wave stub antenna (3 dBi), the power limits shall be adjusted accordingly. These limits are based upon range and interference limiting requirements.

**Note: When transmitting at full (unattenuated) power, the RF power radiated at the pattern peak shall be within the following limits:**

**Maximum EIRP: 57 dBm(500W)**

**Minimum EIRP: 53 dBm(200W)**

**It is assumed that the peak gain of a typical quarter wave stub antenna is 3 dBi. EIRP = Effective Isotropic Radiated Power.**

**Note: As an alternative to the above, an active TAS may choose to operate as a low power system at a fixed rate power product limit of 42 Watts per second, in which case the peak RF output power delivered to a quarter wave stub antenna shall not exceed 46 dBm (40W).**

**1.4 Transmitter Pulse Characteristics.** In lieu of paragraph 2.2.3.5 of RTCA/DO-197A, substitute the following requirement:

ATCRBS interrogations from active TAS shall employ the Mode C format illustrated in Figure 2-1.

The rise and decay times may be less than shown in the following table, provided the sideband radiation does not exceed the spectral limits tabulated in this standard. The amplitude of P3 shall be within 0.5 dB of the amplitude of P1.

ACTIVE TAS MODE PULSE SHAPES (All values in Microseconds)

| Pulse Designator | Pulse Duration | Duration Tolerance | Rise Time | | Decay Time | |
|---|---|---|---|---|---|---|
| P1, P3 | 0.8 | ± 0.075 | Min | Max | Min | Max |
| | | | 0.05 | 0.1 | 0.05 | 0.2 |

The pulse spacing tolerances shall be as follows:

P1 to P3: 21 + 0.10 microseconds

**1.5 Mode S Broadcast Reception.** In lieu of paragraph 2.2.4.2 of RTCA/DO-197A, substitute the following requirement:

The Active TAS shall have the capability to receive 1,030 MHz

Mode S broadcast signals for the purpose of obtaining a count of TCAS interrogators in its vicinity. Mode S reception may reside in an associated Mode S transponder, or may by integral to the Active TAS equipment, in which case those functions necessary to receive and process Mode S broadcast signals for a TCAS count shall be implemented and tested in accordance with RTCA/DO-181A.

**Note: As an alternative to the above, an active TAS may choose to operate at a fixed rate power product limit of 42W/sec, in which case the requirement to obtain a count of TCAS interrogators for the purpose of interference limiting is eliminated.**

**1.6 Interference Limiting.** In lieu of paragraph 2.2.6 of RTCA/DO-197A, substitute the following requirement:

To assure that all interference effects from Active TAS equipment are kept to a low level, Active TAS equipment shall control its interrogation rate or power or both to conform to the following limits.

These limits are given in terms of

RR = the Mode A/C reply rate of own transponder

NT = the number of airborne TCAS interrogators detected via Mode S broadcast receptions with a receiver threshold of -74 dBm.

The Minimum Active TAS shall have the capability to monitor RR and NT and to use this information in interference limiting. Once each scan period, NT shall be updated as the number of distinct TCAS

addresses received within the previous 20 second period.

The limits are as follows:

| NT | K<br>Upper Limit for Σ P(k)<br>k=1 | |
|---|---|---|
| | If RR < 240 | If RR > 240 |
| 0 | 250 | 118 |
| 1 | 250 | 113 |
| 2 | 250 | 108 |
| 3 | 250 | 103 |
| 4 | 250 | 98 |
| 5 | 250 | 94 |
| 6 | 250 | 89 |
| 7 | 250 | 84 |
| 8 | 250 | 79 |
| 9 | 250 | 74 |
| 10 | 245 | 70 |
| 11 | 228 | 65 |
| 12 | 210 | 60 |
| 13 | 193 | 55 |
| 14 | 175 | 50 |
| 15 | 158 | 45 |
| 16 | 144 | 41 |
| 17 | 126 | 36 |
| 18 | 109 | 31 |
| 19 | 91 | 26 |
| 20 | 74 | 21 |
| 21 | 60 | 17 |
| ≥22 | 42 | 12 |

P(k) = power (watts) of the kth interrogation each second. This is the total radiated power (after all losses in cabling and antenna). If the set of powers is not the same in each 1 second period, then Σ P(k) represents the average value.

K = total number of interrogations in a 1 second period.

**Note 1: RR = the Mode A/C interrogation reception rate of own transponder may be used instead of RR = the Mode A/C reply rate of own transponder.**

**Note 2: As an alternative to the above, an active TAS may choose to operate as a low power system at a fixed rate power product limit of 42W/sec, in which case the requirement to further interference limit based on RR or IR is eliminated.**

In lieu of paragraph 2.4.2.5 of RTCA/DO-197A, substitute the following:

This test verifies that Active TAS is able to monitor its own transponder reply rate and to derive a count of TCAS aircraft by listening to TCAS broadcast interrogations and, based on these values, adjust its transmit power-rate product to conform to the Active TAS interference limits.

Inputs:

Active TAS Aircraft

Altitude = 8000 ft.

Altitude Rate = 0 FPM

Intruder Aircraft 1-22

Equipage = Active TCAS II

Range = Not Applicable

Relative Speed = Not Applicable

Altitude = Not Applicable

Altitude Rate = Not Applicable

TCAS Broadcast Interrogation Power = -50 dBm

ATCRBS Interrogation

Frequency = 1030 MHz

Type = ATCRBS Mode C

Power = -50 dBm

Rate

Scenario A = 230 per second

Scenario B = 250 per second

Conditions:

Active TAS initialized and operating at T = 0 seconds. Each of the 22 intruders is assigned a discrete address and transmits only TCAS broadcast interrogations and only at the following times and rates:

Intruders 1-10 every 10 sec starting at T = 30 sec.

Intruders 11-15 every 20 sec starting at T = 70 sec.

Intruders 16-22 every 20 sec starting at T = 130 sec.

The timing of the TCAS broadcast interrogations and the ATCRBS interrogations are controlled to prevent overlap of each other.

Scenario Description

The test involves use of an ATCRBS transponder which supplies

reply rate information to Active TAS. The transponder is interrogated in Mode C at a 230 per second rate in Scenario A and at a 250 per second rate in Scenario B. During each scenario, the value of Total Radiated Power per second from Active TAS is measured by summing the transmitter output powers of each Active TAS interrogation over a scan period, determining the average per second value and accounting for cable and antenna losses.

Success: The Total Radiated Power per second shall not exceed the following values:

Scenario A

250 watts/sec measured at T = 20 sec

245 watts/sec measured at T = 60 sec

158 watts/sec measured at T = 120 sec

42 watts/sec measured at T = 180 sec

Scenario B

118 watts/sec measured at T = 20 sec

70 watts/sec measured at T = 60 sec

45 watts/sec measured at T = 120 sec

12 watts/sec measured at T = 180 sec

**Note: For fixed rate power systems, total radiated power is constant and shall not exceed 42 watts/sec.**

**1.7 Active TAS Antenna System.** In lieu of paragraph 2.2.10 of

RTCA/DO-197A, substitute the following requirement:

The equipment shall transmit interrogations and receive replies from at least one directional antenna mounted on the top or bottom of the aircraft.

**1.8 Pilot Advisory Functions.** In lieu of paragraph 2.1.5 of RTCA/DO-197A, substitute the following requirement:

TAS is an airborne traffic alert system that interrogates ATC transponders in nearby aircraft and uses computer processing to identify potential and predicted collision threats. The system is designed to protect a volume of airspace around the TAS equipped aircraft. The system will provide appropriate aural and visual advisories to assist the flightcrew in visually acquiring the threat aircraft when TAS predicts a penetration of the protected airspace. Traffic advisories indicate the relative positions of intruding aircraft that meet certain range and altitude criteria and are approximately 30 seconds from closest point of approach. They assist the flightcrew in visually acquiring the intruding aircraft. The system provides a traffic display (Class A systems only) and aural and visual alerts. These indicate the relative position and altitude of ATC transponder-equipped aircraft. Traffic advisories can be generated for aircraft with operative Mode S, Mode C or Mode A (non-altitude reporting) transponders. The TAS equipment is viewed as a supplement to the pilot who, with the aid of the ATC system, has the primary

responsibility for avoiding collisions. The TAS system provides no indication of aircraft without operative transponders. For Class A systems, it shall be acceptable for the TAS system to use shape as the only discriminate for traffic threat levels. This will allow the use of a monochrome display representation of the TCAS symbology. For Class A systems, it shall also be acceptable to provide a blinking TA symbol to allow further discrimination of the traffic alert symbol.

**2.0 Changes Applicable Only to Class A Equipment.**

**2.1 Pilot Advisory Functions, Active TCAS I Pilot Interface and Aural Alert**. In lieu of paragraphs 2.1.5, 2.2.12 and 2.2.15 of RTCA/DO-197A, substitute the following requirements:

1. A traffic display shall be provided to indicate the presence and location of intruder aircraft. The traffic display may be combined with other aircraft displays. The traffic display shall provide the crew with the intruder's range, bearing, and, for altitude reporting intruders, relative altitude and vertical trend.

2. Two levels of intruder aircraft shall be displayed; those causing a TA, and other traffic. Other traffic is defined as any traffic within the selected display range and not a TA.

**Note: The use of TCAS threat levels as defined in DO-197A is an acceptable alternative to the requirements defined in this section.**

3. As a minimum, the traffic display shall depict the following

information to aid in the visual acquisition of traffic and assist in determining the relative importance of each aircraft shown:

a. Symbolic differentiation among traffic of different relative importance. TA, other traffic (see i, j, k, l, & m below).

b. Bearing

c. Relative altitude (for altitude reporting aircraft only)

(1) Above or below own aircraft (+ and - signs)

(2) Numerical value

d. Vertical trend of intruder aircraft (for altitude reporting aircraft only).

e. Range. The selected range shall be depicted.

f. The display must be easily readable under all normal cockpit conditions and all expected ambient light conditions from total darkness to bright reflected sunlight.

g. The display shall contain a symbol to represent own aircraft. The symbol shall be different from those used to indicate TA and other traffic. The display shall be oriented such that own aircraft heading is always up (12 o'clock).

h. A ring shall be placed at a range of 2 NM from own aircraft symbol when a display range of 10 NM or less is selected. The ring shall have discrete markings at each of the twelve clock positions. The markings shall be of a size and shape that does not clutter the display.

i. Symbol fill shall be used to discriminate traffic by threat levels.

j. The symbol for a TA is a filled rectangle, and, when appropriate, a data field and vertical trend arrow as described in m. & n. below.

k. The symbol for other traffic shall be an open rectangle, and, when appropriate, a data field and vertical trend arrow as described in m. below.

l. Overlapping traffic symbols should be displayed with the appropriate information overlapped. The highest priority traffic symbol should appear on top of other traffic symbols. Priority order is; 1) TA traffic in order of increasing tau, i.e., the time to closest approach and the time to coaltitude, 2) other traffic in order of increasing range.

m. A data field shall indicate the relative altitude, if available, of the intruder aircraft and shall consist of two digits indicating the altitude difference in hundreds of feet. For an intruder above own aircraft, the data field shall be preceded by a “+” character. For an intruder below own aircraft, the data field shall be preceded by a “-” character. For coaltitude intruders, the data field shall contain the digits “00”, with no preceding “+” or “-” character. The data field shall be wholly contained within the boundaries of the rectangular traffic symbol. For TA traffic, (filled symbol), the data characters shall be depicted in a color that contrasts with the filled symbol color. For other traffic, the data field shall be the same color as the symbol. The height of the relative altitude data

characters shall be no less than 0.15 inches.

n. A vertical arrow should be placed to the immediate right of the traffic symbol if the vertical speed of the intruder is equal to or greater than 500 fpm, with the arrow pointing up for climbing traffic and down for descending traffic. The color of the arrow shall be the same as the symbol.

o. Neither a data field nor a vertical arrow shall be associated with a symbol for traffic which is not reporting altitude.

p. The display shall be capable of depicting a minimum of three intruder aircraft simultaneously. As a minimum, the display shall be capable of displaying aircraft that are within 5 NM of own aircraft.

q. The display may provide for multiple crew-selectable display ranges.

r. When the range of the intruder causing a traffic advisory to be displayed is greater than the maximum range of the display, this shall be indicated by placing no less than one quarter of the traffic advisory symbol at the edge of the display at the proper bearing. The data field and vertical trend arrow shall be shown in their normal positions relative to the traffic symbol.

s. The size of the traffic symbol shall be no less than 0.2 High.

4. “No bearing” advisories shall be presented for an intruder generating a TA when the intruder’s relative bearing cannot be derived.

The “no bearing” advisory shall be an alphanumeric display shown in tabular form. The display shall be in the form of “TA 3.6-05”, which translates to a TA at 3.6 nautical miles, 500 feet below. “No bearing” TA’s against non-altitude reporting intruders shall include the range only, e.g. “TA 2.2”, which translates to a non-altitude reporting, no bearing TA at 2.2 nautical miles. The advisory shall be centered on the display below the own aircraft symbol. The display shall include provisions to display at least two “no bearing” TA’s.

5. **Aural Alerts**. Each TAS aural alert shall be announced in a high-fidelity, distinguishable voice.

a. The aural alert message “Traffic-Traffic”, spoken once, shall be used to inform the crew of a TA.

b. All TAS aural alerts should be inhibited using the following order of precedence;

(1) Below 400 ±100 feet AGL when TAS is installed on an aircraft equipped with a radio altimeter.

(2) For aircraft without a radio altimeter, the aural annunciations shall be inhibited when the landing gear is extended.

**Note: When the TAS is installed on a fixed gear aircraft without a radio altimeter, the aural annunciations will never be inhibited.**

**2.2 Traffic Advisory Criteria.** Replace the second section in paragraph 2.2.14 of RTCA/DO-197A, with the following text:

The TAS equipment shall provide two levels of advisories: Other Traffic (OT), and Traffic Advisories (TA). TAs are issued based on either tau, i.e., the time to closest approach and the time to coaltitude, or proximity to an intruder aircraft. The range tau is defined as the range divided by range rate and the vertical tau is defined as the relative altitude divided by the altitude rate.

**2.3 Display Overload.** In lieu of paragraph 2.2.17 of RTCA/DO-197A, substitute the following requirements:

If the number of targets exceeds the display capability, excess targets shall be deleted in the following order:

a. Other traffic beginning with the intruder at the greatest range.

b. TAs beginning with the intruder having the largest tau. Once a TA has been generated against an intruder, it cannot be removed as a TA until the TA criteria are no longer satisfied even though it may be dropped from the display.

**Note: This exception does not apply when TCAS I symbology and threat levels are used.**

**3.0 Changes Applicable Only to Class B Equipment.**

**3.1 Pilot Advisory Functions, Active TCAS I Pilot Interface, and Aural Alert.** In lieu of paragraph 2.1.5, 2.2.12, and 2.2.15 of RTCA/DO-197A, substitute the following requirements:

1. A visual “Traffic” annunciation, shall be provided for the duration

of the TA.

2. Aural Alerts. For aircraft without a radio altimeter, the aural annunciations shall be inhibited when the landing gear is extended.

**Note: When the TAS is installed on a fixed gear aircraft without a radio altimeter, the aural annunciation will never be inhibited.**

a. Aural alert messages shall be annunciated in threat priority sequence, greatest threat first.

(1) Initial aural traffic advisories shall be spontaneous and unsolicited. The unsolicited annunciations shall be as follows: “Traffic-<X>O’Clock”, spoken once, (where <X> is the clock position of the intruder, such as 1 o’clock, etc.). If surveillance bearing information is not available on the intruder, “Traffic, No Bearing”, shall be annunciated.

(2) The current relative bearing to intruder aircraft shall be annunciated as a traffic advisory update upon crew command. Additional information such as relative altitude, range of intruder, and vertical trend (i.e. climbing, descending) may also be annunciated.

(3) The acceptability of these aural annunciations must be reviewed during flight test. The following factors, at a minimum, must be evaluated for acceptability: quantity of unsolicited annunciations, duration of annunciations, annunciation clarity, and volume. This evaluation shall occur under normal cockpit workload conditions during departure, cruise, and approach and landing phases of flight and should include evaluation

of suitability in a normal air traffic control voice communication environment.

(4) Control means shall be provided to request a traffic advisory update, mute a current aural advisory, and cancel/restore aural advisories (turning the equipment off is an acceptable means of providing the cancel aural advisories function). The default condition of the equipment at power on shall be aural advisories active.

b. All TAS aural alerts should be inhibited using the following order of precedence;

(1) Below 400 ±100 feet AGL when TAS is installed on an aircraft equipped with a radio altimeter.

(2) For aircraft without a radio altimeter, the aural annunciations will never be inhibited in flight but may be inhibited on the ground when the aircraft is equipped with a weight-on-wheels system.

**3.2 Traffic Advisory Criteria.** Replace the first and second sections in paragraph 2.2.14 of RTCA/DO-197A, with the following text:

The Active TAS equipment shall provide two levels of advisories: Other Traffic (OT), and Traffic Advisories (TA). Other traffic is defined as any traffic within the selected display range and not a TA. TAs are issued based on either tau, i.e., the time to closest approach and the time to coaltitude, or proximity to an intruder aircraft. The range tau is defined as the range divided by range rate and the vertical tau is defined as the

relative altitude divided by the altitude rate.

**3.3 Display of intruders on the ground.** In lieu of paragraph 2.2.16 of RTCA/DO-197A, substitute the following requirements:

The Active TAS equipment shall provide logic to inhibit TAs of altitude reporting intruders which are on the ground. This logic shall be used when the TAS-equipped aircraft is below 1,700 feet AGL. The 1,700 foot threshold shall include hysteresis of + 50 feet.

**Note: This represents a requirement for a capability within the Active TAS avionics. When Active TAS is installed on an aircraft which does not have a radio altimeter, there is not a requirement for this logic to function.**

**3.4 Display overload**. In lieu of paragraph 2.2.17 of RTCA/DO-197A, substitute the following requirements:

If the number of intruders exceeds aural memory storage capacity, excess intruders shall be deleted in the following order:

a. Other traffic beginning with the intruder at the greatest range.

b. TAs beginning with the intruder having the largest tau. Once a TA has been generated against an intruder, it cannot be removed as a TA until the TA criteria is no longer satisfied even though it has been dropped from the list of aural warnings.