



The European Organisation for Civil Aviation Equipment
L'Organisation Européenne pour l'Équipement de l'Aviation Civile

Minimum Operational Performance Standards for Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode S) Airborne Equipment

Change 1

DRAFT Version 3

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ED-73C, Change 1
MM DD, 20xx
Modifies EUROCAE ED-73C

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Foreword

1. This document, prepared jointly by EUROCAE Working Group 49 and RTCA SC-209, was accepted by the Council of EUROCAE in **MONTH 20xx**.
2. EUROCAE is an international non-profit making organisation. Membership is open to European users and manufacturers of equipment for aeronautics, trade associations, national civil aviation administrations and, under certain conditions, non-European members. Its work programme is principally directed to the preparation of performance specifications and guidance documents for civil aviation equipment, for adoption and use at European and world-wide levels.
3. The findings of EUROCAE are resolved after discussion among its members and in co-operation with RTCA Inc., Washington DC, USA and/or the Society of Automotive Engineers (SAE), Warrendale PA, USA through their appropriate committees.
4. This Change document modifies ED-73C "*Minimum Operational Performance Specification for Secondary Surveillance Radar Mode S Transponders*," published September 2008.
5. Where applicable, EUROCAE and RTCA documents reflect ICAO standards and documents providing more detail and including test procedures to support equipment implementation. ED-73C/DO-181D is consistent with Annex 10 Vol. IV and ICAO Doc 9871 "Technical Provisions for Mode S Services and Extended Squitter."
6. The Minimum Operation Performance Specifications are recommendations only. EUROCAE is not an official body of the European Governments therefore its recommendations are valid as statements of official policy only when adopted by a particular government or conference of governments.
7. Copies of this document may be obtained from:

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Executive Summary

The update to the *Minimum Operational Performance Specification for Secondary Surveillance Radar Mode S Transponders*, published by EUROCAE in December 2008 as EUROCAE ED-73C, is contained herein as **Change 1 to EUROCAE ED-73C**, and has been produced to reflect changes that have resulted in requirements for airborne transponder equipment.

This **Change 1 to EUROCAE ED-73C** xxxxxxxxxxxxxxxxxxxxxxxx.

With the publication of this document as “**Change 1 to ED-73C**” several changes are being made to EUROCAE ED-73C, that are identified as necessary since the time of the publication of ED-73C. These changes include, but are not limited to:

1. Clarification;
2. Additional;
3. Changes; and
4. Other changes related to correcting additional typographical and paragraph reference errors.

Since the publication of ED-73C in December 2008, ICAO has also been in the process of updating the ICAO SARPs to include those requirements identified in ED-73C.

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Change 1 to EUROCAE ED-73C

Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode S) Airborne Equipment

This Change document prescribes the Minimum Performance Standards (MPS) for airborne transponder equipment, modified as described in this document. The applicable standards basis for those changes requested in this document is EUROCAE ED-73C, “*Minimum Operational Performance Specification for Secondary Surveillance Radar Mode S Transponders*,” issued December, 2008.

Change 1 to ED-73C will use change numbers such as (1.1) through (1.xxx), in this document to describe specific changes made to EUROCAE ED-73C.

In the following requested changes, for those items where existing text is requested to change, the new text is underlined and highlighted in blue, and deleted text is presented in ~~strikethrough and red text~~. In those changes where a totally new section or text is inserted, all the text is presented in underline and highlighted in blue. Some simple typographical changes have been represented with text highlighted in **yellow**.

(1.1) In EUROCAE ED-73C, in section §2.5, in order to strengthen the Flight ID requirements such that the display and crew entry must be simple to access and modify while on the ground or during flight, make the following changes to subparagraph “f.”

- f. If the aircraft uses a flight number for aircraft identification, a means **shall** be provided for the variable aircraft identification to be inserted by the pilot while on the ground, or during flight. The means for modifying and displaying aircraft identification shall be a simple crew action independent of the entry of other flight data.

(1.2) In EUROCAE ED-73C, in section §3.4.1, in order to clarify the requirement for reply rate, insert a note at the end of the paragraph as follows:

NOTE: The reply rate requirement of 500 replies per second establishes the minimum continuous reply rate capability of the transponder. As per the altitude and speed criteria above, the 100 or 120 replies in a 100 millisecond interval defines the peak capability of the transponder. The transponder must be capable of replying to this short term burst rate, but may not be capable of sustaining this rate. If the transponder is subjected to interrogation rates beyond its reply rate capability, the reply rate limit control of §3.11 acts to gracefully desensitize the transponder in a manner that favors closer interrogators. Desensitization eliminates weaker interrogation signals.

(1.3) In EUROCAE ED-73C, in section §3.6.3, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, delete section §3.6.3 and renumber the sections that follow.

- (1.4) In EUROCAE ED-73C, in section §3.7.2.b.(1), insert the text as described below:
- b. Mode A/C/S All-Call
 - (1) At all RF input levels from MTL to -21 dBm, the first preamble pulse of the reply shall occur $128 \pm 0.5 \mu\text{s}$ after the [leading edge of the](#) P4 pulse of the Mode A/C/S All-Call interrogation.
- (1.5) In EUROCAE ED-73C, in section §3.14.2, replace the contents of subparagraph “a” with the following edited text:
- a. A squitter monitor **shall** be provided to verify that the Mode S transponder generates short and Extended Squitters at their nominal rates (see §3.22.2.6 and §3.28). [Event Driven Squitter rates are not required to be monitored to meet this requirement.](#)
- (1.6) In EUROCAE ED-73C, in section §3.17.1.b.(5), in order to strengthen the Flight ID requirements such that the display and crew entry must be simple to access and modify while on the ground or during flight, make the following changes to subparagraph “(5):”
- e. If the aircraft uses a flight number for aircraft identification, a means **shall** be provided for the variable aircraft identification to be inserted by the pilot [while on the ground, or during flight. The means for modifying and displaying aircraft identification shall be a simple crew action independent of the entry of other flight data.](#)
- (1.7) In EUROCAE ED-73C, in section §3.17.3.c.(4), as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, correct the Figure reference as shown below:
- (4) Storage Design, Non Acceptance
The transponder may optionally accept a Comm-A interrogation (UF=20, 21) if the data content of that interrogation cannot be processed. (see ‘UNABLE TO PROCESS’ and ‘OPTION TO REPLY’, Figure ~~2-16~~ [3-15](#))
- (1.8) In EUROCAE ED-73C, in section §3.18.4.26, in order to clarify the regular use of non-selective lockout to block mistaken replies to Mode A/C-only All-Call, as identified in Working Paper SC209-WP11-16, make the following changes in the initial paragraph prior to the descriptions of the PC Code definitions.

This 3-bit (6-8) uplink field contains operating commands to the transponder and is part of surveillance and Comm-A interrogations UF=4, 5, 20, 21. The PC field [values 2 through 7](#) shall be ignored [and the values 0 and 1 shall be processed](#) for the processing of surveillance or Comm-A interrogations containing DI=3 (3.23.2.1). The codes are:

- (1.9) In EUROCAE ED-73C, in section §3.22.2.3, add the following on to the end of the first sentence in the paragraph, and add a *Note* after the Table, and delete the last sentence in the paragraph as follows:

The transponder shall generate replies as follows, except when in the on-the-ground state:

NOTE: Transponders that simulate Mode A/C and Mode S All Call interrogations in self test/squitter transmission may occasionally open their window of non acceptance for this purpose coincident with an actual interrogation, thus generating a reply to the interrogation. Such coincidental acceptance periods may be considered tolerable, but must not exceed one percent of transponder operating time.

~~For all Mode S interrogations the reply format number (DF) shall be the same as the interrogation format number (UF).~~

- (1.10) In EUROCAE ED-73C, in section §3.22.2.4, in order to clarify the regular use of non-selective lockout to block mistaken replies to Mode A/C-only All-Call, as identified in Working Paper SC209-WP11-16, add the following *NOTE* after the second paragraph:

NOTE: Non-selective All-Call lockout and multisite lockout are not mutually exclusive. Interrogators using multisite lockout protocols for interrogator networking coordination may simultaneously use non-selective lockout. The non-selective lockout use may be to prevent Mode S transponder replies to Mode A/C-Only All-Call interrogations because of the misinterpretation of the narrow P4 pulse as a wide P4 pulse.

- (1.11) In EUROCAE ED-73C, in section §3.22.2.5, in order to clarify the regular use of non-selective lockout to block mistaken replies to Mode A/C-only All-Call, as identified in Working Paper SC209-WP11-16, add the following as *NOTE 3*:

NOTE 3: Non-selective All-Call lockout and multisite lockout are not mutually exclusive. Interrogators using multisite lockout protocols for interrogator networking coordination may simultaneously use non-selective lockout. The non-selective lockout use may be to prevent Mode S transponder replies to Mode A/C-Only All-Call interrogations because of the misinterpretation of the narrow P4 pulse as a wide P4 pulse.

- (1.12) In EUROCAE ED-73C, in section §3.22.2.6, in order to clarify the use of the TCS command to control Extended Squitter broadcasts, as identified in Working Paper SC209-WP11-12R1, make the following edits to subparagraph “c” as follows:

- c. Conditions for Acquisition Squitter Transmission – The following applies to transponders transmitting Extended Squitters. When commanded to report the surface ~~position~~ type ~~formats~~ by TCS commands (see paragraph 3.28.5), aircraft without automatic means of determining the on-the-ground condition, and aircraft with such means that are reporting airborne state, shall transmit acquisition squitters in addition to the surface ~~position~~ Extended Squitter formats unless acquisition squitter transmission has been inhibited (subparagraph d.)

NOTE 1: *This action is taken to ensure ACAS acquisition in the event that the ground station inadvertently commands an airborne aircraft to report the surface ~~position type of~~ Extended Squitter formats.*

If aircraft are commanded to stop emitting surface ~~position~~ Extended Squitter formats by RCS command equal to 3 or 4 (see paragraph 3.28.7), these aircraft shall begin to emit the acquisition squitter (if not already doing so).

- (1.13) In EUROCAE ED-73C, in section §3.22.2.7, in bullet “a” just after the *NOTE*, add the following new requirement:

When the transponder transitions to normal operation (see §2.5.c) it shall initiate a temporary alert for 18 ±1 seconds.

- (1.14) In EUROCAE ED-73C, in section §3.22.2.7.d, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, make the following changes in subparagraph “d.”

- d. Special Position Identification - When manually selected, the transponder shall transmit the equivalent of the Mode A/C SPI in the FS field of surveillance replies DF=4,5,20,21 and in the Surveillance Status Subfield (see §3.28.8) of Extended Squitter transmissions (DF=17) when they contain the airborne position report. This code shall be transmitted for 18 ±1.0 seconds (T₁ timer) after initiation and can be reinitiated at any time.

- (1.15) In EUROCAE ED-73C, in section §3.23.1, replace the contents of bullets “a,” “b,” and “c” with the following edited text:

- a. Process uplink and downlink formats DF=16, UF=DF=~~16~~, 20 and 21 (Figure 2-14). The formats UF=~~DF=16~~ ~~are~~ is optional:
- b. Receive broadcast transmissions from sensors (§3.23.1.11).
- c. Follow the protocols for:
- Comm-A (see §3.23.1.10).
 - Comm-B (see §3.23.1.12).
 - Comm-U/V (air-air) (see §3.23.1.16) ~~(optional)~~.
 - Multisite message operation (see §3.23.2).
 - Report Codes 4 through 7 in the CA field (see §3.18.4.5).
 - ACAS crosslink capability (see §3.23.1.18).

- (1.16) In EUROCAE ED-73C, in section §3.23.1.3, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, correct a paragraph reference as indicated in the following change:

The transponder shall be able to transfer information to and from the appropriate data sinks (destinations) and sources (paragraphs 3.17 and 3.23 c and d).

- (1.17) In EUROCAE ED-73C, in section §3.23.1.4, replace the note below the table with the following:

(*) The transponder does not reply when the conditions of §3.22.2.3 apply.

- (1.18) In EUROCAE ED-73C, in section §3.23.1.11, in the first sentence of the paragraph, in order to correct a bad reference:

Change §3.23.1.1 to §3.23.1

- (1.19) In EUROCAE ED-73C, in section §3.23.1.12.d for “Comm-B Broadcast,” in order to adjust the requirements to account for Comm-B extraction using DI=3, as suggested in Working Paper SC209-WP11-09R1, make the following changes in the first paragraph after the *NOTE*:

A Comm-B broadcast starts, when no air-initiated Comm-B transaction is in effect, with the insertion of DR codes 4, 5, 6 or 7 into downlink transmissions of DFs 4, 5, 20, 21 and with the starting of the B-timer. On receipt of the above DR codes, interrogators may extract the broadcast message by transmitting RR=16 with DI ≠ 3 or 7, or with DI=3 or 7 and RRS=0 in subsequent interrogations. When the B-timer runs out after 18 ±1 seconds, the transponder will reset the DR codes as required, will discard the previous broadcast message and change from 1 to 2 (or vice versa) the broadcast message number.

- (1.20) In EUROCAE ED-73C, in section §3.23.1.18, in order to correct a bad paragraph reference, and also make revisions related to the GICB revisions discussed in Working Paper TSG WP08-02R1, revise the paragraph as follows:

In response to a UF=0 with RL=1 (see §3.18.4.31) and DS≠0 (see §3.18.4.11), the transponder **shall** reply with a DF=16 reply in which the MV field **shall** contain the contents of the ground-initiated Comm-B register designated by the DS value. If the requested Register is not supported by the aircraft installation, then the transponder shall reply with an MV field containing ALL ZEROS. In response to a UF=0 with RL=1 and DS=0, the transponder **shall** reply with a DF=16 with an MV field of ALL ZEROS. Receipt of a UF=0 with DS≠0, but RL=0 **shall** have no associated TCAS crosslink action, and the transponder shall reply per §3.18.4.31.

- (1.21) In EUROCAE ED-73C, in section §3.27.1.2.a.(1), in order to adjust the requirements to account for Comm-B extraction using DI=3, as suggested in Working Paper SC209-WP11-09R1, make the following changes in the fourth paragraph as follows:

Upon receipt of a DF=4, 5, 20 or 21 reply, with DR=2, 3, 6 or 7, a Mode S sensor may request downlink of the resolution advisory using the GICB protocol and setting RR=19 and DI≠7 or 3, or RR=19, DI=7 or 3 and RRS=0 in a surveillance or Comm-A interrogation (UF=4, 5, 20 or 21) to the ACAS aircraft. When this request is received by own Mode S transponder, own transponder shall reply with a Comm-B reply, DF=20,21, whose MB field contains a Resolution Advisory Report with information provided previously by the ACAS equipment.

- (1.22) In EUROCAE ED-73C, in section §3.27.1.2.b.(2) in order to correct a statement concerning bit 48 which was not updated during the revision of the document to “C” level, replace the third paragraph below §3.27.1.2.b.(2) with the following:

When Bit 48 is set to ONE ~~and Bit 71 is set to ONE~~ the ACAS unit is operational ~~using the formats for ACAS~~ and the transponder is receiving ACAS RI=2, 3 or 4.

- (1.23) In EUROCAE ED-73C, in section §3.28.2, in order to adjust the requirements to account for Comm-B extraction using DI=3, as suggested in Working Paper SC209-WP11-09R1, in the *Notes* of bullets “a” and “b” make the following changes:

- a. Airborne Position Squitter. The airborne position Extended Squitter shall use format DF=17 with the contents of ground-initiated Comm-B Register 05₁₆ inserted in the ME field.

NOTE: *A GICB request (see §3.23.1.12) containing RR equals 16, DI equals 7 or 3 and RRS equals 5 will cause the resulting reply to contain the airborne position report in its MB field.*

- b. Surface Position Squitter. The surface position Extended Squitter shall use format DF=17 with the contents of ground-initiated Comm-B Register 06₁₆ inserted in the ME field.

NOTE: *A GICB request (see §3.23.1.12) containing RR equals 16, DI equals 7 or 3 and RRS equals 6 will cause the resulting reply to contain the surface position report in its MB field.*

- (1.24) In EUROCAE ED-73C, in section §3.28.2, in order to retain consistency with the terminology used in the ADS-B MOPS and ICAO SARPs, in existing bullet “c” change references to the aircraft identification squitter as follows. In order to adjust the requirements to account for Comm-B extraction using DI=3 or 7, as suggested in Working Paper SC209-WP11-09R1, in the *Note* of bullets “c” and “b” make the following change.

- c. Aircraft Identification and Category Squitter. The aircraft identification and category extended squitter type shall use format DF=17 with the contents of ground-initiated Comm-B register 08 {HEX} inserted in the ME field.

NOTE: *A GICB request (Paragraph 3.23.1.12) containing RR equals 16, DI equals 7 or 3 and RRS equals 8 will cause the resulting reply to contain the aircraft identification and category report in its MB field.*

- (1.25) In EUROCAE ED-73C, in section §3.28.2, in order to adjust the requirements to account for Comm-B extraction using DI=3, as suggested in Working Paper SC209-WP11-09R1, in the *Note* of bullet “d” make the following change:

- d. Airborne Velocity Squitter. The airborne velocity Extended Squitter shall use format DF=17 with the contents of GICB Register 09₁₆ inserted in the ME field.

NOTE: *A GICB request (see §3.23.1.12) containing RR=16, DI=7 or 3 and RRS equals 9 will cause the resulting reply to contain the airborne velocity report in its MB field.*

- (1.26) In EUROCAE ED-73C, in section §3.28.2, as identified in Working Paper SC209-WP11-19, replace bullets “e” through “i” with the following in order to define the Target Status and Status, and the Aircraft Operational Status Messages as Periodic Status Messages and not included any further as “Event-Driven” Messages. In order to adjust the requirements to account for Comm-B extraction using DI=3 or 7, as suggested in Working Paper SC209-WP11-09R1, in the Notes of bullets “e,” “f” and “g” make the following change.

e. Target State and Status Message. The airborne Target State and Status Extended Squitter shall use format DF=17 with the contents of GICB Register 62₁₆ inserted in the ME field.

NOTE: A GICB request (see §3.23.1.12) containing RR=22 (e.g., BDS1=6), DI=7 or 3 and RRS=2 (e.g., BDS2=2) will cause the resulting reply to contain the airborne Target State and Status report in its MB field.

f. Aircraft Operational Status Message. The airborne or surface Aircraft Operational Status Extended Squitter shall use format DF=17 with the contents of GICB Register 65₁₆ inserted in the ME field.

NOTE: A GICB request (see §3.23.1.12) containing RR=22 (e.g., BDS1=6), DI=7 or 3 and RRS=5 (e.g., BDS2=5) will cause the resulting reply to contain the Aircraft Operational Status report in its MB field.

g. Event-driven Squitter. The event-driven Extended Squitter type shall use format DF=17 with the contents of GICB Register 0A₁₆ inserted in the ME field.

NOTE: A GICB request (see §3.23.1.12) containing RR=16, DI=7 or 3 and RRS=0A will cause the resulting reply to contain the event-driven report in its MB field.

- (1.27) In EUROCAE ED-73C, in section §3.28.3, in order to harmonize this section with the requirements specified in RTCA DO-181D, §2.2.23.1.3, replace the first paragraph with the following:

At power up initialization, the transponder shall commence operation in a mode in which it broadcasts only acquisition squitters (Paragraph 3.22.2.6). The transponder shall initiate the broadcast of extended squitters for airborne position, surface position, airborne velocity, target state and status, aircraft operational status and aircraft identification and category when data are inserted into GICB registers 05, 06, 09, 62, 65 and 08 {HEX} respectively. This determination shall be made individually for each squitter type. The insertion of altitude data into register 05 by the transponder (Paragraph 3.28.8) shall not satisfy the minimum requirement for initialisation of broadcast of the airborne position squitter.

NOTE 1: This suppresses the transmission of Extended Squitters from aircraft that are unable to report position, velocity or identity information.

If input to Register 05₁₆ and 06₁₆ stops for 60 seconds, broadcast of that Extended Squitter type will be discontinued until data insertion is resumed. The insertion of altitude by the transponder shall satisfy the minimum requirement for continuing to

broadcast the airborne position squitter. After timeout (see §3.28.4), this squitter type may contain an ME field of ALL ZEROs.

NOTE 2: Continued transmission for 60 seconds is required so that receiving aircraft will know that the data source for the message has been lost.

When extended squitters are broadcast, transmission rates shall be as indicated in the following paragraphs. Acquisition squitters shall be reported in addition to extended squitters unless the acquisition squitter is inhibited (Paragraph 3.22.2.6). Acquisition squitters shall always be reported if extended position or velocity squitters are not reported.

- (1.28) In EUROCAE ED-73C, in section §3.28.3, in order to comply with the changes in transmission rates made in RTCA DO-260B/EUROCAE ED-102A for Periodic Status and Event-Driven Messages, replace the existing second paragraph and the initial Note 1 and 2 with the following:

The maximum rate for the total number of extended squitter messages transmitted by the transponder shall not exceed 6.2 messages per second averaged over any 60 second interval.

NOTE 13: *Transponders are limited to no more than 2 Event Driven messages per second. Therefore, the average of 2 Airborne Position, 2 Airborne Velocity, 0.2 Identification, and 2 Periodic Status and Event Driven messages per second, averaged over any 60 second interval, yields ~~a maximum of the required~~ 6.2 messages per second.*

NOTE 24: *The transmission of extended squitters from aircraft that are unable to report position, velocity or identity is suppressed.*

- (1.29) In EUROCAE ED-73C, in section §3.28.3, as identified in Working Paper SC209-WP11-19, in order to establish transmission rates for the Periodic Status Messages, delete existing bullets “f,” “g,” “h,” and “i.” Insert new bullets “e” and “f” indicated below to define the Target State and Status, and the Aircraft Operational Status squitters, which are not included any further as “Event-Driven” squitters. Re-label and edit the old bullet “e” to become new bullet “g” as shown below, and re-label the old bullet “j” (Delayed Transmission) to become new bullet “h.” In existing bullets “a,” “b,” “c,” and “d” at the end of each subparagraph, change the reference for subparagraph “j” to subparagraph “h.”

e. Airborne Target State and Status Squitter Rate. Airborne Target State and Status squitter shall be transmitted at the rates as specified in §2.2.3.3.1.4.1 of EUROCAE ED-102A / RTCA DO-260B.

Verification of the transmission rates of Airborne Target State and Status Messages shall be performed in accordance with §2.4.3.3.1.4.1 of EUROCAE ED-102A / RTCA DO-260B.

f. Aircraft Operational Status Squitter Rate. The Aircraft Operational Status squitter shall be transmitted at the rates as specified in §2.2.3.3.1.4.2 of EUROCAE ED-102A / RTCA DO-260B, with the exceptions as specified in subparagraph “h.” When transmitting the surface formats, the rate depends on whether the high or low squitter rate has been selected (see §3.28.6).

Verification of the transmission rates of Aircraft Operational Status Messages shall be performed in accordance with §2.4.3.3.1.4.2 of EUROCAE ED-102A / RTCA DO-260B.

- g. Event-driven Squitter Rate. The event-driven squitter shall be transmitted once, each time that GICB register 0A {HEX} is loaded, while observing the delay conditions specified in subparagraph f h. The maximum transmission rate for the event-driven squitter shall be limited by the transponder to twice per second. If a message is inserted in the event-driven register and cannot be transmitted due to rate limiting, it shall be held and transmitted when the rate limiting condition has cleared. If a new message is received before transmission is permitted, it shall overwrite the earlier message.

NOTE: *The squitter transmission rate and the duration of squitter transmissions is application dependent. Choices made should be the minimum rate and duration consistent with the needs of the application.*

- (1.30) In EUROCAE ED-73C, in section §3.28.3.2, in order to comply with the changes in transmission rates made in RTCA DO-260B/EUROCAE ED-102A for Periodic Status and Event-Driven Messages, replace the existing first paragraph with the following:

The maximum total number of Extended Squitters emitted by any Extended Squitter installation shall not exceed 6.2 per second averaged over any 60 second interval.

- (1.31) In EUROCAE ED-73C, in section §3.28.3.3, as partially identified in Working Paper SC209-WP11-19, replace the entire section with the following edited text:

- a. The transponder shall clear all 56-bits of the airborne position, and surface position ~~and velocity~~ messages if no new data is received within two seconds of the previous input data update. This timeout requirement shall be applied individually for each of the ~~three~~ two message types identified. The internal insertion of data by the transponder into these messages (altitude and surveillance status) shall not qualify as a message update for the purposes of this timeout condition.

- b. The transponder shall clear all 56-bits of the velocity message, GICB Register 09₁₆ if input data necessary to update the subfields of the velocity message, other than the Intent Change Flag, is not available for a period of 2.6 seconds.

NOTE 1: *These messages are cleared to prevent the reporting of outdated position and velocity information.*

NOTE 2: *During a register timeout event, the "ME" field of the ADS-B Broadcast Message may contain all zeroes, except for those fields that may be updated due to the receipt of new data.*

- ~~bc.~~ The transponder shall not clear the Aircraft Identification Message (see ED-102A/DO-260B section 2.2.3.2.5) ~~if no new data (neither aircraft type, emitter category, nor identification data) is received within up to 60 seconds of the previous input data update.~~

NOTE 3: *The identification message, is not cleared since it contains data that rarely changes in flight and is not frequently updated. With ADS-B, Register 08₁₆ is not cleared or ZEROed once either Flight Identification or Aircraft Registration data has been loaded into the Register during the current power-on cycle. Register 08₁₆ is not cleared since it provides information that is fundamental to track file management in the ADS-B environment. (See §2.2.5.1.11.c of ED-102A/DO-260B).*

NOTE 4: *The event-driven messages, do not need to be cleared since contents of such messages are only broadcast once each time that new data is loaded.*

~~e. The transponder shall not clear the Intent, Operational Co-ordination, Operational Status, or Event-Driven Messages (see ED-102/DO-260 section 2.2.3.2.7) if no new data is received within up to 60 seconds of the previous input data update.~~

d. Target State and Status Message (Register 62₁₆):

1. Timeout of the Target State and Status Message shall be performed in accordance with §2.2.3.3.2.11.e of EUROCAE ED-102A / RTCA DO-260B.

Verification of the Target State and Status Message timeout shall be performed in accordance with §2.4.3.3.2.11 of EUROCAE ED-102A / RTCA DO-260B.

e. Aircraft Operational Status Message (Register 65₁₆):

1. Timeout of the Aircraft Operational Status Message shall be performed in accordance with §2.2.3.3.2.11.f of EUROCAE ED-102A / RTCA DO-260B.

Verification of the Aircraft Operational Status Message timeout shall be performed in accordance with §2.4.3.3.2.11 of EUROCAE ED-102A / RTCA DO-260B.

(1.32) In EUROCAE ED-73C, in section §3.28.3.4, in order to harmonize the requirements for ADS-B Message Termination with the published EUROCAE ED-102A / RTCA DO-260B, replace the entire section with the following:

If input to Register 05₁₆, or 06₁₆ stops for 60 seconds, broadcast of the associated Extended Squitter Messages shall be discontinued until data insertion is resumed. The insertion of altitude by the transponder will satisfy the minimum requirement for continuing to broadcast the airborne position message.

If input to Register 09₁₆ stops for 2.6 seconds, broadcast of the associated airborne velocity message shall be discontinued until data insertion is resumed.

NOTES:

1. Until timeout, an Extended Squitter Message may contain an "ME" field of ALL ZEROs.
2. Continued transmission for 60 seconds is required so that receiving aircraft will know that the data source for the message has been lost.

(1.33) In EUROCAE ED-73C, in section §3.28.4, as partially identified in Working Paper SC209-WP11-19, in order to clarify the register timeout, replace the entire section with the following edited section:

a. The transponder **shall** clear all 56-bits of the airborne position, and surface position, ~~squitter status and velocity~~ GICB Registers 05₁₆, and 06₁₆, ~~07₁₆ and 09₁₆~~ if these registers are not updated with data received external to the transponder within two seconds of the previous update. This timeout **shall** be determined separately for each of these registers. The internal insertion of data by the transponder into these registers (altitude and surveillance status) shall not qualify as a register update for the purposes of this timeout condition.

b. The transponder shall clear all 56-bits of the velocity squitter, GICB Register 09₁₆ if input data necessary to update the subfields of the velocity squitter, other than the Intent Change Flag, is not available for a period of 2.6 seconds.

NOTE 1: *These registers are cleared to prevent the reporting of outdated position, velocity and squitter rate information.*

~~**NOTE 2:** *The internal insertion of data by the transponder into these registers (e.g. altitude and surveillance status) does not qualify it as a register update for the purposes of this timeout condition.*~~

NOTE 3 2: *The Identification Register 08₁₆, is not cleared since it contains data that rarely changes in flight and less frequently updated. With ADS-B, Register 08₁₆ is not cleared or ZEROed once either Flight Identification or Aircraft Registration data has been loaded into the Register during the current power-on cycle. Register 08₁₆ is not cleared since it provides information that is fundamental to track file management in the ADS-B environment. (See ED-102A/DO-260B, section 2.2.5.1.11.c). Refer to §B.4.3.3 for implementation guidelines regarding register 20₁₆ and 08₁₆. The event-driven Register, 0A₁₆ does not need to be cleared since its contents are only used once each time that the register is loaded.*

c. Transponder data insertion and squitter transmission shall not be affected by a register timeout event, except as specified in §3.28.3.

NOTE 3: *During a register timeout event, the ME field of the Extended Squitter may contain all zeroes, except for any data inserted by the transponder.*

d. Target State and Status (Register 62₁₆):

1. Timeout of the Target State and Status Message shall be performed in accordance with §2.2.3.3.2.11.e of EUROCAE ED-102A / RTCA DO-260B.

Verification of the Target State and Status Message timeout shall be performed in accordance with §2.4.3.3.2.11 of EUROCAE ED-102A / RTCA DO-260B.

e. Aircraft Operational Status (Register 65₁₆):

1. Timeout of the Aircraft Operational Status Message shall be performed in accordance with §2.2.3.3.2.11.f of EUROCAE ED-102A / RTCA DO-260B.

Verification of the Aircraft Operational Status Message timeout shall be performed in accordance with §2.4.3.3.2.11 of EUROCAE ED-102A / RTCA DO-260B.

- (1.34) In EUROCAE ED-73C, in section §3.28.5.2, in order to clarify the use of the TCS command to control Extended Squitter broadcasts, as identified in Working Paper SC209-WP11-12R1, make the following edits to the entire section as follows:

Aircraft without such means shall report the airborne type ~~message~~ formats. Aircraft with or without such automatic on-the-ground determination shall ~~use position message types~~ report the surface type formats as commanded by control codes in the TCS subfield (Paragraph 3.28.7). After timeout of the TCS commands, control of airborne/surface determination shall revert to the means described above.

NOTE 1: *Extended squitter ground stations determine aircraft airborne or surface status by monitoring aircraft position, altitude and ground speed. Aircraft determined to be on the ground that are not reporting the surface ~~position message~~ type formats will be commanded to report the surface type formats via the TCS subfield. The normal return to the airborne ~~position message~~ type formats is via a ground command to report the airborne ~~message~~ type formats. To guard against loss of communications after takeoff, commands to report the surface ~~position message~~ type formats automatically timeout.*

When commanded to report the surface type format by TCS commands, aircraft without automatic means of determining the on-the-ground condition, and aircraft with such means that are reporting airborne state, shall transmit acquisition squitters as specified in §3.22.2.6.

NOTE 2: *Transmission of the acquisition squitter will provide for ACAS acquisition in the event that an airborne aircraft is commanded to report the surface type formats. In this case, the CA field of the acquisition and Extended Squitters will continue to show that the aircraft is airborne, or is unable to determine its on-the-ground state.*

- (1.35) In EUROCAE ED-73C, in section §3.28.7, as specified in Working Paper SC209-WP11-12R1, in order to provide ground control to inhibit ATCRBS and Mode S All-Call replies, primarily for aircraft without a squat switch, replace the entire section 3.28.7 as follows:

3.28.7 Subfields in SD for Extended Squitter

The SD field contains the following information if the DI code is 2:

3.28.7.1 Type Control Subfield (TCS) in SD for Extended Squitter

TCS, the 3-bit (21 – 23) Type Control Subfield in SD **shall** control the ~~position~~ extended squitter airborne and surface format types reported by the transponder, and its response to Mode A/C, Mode A/C/S All-Call and Mode S-Only All-Call interrogations. These commands shall only affect the format type reported, they shall not change the aircraft determination of its on-the-ground condition. The commands for codes 1 and 2 shall be able to refreshed for a new period before timeout of the prior period.

NOTE 1: Thus aircraft without the means to set the on-the-ground condition will continue to report code 6 in the CA field, and an aircraft with the means to set the on-the-ground condition that has determined that it is in the airborne state will continue to set code 5, independent of the Extended Squitter format that is emitted.

The following TCS codes have been assigned:

TCS Codes	Description
0	No position surface format types <u>or reply inhibit</u> command
1	Use surface position type for the next 15 seconds <u>See §3.28.7.1.1</u>
2	Use surface position type for the next 60 seconds <u>See §3.28.7.1.2</u>
3	Cancel surface format types <u>and reply inhibit</u> commands
4 – 7	Not assigned <u>Reserved</u>

3.28.7.1.1 TCS Equal to ONE (1)

- (a) Broadcast extended squitter surface formats, including the Surface Position Message, the ID and Category Message, the Aircraft Operational Status Message and the Aircraft Status Message for the next 15 seconds at the appropriate rates (see Table 2-79 in EUROCAE ED-102A/RTCA DO-260B).
- (b) Inhibiting replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-only All-Call interrogations for the next 15 seconds.
- (c) Broadcast acquisition squitters as per §3.22.2.6.c.
- (d) Make no change to the air/ground state reported via the CA, FS and VS fields.
- (e) Discontinue broadcast of airborne message formats.
- (f) Broadcast the surface formats at the rates according to the TRS subfield unless commanded to transmit at the rates set by the RCS subfield.

3.28.7.1.2 TCS Equal to TWO (2)

- (a) Broadcast extended squitter surface formats, including the Surface Position Message, the ID and Category Message, the Aircraft Operational Status Message and the Aircraft Status Message for the next 60 seconds at the appropriate rates (see Table 2-79 in EUROCAE ED-102A/RTCA DO-260B).
- (b) Inhibiting replies to ATCRBS, ATCRBS/Mode S All-Call and Mode S-only All-Call interrogations for the next 60 seconds.
- (c) Broadcast acquisition squitters as per §3.22.2.6.c.
- (d) Make no change to the air/ground state reported via the CA, FS and VS fields.
- (e) Discontinue broadcast of airborne message formats.
- (f) Broadcast the surface formats at the rates according to the TRS subfield unless commanded to transmit at the rates set by the RCS subfield.

3.28.7.2 Rate Control Subfield (RCS) in SD for Extended Squitter

RCS, the 3-bit (24 – 26) Rate Control Subfield in SD shall control the squitter rate of the transponder when it is reporting the Extended Squitter surface type formats. This subfield shall have no effect on the transponder squitter rate when it is reporting the airborne ~~position~~ type formats of Extended Squitter.

NOTE 2: Aircraft without the means of determining on-the-ground state or aircraft with such means that are declaring the airborne state must be commanded to transmit the surface format (via TCS) before they can be controlled by this subfield. Both of these commands may be sent in the same interrogation.

NOTE 3: Both TCS and RCS have specific timeout periods. If the surface format command times out first, the aircraft will resume broadcasting the airborne format (unless it is now declaring the on-the-ground state or the surface format is selected in accordance with the requirements of EUROCAE ED-102A/RTCA DO-260B §2.2.3.2.1.2 (3)) even if the squitter suppression command has not timed out (since the squitter suppression command has no effect on the transmission of the airborne format). If the squitter suppression command times out first, the aircraft will resume the transmission of surface formats.

The following RCS codes have been assigned:

RCS Codes	Description
0	No surface Extended squitter rate command
1	Report high surface Extended squitter rate for 60 seconds
2	Report low surface Extended squitter rate for 60 seconds
3	Suppress all surface Extended squitters for 60 seconds
4	Suppress all surface Extended squitters for 120 seconds
5 – 7	Not assigned <u>Reserved</u>

NOTE 4: *The definition of high and low squitter rate is given in §3.28.3 and applies to the Surface Position, Aircraft Identification and Category, and the Operational Status Messages.*

NOTE 5: *As stated in §3.22.2.6.b.4, Acquisition squitters are transmitted when Surface Extended Squitters are suppressed by using RCS=3 or 4.*

3.28.7.3 Surface Antenna Subfield (SAS) in SD for Extended Squitter

SAS, the two bit (27 – 28) Surface Antenna Subfield in SD shall control the transponder selection of the diversity antenna that is used for: (1) the Extended Squitter when it is reporting the surface type formats, and (2) the acquisition squitter when the aircraft is reporting the on-the-ground condition. This subfield shall have no effect on the transponder diversity antenna selection when the aircraft is reporting the airborne position type, or if the aircraft does not have diversity antennas. When reporting the surface type formats, the default shall be the top antenna. The following SAS codes have been assigned:

SAS Codes	Description
0	No antenna command
1	Alternate top and bottom antennas for 120 seconds
2	Use bottom antenna for 120 seconds
3	Use top antenna Return to the default

(1.36) In EUROCAE ED-73C, in section §3.29.2, in order to adjust the requirements to account for Comm-B extraction using DI=3, as suggested in Working Paper SC209-WP11-09R1, insert a sub-bullet to the list of references mentioning the use of BDS2 with SI Code.

o paragraph 3.23.1.12.a “Comm-B data selector, BDS”

(1.37) In EUROCAE ED-73C, in section §3.29.3.2.2, in order to account for the changes that are being made in the ADS-B MOPS (RTCA DO-260B/EUROCAE ED-102A) and subsequent equivalent changes in ICAO Doc 9871, Edition 2, the Mode S Subnetwork Version Number will have to change accordingly. Replace Table 3-2 with the following:

Version Number	ICAO	RTCA	EUROCAE
0	Mode S Subnetwork Not Available		
1	ICAO Doc 9688 (1996)		
2	ICAO Doc 9688 (1998)		
3	Annex 10, Vol III, Amendment 77		
4	ICAO Doc 9871, Edition 1	DO-181D	ED-73C
<u>5</u>	ICAO Doc 9871, Edition 2	DO-181D Change 1	ED-73C Change 1
6-127	Unassigned Reserved		

- (1.38) In EUROCAE ED-73C, there are numerous occasions where the phrase “Minimum Update Interval” has been incorrectly used, and where the phrase “Maximum Update Interval” should have been used instead. In the requirements description at some of these locations, reference has also been made to the Register Allocation Table in Appendix B, which is incorrectly referenced as Table B-1, and should have been referenced as Table B-2-1. In each of the following paragraph references, **all instances of “Minimum Update Interval” must be changed to “Maximum Update Interval,”** and **where references occur to “Table B-1,” they must be changed to “Table B-2-1.”**

§3.29.3.3	§3.30.1.3	§3.30.6.3	§5.7.1.3
§3.29.5.3	§3.30.2.2.7	§3.30.7.3	§5.7.2.2.7
§3.29.6.3	§3.30.3.3	§3.30.8.3	§5.7.3.3
§3.29.7.3	§3.30.5.3	§3.31.3	§5.8.3

- (1.39) In EUROCAE ED-73C, in section §3.29.6.2.1.b, to correct a minor typographical error, in the *Note* following subparagraph “b”:

Replace “(Data| Link Capability Report)” **with** “(Data Link Capability Report)”

- (1.40) In EUROCAE ED-73C, in section §3.29.6.4.2, in order to correct a cut-and-paste error in a bit reference, replace the only sentence in the section with the following correction:

“Correct servicing of the character fields of Register 20₁₆ **shall** be reported in Register 17₁₆ via bit ~~33~~ 7 as defined in §3.29.4.2.1.”

- (1.41) In EUROCAE ED-73C, in section §3.30.7.3.c, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, update the maximum update interval in subparagraph “c” to 2.0 seconds as below:

- c) If a particular data field in Register 5F₁₆ cannot be updated within ~~4~~2.0 seconds (e.g., twice the specified ~~minimum~~ ~~maximum~~ update interval of 0.5. seconds, then the data field shall be ZEROed (i.e., binary “00”).

- (1.42) In EUROCAE ED-73C, in section §3.30.8.3, in order to correct references to the “maximum update interval” as detailed in Appendix B, Table B-2-1, and to also correct the specific maximum update interval for Register 60₁₆, which is specified in Table B-2-1 as 1.3 seconds, make the changes identified below in yellow to replace the word “minimum” with the word “maximum,” and replace the actual values for the Register 60₁₆ maximum update interval:

- a. The **maximum** update interval at which Register 60₁₆ **shall** be reloaded with valid data is **1.3** seconds.

Note: Register 60₁₆ is updated at least once every **1.3** seconds.

- b. The time between availability of data that causes a change in Register 60₁₆ and the time that the change is made to Register 60₁₆ **shall** be less than the **maximum** update interval specified as **1.3** seconds.
- c. If Magnetic Heading data in Register 60₁₆ “MB” field bits 2 through 12 cannot be updated with valid data within **2.6** seconds (e.g., twice the specified **maximum**

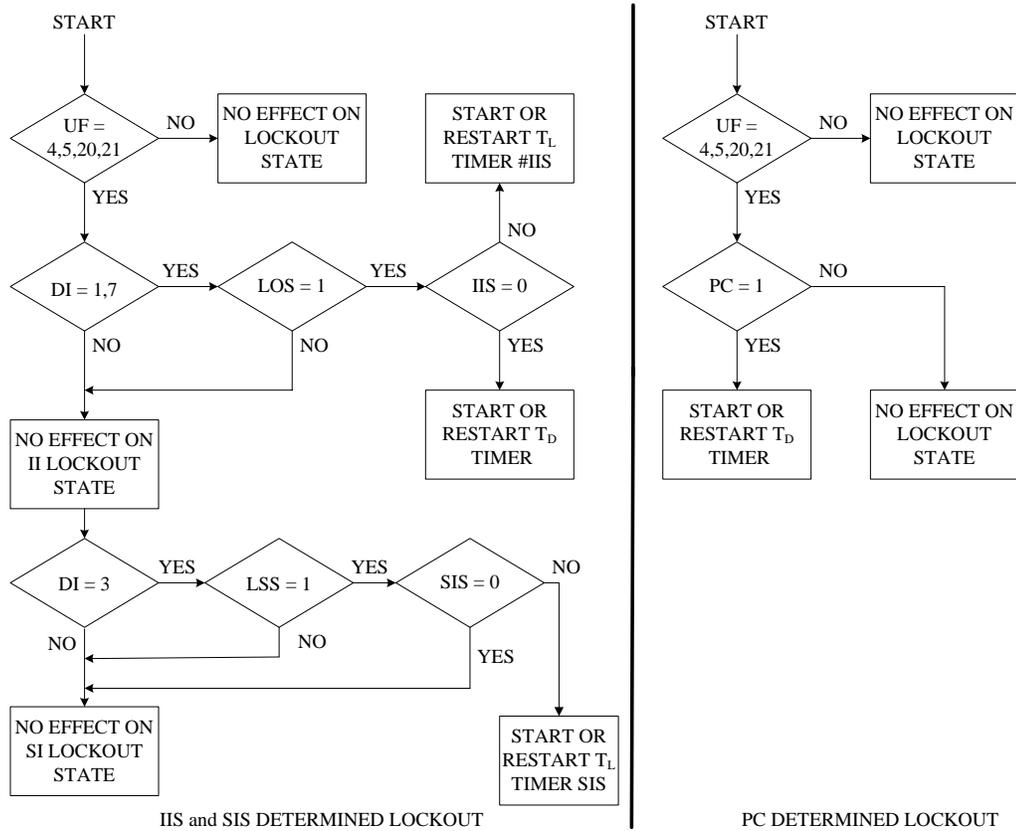
update interval of 1.3 seconds) then Status Bit 1 shall be set to ZERO (0) and bits 2 through 12 shall be set to ZERO (0).

- d. If Indicated Airspeed data in Register 60₁₆ “MB” field bits 14 through 23 cannot be updated with valid data within 2.6 seconds (e.g., twice the specified maximum update interval of 1.3 seconds) then Status Bit 13 shall be set to ZERO (0) and bits 14 through 23 shall be set to ZERO (0).
- e. If Mach data in Register 60₁₆ “MB” field bits 25 through 34 cannot be updated with valid data within 2.6 seconds (e.g., twice the specified maximum update interval of 1.3 seconds) then Status Bit 24 shall be set to ZERO (0) and bits 25 through 34 shall be set to ZERO (0).
- f. If Barometric Altitude Rate data in Register 60₁₆ “MB” field bits 36 through 45 cannot be updated with valid data within 2.6 seconds (e.g., twice the specified maximum update interval of 1.3 seconds) then Status Bit 35 shall be set to ZERO (0) and bits 36 through 45 shall be set to ZERO (0).
- g. If Inertial Vertical Rate data in Register 60₁₆ “MB” field bits 47 through 56 cannot be updated with valid data within 2.6 seconds (e.g., twice the specified maximum update interval of 1.3 seconds) then Status Bit 46 shall be set to ZERO (0) and bits 47 through 56 shall be set to ZERO (0).

(1.43) In EUROCAE ED-73C, in section §3.31.3, in order to correct references to the “maximum update interval” as detailed in Appendix B, Table B-2-1, and to also correct the specific references to the actual Table in Appendix B, make the changes identified below in yellow to replace the word “minimum” with the word “maximum,” and replace the Table reference with “Table B-2-1” as described below:

- a. The maximum update interval at which a data field in a Register will be reloaded with valid data is defined for each register in Table B-2-1 in Appendix B.
- b. The transponder will load valid data into the related transponder Register as soon as it becomes available at the Mode S Specific Services entity.
- c. The time between availability of data that causes a change in a data-field of a Register and the time that the change is made to the Register will be less than the maximum update interval specified in Table B-2-1 in Appendix B.
- d. If a data-field field cannot be updated with valid data within twice the specified maximum update interval defined for the Register, or 2 seconds (whichever is the greater), then the Status Bit (if specified) of the field will be set to ZERO (0) (INVALID) and that data field will be ZEROed.

(1.44) In EUROCAE ED-73C, after section §3.31.4, in order to clarify the regular use of non-selective lockout to block mistaken replies to ATCRBS-only All-Call, as identified in Working Paper SC209-WP11-16, and to make clear that the transponder should interpret multisite lockout in an interrogation where $DI=1, 7$, and non-selective lockout in the same interrogation where $PC=1$, and set the T_D and appropriate T_L timers accordingly from that single interrogation, replace Figure 3-11 with the following:



Note: For actions of $T_D - T_L$ and IIS, see acceptance protocol.

FIGURE 3-11: LOCKOUT PROTOCOL

(1.45) In EUROCAE ED-73C, after section §3.31.4, as identified in Working Paper SC209-WP11-20R1, replace Figure 3-12 with the following:

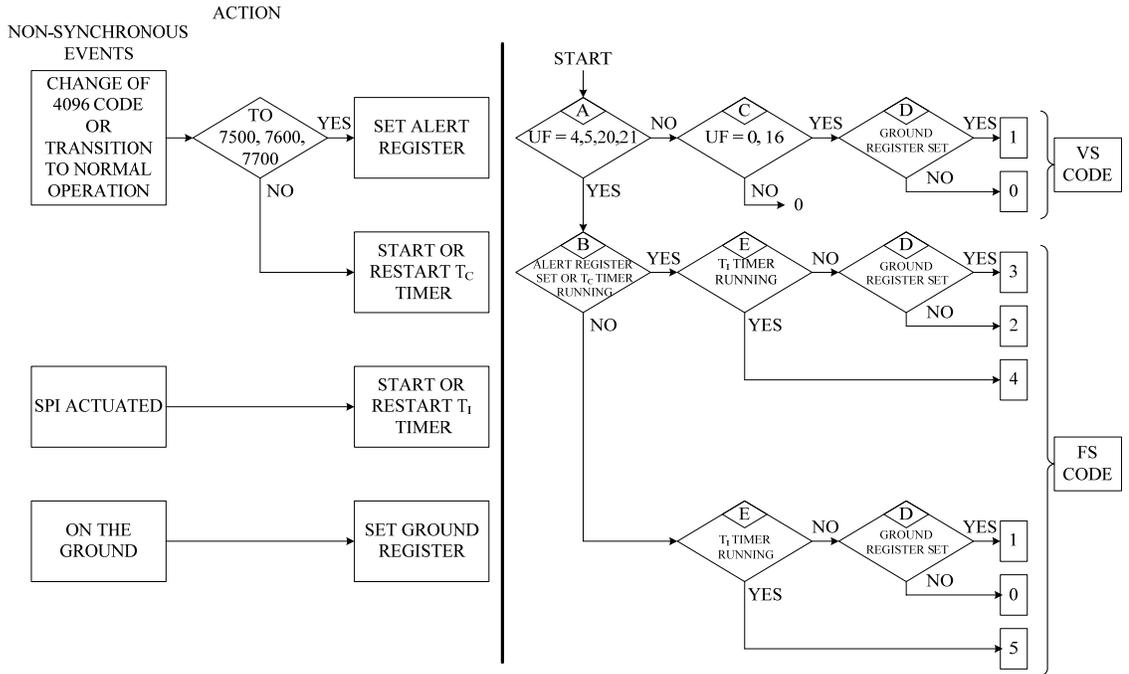


FIGURE 3-12: FLIGHT STATUS AND VERTICAL STATUS PROTOCOL

(1.46) In EUROCAE ED-73C, after section §3.31.4, as identified in Working Paper SC209-WP12-08, to account for DI=3, replace Figure 3-18 with the following:

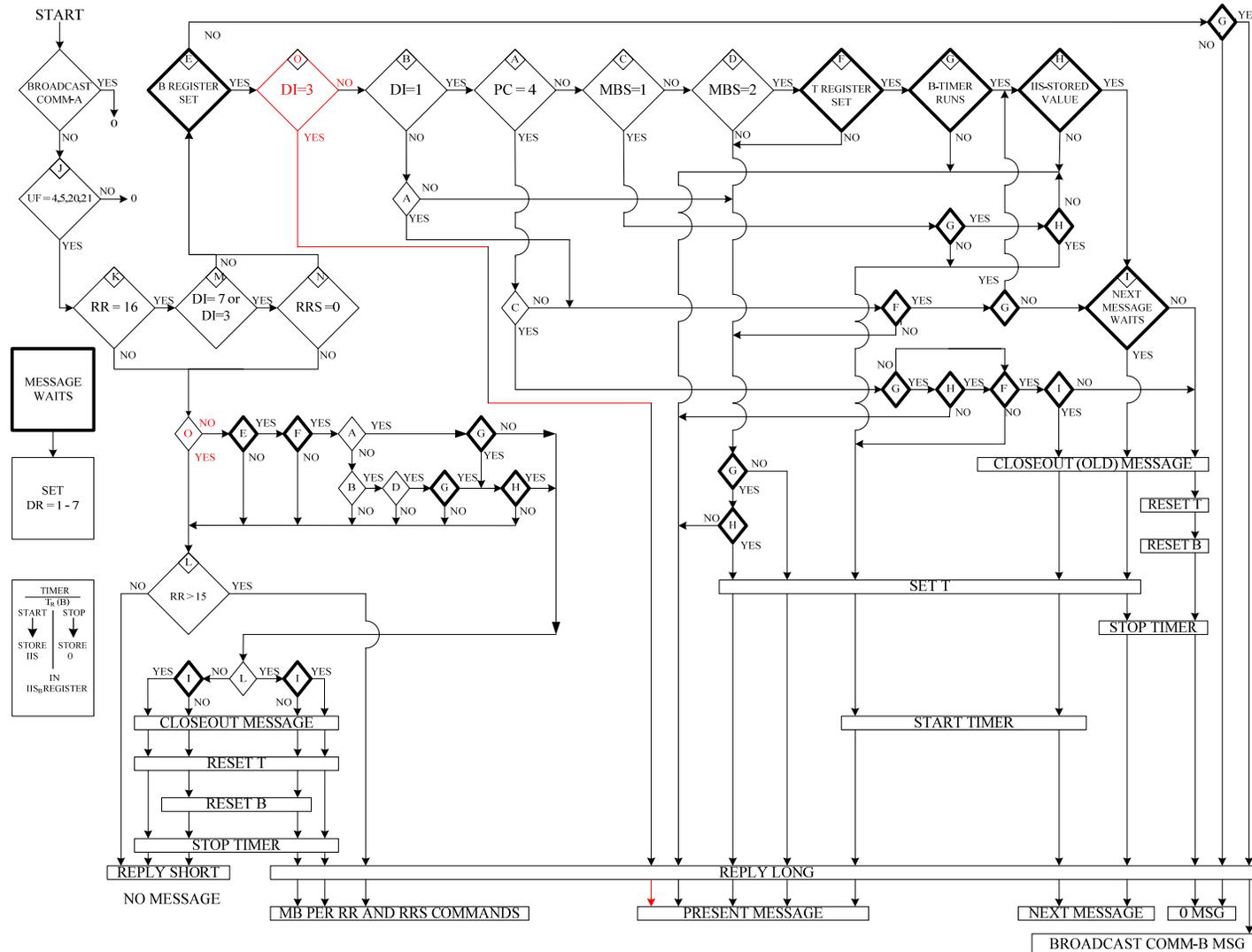


FIGURE 3-18: DATA LINK TRANSPONDERS: B-PROTOCOL

(1.47) In EUROCAE ED-73C, after section §3.31.4, as identified in Working Paper SC209-WP12-08, to account for DI=3, replace Figure 3-18A with the following:

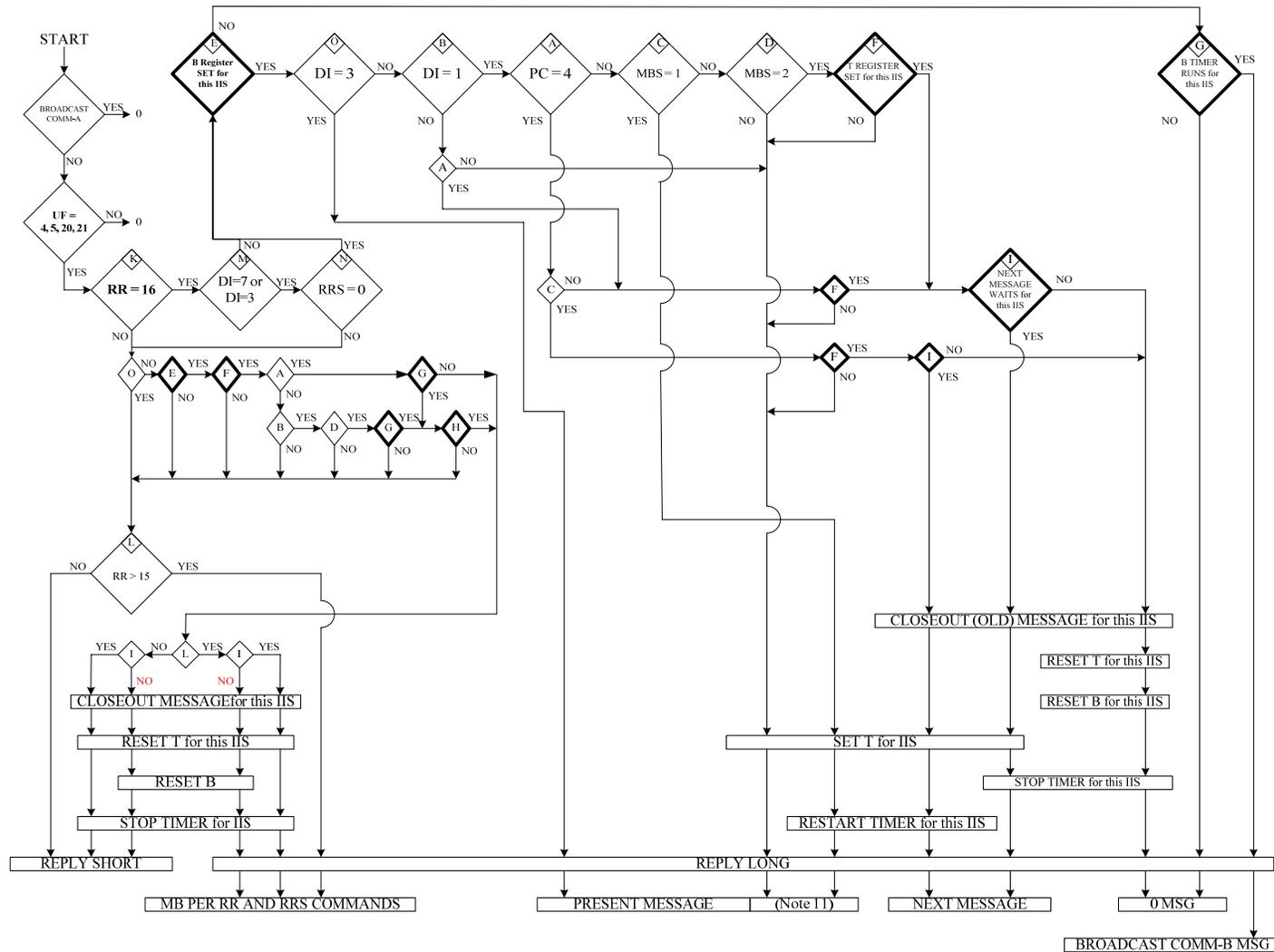


FIGURE 3-18A: ENHANCED COMM-B PROTOCOL

- (1.48) In EUROCAE ED-73C, in section §5.4.5.2.a, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, correct the spelling error in the second sentence, as follows:

Vary the level of the P4 pulse between -10 dB and 0 dB with respect to P3.

- (1.49) In EUROCAE ED-73C, in section §5.4.6.2, in order to harmonize between ED-73C and RTCA/DO-181D, for bullet “d” (Step 4) of this test procedure, make the following changes in the title:

- d. STEP 4 - Recovery from an ~~Suppression Pair~~ or unaccepted Mode A/C/S All-Call or Mode A/C-Only All-Call or ~~Suppression Pair~~ (Paragraphs ~~3.10.2.e~~ and ~~3.10.2.g~~ and ~~3.10.2.e~~.)

- (1.50) In EUROCAE ED-73C, in section §5.4.6.2, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, in order to harmonize between ED-73C and RTCA/DO-181D, for bullet “f” (Step 6) of this test procedure, make the following changes in the first sentence of the test procedure:

- f. STEP 6 Dead Time (Paragraph 3.10.3)
Set the master test set to generate a Mode A ~~/C/S All-Call~~ interrogation at a level of -21 dBm.

- (1.51) In EUROCAE ED-73C, in section §5.4.7.2.f, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, make the following changes to the NOTE immediately following subparagraph “f:”

NOTE: *The purpose of this test is to demonstrate that when the interference pulse combines with the P1 pulse of the P1-P2 pair of a Mode S interrogation, that the transponder ~~detects the Mode A/C All-Call and~~ does not reply with a Mode A/C reply.*

- (1.52) In EUROCAE ED-73C, in section §5.4.8, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, the reference to paragraph 3.12.7 is incorrect and should be replaced by a reference to paragraph 3.13 as follows:

5.4.8 Undesired Replies (Paragraph ~~3.13~~2.7)

- (1.53) In EUROCAE ED-73C, in section §5.5.8.2, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, in the initial list of references, the reference to paragraph 3.24.4 is incorrect because it does not exist. Replace the reference with 3.24 as follows:

(Paragraph ~~3.24.4~~ – interrogation reply coordination, ELM)

- (1.54) In EUROCAE ED-73C, in section §5.5.8.6.2.2, replace the second paragraph with the following:

Verify the content of the CA, AA and PI fields of all Extended Squitter replies. For the following test, connect the transponder to the appropriate source that provides altitude code input to the transponder. Also, as required, setup to provide Extended Squitter data to ground initiated Comm-B Registers 05₁₆, 06₁₆, 07₁₆, 08₁₆, 09₁₆ ~~and~~ 0A₁₆, 62₁₆ and 65₁₆ through an external interface as specified in §3.17.2.

- (1.55) In EUROCAE ED-73C, in section §5.5.8.6.2.2, in bullet “c,” STEP 3, make the following changes in the first three lines of the test procedure:

- c. STEP 3 - Provide Extended Squitter updates to the transponder at a ~~rate~~ maximum update interval as specified in Appendix B, Table B-2-1. Include updates to GICB Registers 05₁₆, 06₁₆, 07₁₆, 08₁₆, ~~and~~ 09₁₆, 62₁₆ and 65₁₆.

- (1.56) In EUROCAE ED-73C, in section §5.5.8.6.2.2, in bullet “d,” STEP 4, first paragraph, make the following changes:

- d. STEP 4 - Set up the transponder as in STEP 3 with Extended Squitter updates to the transponder at a ~~rate~~ maximum update interval as specified in Appendix B, Table B-2-1. Place the transponder in the airborne state. Stop updates of all Extended Squitter data, except altitude information, to the transponder for GICB Registers 05₁₆, 06₁₆, 07₁₆, 08₁₆, ~~and~~ 09₁₆, 62₁₆ and 65₁₆.

1. Verify that after 2 seconds, ~~all subsequent the~~ Extended Squitter ME fields for (GICB Registers 05₇₋₁₆, and 09₄₆) are ZERO with the exception of the ACS and surveillance status fields in the airborne position squitter (GICB Register 05₄₆) and the airborne identification squitter (GICB Register 08₄₆).

2. Verify that after 2 seconds the aircraft identification and category squitter (GICB Register 08₁₆) continues to be transmitted.

3. Verify that after 2 seconds only the Selected Altitude, Selected Heading or Barometric Pressure Setting subfields of the target state and status squitter (GICB Register 62₁₆) are set to ZERO. Verify that the remaining Extended Squitter ME subfields are not cleared, as they contain other integrity, mode or status information.

4. Verify that after 2 seconds the Extended Squitter ME fields of the aircraft operational status squitter (GICB Register 65₁₆) are not cleared, as they contain various integrity, mode or status information.

5. Verify that after 2.6 seconds the Extended Squitter ME fields of the airborne velocity squitter (GICB Register 09₁₆) are cleared, and verify that it is not being transmitted.

6. Place the transponder in the ground state and verify that the surface position Extended Squitter ME field (GICB Register 06₁₆) is ZERO. Repeat the setup as in STEP 3 with Extended Squitter updates to the transponder at a one half second rate. Place the transponder in the airborne state. Interrogate the

transponder with RR=17 and DI=7 and verify that the SCS subfield of the data link capability report is one. After all updates (except altitude information) have ceased for 10 seconds, interrogate to extract the data link capability report and verify that the SCS subfield is ZERO.

Interrogate the transponder with ground initiated Comm-B requests with RR=16, DI=7 and RRS=5, 6, 7, 8 and 9 respectively. Verify that the MB fields are ZERO with the exception of the ACS field in the airborne position squitter (GICB Register 05₁₆) and the airborne identification squitter (GICB Register 08₁₆). After all updates (except altitude information) have ceased for 60 seconds, verify that airborne identification and category and airborne velocity Extended Squitters are ~~no longer~~ still being transmitted. Place the transponder in the ground state and verify that the surface position Extended Squitter (GICB Register 06₁₆) is no longer transmitted.

Return the transponder to the airborne state. Verify that the acquisition squitter and airborne position squitter are broadcast. Set the ALT switch to the "off" position. Verify that the ME field of the airborne position squitter is ZERO.

After 60 seconds, verify that the transponder no longer broadcasts airborne position squitters.

(1.57) In EUROCAE ED-73C, in section §5.5.8.6.2.2, in bullet "e," STEP 5, make the following changes in the first three lines of the test procedure:

- e. STEP 5 - Set the ALT switch to the "on" position and provide altitude code input to the transponder. Provide Extended Squitter updates to the transponder at a ~~rate~~ maximum update interval as specified in Appendix B, Table B-2-1.

(1.58) In EUROCAE ED-73C, in section §5.5.8.6.2.2, in bullet "f," STEP 6, make the following changes:

- f. STEP 6 -Set the ALT switch to the "on" position and provide altitude code input to the transponder. Provide Extended Squitter updates to the transponder at a ~~rate~~ maximum update interval as specified in Appendix B, Table B-2-1. Include updates to GICB Registers 05₁₆, 06₁₆, 07₁₆, 08₁₆ and 09₁₆. Verify that the ME fields of the airborne position, velocity and aircraft identification squitters match the data input. Stop updates of Extended Squitter data to the transponder for GICB Registers 08₁₆ and 09₁₆ only.

After 2.6 seconds, verify that the ~~ME field of the~~ airborne velocity squitter is ~~ZERO~~ no longer transmitted. Interrogate with RR=16, DI=7 and RRS=5, 6, 8 and 9 and verify that the MB fields match the ME fields in the corresponding Extended Squitter reply.

After 10 seconds, interrogate to extract the data link capability report and verify that SCS is one. After 60 seconds, verify that airborne position and aircraft identification squitters ~~reports~~ are still transmitted and that aircraft identification and airborne velocity squitters are not transmitted.

(1.59) In EUROCAE ED-73C, in section §5.5.8.6.2.2, in bullet “g,” STEP 7, make the following changes:

- g. STEP 7 - Configure the transponder to inhibit Acquisition squitters when Extended Squitters are broadcast. Prior to providing Extended Squitter updates, verify that Acquisition squitters are broadcast. Provide Extended Squitter updates at a ~~rate~~ maximum update interval as specified in Appendix B, Table B-2-1 to GICB Registers 05₁₆, 06₁₆ and 08₁₆ and provide altitude code input to the transponder. Verify that Extended Squitters are broadcast and Acquisition squitters are not broadcast. Verify that airborne position and aircraft identification squitters are broadcast at the proper rate and alternately on the top and bottom antenna ports as specified for airborne state if antenna diversity is supported. Additionally provide updates to GICB Register 09₁₆. Verify the broadcast of airborne position squitters, aircraft identification squitters and airborne velocity squitters at the proper rate and the ME data content matches the data stored in GICB Registers 05₁₆, 08₁₆ and 09₁₆, respectively. Verify that the transponder does not broadcast Acquisition squitters.

Set the ALT switch to the “off” position and stop update to GICB Registers 05₁₆, 06₁₆, 08₁₆ and 09₁₆. After 2 seconds, verify that the ME fields of the airborne position ~~and airborne velocity~~ squitters are ZERO. After 2.6 seconds, verify that the airborne velocity squitter is no longer transmitted. Interrogate with UF=4, RR=16, DI=7 and RRS=5, 6, 8 and 9, respectively. Verify that the MB fields of the replies match the data of the corresponding Extended Squitter reply. After 60 seconds, verify that Extended Squitter airborne position squitter transmissions stop and the transponder resumes Acquisition squitter broadcast.

Repeat above sequence except stop update to GICB Registers 05₁₆ and 06₁₆ only.

After 2 seconds, verify that the ME field of the airborne position report is ZERO.

After 60 seconds, verify that the transponder no longer broadcasts airborne position squitters and continues to broadcast airborne velocity and aircraft identification squitters. Verify that the transponder continues to inhibit the broadcast of Acquisition squitters.

Repeat above except stop update to GICB Register 09₁₆ only. After 2.6 seconds, Again, verify that ~~after 2 seconds the ME field of~~ the airborne velocity squitter is ~~ZERO~~ no longer transmitted, and after 60 seconds, ~~both airborne velocity and~~ verify that the Acquisition squitters are not transmitted.

(1.60) In EUROCAE ED-73C, in section §5.5.8.6.2.2, in bullet “h,” STEP 8, make the following changes:

- h. STEP 8 - Input GICB Register 0A₁₆ and verify that an event-driven Extended Squitter is generated with the proper data content. Update GICB Register 0A₁₆ at a rate less than twice every second. Verify that an event-driven Extended Squitter is generated subsequent to each update with the proper data content. Vary the data content provided externally to the transponder and verify that the data content subsequent to update of the event-driven report is correct. Increase the update rate to exceed twice per second. Verify that the event-driven squitter rate does not exceed twice per second and that the data content reflects the most recent update contents. Repeat for all supported Event-Driven Extended Squitter Message types.

For the following steps, for those transponders that support automatic detection of on-the-ground status, change the transponder to on-the-ground status.

Configure the transponder to not inhibit Acquisition squitters when Extended Squitters are broadcast.

(1.61) In EUROCAE ED-73C, in section §5.5.8.6.2.2, in bullet “i,” STEP 9, make the following changes:

- i. STEP 9 - Upon power-up initialization of the transponder, verify that the transponder broadcasts Acquisition squitters at the proper rate but does not broadcast Extended Squitters. For transponders that support automatic detection of on-the-ground status and diversity, verify that Acquisition squitters occur on the top antenna port only. Interrogate the transponder with GICB requests with RR=16, DI=7 and RRS=5, 6, 8 and 9 respectively. Verify that the MB field of the corresponding replies are ZERO, with the exception of Register 08₁₆.

(1.62) In EUROCAE ED-73C, in section §5.5.8.6.2.2, in bullet “j,” STEP 10, make the following changes:

- j. STEP 10 - Provide Extended Squitter updates to the transponder at a ~~rate~~ maximum update interval as specified in Appendix B, Table B-2-1. Include updates to GICB Registers 05₁₆, 06₁₆, 08₁₆, ~~and~~ 09₁₆, 62₁₆ and 65₁₆. Use other than ZERO or all ONEs for the surface position report and the aircraft identification report. Set TRS to ZERO. For transponders that support automatic on-the-ground detection, perform the following:
 1. Verify that the transponder broadcasts surface position squitters at the high rate and the ME data content matches the data stored in GICB Register 06₁₆.
 2. Verify that the transponder broadcasts aircraft identification squitters and that they occur uniformly over the range of 4.8 to 5.2 seconds as specified in paragraph 3.28.3.c. Verify that the ME data content matches the data stored in GICB Register 08₁₆.
 3. Verify that the transponder broadcasts aircraft operational status squitters at the rates as specified in §2.2.3.3.1.4.2 of EUROCAE ED-102A / RTCA DO-260B and that the data content matches the data stored in GICB Register 65₁₆. When transmitting the surface formats, the rate depends on whether the high or low squitter rate has been selected (see §3.28.6).
 4. Verify that the transponder does not broadcast the airborne position and the airborne velocity squitter.
 5. Verify that the transponder does not broadcast Acquisition squitters.
 6. Stop update of GICB Registers 05₁₆, 06₁₆, 08₁₆, ~~and~~ 09₁₆ and 65₁₆. After 2 seconds, verify that the surface position squitter ME field is ZERO. Verify that after 2 seconds the Extended Squitter ME fields of the aircraft operational status squitter (GICB Register 65₁₆) are not cleared, as they contain various integrity, mode or status information.
 7. After 60 seconds, verify that surface position ~~and aircraft identification~~ squitters stop and Acquisition squitters resume.

For transponders that do not support automatic on-the-ground detection, verify that airborne position squitters, airborne velocity squitters and aircraft identification squitters are transmitted at the proper rate and data content. Verify that surface position squitters are not emitted. Verify that the transponder broadcasts Acquisition squitters at the proper rate.

Repeat except vary the data content of GICB Registers 06₁₆ and 08₁₆ and verify the data content of each Extended Squitter subsequent to each register update.

- (1.63) In EUROCAE ED-73C, in section §5.5.8.7, in order to bring ED-73C into harmonization with changes that were originally made in RTCA/DO-181B and DO-181C, at the end of §5.5.8.7.3, and just prior to §5.5.8.8, add the following text on to the end of the “Required Timer Duration Test” and then add the new sections for additional test procedures as identified in Working Paper SC209-WP11-20R1:

Change the input of the ID function to a value other than 7500, 7600 or 7700. Verify that the Mode A Code, temporary alert is set (FS field value is 4 or 5). Five (5) seconds later, change the input of the ID function to a value other than 7500, 7600 or 7700 and different from the previously used value. Verify that the Mode A Code temporary alert is set (FS field value is 4 or 5) for 18 ±1 seconds after the second change.

5.5.8.7.4 On-the-Ground Validation Test

For transponders that support automatic on-the-ground condition input and either implement Extended Squitter formatting or support the on-the-ground validation requirements of §3.22.2.7.c, the following test shall be performed.

The on-the-ground input is used in determining the codes for FS, VS and CA fields. The requirements of Section §3.22.2.7.c utilize radio altitude, ground speed and airspeed inputs to validate the on-the-ground status when indicated by the input to the transponder. If the conditions for overriding the on-the-ground status indicated by the input to the transponder, the airborne status shall be utilized to select FS, VS and CA field coding. Also, for extender squitter format selection, airborne formats shall be transmitted unless overridden by ground station interrogation commands. CA field validation for Acquisition squitters and Extended Squitters is verified as part of Procedure #6 in §5.5.8.6, so the following test can be incorporated as part of that testing.

Set up the transponder to indicate on-the-ground status by input to the transponder. With no input of radio altitude, airspeed and ground speed to the transponder, verify that the FS codes are determined by the transponder states above with the Ground Register set to on-the-ground and VS is set to 1. Input radio altitude, airspeed and ground speed to the transponder. Since not all aircraft installations may have access to all three inputs, testing is required for all combinations of inputs being provided to the transponder so that each input is tested individually and collectively. This is to insure that any one input reporting a value that sets airborne status as specified in §3.22.2.7.c, properly outputs FS values according to Figure 3-12 with the Ground Register reset to NOT indicate on-the-ground condition and VS is ZERO. If all inputs are supported by the transponder, a total of 27 combinations are required.

This represents 9 cases with radio altitude not input, 9 cases with a value above 50 feet and 9 cases with a value below or equal to 50 feet. The same variation for airspeed and ground speed is required except the values selected would be above 100 knots to satisfy the requirement to reset the Ground Register to NOT indicate on-the-ground condition and a value at 100 knots or below to not modify the on-the-ground status.

5.5.8.7.5 SSS Code Validation Test

The SSS subfield is contained in the ME field of airborne Extended Squitters. Setup the transponder to transmit airborne Extended Squitters at the nominal rates. Verify the following:

- 1) SSS=0 when no alert (the Alert Register is clear and T_C timer is not running) and no SPI condition is active.
- 2) SSS=1 when Alert Register is set and no SPI Condition is active.
- 3) SSS=2 when the T_C timer is running and returns to ZERO after the temporary alert has cleared after 18 ±1 seconds.
- 4) SSS=3 when the T_I timer is set indicating a SPI Condition is active and returns to ZERO after the T_I timer expires.
- 5) SSS=1 when Alert Register is set and SPI Condition is active. Clear the alert and verify that SSS=2 as T_C timer is now active. Set the SPI Condition, which will set the T_I timer. Verify that SSS=2 until the T_C timer expires. Verify that SSS=3 upon expiration of the T_C timer and that SSS=0 upon expiration of the T_I timer.
- 6) SSS=3 when the T_I timer is started. Prior to expiration of the T_I timer, start the T_C timer and verify that SSS=2. Upon expiration of the T_C timer, verify that SSS returns to ZERO.
- 7) SSS=3 when the T_I timer is started. Set the Alert Register while the T_I timer is running and verify that SSS=1.

5.5.8.7.6 Alert when leaving STANDBY Condition

- a. Set to the airborne state and change the input of the ID function to a value other than 7500, 7600 or 7700.
- b. Wait 19 seconds.
- c. Set the transponder to STANDBY condition.
- d. Set the transponder to return to normal condition.
- e. Verify that the Mode A Code, temporary alert is set (FS field value is 2 and SSS=2 when the transponder is ES capable) for 18 ±1 seconds after leaving the STANDBY condition.
- f. Repeat Steps "a" through "e", except in Step "c" set the transponder to OFF.

5.5.8.7.7 Change the input of the ID function to 7500

- a. Set to the airborne state and set the transponder to STANDBY condition and provide the transponder with the 7500 code.
- b. Set the transponder to return to normal condition.
- c. Verify that the permanent alert is set (FS field value is 2 and SSS=1 when the transponder is ES capable).
- d. Repeat the test with 7600 and 7700.
- e. Repeats Steps "a" through "d", except in Step "a" set the transponder to OFF.

- (1.64) In EUROCAE ED-73C, in section §5.5.8.13.3.b, in order to clarify which specific Timers are being referenced, replace the text of the first paragraph of “b” with the following:

The transponder can be in 79 different specific lockout states as determined by the running of the one of the 79 T_D and the 78 T_L timers. The following test sequence must be repeated for each of the lockout states:

- (1.65) In EUROCAE ED-73C, in section §5.6.2, in order to adjust the requirements to account for Comm-B extraction using DI=3, as suggested in Working Paper SC209-WP11-09R1, add the following *NOTE* after sub-bullet “b:”

NOTE: Extraction of a Register or a Comm-B broadcast using an SI code is performed in §5.6.6.4.

- (1.66) In EUROCAE ED-73C, in several sections of §5.6.6 there are references to ICAO Annex 10 Amendments. With this Change document, these references to specific Amendments will be removed, so as not to require updates in the future. Remove references to ICAO Annex 10 Amendments in the following locations:

- §5.6.6.1.a.(1) - Note 2 inside the Table
- §5.6.6.1.a.(2) - Note 1 inside the Table
- §5.6.6.5.a.(1) - Note 2 inside the Table
- §5.6.6.5.a.(2) - Note 1 inside the Table
- §5.6.6.6.a.(1) - Note 2 inside the Table
- §5.6.6.6.a.(2) - Note 1 inside the Table

- (1.67) In EUROCAE ED-73C, in section §5.6.6.1.c, in order to adjust the requirements to account for Comm-B extraction using DI=3, as suggested in Working Paper SC209-WP11-09R1, add the following at the end of sub-bullet “c” and just prior to the text of sub-bullet “d:”

Repeat the extraction with the following Comm-B Broadcast Extraction interrogation in order to extract the Comm-B broadcast message using an SI code (DI=3).

<u>COMM-B BROADCAST EXTRACTION INTERROGATION SETUP USING DI=3</u>							
<u>1 --- 5</u>	<u>6 --- 8</u>	<u>9 --- 13</u>	<u>14-16</u>	<u>17 - 22</u>	<u>23</u>	<u>24-27</u>	<u>28 --- 32</u>
				<u>“SD”</u>			
<u>“UF”</u> ≡	<u>“PC”</u> ≡	<u>“RR”</u> ≡	<u>“DI”</u> ≡	<u>“SIS”</u> ≡	<u>“LSS”</u> ≡	<u>“RRS”</u> ≡	<u>“XX”</u> ≡
<u>4</u>	<u>0</u>	<u>16</u> <u>(10 HEX)</u>	<u>3</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>

Verify that the transponder replies with a “DF” = 20 reply with the “MB” field providing Aircraft Identification data as follows:

Part 1. c. DF = 20, Register 20₁₆ - Aircraft Identification "MB" Field									
Reply Bits:	33 --- 40	41 -- 46	47 -- 52	53 -- 58	59 -- 64	65 -- 70	71 --76	77 -- 82	83 -- 88
"MB" Bits:	1 --- 8	9 --- 14	15 -- 20	21 -- 26	27 -- 32	33 -- 38	39 -- 44	45 -- 50	51 -- 56
Field:	BDS	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5	Char. 6	Char. 7	Char. 8
Data:	0010 0000	010101	001010	010101	001010	010101	001010	010101	001010
Character:		"U"	"J"	"U"	"J"	"U"	"J"	"U"	"J"

- (1.68) In EUROCAE ED-73C, in section §5.6.6.1.h, in order to adjust the requirements to account for Comm-B extraction using DI=3, as suggested in Working Paper SC209-WP11-09R1, add the following at the end of sub-bullet "h" and just prior to the text of sub-bullet "i.":

Repeat the extraction of Register 17₁₆ using the following GICB extraction interrogation in order to use the format for SI code (DI=3) and verify that the content is the same as the content of Register 17₁₆ previously extracted using DI=7.

REGISTER 17₁₆ COMMON USAGE GICB CAPABILITY GICB EXTRACTION							
EXTENDED DATA SOURCE INTERROGATION SETUP USING DI=3							
1 --- 5	6 --- 8	9 --- 13	14-16	17 - 22	23	24-27	28 --- 32
"SD"							
"UF"	"PC"	"RR"	"DI"	"SIS"	"LSS"	"RRS"	Not Assigned
≡	≡	≡	≡	≡	≡	≡	≡
<u>4</u>	<u>0</u>	<u>17</u> (11 HEX)	<u>3</u>	<u>1</u>	<u>1</u>	<u>7</u>	<u>0</u>

- (1.69) In EUROCAE ED-73C, in section §5.6.6.1.i, in order to adjust the requirements to account for Comm-B extraction using DI=3, as suggested in Working Paper SC209-WP11-09R1, add the following at the end of sub-bullet "i" and just prior to the text of 5.6.6.2:

Repeat the extraction of Register 18₁₆ using the following GICB extraction interrogation in order to use the format for SI code (DI=3) and verify that the content is the same as the content of Register 18₁₆ previously extracted using DI=7.

REGISTER 18₁₆ MODE S SPECIFIC SERVICES CAPABILITY GICB EXTRACTION							
EXTENDED DATA SOURCE INTERROGATION SETUP USING DI=3							
1 --- 5	6 --- 8	9 --- 13	14-16	17 - 22	23	24-27	28 --- 32
"SD"							
"UF"	"PC"	"RR"	"DI"	"SIS"	"LSS"	"RRS"	Not Assigned
≡	≡	≡	≡	≡	≡	≡	≡
<u>4</u>	<u>0</u>	<u>17</u> (11 HEX)	<u>3</u>	<u>1</u>	<u>1</u>	<u>8</u>	<u>0</u>

- (1.70) In EUROCAE ED-73C, in section §5.7.5.6.d, in order to correct an error in logic during the creation of this test procedure, make the following changes to §5.7.5.6.d.(2):

- (2). Bit 55 (bit 23 of the "MB" field) set to "40" to indicate that Register 5F₁₆ servicing capability has been ~~established and that data is valid~~ terminated because of the loss of data.

- (1.71) In EUROCAE ED-73C, in section §5.7.5.9, as indicated in Working Paper SC209-WP11-10R1, following a review of EUROCAE ED-73C by EADS, and discussion and agreement by RTCA SC-209 and EUROCAE WG-49, the Set number referenced is incorrect. Replace “Set 6” with “Set 8” as follows:

5.7.5.9 PART 9: Register 40₁₆ - Selected Vertical Intention - Data Change Validation - Set 6~~8~~ (§3.30 through 3.30.5)

- (1.72) In EUROCAE ED-73C, in section §5.7.5.15.d, in order to correct an error in logic during the creation of this test procedure, make the following changes to §5.7.5.15.d.(2):

- (2). Bit 55 (bit 23 of the “MB” field) set to “40” to indicate that Register 5F₁₆ servicing capability has been ~~established and that data is valid~~ terminated because of the loss of data.

- (1.73) In EUROCAE ED-73C, in section §5.7.6.15, add the following NOTE to clarify the use of GPS data sources:

NOTE: GPS Data Sources may not provide data more often than once every 1.2 seconds. If GPS Data Sources are used to provide data, ensure that the data is provided at the minimum rate of once every 1.2 seconds. For Register 50₁₆, this may apply to the True Track Angle data and/or Ground Speed data.

- (1.74) In EUROCAE ED-73C, in section §5.7.7.14, make the following changes in subsection “a.”

a. **Data / Source Change - Set 1:** (§3.30.8.2)

- (1). Magnetic Heading Data Input: (§3.30.8.2.1)
Via an appropriate input interface, set the rate at which valid Magnetic Heading data is provided to less than once ~~per two~~ in 2.6 seconds.
- (2). Indicated Airspeed Data Input - ADS: (§3.30.8.2.2)
Via an appropriate input interface, set the rate at which valid Indicated Airspeed data is provided to less than once ~~per two~~ in 2.6 seconds.
- (3). Mach Data Input - ADS: (§3.30.8.2.3)
Via an appropriate input interface, set the rate at which valid Mach data is provided to less than once ~~per two~~ in 2.6 seconds.
- (4). Barometric Altitude Rate Data Input - ADS: (§3.30.8.2.4)
Via an appropriate input interface, set the rate at which valid Barometric Altitude Rate data is provided to less than once ~~per two~~ in 2.6 seconds.
- (5). Inertial Vertical Rate Data Input - FMS / IRS: (§3.30.8.2.5)
Via an appropriate input interface, set the rate at which valid Inertial Vertical Rate data is provided to less than once ~~per two~~ in 2.6 seconds.

- (1.75) In EUROCAE ED-73C, in section §5.7.7.15, add the following NOTE to clarify the use of GPS data sources:

NOTE: GPS Data Sources may not provide data more often than once every 1.2 seconds. If GPS Data Sources are used to provide data, ensure that the data is provided at the minimum rate of once every 1.2 seconds. For Register 60₁₆, this may apply to the Inertial Vertical Rate data.

(1.76) In EUROCAE ED-73C, in section §5.8.4, in bullets “a” and “b,” in order to correct a problem with Table references in Appendix B, make the following changes identified below in yellow:

- a. Verify that the servicing of Register **XX₁₆** during the power-on cycle of the transponder is properly reported in Registers 18₁₆ through 1C₁₆ as required in Appendix B, **Table B-3-24 to Table B-3-28**.
- b. Verify that the real-time (not just since power-on) servicing of Register **XX₁₆** is properly reported in Register 17₁₆ (see Appendix B, **Table B-3-23**) if such reporting is required for Register **XX₁₆**.

(1.77) In EUROCAE ED-73C, in Appendix A, section §A.1, add the following acronyms:

- QFE – Aviation “Q” Code for “Field Elevation”
- QNE – Aviation “Q” Code for “Nautical Height” for Enroute
- QNH – Aviation “Q” Code for “Nautical Height”

(1.78) In EUROCAE ED-73C, in Appendix A, section §A.2, edit and add the following definitions:

Event-Driven – Messages that are broadcast periodically for a duration of the operational condition. Examples of Event-Driven Messages include the Extended Squitter Aircraft Status Message with the Emergency/Priority Status and TCAS RA Broadcast subtypes, ~~Operational Status and Target State and Status Messages~~ (ref. RTCA/DO-260A ~~B/EUROCAE ED-102A~~).

Periodic Status – Status Messages that are broadcast independently in the same manner as the Airborne Position, Surface Position, Airborne Velocity and Aircraft Identification Messages. Examples of Periodic Status Messages include the Target State and Status and the Aircraft Operational Status (ref. RTCA DO-260B/EUROCAE ED-102A).

QFE – Local station barometric pressure setting which provides an altimeter reading of indicated altitude of the airplane above the station, whether airborne or on the ground.

QNE – The barometric pressure used for the standard altimeter setting (29.92 inches Hg).

QNH – Local station barometric pressure setting which provides an altimeter reading of indicated altitude of the airplane above mean sea level, whether airborne or on the ground.

- (1.79) In EUROCAE ED-73C in Appendix B, there are several references to ICAO Doc 9871, Edition 1. There are specific paragraph references to guidance materials in Doc 9871, Edition 1, Appendix C, which will change to Appendix D in Doc 9871, Edition 2. In the titles of the following subparagraphs in Appendix B, make the specified changes to the paragraph reference in ICAO Doc 9871, Edition 2:

In the title of §B.4.1 **change** §C.2.4.1 **to** Edition 2, §D.2.4.1
 In the title of §B.4.2 **change** §C.2.4.2 **to** Edition 2, §D.2.4.2
 In the title of §B.4.3 **change** §C.2.4.3 **to** Edition 2, §D.2.4.3
 In the title of §B.4.4 **change** §C.2.4.4 **to** Edition 2, §D.2.4.4
 In the title of §B.4.5 **change** §C.2.4.5 **to** Edition 2, §D.2.4.5
 In the title of §B.4.6 **change** §C.2.4.6 **to** Edition 2, §D.2.4.6

- (1.80) In EUROCAE ED-73C, in Appendix B, section §B.2.1 inside Table B-2-1, revise the entry for Register 62₁₆ by removing reference to “Reserved for” and setting the Maximum Update Interval to 0.5 seconds:

<i>Transponder Register No.</i>	<i>Assignment</i>	<i>Maximum update interval (see Note 1)</i>
62 ₁₆	Reserved for Target State and Status Information	N/A 0.5s

- (1.81) In EUROCAE ED-73C, in Appendix B, section §B.2.1, in order to resolve the coordination of documents with regard to the issue of timeout issues related to Registers 08₁₆ and 20₁₆ initially raised by Kevin Wilson of Honeywell and discussed in Working Papers SC209-WP10-04 and SC209-WP11-04 by Bob Saffell of Rockwell Collins, add the following Note #2 directly after the existing Note at the bottom of Table B-2-1:

NOTE 2: *If Extended Squitter is implemented, then Register 08₁₆ is not cleared or ZEROed once either Flight Identification or Aircraft Registration data has been loaded into the Register during the current power-on cycle. Register 0816 is not cleared since it provides information that is fundamental to track file management in the ADS-B environment. (See RTCA DO-260B, §2.2.5.1.11.c). Refer to §B.4.3.3 for implementation guidelines regarding Register 08₁₆ and 20₁₆.*

- (1.82) In EUROCAE ED-73C, in Appendix B, section §B.3 just prior to Table B-3-7 there is an un-numbered table containing references to “ADS-B Registers.” Because of the changes in RTCA DO-260B and EUROCAE ED-102A defining the ADS-B Periodic Status Messages and removing them from being broadcast by the Event-Driven protocol, edit the text, the un-numbered table and the *Note* just prior to Table B-3-7 as follows:

For additional information on the following ADS-B Registers, please reference RTCA/DO-260A [B \[EUROCAE ED-102A\]](#):

Table B-3-5	BDS Code 0,5	Extended Squitter Airborne Position
Table B-3-6	BDS Code 0,6	Extended Squitter Surface Position
Table B-3-7	BDS Code 0,7	Extended Squitter Status (see Note)
Table B-3-8	BDS Code 0,8	Extended Squitter Aircraft Identification and Category
Table B-3-9a	BDS Code 0,9	Extended Squitter Airborne Velocity (Subtypes 1 and 2 – Velocity Over Ground)
Table B-3-9b	BDS Code 0,9	Extended Squitter Airborne Velocity (Subtypes 3 and 4 – Airspeed and Heading)
Table B-3-10	BDS Code 0,A	Extended Squitter Event-Driven Information
Table B-3-97-1	BDS Code 6,1	Extended Squitter Aircraft Status (see Note) (Subtype =1 – Emergency/Priority Status)
Table B-3-97-2	BDS Code 6,1	Extended Squitter Aircraft Status (see Note) (Subtype=2 – TCAS RA Broadcast)
Table B-3-98	BDS Code 6,2	Target State and Status (see Note)
Table B-3-101	BDS Code 6,5	Extended Squitter Aircraft Operational Status (see Note)

NOTE: *The 1090 Extended Squitter Status Registers are actually provided in this section since they are not squittered and intended to be accessed through GICB protocols.*

- (1.83) In EUROCAE ED-73C, in Appendix B, section §B.3, Table B-3-16 describes the format for Register 10₁₆. In order to account for the changes that were made in the ADS-B MOPS (RTCA DO-260B/EUROCAE ED-102A) and subsequent corresponding changes being proposed in ICAO Doc 9871, Edition 2, the following additional reference should be added in *Note* #1 of Table B-3-16:

- 1) Annex 10 Volume IV, §3.1.2.6.10.2 [and §4.3.8.4.2.2.2.](#)

- (1.84) In EUROCAE ED-73C, in Appendix B, section §B.3, Table B-3-16 describes the format for Register 10₁₆. In order to account for the changes that are being made in the ADS-B MOPS (RTCA DO-260B/EUROCAE ED-102A) and subsequent corresponding changes in ICAO Doc 9871, Edition 2, RTCA DO-181D and EUROCAE ED-73C, the Mode S Subnetwork Version Number will have to change accordingly. Replace the description of the Mode S Subnetwork Version Number field, Bits 17 through 23, in Table B-3-16 with the following:

Version Number	ICAO	RTCA	EUROCAE
0	Mode S Subnetwork Not Available		
1	ICAO Doc 9688 (1996)		
2	ICAO Doc 9688 (1998)		
3	Annex 10, Vol III, Amendment 77		
4	ICAO Doc 9871, Edition 1	DO-181D	ED-73C
<u>5</u>	ICAO Doc 9871, Edition 2	DO-181D Change 1	ED-73C Change 1
6 -127	Unassigned Reserved		

- (1.85) In EUROCAE ED-73C, in Appendix B, section §B.3, Table B-3-23, in order to harmonize the naming of the Extended Squitter Identification and Category Message across all documents, in the definition table for Register 17₁₆, make the following changes for bit #4:

0,8 Extended Squitter ~~Type and~~ Identification and Category

- (1.86) In EUROCAE ED-73C, in Appendix B, section §B.3, Table B-3-48, Note 1 has an incorrect reference:

In Note 1 of Table B-3-48 **replace** §2.2.22.1.2.1.3 **with** §2.2.22.1.2.1

(1.87) In EUROCAE ED-73C, in Appendix B, section §B.3, Table B-3-97-1 it is necessary to reflect the addition of the Mode A Code to the format for the Aircraft Status Message for Subtype=1 broadcasting the Emergency/Priority status and the Mode A Code. Replace Table B-3-97-1 with:

1	MSB	FORMAT TYPE CODE = 28	<p>PURPOSE: To provide additional information on aircraft status.</p> <p>Subtype shall be coded as follows:</p> <p>0 = No information 1 = Emergency/priority status and Mode A Code 2 = TCAS RA Broadcast 3 to 7 = Reserved</p>																		
2																					
3																					
4	LSB																				
5	MSB	SUBTYPE CODE = 1	<p>Emergency state shall be coded as follows:</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No emergency</td> </tr> <tr> <td>1</td> <td>General emergency</td> </tr> <tr> <td>2</td> <td>Lifeguard/Medical</td> </tr> <tr> <td>3</td> <td>Minimum fuel</td> </tr> <tr> <td>4</td> <td>No communications</td> </tr> <tr> <td>5</td> <td>Unlawful interference</td> </tr> <tr> <td>6</td> <td>Downed aircraft</td> </tr> <tr> <td>7</td> <td>Reserved</td> </tr> </tbody> </table>	Value	Meaning	0	No emergency	1	General emergency	2	Lifeguard/Medical	3	Minimum fuel	4	No communications	5	Unlawful interference	6	Downed aircraft	7	Reserved
Value	Meaning																				
0	No emergency																				
1	General emergency																				
2	Lifeguard/Medical																				
3	Minimum fuel																				
4	No communications																				
5	Unlawful interference																				
6	Downed aircraft																				
7	Reserved																				
6																					
7																					
8	LSB																				
9	MSB	EMERGENCY STATE	<p>1) Message delivery shall be accomplished using the Event-Driven protocol as specified in §2.2.3.3.1.4.3.1 of EUROCAE ED-102A / [RTCA DO-260B].</p> <p>2) Termination of emergency state shall be detected by coding in the surveillance status field of the airborne position message.</p> <p>3) Subtype 2 message broadcast shall take priority over subtype 1 message broadcast.</p> <p>4) Emergency State value 1 shall be set when Mode A code 7700 is provided to the transponder.</p> <p>5) Emergency State value 4 shall be set when Mode A code 7600 is provided to the transponder.</p> <p>6) Emergency State value 5 shall be set when Mode A code 7500 is provided to the transponder.</p> <p>7) The Mode A Code shall be coded as defined in ICAO Annex 10 Volume IV, §3.1.2.6.7.1.</p>																		
10	LSB																				
11	MSB	MODE A (4096) CODE																			
12																					
13																					
14																					
15																					
16																					
17																					
18	LSB																				
19		RESERVED																			
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- (1.88) In EUROCAE ED-73C, in Appendix B, section §B.3, Table B-3-97-2 in order to harmonize with changes made in RTCA DO-260B/EUROCAE ED-102A, make the following changes to Note #3 in the register description of the Aircraft Status Message with Subtype=2:
- 3) RA Broadcast shall be terminated ~~10~~ 24 +/-1 seconds after the RAT flag (Annex 10, Volume IV, §4.3.8.4.2.2.1.3) transitions from ZERO to ONE.

(1.89) In EUROCAE ED-73C, in Appendix B, section §B.3, Table B-3-98 it is necessary to reflect the revised definition of the Register 62₁₆ Target State and Status Information for Subtype=1 as defined in DO-260B/ED-102A for ADS-B Version = 2. Replace Table B-3-98 with the following:

1	
2	
3	FORMAT TYPE CODE = 29
4	
5	
6	MSB SUBTYPE CODE = 1
7	LSB
8	SIL SUPPLEMENT (0=Per Hour, 1=Per Sample)
9	SELECTED ALTITUDE TYPE (0=MCP/FCU, 1=FMS)
10	MSB = 32768 feet
11	MCP / FCU SELECTED ALTITUDE
12	(when Selected Altitude Type = 0)
13	FMS SELECTED ALTITUDE
14	(when Selected Altitude Type = 1)
15	Coding: 111 1111 1111 = 65472 feet
16	*** **
17	000 0000 0010 = 32 feet
18	000 0000 0001 = 0 feet
19	000 0000 0000 = No data or Invalid
20	LSB = 32 feet
21	MSB = 204.8 millibars
22	BAROMETRIC PRESSURE SETTING (MINUS 800 millibars)
23	Range = [0, 408.0] Resolution = 0.8 millibars
24	Coding: 1 1111 1111 = 408.00 millibars
25	* **
26	0 0000 0010 = 0.800 millibars
27	0 0000 0001 = 0.000 millibars
28	0 0000 0000 = No Data or Invalid
29	LSB = 0.8 millibars
30	STATUS (0=Invalid, 1=Valid)
31	Sign (0=Positive, 1=Negative)
32	MSB = 90.0 degrees
33	
34	SELECTED HEADING
35	Range = [+/- 180] degrees, Resolution = 0.703125 degrees
36	(Typical Selected Heading Label = "101")
37	
38	
39	LSB = 0.703125 degrees (180/256)
40	MSB
41	NAVIGATION ACCURACY CATEGORY FOR POSITION (NAC_P)
42	
43	LSB
44	NAVIGATION INTEGRITY CATEGORY FOR BARO (NIC_{BARO})
45	MSB
46	LSB SOURCE INTEGRITY LEVEL (SIL)
47	STATUS OF MCP / FCU MODE BITS (0 = Invalid, 1 = Valid)
48	AUTOPILOT ENGAGED (0 = Not Engaged, 1 = Engaged)
49	VNAV MODE ENGAGED (0 = Not Engaged, 1 = Engaged)
50	ALTITUDE HOLD MODE (0 = Not Engaged, 1 = Engaged)
51	Reserved for ADS-R Flag (see §2.2.18.4.6)
52	APPROACH MODE (0 = Not Engaged, 1 = Engaged)
53	TCAS OPERATIONAL (0 = Not Operational, 1 = Operational)
54	LNAV MODE (0 = Not Engaged, 1 = Engaged)
55	MSB RESERVED
56	LSB

PURPOSE: To provide aircraft state and status information.

Note: This Barometric Pressure Setting data can be used to represent QFE or QNH/QNE, depending on local procedures. It represents the current value being used to fly the aircraft.

(1.90) In EUROCAE ED-73C, in Appendix B, section §B.3, Table B-3-101 it is necessary to reflect the revised definition of the Extended Squitter Aircraft Operational Status as defined in DO-260B/ED-102A for ADS-B Version = 2. Replace Table B-3-101 with the following:

1	MSB			
2	FORMAT TYPE CODE = 31			
3				
4				
5			LSB	
6	MSB	MSB		
7	SUBTYPE CODE = 0	SUBTYPE CODE = 1		
8	LSB	LSB		
9	AIRBORNE CAPABILITY CLASS (CC) CODES	SURFACE CAPABILITY CLASS (CC) CODES		
10				
11				
12				
13				
14				
15				
16				
17			LSB	
18				
19				
20				
21			MSB	LENGTH/WIDTH CODES
22			LSB	
23			MSB	
24			LSB	
25	AIRBORNE OPERATIONAL MODE (OM) CODES	SURFACE OPERATIONAL MODE (OM) CODES		
26				
27				
28				
29				
30				
31				
32				
33			LSB	
34				
35				
36				
37				
38				
39				
40				
41	MSB			
42	ADS-B VERSION NUMBER			
43	LSB			
44	NIC SUPPLEMENT-A			
45	MSB			
46	NAVIGATIONAL ACCURACY CATEGORY – POSITION			
47	(NAC _P)			
48	LSB			
49	MSB	GVA		
50	LSB	RESERVED		
51	MSB			
52	SOURCE INTEGRITY LEVEL (SIL)			
53	LSB			
53	NIC _{BARO}	TRK/HDG		
54	HRD			
55	SIL SUPPLEMENT			
56	RESERVED for ADS-R			

PURPOSE: To provide the capability class and current operational mode of ATC-related applications and other operational information..

Subtype Coding:

- 0 = Airborne Status Message
- 1 = Surface Status Message
- 2 – 7 = Reserved

- (1.91) In EUROCAE ED-73C, Appendix B, section §B.4.1.3 describes the Mode S Subnetwork Version Number. In order to account for the changes that were made in the ADS-B MOPS (RTCA DO-260B/EUROCAE ED-102A) and subsequent corresponding changes being proposed in ICAO Doc 9871, Edition 2, the definition of the Mode S Subnetwork Version Number in RTCA DO-181D and EUROCAE ED-73C will have to change accordingly. At the beginning of §B.4.1.3, replace the definition of Bits 17 – 23 for the Mode S Subnetwork Version Number with the following:

Bits 17 – 23 reflect the Mode S Subnetwork Version Number.

Version Number	ICAO	RTCA	EUROCAE
0	Mode S Subnetwork Not Available		
1	ICAO Doc 9688 (1996)		
2	ICAO Doc 9688 (1998)		
3	Annex 10, Vol III, Amendment 77		
4	ICAO Doc 9871, Edition 1	DO-181D	ED-73C
<u>5</u>	ICAO Doc 9871, Edition 2	DO-181D Change 1	ED-73C Change 1
<u>6</u> -127	Unassigned Reserved		

- (1.92) In EUROCAE ED-73C, in Appendix B, after section §B.4.3.2 and just prior to section §B.4.4, add a new section to explain implementation considerations for Registers 08₁₆ and 20₁₆.

B.4.3.3 Register 20₁₆ and 08₁₆ Implementation Considerations

Detailed implementation requirements for Register 20₁₆ are provided in §3.29.6. §3.28.3.3.b and §B.2.1, Table B-2-1, Note 2 then provide introduction to Register 08₁₆ implementation. Implementation of Register 08₁₆ should also consider the following:

- a. If valid Flight Identification data is available, then the data should be used to populate the character subfields in Register 08₁₆.
- b. After using Flight Identification data to populate the character subfields in Register 08₁₆ in a given power-on cycle, if Flight Identification data becomes invalid or not available, then the last known valid Flight Identification data should be retained and used to continue population of the character subfields in Register 08₁₆ for the duration of the power-on cycle.
- c. If valid Flight Identification data is not available, but valid Aircraft Registration data is available in a given power-on cycle, then the valid Aircraft Registration data should be used to populate the character subfields in Register 08₁₆ for the duration of the power-on cycle.
- d. If Register 08₁₆ has been populated using Aircraft Registration data in a given power-on cycle, and valid Flight Identification data becomes available, then the Flight Identification data should be used to populate the character subfields in Register 08₁₆ for the remainder of the power-on cycle.

e. Once valid Flight Identification data has been used to populate Register 08₁₆ in a given power-on cycle, Aircraft Registration data should not be used to populate the character subfields of Register 08₁₆, even if Flight Identification data becomes invalid or not available during the power-on cycle.