

**RTCA Special Committee 209**

**ATCRBS / Mode S Transponder MOPS Maintenance**

**Meeting #11**

**In Joint Session with EUROCAE WG-49  
RTCA Headquarters, Washington, DC  
8 – 10 September 2010**

**Register 60<sub>16</sub> Maximum Update Interval**

**Change from 1.0 to 1.3 seconds**

**And**

**Required Document Changes**

**To**

**RTCA DO-181D and EUROCAE ED-73C**

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This Working Paper is provided in response to **Action Item 10-02**.

During the SC-209/WG-49 Meeting 10 in Paris, it was agreed to change the Maximum Update Interval for Register 60<sub>16</sub> from 1.0 seconds to 1.3 seconds. This Working Paper replicates the applicable sections from RTCA DO-181D and EUROCAE ED-73C and then uses the Track Changes function to indicate where change is needed in both the requirements sections and in the Test Procedure section.

## Introduction:

During the SC-209/WG-49 Meeting 10 in Paris, it was agreed to change the Maximum Update Interval for Register 60<sub>16</sub> from 1.0 seconds to 1.3 seconds. Updates of Register 50<sub>16</sub> had previously already been changed from 1.0 to 1.3 seconds. These changes are driven by the fact that certain data parameters used in Register 50<sub>16</sub> and 60<sub>16</sub> may be acquired from GPS Data Sources which may only provide the data once every 1.2 seconds.

## Discussion / Changes:

### 1. RTCA DO-181D Changes:

**In RTCA DO-181D, make the changes as shown in the following replications of section 2.2.25.8.3, 2.7.6.15, 2.7.7.14, and 2.7.7.15.**

#### 2.2.25.8.3 Minimum Update Interval of Register 60<sub>16</sub>

- a. The minimum update interval at which Register 60<sub>16</sub> **shall** be reloaded with valid data is 1.~~30~~ seconds.  
*Note: Register 60<sub>16</sub> is updated at least once every 1.~~30~~ seconds.*
- b. The time between availability of data that causes a change in Register 60<sub>16</sub> and the time that the change is made to Register 60<sub>16</sub> **shall** be less than the minimum update interval specified as 1.~~30~~ seconds.
- c. If Magnetic Heading data in Register 60<sub>16</sub> “MB” field bits 2 through 12 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ 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 60<sub>16</sub> “MB” field bits 14 through 23 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ 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 60<sub>16</sub> “MB” field bits 25 through 34 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ 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 60<sub>16</sub> “MB” field bits 36 through 45 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ 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 60<sub>16</sub> “MB” field bits 47 through 56 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ seconds) then Status Bit 46 **shall** be set to ZERO (0) and bits 47 through 56 **shall** be set to ZERO (0).

#### 2.7.6.15 Part 15 – Multiple Data Sources (§2.2.25 through §2.2.25.4, and §2.2.25.6)

If Multiple Data Sources of Register 50<sub>16</sub> parameters are provided to the Unit-Under-Test (UUT), then REPEAT all applicable sections of Part 2 for each

additional data source that was not tested while performing Parts 1 through 13 above.

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 50<sub>16</sub>, this may apply to the True Track Angle data and/or Ground Speed data.*

#### 2.7.7.14 Part 14 – Reduced Update Rate (§2.2.25.8.3)

Notes:

1. *The primary intent of Part 3 beyond data validation in Register 60<sub>16</sub> is to validate Declaration of Capability as data inputs are reduced to rates that are less than the minimum acceptable rate.*
2. *Review all subparagraphs of Part 3 prior to performing tests. This is necessary to establish the appropriate timing between changing data inputs and interrogations.*

a. **Data / Source Change - Set 1:** (§2.2.25.8.2)

- (1). Magnetic Heading Data Input: (§2.2.25.8.2.1)  
Via an appropriate input interface, set the rate at which valid Magnetic Heading data is provided to less than once ~~in 2.6per two~~ seconds.
- (2). Indicated Airspeed Data Input - ADS: (§2.2.25.8.2.2)  
Via an appropriate input interface, set the rate at which valid Indicated Airspeed data is provided to less than once ~~in 2.6per two~~ seconds.
- (3). Mach Data Input - ADS: (§2.2.25.8.2.3)  
Via an appropriate input interface, set the rate at which valid Mach data is provided to less than once ~~in 2.6per two~~ seconds.
- (4). Barometric Altitude Rate Data Input - ADS: (§2.2.25.8.2.4)  
Via an appropriate input interface, set the rate at which valid Barometric Altitude Rate data is provided to less than once ~~in 2.6per two~~ seconds.
- (5). Inertial Vertical Rate Data Input - FMS / IRS: (§2.2.25.8.2.5)  
Via an appropriate input interface, set the rate at which valid Inertial Vertical Rate data is provided to less than once ~~in 2.6per two~~ seconds.

#### 2.7.7.15 Part 15 – Multiple Data Sources (§2.2.25 through §2.2.25.4, and §2.2.25.8)

If Multiple Data Sources of Register 60<sub>16</sub> parameters are provided to the Unit-Under-Test (UUT), then REPEAT all applicable sections of Part 2 for each additional data source that was not tested while performing Parts 1 through 13 above.

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 60<sub>16</sub>, this may apply to the Inertial Vertical Rate data.*

## 2. EUROCAE ED-73C Changes:

In EUROCAE ED-73C, make the changes as shown in the following replications of section 3.30.8.3, 5.7.6.15, 5.7.7.14, and 5.7.7.15.

### 3.30.8.3 Minimum Update Interval of register 60<sub>16</sub>

- a) The minimum update interval at which Register 60<sub>16</sub> shall be reloaded with valid data is 1.~~30~~ seconds.

**NOTE:** Register 60<sub>16</sub> is updated at least once every 1.~~30~~ seconds.

- b) The time between availability of data that causes a change in Register 60<sub>16</sub> and the time that the change is made to Register 60<sub>16</sub> shall be less than the minimum update interval specified as 1.~~30~~ seconds.
- c) If Magnetic Heading data in Register 60<sub>16</sub> "MB" field bits 2 -through- 12 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ seconds) then Status Bit 1 shall be set to "0" and bits 2 --through-- 12 shall be set to "0".
- d) If Indicated Airspeed data in Register 60<sub>16</sub> "MB" field bits 14 -through- 23 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ seconds) then Status Bit 13 shall be set to "0" and bits 14 -through- 23 shall be set to "0".
- e) If Mach data in Register 60<sub>16</sub> "MB" field bits 25 -through- 34 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ seconds) then Status Bit 24 shall be set to "0" and bits 25 -through- 34 shall be set to "0".
- f) If Barometric Altitude Rate data in Register 60<sub>16</sub> "MB" field bits 36 -through- 45 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ seconds) then Status Bit 35 shall be set to "0" and bits 36 -through- 45 shall be set to "0".
- g) If Inertial Vertical Rate data in Register 60<sub>16</sub> "MB" field bits 47 -through- 56 cannot be updated with valid data within 2.~~60~~ seconds (e.g., twice the specified minimum update interval of 1.~~30~~ seconds) then Status Bit 46 shall be set to "0" and bits 47 -through- 56 shall be set to "0".

### 5.7.6.15 PART 15: Multiple Data Sources (§3.30 –through- 3.30.4, and 3.30.6)

If Multiple Data Sources of Register 50<sub>16</sub> parameters are provided to the Unit-Under-Test (UUT), then **REPEAT** all applicable sections of Part 2 for each additional data source that was not tested while performing Parts 1 through 13 above.

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 50<sub>16</sub>, this may apply to the True Track Angle data and/or Ground Speed data.

5.7.7.14

**PART 14: Reduced Update Rate (§3.30.8.3)**

**NOTE 1:** *The primary intent of Part 3 beyond data validation in Register 60<sub>16</sub> is to validate Declaration of Capability as data inputs are reduced to rates that are less than the minimum acceptable rate.*

**NOTE 2:** *Review all subparagraphs of Part 3 prior to performing tests. This is necessary to establish the appropriate timing between changing data inputs and interrogations.*

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 ~~in 2.6per two~~ 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 ~~in 2.6per two~~ 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 ~~in 2.6per two~~ 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 ~~in 2.6per two~~ 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 ~~in 2.6per two~~ seconds.

5.7.7.15

**PART 15: Multiple Data Sources (§3.30 –through- 3.30.4, and 3.30.8)**

If Multiple Data Sources of Register 60<sub>16</sub> parameters are provided to the Unit-Under-Test (UUT), then **REPEAT** all applicable sections of Part 2 for each additional data source that was not tested while performing Parts 1 through 13 above.

*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 60<sub>16</sub>, this may apply to the Inertial Vertical Rate data.*

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