

RTCA Paper No. 078-10/SC209-024
Minutes of Plenary Meeting #10 of RTCA SC-209
Held in Joint Session with EUROCAE WG-49
For The Maintenance of the ATCRBS & Mode-S MOPS
<http://adsb.tc.faa.gov/SC209.htm>

The Joint Plenary Session of RTCA/SC-209 Meeting #10 with EUROCAE WG-49 was called to order by SC-209 Co-Chair, Thomas Pagano at 9:00am CET on 28 June 2010, at EUROCAE Headquarters in Malakoff France. Mr. Pagano welcomed all attendees and asked that each attendee introduce themselves and their organization. The attendees for all or part of the meeting included the following:

Dominic Anello, DoD AIMS Program Office (SC-209)	Eric Potier, Eurocontrol, Brussels (WG-49)
Yves Audineau, Rockwell Collins, Paris (WG-49)	Alejandro "Alex" Rodriguez, Rockwell Collins (SC-209)
Gary Furr, Engility Corp., FAATC-AJP-653 (SC-209)	Pierre Ruault, Eurocontrol (WG-49)
Martin Gray, Trig Avionics (WG-49)	Robert "Bob" Saffell, Rockwell Collins (SC-209)
Kevin Hallworth, EASA (WG-49)	Kurt Schueler, Garmin International (SC-209)
Antoine Herve, DGAC (French CAA) (WG-49)	Nicolas Soldevila, Thales (WG-49)
Dr. Roland Mallwitz, Eurocae Technical Secretary (WG-49)	Chris Tourigny FAA, Spectrum Engineering (SC-209)
Dr. Vincent Orlando, Jr., MIT Lincoln Lab (SC-209)	Dr. William Thedford, Consultant, USAF (SC-209)
Tom Pagano, FAA, ATO-P FAATC – AJP-653 (SC-209)	Don Walker, FAA, AIR-130 (SC-209)
Masoud Paydar, ICAO ASP Secretary	

1. Agenda Item #1

- 1.1 Don Walker, was with us during this meeting as the Designated Federal Official. Mr. Walker additionally welcomed all attendees and thanked the Committees for all of their work over the last several years to harmonize the Transponder MOPS. Dr. Roland Mallwitz, EUROCAE Technical Secretary, welcomed the Joint Session attendees to EUROCAE Headquarters and we were informed of the arrangements for lunches.

2. Agenda Item #2

- 2.1 Gary Furr indicated that the initial Agenda that was posted on the meeting web page has now been updated with several new Working Papers. The Joint Session discussed the order in which the Working Papers would be reviewed as they related to the actual drafts of the Change Documents in WP10-06 and WP10-07. Gary also indicated that the final Agenda showing all of the Working Papers that were reviewed during the meeting would be posted on the meeting web page after the end of the meeting as WP10-01R1.

3. Agenda Item #3

- 3.1 Gary Furr briefly indicated that RTCA SC-209 had held a teleconference on 22 April 2010 for the purpose of informing the membership that there was a need for some changes in the Transponder MOPS document that was published in October

2008 and identified as RTCA DO-181D and EUROCAE ED-73C. During the teleconference there was detailed review of the initial draft version 1 of “Change 1 to DO-181D” and numerous comments were recorded. Among those comments was a strong negative reaction from the Transponder Manufacturer community related to a proposed change to command the transponder into the “Surface” condition when on the ground. There was concern that the proposed change would interfere with TCAS operations. Because of this, a revised change was proposed to the ICAO ASP Technical Subgroup during their meeting, also at EUROCAE Headquarters in Paris, 21 – 25 June 2010 and the revised proposed change was incorporated into an updated set of changes to be reflected in WP10-06R1 and WP1-07R1.

4. Agenda Item #4

4.1 Eric Potier and Antoine Herve indicated that the “new” EUROCAE WG-49 held a meeting and teleconference on 26 May 2010 at EUROCAE Headquarters, also to inform their membership of the need for changes to the Transponder MOPS and to review the set of changes that had previously been reviewed by RTCA SC-209 during their teleconference. The Minutes of the WG-49 meeting and teleconference were reviewed in Working Paper WP10-05. Several actions in WP10-05 were discussed and it was indicated that these will be discussed during this Joint Session as the appropriate Working Papers are reviewed.

5. Next, under **Agenda Item #5** the Joint Session began the review of Working Papers that have been submitted as the result of open issues that have been discussed by manufacturers, ICAO, RTCA and Regulatory Authorities. Working Papers in Agenda Item #5 were taken in no particular order and in some cases were interleaved with review of Working Papers and Change Documents in Agenda Item #6. The presentation of a given Working Paper was dependent on the availability of certain Meeting Members. The summaries below simply represent the summaries at the time of presentation.

5.1 The Joint Session started with the review of Working Paper WP10-02 as presented by Raymond Bayh of BAE Systems. Ray has itemized several proposed changes that he would like to see included in the proposed Transponder MOPS Change Documents. The Joint Session reviewed and discussed each of Ray’s proposed changes and made decisions on the merit of the change and recorded the decision in a revised Working Paper WP10-02R1, which was posted to the meeting web page.

5.2 The Joint Session continued with the review of Working Paper WP10-14 submitted by Gary Furr as a description of issues in three separate standards documents, ICAO Doc 9871, DO-181D and ED-73C that relate to the specification of the Mode S Subnetwork Version Number (MSSVN). Working Paper WP10-14 was also reviewed as Working Paper TSGWP09-21R1 by the ICAO ASP TSG during their meeting at EUROCAE the previous week, and a proposed solution was offered by the TSG at the end of WP10-14, which was reviewed, discussed and accepted by the Joint Session. Don Walker of the FAA made the point that the community does not want to “bump” the MSSVN simply because of changes in the ADS-B MOPS message descriptions. After discussion and review it was determined that it was necessary to modify the MSSVN to Version=5 because of changes in the contents

and descriptions of fields in Registers 51₁₆ and 52₁₆. It was further agreed that the text that describes previous versions of the MSSVN in DO-181D and ED-73C Appendix B, section §B.4, and also in ICAO Doc 9871, Appendix D, section §D.2.4.1.3 would not be edited to remove references to ICAO SARPs Amendment numbers.

- 5.3 The Joint Session continued with the review of Working Paper WP10-09 submitted by Gary Furr as a description of issues related to the Maximum Update Interval values for Registers 40₁₆, 50₁₆ and 60₁₆. The issue described in this Working Paper revolves around the fact that the Maximum Update Intervals for Registers 50₁₆ and 60₁₆ were changed to 1.3 seconds in the respective “Register Allocation” Tables in ICAO SARPs Amendment 82 and ICAO Doc 9871, Edition 1. An issue came to light during the preparation of “Change 1 to DO-181D,” in the review of section §2.2.25.8.3, wherein the test procedure is written with the Maximum Update Interval set to 1.0 seconds. Bob Saffell indicated that he believed that the Maximum Update Interval should not have been changed to 1.3 seconds because there is no GPS data source feeding the input to Register 60₁₆. Eric Potier indicated that he felt that this was not the case, and Eric accepted a Meeting Action Item to discuss this with Airbus. After discussion with Airbus, Eric came back to the Joint Session and indicated that there was a GPS label being used as data input. Bob Saffell agreed to accept **Action Item 10-01** to write an errata for ARINC 718A, Supplement 3 and to also provide input to update Table D-1-1 in the draft of ICAO Doc 9871 to be reviewed by the ICAO ASP in October. Bob Saffell further agreed to accept **Action Item 10-02** to review the test procedures in DO-181D and ED-73C to ensure that no changes are necessary when the Maximum Update Interval for Register 60₁₆ is changed from 1.0 seconds to 1.3 seconds as required by the change to DO-181D, §2.2.25.8.3 [ED-73C, §3.30.8.3].
- 5.4 The Joint Session continued with the review of Working Paper WP10-11 submitted by Tom Pagano as a description of issues related to the current reply rate requirements in the ICAO SARPs. The ICAO ASP TSG has previously requested a proposal to clarify the reply rate requirements in the SARPs for discussion and potentially adopt changes to clarify current requirements. This Working Paper was previously presented to the TSG as TSG WP09-09R1 and it proposed that a clarifying Note be added to Annex 10, Vol IV, §3.1.1.7.9.1. After discussion, the Joint Session agreed with the proposed change and indicated that the Note would be added to DO-181D, §2.2.3.4.1 [ED-73C, §3.4.1].
- 5.5 The Joint Session continued with the review of Working Paper WP10-04 submitted by Bob Saffell in response to an email question previously from Kevin Wilson of Honeywell. The basic issue surfaced by the original email is that Register 20₁₆ is cleared upon loss of data while Register 08₁₆ is not cleared in all cases. Bob Saffell points out that there are reasons for this, which based on the history of the definition and use of the two Registers is discussed in the Working Paper. After a brief discussion of the issues, Bob suggested that there be some minor changes in several documents, including DO-181D/ED-73C, ICAO Doc 9871, DO-260B and ARINC 718A Supplement 3. After further review and discussion later in the meeting, it was agreed that Bob Saffell would accept **Action Item 10-03** to further review this issue and make further recommendations for any changes.

- 5.6 The Joint Session continued with the review of Working Paper WP10-10 submitted by Don Walker in response to the belief that the existing requirements for Interrogation Acceptance Protocol are not specific about how a transponder should respond when the DI field contains an undefined value. Don points out that this has the potential to cause problems in the future when those values are defined. The Working Paper proposed requirements to make transponder behavior deterministic when the DI field is undefined. The Joint Session agreed to make modifications to Figure 2-15 in DO-181D and Figure 3-16 in ED-73C to add a decision box between States “J” and “X” to indicate that If Present, DI=4, 5, or 6, then Recover. If not present, then the decision box continues to the Accept box. It was pointed out that this change may affect test procedures and Tom Pagano accepted **Action Item 10-04** to have John Van Dongen of the FAA Technical Center review all of the test procedures in this area and proposed modifications for the next meeting.
- 5.7 The Joint Session continued with the review of Working Paper WP10-13 originally submitted by Greg Dunstone of AirServices Australia to the ICAO ASP TSG for their review as TSG WP09-19 and presented to the Joint Session by Tom Pagano. The basic issue discussed in WP10-13 is the need in Australia to have the information available concerning which Transponder is providing the data. The Joint Session agreed that it was not possible to revise the ADS-B MOPS documents (RTCA DO-260B / Eurocae ED-102A) to add a single bit for Transponder identification as requested by the Working Paper. Rather, it was agreed that Alex Rodriguez, Bob Saffell and Don Walker would accept **Action Item 10-05** and work together for the purpose of defining one or more Registers for maintenance data.
- 5.8 The Joint Session continued with the review of Working Paper WP10-16 submitted by Dr. Vincent Orlando on the topic of an Alternative Approach for Ground Control to Inhibit Mode A/C and Mode S All-Call Replies for Surface Aircraft. The ICAO ASP TSG was tasked to provide a means to control the on-the-ground condition for aircraft operating without a squat switch. The TSG developed a SARPs CP to provide ground control of the surface status via modification to commands in the TCS subfield (see WP-ASP07-03R1). This SARPs CP was approved by the ASP WG at the September 2009 Montreal meeting. The TSG considered the development of a complementary aircraft based technique in addition to the ground control at the January 2010 meeting. The consensus was that no additional technique was needed in addition to the ground based technique. This was reported by the TSG at the recent ASP WG meeting in Montreal in April 2010 and was accepted by the WG. However, the only reason for controlling the OTG status of aircraft without a squat switch is to inhibit replies to Mode S All-Call and Mode A/C interrogations while on the surface. These replies represent a significant source of unnecessary interference at an airport. Ring around can occur since transmit SLS may not be effective at all locations on the surface. When a draft of “Change 1 to DO-181D” was reviewed on a RTCA/EUROCAE teleconference in April 2010, TCAS manufacturers objected to ground control of the OTG status. The concern was that incorrect setting of the OTG status by the ground (or a hacker) could cause TCAS to ignore a possible airborne threat. Therefore, the current Working Paper (WP10-16R1) as modified during the discussion of the Joint Session provides an alternative technique for ground control to modify the TCS commands in DO-181D §2.2.23.1.7 [ED-73C §3.28.7] to only add the requirement to inhibit replies to Mode S All-Call and Mode A/C interrogations when commanded to report the surface

format. This will satisfy the intent of the ground control of OTG status but will be acceptable to the TCAS community since there is no change to the vertical status reported to TCAS. The Joint Session concluded that there was no need for the modification of the “validation” section as provided in the original WP10-16, and the proposed change was accepted with only a change proposed to the TCS command in DO-181D, §2.2.23.1.7 [ED-73C, §3.28.7].

- 5.9 The Joint Session continued with the review of Working Paper WP10-12 submitted by Don Walker as a proposal to require simple action of the flight crew during flight for display and entry of the Flight ID. This Working Paper was the result of a previous Working Paper (TSG WP09-17R1) that was discussed and agreed upon during the ASP TSG meeting the previous week. Don points out that some initial implementations of Flight ID crew interfaces are not flexible enough to allow for correction of errors in flight. Incorrect Flight ID has safety implications for positive identification by Air Traffic Control and by other aircraft using ADS-B applications. This Working Paper proposed language to require that Flight ID be displayed to the crew with a simple action. This Working Paper also proposed that Flight ID must be able to be entered by the crew with a simple action independent of any other parameters similar to Mode A Code entry. Upon the review of the proposed changes, the Joint Session agreed with the changes proposed in WP10-12.
- 5.10 The Joint Session continued with the review of Working Paper WP10-15 submitted by Tom Pagano as a review of test procedures in DO-181D/ED-73C that should be reviewed and/or modified for DI=3. This analysis was performed by John Van Dongen and a list of paragraphs affected is presented in the Working Paper. There are two DI values that identify SD field coding that request extended data readout. These values are 3 and 7. The difference is that the value of 3 also identifies the SD field as containing multisite SI lockout information while the DI value of 7 identifies that SD field as containing IIS lockout information. After a brief review of the Working Paper, Eric Potier agreed to accept **Action Item 10-07** for the purpose of a more detailed review of the proposed affected paragraphs and test procedures and to make specific recommendations for proposed changes to DO-181D/ED-73C.
- 5.11 The Joint Session continued with the review of Working Paper WP10-18 submitted by Tom Pagano regarding the issue of the Wide P4. This Working Paper discussed the options for reducing unwanted 1090 MHz interference due to transponder DF=11 IIS=0 replies. This is a result of the presentation of Working Paper ASP08-07 to the ASP Working Group at the April 2010 Montreal Meeting. The ASP TSG was tasked to make recommendations to reduce the impact of undesirable DF=11 IIS=0 transmissions. Analysis presented at the January 2010 TSG of flight test data collected on 1030 MHz and 1090 MHz in the United States Northeast corridor in 2007 showed high transmission rates of DF=11 with IIS=0, more than the expected once per second per aircraft. This Working Paper offered several options that the Joint Session was asked to consider for incorporating requirements as a result of these findings. After discussion, it was concluded that there would be no proposed changes to DO-181D/ED-73C as a result of this issue. Vince Orlando and Tom Pagano agreed to continue the discussion of this issue at the ICAO level and to propose a SARPs change that would introduce a Note into the SARPs to the effect that using a Wide P4 is a bad idea and that it will be cut off at some point in the future. Don Walker accepted **Action Item 10-08** to produce an information paper on

Multisite Lockout. Don will review DO-181D, Figure 2-13 to attempt to solve part of the Wide P4 issue.

6. Under **Agenda Item #6** the Joint Session began the review of Working Papers that specifically represented the drafts of the two Transponder MOPS Change documents. Working Paper WP10-06 represents the latest draft of “Change 1 to DO-181D” and Working Paper WP10-07 represents the latest draft of “Change 1 to ED-73C.” Gary Furr has prepared these draft change documents and began to step through both documents at the same time so as to compare the proposed changes in each document. With the review of each proposed change, there was discussion and some editing of the draft documents occurred. Additionally, there were additional Action Items that were discussed and agreed upon as the reviews of the change documents progressed.
- 6.1 Gary Furr accepted **Action Item 10-06** to review DO-181D §2.2.23.1.4.2 (Register Timeout) [ED-73C, §3.28.3.3, §3.28.3.4 & §3.28.4] and ensure that the paragraph(s) matches the same timeout paragraphs in RTCA DO-260B/ED-102A. Gary to propose specific changes required to DO-181D/ED-73C.
- 6.2 Gary Furr accepted **Action Item 10-09** to review DO-181D and ED-73C and make specific recommended changes to ensure that the references to Mode A/C/S and Mode S-only All-Call are consistent throughout both documents.
- 6.3 Bob Saffell accepted **Action Item 10-10** to perform a deeper analysis of Working Paper WP10-04 and DO-181D, §2.5.4.6.2.2 concerning the termination and zeroing of various squitter types, including Registers 62₁₆ and 65₁₆.
- 6.4 Bob Saffell and Gary Furr accepted **Action Item 10-11** to perform a check of original documentation including DO-181 (and all of its changes and versions) §2.1.11.4.4, as well as Annex 10 Vol IV, §3.1.2.1.5.2.4 regarding the received DPSK signal spacing of the P5 to attempt to explain the difference in the SARPs and ED-73 value of 0.05 versus the value in DO-181 for 0.10 microseconds.
7. Under **Agenda Item #7** the Joint Session discussed the need for future meetings and began to review the possible dates required to complete the change documents before the end of 2010. The agreed meetings were as follows:

Meeting	Dates/Time	Meeting Location
#11	8 – 10 Sept 2010	Joint meeting between RTCA SC-209 and Eurocae WG-49 at RTCA in Washington DC
#12	16 – 18 Nov 2010	Joint meeting between RTCA SC-209 and Eurocae WG-49 at EASA in Cologne Germany

8. Under **Agenda Item #8** the Joint Session began the review of Working Papers that were not specifically related to changes in DO-181D/ED-73C, but that needed to be addressed by the Transponder community represented by RTCA SC-209 and EUROCAE WG-49.

- 8.1 On the morning, of 29 July 2010, the Joint Session was joined by Dr. Jochen Bredemeyer from Flight Calibration Services (FCS). FCS was contracted by EASA to perform a study entitled “Mode S Transponder in High Density Operational Environments.” This was presented in Working Paper WP10-17 by Dr. Bredemeyer and discussed by the Joint Session. The study was commissioned because in certain parts of Europe transponders in some small aircraft were not detected by ground based interrogators. During the presentation, there was considerable discussion regarding phase reversal. However, no specific proposed changes to DO-181D/ED-73C were forthcoming from the conclusions of the presentation.
- 8.2 Working Paper WP10-08A was presented by Pierre Ruault of Eurocontrol on the subject of BDS Register Swap. The Working Paper that was originally posted to the Meeting Web Page was WP10-08, which was a report on this topic, whereas WP10-08A is the briefer presentation given by Pierre. The presentation focused on the fact that a problem was originally seen by the US Air Force and then later confirmed by Mitre, the FAA, Belgocontrol and LVNL. The problem involves a transponder problem, a design problem and a radar problem, two of which result in the swapping of a BDS Register contents when analyzed. At the end of the presentation, Pierre concluded that the Transponder problem is solved and an adapted retrofit process must be put in place. The Radar problem is identified but not yet confirmed by Thales. Finally, the system problem due to the FRUIT seems minor, assuming that the DF analysis was performed correctly. However, Eurocontrol proposes an other measurement campaign with an other type of radar to confirm.
9. The list of Open Action Items that were newly recorded as being assigned and accepted during the Joint Session of RTCA SC-209 and EUROCAE WG-49, referred to as Meeting #10 are as follows:

Action Number	Open Action Item Descriptions	Assigned to	Status
10-01	Write an errata for ARINC 718-A, Supplement 3 for Register 60 ₁₆ to add a label to indicate GPS data input. With the same information, propose an update to Table D-1-1 for the draft of ICAO Doc 9871 to be reviewed by the ICAO ASP during their October Working Group meeting in Brussels.	Bob Saffell	
10-02	Review the test procedures in DO-181D and ED-73C to ensure that no changes are necessary when the Maximum Update Interval for Register 6016 is changed from 1.0 seconds to 1.3 seconds as agreed by the Joint Session in DO-181D, §2.2.25.8.3.	Bob Saffell	
10-03	Review the issues surrounding the zeroing out of Registers 08 ₁₆ and 20 ₁₆ and make further recommendations for changes.	Bob Saffell	
10-04	Review the changes agreed to in WP10-10R1 for DI=4, 5, 6 and propose required changes to any test procedures.	John Van Dongen Tom Pagano	
10-05	Review the needs of the community to receive maintenance data as a downlink from the Transponder and define the contents or one or more Registers for maintenance data.	Alex Rodriguez Bob Saffell Don Walker	
10-06	Review DO-181D §2.2.23.1.4.2 (Register Timeout) [ED-73C, §3.28.3.3, §3.28.3.4 & §3.28.4] and ensure that the paragraph(s) matches the same timeout paragraphs in RTCA DO-260B/ED-102A. Prepare required proposed changes.	Gary Furr	

Action Number	Open Action Item Descriptions	Assigned to	Status
10-07	Review Working Paper WP10-15, analyze the proposed test procedures, and make specific recommendations for changes that may be required in DO-181D/ED-73C for DI=3.	Eric Potier	
10-08	Review DO-181D, Figure 2-13 and write an Information Paper on Multisite Lockout in an attempt to partially resolve the Wide P4 issue discussed in Working Paper WP10-18.	Don Walker	
10-09	Review DO-181D and ED-73C and make specific recommended changes to ensure that the references to Mode A/C/S and Mode S-only All-Call are consistent throughout both documents.	Gary Furr	
10-10	Perform a deeper analysis of Working Paper WP10-04 and DO-181D, §2.5.4.6.2.2 concerning the termination and zeroing of various squitter types, including Registers 62 ₁₆ and 65 ₁₆ .	Bob Saffell	
10-11	Perform a check of original documentation including DO-181 (and all of its changes and versions) §2.1.11.4.4, as well as Annex 10 Vol IV, §3.1.2.1.5.2.4 regarding the received DPSK signal spacing of the P5 to attempt to explain the difference in the SARPs and ED-73 value of 0.05 versus the value in DO-181 for 0.10 microseconds.	Bob Saffell Gary Furr	

10. The **Working Papers** for all SC-209 Meetings, as well as the Meeting Agendas, Meeting Minutes, Meeting Schedules and proposed modifications to the ATCRBS and Mode-S MOPS will be posted on the web site maintained by Gary Furr at the FAA William J Hughes Technical Center, located at:

<http://adsb.tc.faa.gov/SC209.htm>

As reported in the Meeting Summary of Eurocae WG-49, Meeting #6, members of SC-209 may access the WG-49 workspace through the Eurocae web site located at:

<http://www.eurocae.org/> Login: WG49 and password: MODE-S

Also, the workspace of Eurocae WG-51 can be accessed by SC-209 members through the same Eurocae web site with: Login: WG51 and password: ADSB