

**Summary of Meeting #28 of RTCA SC-186 Working Group 3
and Meeting #5 of EUROCAE Working Group 51, Subgroup 1
held at EUROCAE Headquarters in Malakoff near Paris as a Joint Session for the
Maintenance of the ADS-B 1090 MHz Extended Squitter (1090ES) MOPS
from 16 – 19 June 2009 between 9:00am and 5:00pm Paris time
<http://adsb.tc.faa.gov/WG3.htm>**

The meeting was called to order by Working Group 3 Co-Chair Thomas Pagano of the FAA ATO-P organization at about 9:00am, 16 June 2009. Mr. Pagano and EUROCAE WG-51, SG-1 Chair Jorg Steinleitner welcomed all attendees and asked that each attendee introduce themselves and their organization. The participants during part, or all, of the meeting included:

Yves Audineau, Rockwell Collins (WG-51, SG-1)	Herve Lespinasse, DGAC, France (WG-51, SG-1)	Tom Pagano, FAA ATO-P, AJP-653
Dr. Larry Bachman, JHU-APL	Stan Jones, Mitre CAASD	Christian Paquier, Dassault Aviation (WG-51, SG-1)
Dave Barnard, L-3 / ACSS (phone)	Dr. Ian Levitt, FAA ATO-P, AJP-653	Eric Potier, Eurocontrol (WG-51, SG-1)
Chip Bulger, FAA AIR-130 (phone)	Dr. George Ligler, PMEI – FAA SBS P.O. (phone)	Friedhelm Runge, EASA (WG-51, SG-1)
Gary Furr, Engility Corp, FAA ATO-P, AJP-653	Christophe Maily, Airbus (WG-51, SG-1)	Robert “Bob” Saffell, Rockwell Collins
Michael Garcia, ITT Corp.	Al Marshall, Sensis Corp	Nicolas Soldevila, Thales (WG-51, SG-1)
Martin Gray, Trig Avionics (WG-51, SG-1)	Johan Martensson, Eurocontrol (WG-51, SG-1)	Jorg Steinleitner, Eurocontrol (WG-51, SG-1)
Dr. William Harman, MIT Lincoln Lab	Dean Miller, Boeing ATM (phone)	Don Walker, Honeywell International
Richard Jennings, FAA AIR-130	Damian Mills, NATS, UK (WG-51, SG-1)	

1. Tom Pagano and Jorg Steinleitner began the meeting with **Agenda Item #1** by welcoming all participants to the EUROCAE Headquarters at Malakoff, near Paris France. Jorg Steinleitner of Eurocontrol discussed the facilities at EUROCAE Headquarters and the arrangements for lunch.
2. After Tom Pagano and Jorg Steinleitner concluded their initial remarks, Tom indicated that the next order of business would be **Agenda Item #2** to review the proposed Agenda, which was distributed for this Meeting under Working Paper 1090-WP28-01. Gary Furr pointed out that several Working Papers had been added to the proposed Agenda that was initially distributed via email and posted on the web site. Further, Gary noted that all revisions of Working Papers would be posted to that web page as soon as possible after their revision or after the end of the meeting. The Agenda was reviewed in detail because of the specific requirements related to presentation timing and the availability of certain Working Group members. Several Working Papers were scheduled to be presented at specific times as was indicated on the revised Agenda, posted to the web page as 1090-WP28-01R1.
3. Next, under **Agenda Item #3**, the Meeting turned to Working Paper 1090-WP28-02 as presented by Gary Furr as the Summary of Meeting #27, which was held at the facilities of United Airlines near Chicago Illinois. These minutes of Meeting #27 were accepted by the Joint Session as published with no questions or comments discussed.
4. Under **Agenda Item #4a**, Gary Furr then began a brief review of Working Paper 1090-WP28-03 as a brief look at the current status all of the currently proposed changes that could be included in what was originally referenced as “Change 3 to DO-260A,” but has now been recognized as the complete publication of DO-260B.

- 4.1 Gary indicated that there would not be a detailed review of this Working Paper, given that it is only a working copy of the progress of the activities of the Working Groups toward the ultimate published MOPS documents. It was pointed out that there had been assignments made for Action Items to many, or most, of the proposed changes during Meeting #27 at Chicago and that these actions would be updated during this Meeting and that the Change Matrix would continue to be updated during and after this Meeting. Additionally, Stuart Searight has prepared information regarding the changes that may affect the ADS-B MASPS (DO-242A) and this information was folded into WP28-03.
 - 4.2 Gary indicated that Working Paper 1090-WP28-10 was a working draft version 2.0 of the current DO-260B with all changes from the published DO-260A being highlighted in yellow.
 - 4.3 During the review of WP28-03, there was discussion on the issue of folding into the Link MOPS some of the paragraphs from the STP MOPS. There is not yet an action on the Working Group to perform this activity, so it was agreed that this Session would have a discussion regarding this issue under Agenda Item #7.
5. Next, under **Agenda Item #5**, the Joint Session began the review of Working Papers that have been submitted as the result of Open Action Items, which were initially accepted during Meetings #24, #25, #26 and #27. Working Papers in Agenda Item #5 were taken in no particular order and were interleaved with Working Papers 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 first Working Paper to be reviewed was 1090-WP28-07 under Agenda Item #5e, presented by Martin Gray as a result of Action Item 27-04. This Working Paper presents proposed changes that correct problems between the transponder MOPS (DO-181D) and DO-260A/B for requirements for closely spaced transmissions. After discussion, all proposed changes in the Working Paper were accepted by the Working Group and Gary Furr agreed to implement the changes into the draft of DO-260B under on-going Action Item 25-23.
 - 5.2 The Meeting then began to review Working Paper 1090-WP28-13 under Agenda Item #5h, presented by Al Marshall as a result of Action Item 26-07 dealing with issues that Al believes are related to position time of applicability. During the discussions, the Working Paper was edited to produce 1090-WP28-13R1. Al Marshall was then asked by the Working Group to revise the Working Paper to add a note in his proposed changes in §2.2.8.1.4.2.3. Al came back to the Working Group later in the meeting and the proposed Note was reviewed, discussed and rejected. Gary Furr agreed to implement the proposed changes originally identified in 1090-WP28-13R1 before Al proposed the note.

- 5.3 The Meeting began to review Working Paper 1090-WP28-20 under Agenda Item #5m, presented by Ian Levitt as a result of Action Item 27-02 dealing with issues related to the agreements for making changes for Total and Un-compensated Latency. During the discussions, the Working Paper was edited to produce 1090-WP28-20R1. Ian and others accepted a new **Action Item 28-02** for making suggested changes in the requirements, test procedures, Appendix A and the new timing Appendix prior to the July meeting at RTCA.
- 5.4 The Meeting began to review Working Paper 1090-WP28-05 under Agenda Item #5c, presented by Bob Saffell as a result of Action Item 27-13 dealing with writing the specific requirements and test procedures text for the revised Target State and Status Message. Bob agreed to accept **Action Item 28-03** to further review section 2.2.5 for the changes that he has identified in the revised Target State and Status Message.
- 5.5 The Meeting continued with the review of Working Paper 1090-WP28-17 under Agenda Item #5i by Mike Garcia of ITT as a result of Action Item 27-06 regarding the treatment of potential duplicate addresses in the FAA SBS Ground Station. This issue came out of a question from the Chicago meeting that asks the question about how the Ground Station handles a potential situation when two different aircraft on different links have the same 24-bit ICAO Address. Mike indicates that the ground system attaches an internal prefix to each ICAO address that passes through the ADS-B system, which would allow it to provide ADS-R service to each aircraft in this case. The 1090ES aircraft would continue to receive UAT aircraft through ADS-R (including the duplicate target) and vice versa. The Target Addresses within the ADS-R messages themselves would remain unchanged from their source.
- 5.6 The Meeting continued with the review of Working Paper 1090-WP28-21 under Agenda Item #5n by Dean Miller in response to Action Item 27-07 concerning the possibilities of having duplicate 24-bit ICAO Addresses on a 1090ES system. After discussion it was agreed that Action Item 27-07 would remain open and that Dean would work with Tom Pagano to further specify the details of changes to DO-260B.
- 5.7 The Meeting continued with the review of Working Paper 1090-WP28-09 under Agenda Item #5g by Tom Pagano in response to Action Item 27-03 concerning changes that need to be made because of the revision of the broadcast of the Mode A Code from the ADS-B TEST Message and into the Emergency/Priority Message. There were some editorial changes to the Working Paper to reflect corrections to produce 1090-WP28-09R1. During discussion, it was agreed that the Emergency/Priority Code would be removed from the Target State and Status Message and will only be broadcast in the Emergency/Priority Message, and the broadcast rate of the Emergency/Priority Message will no longer be dependent on the Target State and Status Message. Tom accepted **Action Item 28-04** to write a new requirement to prioritize the broadcast of the 7500, 7600 and 7700 emergency codes.
- 5.8 The Meeting continued with the review of Working Paper 1090-WP28-04 under Agenda Item #5a by Larry Bachman in response to Action Item 25-03 concerning the updating of Appendix P for performance with analysis of the A1S and A3 equipment classes. After discussing the results in the Working Paper, there were questions about

how well other aircraft will be able to “see” the A1S aircraft. Larry agreed to update this analysis to reflect an A1S transmitting and A1 receiving. Larry indicated that instead of specifying the actual 2020 and 2035 environments, he has specified projected numbers of aircraft. Larry will continue to update this Working Paper for the July meeting.

- 5.9 The Meeting continued with the review of Working Paper 1090-WP28-15 under Agenda Item #5b by Bill Harman as a further statement of the issues raised in the Larry Bachman Working Paper 1090-WP28-04. Bill indicates that his working paper offers some clarifications, intending to help indicate the assumptions that were used by Larry Bachman in Working Paper 1090-WP28-04. Bill also indicated that Working Paper 1090-WP28-15 also presents some evaluation results generated by Lincoln Laboratory for comparison with the values given in 1090-WP28-04.
- 5.10 The Meeting continued with the review of Working Paper 1090-WP28-08 under Agenda Item #5f by Christophe Maily in response to Action Item 24-11 regarding the position of Airbus on the issues of ADS-B ON/OFF switch and the ADS-B Failure Indication. Christophe indicates that the ADS-B ON/OFF switch might make sense, but that the impacts on the overall aircraft architecture would be so significant that probably this item should not be mandated. Regarding the ADS-B Failure Indication, Christophe indicates that Airbus supports the position that an indication in the cockpit would be interesting, in order to indicate to the crew that the ADS-B function is not performing correctly its intended function. (i.e., providing position information).
- 5.11 The Meeting continued with the review of Working Paper 1090-WP28-22 under Agenda Item #5o by Don Walker in response to Action Item 25-06 regarding the updating of the MOPS language regarding the issue of ADS-B Failure Indication. This revision of the Working Paper comes out of a teleconference and indicates the final recommendations on changes to the MOPS for annunciating an ADS-B Failure. After discussion and Meeting agreement, there were minor editorial changes to produce 1090-WP28-22R1, and Gary Furr agreed to implement the suggested changes into the draft of DO-260B.
- 5.12 The Meeting continued with the review of Working Paper 1090-WP28-23 under Agenda Item #5k by George Ligler in response to Action Item 27-10 regarding the consensus that was to be reached with regard to the teleconferences held by a Subgroup to discuss the issue of redefining the SIL parameter. George presented Working Paper 1090-WP28-23 as a summary of the two teleconferences held by the Subgroup as a lead-in to the further discussion on specific changes by Chip Bulger.
- 5.13 The Meeting continued with the review of Working Paper 1090-WP28-18 under Agenda Item #5j by Chip Bulger in response to Action Item 27-11 regarding the proposal for resolving the issue of redefining the SIL parameter. There was considerable discussion regarding the proposals and there was agreement that the proposed parameter SIL_C is basically the current SIL in DO-260A and the new parameter would occupy the same bit locations as in Version 1 to provide backward compatibility. It was agreed that there would be a new parameter named SIL Supplement (SIL_{SUPP}) to define the “per hour” or “per sample” measurement. Finally, a

new parameter named the System Design Assurance (SDA). Chip provided a revision of the Working Paper, which will be posted as 1090-WP28-18R1. Stan Jones and Jorg Steinleitner agreed to accept an Action Item to work with Chip to refine the language of some of the notes and they will forward a new revision of this Working Paper to Gary after the Paris meeting for incorporation into the Draft of DO-260B.

- 5.14 The Meeting continued with the review of Working Paper 1090-WP28-27 under Agenda Item #5r by Jorg Steinleitner in response to Action Item 27-12 regarding the addition of a NIC Supplement indicating a Radius of Containment of 0.3 NM. After group discussion, Eric was asked to review the proposed solutions and come back with a proposed method of revising the NIC table to retain compatibility. Eric came back to the Joint Session with what came to be identified as Working Paper 1090-WP28-29, which was discussed in Joint Session. WP28-29 describes methods by which the newly identified NIC Supplement to be broadcast in the Airborne Position Message in conjunction with the older NIC Supplement broadcast in the operational Status Message to achieve the containment radius of 0.3 NM. The Joint Session agreed that the proposed solution was acceptable and that this method would be implemented into the draft of DO-260B.
- 5.15 The Meeting continued with the review of Working Paper 1090-WP28-19 under Agenda Item #5l by Don Walker in response to Action Item 27-09 regarding the issue of determining the actual point at which the aircraft is stopped on the surface. The issue was brought to the Working Group by the ATSA SURF and RFG ATP application subgroups because they are worried about the situation where an aircraft is actually stopped at a hold line at the runway, but there may still be a minor ground speed being reported at the low broadcast rate on the surface that has gone down to once per 5 seconds. The problem can come when the automation system extrapolates the position between receptions of the surface position message which makes it appear to the controller (and possibly the pilot) as if the aircraft is progressing toward the runway, even though it may be completely stopped for a long period of time. Don proposes to establish cutoff values for the Ground Speed where the aircraft would report being stopped and to write these new requirements into the data source section §2.2.5.1.9. Bob Saffell pointed out that this proposed solution is something that tries to impose a solution on the transponder rather than on the application that may be using the data. After some Meeting discussion, it was agreed that the specific proposal of the Working Paper would be one of three options and further discussion would be held on Friday morning regarding the alternate solutions. There were three options agreed to be further discussed: (1) eliminate the transition to low broadcast rate of the surface position message, (2) broadcast a ZERO Ground Speed when we transition to low rate, [means a change to Table 2-18 to introduce a absolute ZERO Ground Speed encoding] (3) implement the threshold values identified in WP28-19. There was a proposed change to Table 2-18 to incorporate a value to indicate an absolute ZERO Ground Speed, which would be used when the squitter rate switches to the low rate. It was agreed that the three options discussed would be further discussed at the ICAO ASP TSG meeting on 22-26 June and the result of that discussion would be brought back to the WG-3/SG-1 Joint Session in July and carried forward.

- 5.16 The Meeting continued with the review of Working Paper 1090-WP28-25 under Agenda Item #5q by Eric Potier in response to Action Item 26-05 regarding the beginning and ending of squittering, and the broadcast of the TYPE Code of ZERO. During presentation of the Working Paper minor editorial changes were made to result in 1090-WP28-25R1. After reviewing the entire Working Paper, the Joint Session agreed on the modified Working Paper and Gary Furr agreed to implement the proposed changes into the draft of DO-260B.
- 5.17 The Meeting continued with the review of Working Paper 1090-WP28-24 under Agenda Item #5p by Don Walker in response to Action Item 27-05 regarding the need for a vertical metric parameter by the applications defined in the ASAS MOPS. This Working Paper is a revision of 1090-WP27-15, which initially introduced the idea of needing a vertical metric. Don proposes using the parameter that was previously defined in DO-260A as “BAQ” and rename it to the “Geometric Vertical Accuracy” (GVA) parameter. After Meeting discussion and some minor editorial changes, the Working Paper was accepted by the Joint Session as 1090-WP28-24R1 and Gary Furr agreed to implement the suggested changes into the draft of DO-260B.
- 5.18 The Meeting continued with the review of Working Paper 1090-WP28-06 under Agenda Item #5d by Gary Furr in response to Action Item 25-22 regarding the proposed changes in DO-260B when we agreed to go to ADS-B Version Number = 2. Among several normal editing issues, Gary pointed out that it was necessary to copy versions of the ADS-B Version=1 Messages and Reports to Appendix N, which in DO-260A showed the differences in formats between Version ZERO and Version ONE. There was some Meeting discussion about what some members indicated was the fact that Appendix N had no requirements. However, it was pointed out that Appendix N is referenced in section §2.2.6 under a “shall” statement and is thus part of a requirement for the ADS-B Receiving Subsystem to receive and decode and pass Reports on to Applications and/or automation systems properly, no matter which Version the Transmitting Subsystem is. Gary will provide an updated draft of Appendix N at the July RTCA Meeting.
6. Under **Agenda Item #6**, the Meeting discussed the additional Working Papers that make proposals on issues related to proposed changes to DO-260A. Working Papers in Agenda Item #6 were taken in no particular order and were interleaved with Working Papers in Agenda Item #5. The summaries below simply represent the summaries at the time of presentation.
- 6.1 The Meeting continued with the review of Working Paper 1090-WP28-16 under Agenda Item #6b prepared by Al Marshall of Sensis. The Working Paper deals with the fact that Sensis is using the TYPE Code=24 for Surface System Status Messages in multilateration systems. It was felt by the Working Group that the specification of TYPE Code=24 Messages should be documented in DO-260B since it is in use in a number of multilateration systems, rather continuing to represent it in the TYPE Code Table as “Reserved for Surface System Messages.”. After discussion, it was agreed that it was not appropriate to input the requirements into the section dealing with airborne transmitters. It was agreed that it is more appropriate to create a new section

§2.2.8.4 with test procedures specific to receivers seeing this specific TYPE Code and Subtype Code. All agreed to make changes to this Working Paper during the meeting and created 1090-WP28-16R1, which was reviewed and accepted. Gary Furr agreed to implement the suggested changes into the draft of DO-260B and to revise the test procedures. During further review of this issue during the ICAO ASP TSG meeting the following week, it was pointed out that Working Paper 1090-WP28-16 indicates that Sensis is broadcasting an ID Message, which the TSG feels is not appropriate because it will force airborne and surface receivers to start a track on a participant that will not receive further information.

- 6.3 The Meeting continued with the review of Working Paper 1090-WP28-12 under Agenda Item #6c by Bob Saffell as a result of requests coming from the FAA AIR-130 organization to have a representation for sending an encoding for “No Data” or “Unknown” indication for the Aircraft Length/Width codes. Bob suggests that the lowest encoding of “0000” be recoded to mean “No Data or Unknown.” The Working Group agrees with the suggestion and Gary Furr agreed to implement the suggested changes into the draft of DO-260B and to revise the test procedures.
 - 6.4 The Meeting continued with the review of Working Paper 1090-WP28-14 under Agenda Item #6d by Bob Saffell of Rockwell Collins on behalf of Joel Wichgers, also of Rockwell Collins as a result of his review of ADS-B MASPS on the subject of requiring the NAC_V parameter on the surface for applications. After discussion, it was agreed that the NAC_V parameter should be broadcast on the surface and in Working Paper 1090-WP28-28 Gary Furr showed how this and other DO-260B parameters would be integrated into the proposed draft DO-260B ADS-B Messages.
 - 6.5 The Meeting continued with the review of Working Paper 1090-WP28-26 under Agenda Item #6e by the entire Joint Session and it was agreed that any Session member that had comments would provide same to Gary Furr not later than close of business on 1 July 2009 for transmitting back to the Ad Hoc subgroup that created the proposed new Appendix on Wake Vortex applications.
7. Under **Agenda Item #7**, the Meeting discussed Other Business issues.
- 7.1 The Meeting discussed the topic of what to do with the contents of the STP MOPS that have previously been identified by the RTCA SC-186 STP MOPS Ad Hoc Subgroup to be included in the ADS-B Link MOPS. Larry Bachman accepted **Action Item 28-06** to take the Requirements Restructuring matrix that was prepared by the STP MOPS Ad Hoc Subgroup and to review it in conjunction with the STP MOPS and make recommendations as to which paragraphs, tables and/or figures should be included into the draft of DO-260B. Dean Miller of Boeing and Bob Saffell of Rockwell Collins offered to assist Larry in this task.

8. Under **Agenda Item #8**, the Meeting discussed the dates, times and length of the future meetings of the joint sessions of RTCA SC-186 WG-3 and EUROCAE WG-51, SG-1. Jorg Steinleitner had previously indicated that it was the position of WG-51, SG-1 that it would probably be better for all concerned to hold the August meeting in Washington DC instead of at Eurocontrol, in view of the number of vacations taken by the European members during August. Therefore, the Meeting agreed that the currently planned future meetings in order to meet our schedule would be the following:

Meeting #	Dates/Time	Meeting Location
WG-3 #29 SG-1 #6	21 – 24 July 2009 9:00am 7/21 to noon 7/24	Confirmed at RTCA in Washington DC
WG-3 #30 SG-1 #7	18 – 21 August 2009 9:00am 8/18 to noon 8/21	Confirmed at RTCA in Washington DC
WG-3 #31 SG-1 #8	Week of 5 – 9 October '09 Specific days TBD	Proposed for FRAC Comment Resolution at RTCA SC-186/WG-51 Joint Plenary on 9 October <i>Will have to consider Comment Resolution for UAT will be taking place during the same week.</i>

9. The following is a summary of all of the Open Action Items from Meetings #25, #26, & #27, and those accepted during Meeting #28.

Action Number	Action Description	Assigned to	Status
25-03	Update Appendix P to include A1S equipment class. This will include the results of the USA East Coast model for 2020 and 2035.	Larry Bachman	See WP28-04 Update due < 15 July
25-23	Open Action for Gary Furr to implement agreed upon changes into the current draft of DO-260B for review during the next meeting.	Gary Furr	On-Going
26-02	Review all of the Link Budget Ranges in Table E-1 and analyze and add the values for the proposed new A1S equipment class.	Bill Harman	Due < 15 July
27-01	Propose specific language for the §2.2 requirement and the §2.4 test procedure to achieve the requirement for specifying the performance of the Position Offset Applied bit.	Don Walker	Due < 15 July
27-07	Review WP27-16R1 based on discussions during Meeting #27 and make further proposals for handling Duplicate Addresses. Dean and Tom Pagano to work together for specific MOPS language.	Dean Miller Tom Pagano	See WP28-21 Further review required Updates due < 15 July
28-01	Need to double check as to whether the 1090ES MOPS actually handles the case where there is a switch installed for the ADS-B ON/OFF Switch.	Rich Jennings	Due < 15 July
28-02	Propose specific language for the §2.2 (including §2.2.5.2) requirement and the §2.4 test procedures, Appendix A changes, and the new Timing Appendix, to achieve the requirements for specifying the total and uncompensated latency. Implement the expected actions in WP28-20 for requirements, test procedures and Appendix A changes and review prior to the July meeting.	Ian Levitt Tom Pagano Bob Saffell Dave Barnard Don Walker	See WP28-20 Updates due < 15 July

Action Number	Action Description	Assigned to	Status
28-03	Review the changes that are needed in the entire document because of the revisions agreed to for the: Target State and Status and Operational Status Messages.	Bob Saffell	Due < 15 July
28-04	Write a requirement for prioritizing the emergency codes 7500, 7600 and 7700 for the Emergency/Priority Message.	Tom Pagano	Due < 15 July
28-05	Complete a draft of a proposed Appendix on the analysis for the 6.2 squitters averaged over 60 seconds.	Eric Potier	Due < 15 July
28-06	Take the Requirements Matrix that was completed by the STP MOPS Ad Hoc Subgroup and recommend locations inside DO-260B for the identified paragraphs that were referred to as needing to be retained in the Link MOPS.	Larry Bachman Bob Saffell Dean Miller	Due < 15 July

10. The **Working Papers** for all WG-3 Meetings, as well as the Meeting Agendas, Meeting Minutes, and Meeting Schedules are posted on the ADS-B 1090 MHz web site maintained at the FAA William J Hughes Technical Center, located at: <http://adsb.tc.faa.gov/WG3.htm>