

**Summary of Meeting #6, of RTCA SC-186, Working Group 5  
For the Development of a MOPS for UAT**

The meeting was held on 31 July through 3 August 2001, at the facilities of the FAA Technical Center at the Atlantic City NJ Airport, hosted by FAA-TC ACT-350 and the Titan Corporation. The meeting was called to order at 9 a.m. on 31 July 2001 by Co-Chairman George Ligler. George provided introductory remarks, welcomed all attendees and asked that each one introduce themselves and their organization. The attendees included:

John Barrows - FAA Tech Support	Greg Kuehl – UPS Airlines	Ei Mon Phyu – Titan Corp -FAATC-ACT-350
Mike Biggs – FAA (ASR-200)	Ian Levitt – Titan Corp - FAATC – ACT-350	Stuart Searight – FAA TC – ACT-350
Andrew Chung – FAA TC – ACT-350	George Ligler – PMEI	Tom Teotor – Defense Concepts Assoc.
John Doughty – Garmin International	Robert Manning – USAF HQ XOR-GANS	Bill Thedford – Titan Corp, Hanscom AFB
Nikolaos Fistas – Eurocontrol	James Maynard – UPS Aviation Technologies	Dave Thomas – Titan Corp. FAATC-ACT-350
Gary Furr – Titan Corp - FAATC – ACT-350	Chris Moody – Mitre CAASD	Ed Valovage – Sensis Corp.
Carl Gleason – FAA / NISC	Tom Mosher – UPS Aviation Technologies	Leo Wapelhorst – FAA TC – ACT-350
James Higbie – JHU – APL	Al Muaddi – JHU – APL	Richard Weathers – JSC J6T
Richard Jennings FAA (AIR-130)	Vincent Nguyen – FAA – AND-530	Warren Wilson – Mitre Corp.
Stan Jones – Mitre CAASD	Tom Pagano – FAA TC – ACT-350	Thomas Wright – JSC / IITRI
Todd Kilbourne – Trios Associates	Brent Phillips – FAA - ASD	

1. Following introductions, known regrets were announced as follows:
  - Jerry Anderson, FAA Certification
  - George Cooley, UPS Aviation Technologies
  
2. The Working Group was asked to review and approve the Minutes to Meeting #5. Several changes and corrections were suggested and implemented as discussed. The revised Minutes of Meeting #5 will be posted as “Minutes-A” on the ADS-B/UAT web site at <http://adsb.tc.faa.gov>
  
3. The following table indicates the currently agreed upon meeting dates and places for meetings of RTCA SC-186 Working Group #5.

**Proposed dates and places for future meetings of the UAT MOPS Working Group 5:**

<b>Dates/Time</b>	<b>Meeting Place</b>
9am Tuesday, 25 Sept to 4pm Friday, 28 Sept.	Brussels – Eurocontrol Headquarters, hosted by Nikos Fistas Travel info and lodging details are available on the ADS-B/UAT web site
9am Tuesday, 6 Nov to noon Friday, 9 Nov	Location - Officers Club at the Norfolk Naval Station, 1756 Powhatan Street, Norfolk VA 23511-2995 Will require attendees to submit their name and SSN for access to tour the simulator and E2. Travel info and lodging details to be made available on the ADS-B/UAT web site as soon as available
Week of 10 Dec to 14 Dec	To be held in conjunction with the SC-186 Plenary. Exact days and times to be agreed to during the September meeting in Brussels
Week of 28 Jan to 1 Feb	Location TBD – preferably a WARM climate location. Exact plans to be firmed up by November meeting in Norfolk.

4. Moving to Agenda Item 4a, Leo Wapelhorst presented WP-6-10 in response to Action Item 3-25, as a summary of the status of the project by the FAA Tech Center to create an RF UAT Message

Generation System to simulate high-density scenarios for MOPS development and testing. Leo indicated that the capability is expected to be operational by early September 2001.

5. In response to Action Item 3-19, Al Muaddi of JHU-APL presented WP-6-12 detailing his analysis of the impact of one or more DMEs on UAT. Al concluded that UAT may be able to co-exist with DME without clearing the 978 MHz DME, but this requires a shuffling of the DME frequencies to reduce the impact of the worst-case scenario. Al further concluded that UAT may be able to survive the worst-case scenario in Europe with either the 1.2 MHz or 0.8 MHz filters, if the 978 MHz DME is cleared.
6. In partial response to the continuing analysis of Action Item 3-13, James Higbie presented WP-6-11 as a work initiated by Larry Bachman of JHU-APL, in conjunction with Agenda Item 4b. During the production of WP-6-11, a computer simulation of UAT reception was run to predict the performance of an “enhanced” receiver using RS(48,34) coding and both the 1.2MHz and 0.8 MHz filter bandwidth. Interference scenarios included other co-site transmissions and external UAT and Link 16 transmitters, and DME transponders. The simulation conditions are described and simulation results are presented in the combined 84 pages of WP-6-11 and the addendum to WP-6-11, both of which are posted in their original PowerPoint formats on the ADS-B/UAT web site. The simulations indicated overall better performance with the 0.8 MHz receiver filter, at least for A1 and A2 classes of equipment.
7. Staying with Agenda Item 4b, and in response to Action Item 5-10, Warren Wilson of Mitre presented WP-6-02 detailing some additional information on the susceptibility of UAT to JTIDS Interference. The difference in UAT performance with different IF filters is the focus of WP-6-02. Warren recommends that the Working Group consider whether the marginal advantage of the narrow filter, at least with regard to JTIDS, is sufficient to outweigh the better performance of the wide filter in self-interference scenarios.
8. Following through with discussions of the IF filters, Stan Jones presented some of his findings in a paper, which was assigned as UAT-WP-6-15, entitled “UAT Performance Estimates.” While discussing the data presented by Stan, the Working Group *agreed* that the 1.2 MHz filters would be used for A0/A1 class equipment. Further discussion on IF Filter selection led to the creation of **Action Item 6-1** accepted by Stan Jones, and by James Higbie on behalf of Larry Bachman. The focus of **AI-6-1** is to run simulations additional to those described in WP-6-11, with scenarios modified as defined by the Working Group. The definition of those scenarios in **AI-6-1** evolved as the meeting went forward, and was finally, and completely, agreed to by the Working Group prior to the close of the meeting, as that which can be seen in the table of Open Action Items further in this Summary.
9. At the end of Tuesday, the Test Subgroup met after the general meeting session had adjourned in order to discuss modifications of the Capstone UAT boxes for MOPS modifications tests. The Test Subgroup met again on Wednesday morning prior to the start of the general session. During these meetings, it was *agreed* by the Test Subgroup that 5 boxes will only get a modified EPROM with modified RS coding and will have the 1.5MHz filter. Three other boxes will have separate boards: (a) 1.2MHz filter (Tx/Rx), (b) 0.8MHz (Rx only), (c) 1.5MHz (Tx/Rx – except for the box that was upgraded from 966MHz to 981MHz).
10. Following up with discussions that were begun Tuesday afternoon, the Wednesday morning session began with discussions on further tests and analysis that needs to be run. Tom Mosher accepted **Action Item 6-2** to test the effect of adjacent channel DME on receiver performance for presentation at Meeting #7. Al Muaddi, Nikos Fistas and Stan Jones accepted **Action Item 6-3** to model the Core Europe DME receive signal power contours for 979 MHz, and to include 978 MHz analysis as appropriate for presentation during Meeting #7.
11. Returning to the Agenda with Item 4c, Al Muaddi of JHU-APL, in response to Action Item 5-4, presented WP-6-13, reviewing the impact of UAT on DME. The conclusions drawn from this Working Paper indicated that knowledge of operation of DME interrogators is incomplete, even after the receipt

of several maintenance manuals for the DME units that we have been testing, and personal contact with several engineers from the representative DME companies. John Doughty of Garmin offered to make personal contacts in an attempt to obtain better technical information on the DME units to be forwarded to Al Muaddi.

12. In response to Action Item 5-1, Ian Levitt of Titan Corp and the FAA TC presented Working Paper WP-6-14, detailing the measurement of UAT interference effects on DME interrogators. Ian reports that the tests on the four DME units that the FAA TC had previously agreed to test have been completed. This includes the Bendix King KD-7000, the NARCO DME-890, and the two European models, the Honeywell KDM-706A and the Rockwell-Collins DME-900. With all 4 models tested, Ian concludes that the Reply Efficiency tests are very similar across all models tested, with variance in only the Signal to Interference Ratio (SIR) tolerated by each DME. All of the DMEs tested appear relatively resilient to UAT interference. Ian continues to propose an alternative approach to pulse-level simulation. In order to verify that his proposal has merit, Ian accepted **Action Item 6-4** wherein JHU-APL will supply to Ian the UAT interference and JTIDS timelines from their output of **Action Item 6-1**, scenario two. Ian will take the supplied timelines and determine the impact of these timelines on DME operation in light of reply efficiency tests for all 4 DME units reported on in WP-6-14. Ian will report on **AI-6-4** at Meeting #7.
13. Given a data result chart that was literally “hot-off-the-printer,” Tom Pagano displayed and discussed Co-Site Testing performed as a result of Action Item 5-5 using the longer uplink message format. Tom indicated that the FAA TC had started the testing effort finding out that there were significant problems with the Capstone units testing with the uplink messages. UPS-AT supplied the FAA TC with a modified EPROM allowing for 7 Ground Station uplink messages per second, and the chart that Tom presented was the result of tests run with the new EPROM. After review of the charts that Tom presented, the Working Group agreed that there was no further co-site testing required by the FAA TC at this time.
14. Returning to Agenda Item 4b, Warren Wilson presented Working Paper WP-6-03 in response to Action Item 5-7 detailing UAT/JTIDS Co-site Performance. Warren concluded that the graphs shown in WP-6-03 show that the performance degradation due to co-sited JTIDS interference sources may be acceptable if the isolation is -82 dB or better. If the isolation is -72 dB or worse, the degradation may be too large. Without a clear definition of the requirements for this UAT application, it is difficult to make a more precise statement; however, it does seem clear that co-site operation will require careful placement of antenna sites, and/or large sites.
15. Warren Wilson continued with the presentation of Working Paper WP-6-09, which detailed some enhanced techniques for mathematically modeling UAT bit error rate performance in the presence of noise and co-channel interference. WP-6-09 provided some *ad hoc* prescriptions for interpolating the measured UAT data in order to cover cases not directly measured but which are expected to arise in simulations and the real world. The equations were kept as simple as possible so that if they are used in computer simulations, they will not unduly slow down the processing. It would be useful to have measured data on some of the intermediate cases such as: cases with two co-channel interferers at various power levels, or cases with co-channel interference and the desired signal near sensitivity so that both noise and co-channel interference come into play. Warren agreed to accept **Action Item 6-5** along with Larry Bachman to reconcile any differences in assessment of the JTIDS impact on LA2020 scenario as seen in Figure 9 of WP-6-09 and page 1-11 of the Addendum file to WP-6-11.
16. In conjunction with Agenda Item 4d and in response to Action Item 5-9, Tom Mosher of UPS-AT presented Working Paper WP-6-08, which presented an analysis of the impact on unit cost due to the RF output power requirements for equipment categories (A0, A1, A2, A3). The Vehicle Transmitter was used by Tom as his baseline configuration. In the Baseline, the Cost Factor and Size Factors are assigned unity (1). The Size Factors are normalized to 1 square inch of surface area. The Table below summarizes the findings of WP-6-08:

	Watts at the Antenna	Cost Factor	Size Factor
Baseline – Vehicle Tx	0.5	1	1
Low Power	5	4	4
Medium Power	12.5	16	10
High Power	100	64	38

17. On Thursday morning prior to the start of the general session, the Test Subgroup met again to discuss the necessary tests required once the Pre-MOPS boxes are modified.
18. In Working Paper WP-6-06, James Higbie presented the UAT Receiver Model for Multi-Aircraft Network Simulations. The Working Paper described the UAT receiver model, for receiver filter bandwidths of 1.26MHz and 0.8MHz, used for multi-aircraft network performance modeling at JHU-APL. James explained that the model was bit-based to permit analysis of various coding and synchronization designs in time-varying interference conditions.
19. Tom Mosher of UPS-AT then presented two plots showing the 99% Occupied Bandwidth for the 750KHz and 1.0MHz Filters. These plots are not available to be distributed electronically. However, during Working Group discussion, John Barrows offered to submit a UAT Transmit Spectrum plot, part of which was shown during the discussion. This file was received after the meeting and has been given the Working Paper number **UAT-WP-6-17**, and has been posted on the ADS-B UAT web site.
20. As received during the meeting, **UAT-WP-6-16** is identified as “A Case for Gain Antennas” and was presented by Tom Mosher. This Working Paper examined the feasibility of using gain antennas to allow using lower power transmitters for UAT applications. Various types of gain antennas are presented, then vertical and horizontal communication ranges were explored. Practical considerations were compared to theoretical calculations. Finally, existing ¼ -wavelength antennas; as currently used on airborne transponders, DMEs and experimental UATs; were examined. During discussion of this Working Paper, George Ligler proposed and the Working Group *agreed* to adopt the 150 NM requirement for air-ground reception that was proposed by Eurocontrol. The Working Group further *agreed* to specify output of power at the base of the antenna, similar to the 1090 MOPS. The Working Group also *agreed* to specify a requirement for power at the input to the antenna and to place a “Note” into a subparagraph in Section 2.2 discussing alternate implementations that would give equal performance. Further, information will be placed into Appendix E on tests performed on various antenna, such as the 5/8 wave antenna discussed in Working Paper WP-6-16.
21. In conjunction with Agenda Item 6a, the Working Group began the discussion of Working Paper WP-6-05, the 4<sup>th</sup> draft of Section 2.2 as submitted by Chris Moody. Numerous changes were made to WP-6-05 during the actual review and discussion of each subparagraph. Additionally, in an attempt to better understand the processing of time data discussed in subparagraph 2.2.5.1, the Working Group reviewed Working Paper WP-6-04, which was also submitted by Chris Moody as a “Possible MOPS Appendix That Elaborates on Timing Requirements.” A modified version of WP-6-05 including all changes discussed during the review will be placed onto the ADS-B UAT web site under the name **UAT-WP-6-05A**. Review of WP-6-05 was halted at noon on Friday at subparagraph 2.2.5.2 and the meeting was adjourned.
22. During the 1<sup>st</sup> meeting of WG-5, December 18, 2000, the Working Group reviewed the sections of the proposed UAT MOPS and worked through the identification of individuals and organizations that would be responsible for writing drafts of those sections. The following table is the result of the assignments of those writing actions. The asterisk (\*) beside a name indicates the lead person or organization.

### UAT MOPS Writing Assignments

File Names	Dated	Description	Responsibility
Sec_1a.pdf	3/27/01	Draft 1 of Section 1 – Introduction	Bill Flathers * Jerry Anderson
Sec_2-1b.pdf	3/27/01	Draft 2 of the General Requirements	Tom Mosher
Sec_2-2d.pdf	7/23/01	Draft 4 of the Equipment Performance Requirements	Chris Moody * Bob Saffell Rich Weathers Jim Maynard JHU-APL (?)
		Section 2.3 – Environmental	Small 2.4 group
		Section 2.4 – Equipment Test Procedures	Tom Pagano * Bob Saffell UPS-AT Chuck LaBerge JHU-APL (?)
		Section 3 – Installed Equipment Performance	
Sec_4c.pdf	6/07/01	Draft 3 of the Equipment Performance Characteristics	Greg Kuehl
App_A3.pdf	6/5/01	Draft 3 of the Glossary and Acronyms	Rich Jennings
App_B2.pdf	7/19/01	Draft 2 of the MASPS Cross Reference Matrix	Greg Kuehl * Jim Maynard Nikos Fistas JHU-APL (?)
		Appendix C – Example ADS-B Message Encoding	Chris Moody + 2.2 Writers
App_D1.pdf	2/14/01	Draft 1 of the UAT Ground Infrastructure	Ed Valovage * Paul Gross
		Appendix E – Aircraft Antenna Characteristics	
		Appendix F – Link Budgets and Scenario Dependent Ranges	Larry Bachman
		Appendix G – Standard Interference Environments	Mike Biggs
		Appendix H – Synchronization Processing Information	Warren Wilson
		Appendix I – UAT Timing Considerations	Chris Moody

23. The following **Action Items** were identified during the course of this and previous meetings. The asterisk (\*) beside a name or organization indicates that they are the lead for the resolution of that Action Item. Actions shown here are those Action Items which remain OPEN.

Action Number	Action Description	Assigned to	Status
3-6	Mike and Gondo to determine criteria for acceptable DME performance in the presence of UAT interference	Mike Biggs Gondo Gulean	Assess at Meeting #7
3-10	Bob to focus on necessity of database, frequency selection to avoid DMEs, and cost feasibility (using single channel implementation as baseline cost) of BAE proposal.	Bob Prill	George Ligler will contact Bob. See Action 5-15
4-3	Run his models on all JTIDS scenarios (9), two 1 MHz offset DME scenarios, and self interference, as appropriate to the JTIDS scenarios, with power levels agreed to at Meeting #3 -- with labeled axes (and no yellow lines) -- for Meeting 7	Stan Jones	

Action Number	Action Description	Assigned to	Status
4-14	Establish subparagraphs to section 2.2.5.2.2, and/or notes to the table in section 2.2.5.2.2	Stan Jones Chris Moody (*) Larry Bachman	
5-6	Put old coding into the simulation and run to see if the result is similar to the curves that were presented in the Co-site testing presented by Tom Pagano	Al Muaddi	
5-15	Get with Bob Prill about Action Item 3-10	George Ligler	
5-16	Accuracy of the time synch availability on various aircraft. What part of the 2.7 microsec is static versus variable?	Chris Moody Stan Jones George Ligler	
6-1	Re-run simulations from WP-6-11 with modified scenarios as specified below for Meeting 7 in Brussels: <ol style="list-style-type: none"> <li>1. Core Europe with JTIDS Baseline, option B from WP-4-04 (don't vary the draw for the antennae pattern for JTIDS), 2 adjacent channel DMEs (3600 pulse pair), and self-interference.</li> <li>2. Scenario one: The power of A3 is 48 to 52 dBm. A0/A1 power is at 38.5 to 42.5 dBm, with A0 restricted in altitude to 15,000 ft. A2 power is at 42 to 46 dBm</li> <li>3. Scenario two: The power of A3 is 50 to 54dBm. A0 power is at 38.5 to 42.5 dBm and is restricted in altitude to 15,000 ft. A1/A2 power is at 42 to 46 dBm</li> <li>4. A0/A1 will have the 1.2 MHz receive filter. A2/A3 will have both 0.8 and 1.2 MHz filters</li> <li>5. Baseline for A1/A2/A3 is TT, BB transmission. A0 is Bottom only, for transmission. For reception: A0 is bottom only, A1 is switched, and A2/A3 are full diversity</li> <li>6. Model air-ground ATC reception presuming one adjacent channel DME ground station at a separation of 1000 ft. UAT antennae height 30 feet (Stan Jones model); additional excursion presuming 2 dB improvement in ground station receiver sensitivity</li> </ol>	Larry Bachman * Stan Jones	
6-2	Test effect of adjacent channel DME on receiver performance (off-channel impulse response time domain), for Meeting 7	Tom Mosher	
6-3	Model the Core Europe DME receive signal power contours for 979 MHz. Include 978 analysis as appropriate for Mtg 7	Al Muaddi * Nikos Fistas Stan Jones	
6-4	APL will supply Ian UAT interference and JTIDS timelines from AI-6-1, scenario two. Ian will take the supplied timelines and determine the impact of these timelines on DME operation in light of reply efficiency tests for all 4 DME units reported on in WP-6-14. Any time there is a JTIDS within +/- 12 microseconds from the leading edge of the first pulse of a DME pulse pair with SIR under 10dB, assume that the DME pulse pair is lost. Both for on-channel and 1MHz off, as well as varying desired DME signal levels. Please take into account co-site impact UAT and other L-Band transmissions.	Al Muaddi Ian Levitt *	
6-5	Reconcile any differences in assessment of JTIDS impact on LAX 2020 scenario as seen in Figure 9 of WP-6-09 and page 1-11 of the Addendum to WP-6-11.	Larry Bachman Warren Wilson	
6-6	Draft Appendix B.2 on FIS-B MASPS compliance.	George Ligler Chris Moody	
6-7	Draft a paper on improved ground station sensitivity.	George Cooley Ed Valovage	

Action Number	Action Description	Assigned to	Status
6-8	Ian to provide Nikos with a paper describing the testing activity at the FAA Technical Center conducted to determine the potential input of UAT signals to co-channel and adjacent channel DMEs.	Ian Levitt	

24. The **Working Papers** shown in the following table are specifically for the Meeting being reported in these Meeting Minutes. Working Papers for all WG-5 Meetings, as well as the Meeting Agendas, Meeting Minutes, Meeting Schedules and files leading to the production of a UAT MOPS are posted on the ADS-B UAT web site at: <http://adsb.tc.faa.gov>

### SC-186 Working Group 5 – MOPS for UAT – Working Papers

Working Paper	Size	Description	Introduced At:
UAT-WP-6-01	15KB	Input on Random Address Generation, presented by Chris Moody in response to Action Item 4-5	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-02	16KB	UAT Performance in the Presence of JTIDS Interference: Sensitivity to Receiver Bandwidth, presented by Warren Wilson in response to Action Item 5-10	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-03	22KB	UAT/JTIDS Co-site Performance, presented by Warren Wilson and Myron Leiter in response to Action Item 5-7	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-04	27KB	Possible UAT MOPS Appendix that elaborates on timing requirements, presented by Chris Moody	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-05A	71KB	Draft 4 of Section 2.2 of the UAT MOPS, presented by Chris Moody	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-06	212KB	UAT Receiver Model for Multi-Aircraft Network Simulations, presented by James Higbie	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-07	44KB	Draft #2 of Appendix B, the MASPS Compliance Matrix, presented for review by Greg Kuehl	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-08	21KB	Effect of RF Power Output Levels on Unit Cost, presented by Tom Mosher and George Cooley in response to Action Item 5-9	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-09	43KB	Simplified Equations for Modeling UAT Performance, presented by Warren Wilson	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-10	22KB	UAT Message Generator System Development Design Overview and Status, presented by Leo Wapelhorst in response to Action Item 3-25	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-11.ppt	545KB	Performance of Enhanced UAT in Multi-Aircraft Scenarios, presented by James Higbie	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-11add.ppt	1,291KB	Addendum to UAT-WP-6-11 showing detailed plots, presented by James Higbie	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-12	426KB	Impact of DME on UAT, presented by Al Muaddi in response to Action Item 3-19	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-13	23KB	Impact of UAT on DME, presented by Al Muaddi in response to Action Item 5-4	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-14	186KB	Measurement of UAT interference effects on DEM interrogators, presented by Ian Levitt in response to Action Items 3-3 and 5-1	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-15	35KB	UAT Performance Standards, presented by Stan Jones	Meeting 6, 07/31/01 FAA Tech Center

<b>Working Paper</b>	<b>Size</b>	<b>Description</b>	<b>Introduced At:</b>
UAT-WP-6-16	251KB	A Case for Gain Antennas for UAT, presented by George Cooley	Meeting 6, 07/31/01 FAA Tech Center
UAT-WP-6-17	57KB	UAT Transmit Spectrum, presented by John Barrows	Meeting 6, 07/31/01 FAA Tech Center

25. As part of an on-going effort to retain knowledge of items that might otherwise be forgotten, we have created and maintain the following table of “Un-Resolved” or “Orphaned” Issues. This list is reviewed during each meeting and is updated as needed.

<b>Issue #</b>	<b>Issue/Question Description</b>	<b>Raised by</b>	<b>Date Raised</b>	<b>Status</b>
5	Can a minimal installation without an “On Ground” indication continue alternating top and bottom antennas for transmit without significantly sacrificing performance?	Chris Moody UAT-WP-2-06	20 Feb 01	
6	What is the minimum isolation required for antenna switching (20 dB in 1090 MOPS)?	Chris Moody UAT-WP-2-06	20 Feb 01	
10	Whether or not to require an algorithm to determine On-the-Ground status	Section 2.2 discussion	2 May 01	
11	Given that the agreed-upon solution to Coding Selected Altitude appears to add 2 bits, we will remember that we can revisit this issue later if we need to recover those bits.	Discussion on Coding Selected Altitude in WP-4-03	3 May 01	