

RTCA Special Committee 209

Working Group #1

Mode S Transponder MOPS Maintenance

Meeting #3

Engility Corporation, Washington DC

2 – 4 October 2007

**Further Analysis of Specific
MOPS Changes as a Result of SARPs CPs
(Action Item 7-10)**

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SUMMARY

In Working Paper SC209-WP07-05 tables were presented that showed all of the identified Change Proposals that were accepted for SARPs documents relating to potential changes that might need to be made to the Transponder MOPS. Gary Furr had made an initial pass at each SARPs CP and had identified whether or not he believed that there should be a change to the MOPS documents. In response to Action Item 7-10, this Working Paper takes each of the SARPs CPs and details specific changes that should be made.

Regarding CP numbers for those amendments, here is the table listing those at the last WG-B meeting prior to SCRSP/1:

Change Number Assigned by Rapporteur	Title of Change	Final Working Paper	Originating Working Paper	DO-181D § (if needed)	ED-73C § (if needed)
S/1	Clarification on the Use of Lockout	Flimsy B/3-2	WP/B/3-6	N/A	N/A
S/2	SARPs Change for Transponder Unlawful Interference Features		WP/B/5-12	N/A	N/A
S/3	Transponder Performance in the Presence of CW Interference		WP/B/5-10	Done 2.2.8.6	Needs new CW section
S/4	SARPs Change for Updating the Data Link Capability Report		WP/B/5-14	Made by GF 2.2.19.1.12.8	Need to fix 3.21.1.12.e.(3)
S/5	Transmission Rate for ES/NT on Surface with no navigation	WP/B/6-08A	WP/B/5-21	Made by GF 2.2.23.1.3 2.2.23.3.1 2.2.23.3.8	Needs new ES/NT Section
S/6	Criteria for Broadcast of Surface Format	WP/B/7-52 Rev 1		Need to fix 2.2.18.2.7.c 2.2.23.3.7	Need to fix 3.22.2.7.b 3.28.5 6.2.13
S/7	Validation of on-the-ground status with a Squat Switch (partially revised in WP/B/7-22 in S/15 below)	WP/B/6-04		Need to fix 2.2.18.2.7.b 2.2.18.2.7.c 2.2.23.3.7	Need to fix 3.20.2.7.b 6.2.13
S/8	To allow a transponder to reply to a Comm A if it can't buffer the Comm A message	WP/B/6-23		Need to fix 2.2.13.3.1 2.2.19.1.1 Figure 2-16 2.5.4.15	Need to fix 3.17.3.c 3.21.1.1 Figure 3-15 5.5.8.15
S/9	Correction of a reference	WP/B/6-45		N/A	N/A
S/10	Changes to the Structure of Annex 10 Volume IV	Flimsy 2 Rev 3	WP/B/7-07	N/A	N/A
S/11	SARPs CP for the Transmission and Reception of Extended Squitter	WP/B/7-08 Rev 2		N/A	N/A
S/12	TIS-B SARPS	WP/B/7-15 Rev 3		N/A	N/A

Change Number Assigned by Rapporteur	Title of Change	Final Working Paper	Originating Working Paper	DO-181D § (if needed)	ED-73C § (if needed)
S/13	Stochastic Lockout Override and the use of II code 0	WP/B/7-17 Rev 1		N/A	N/A
S/14	25 foot altitude quantization	WP/B/7-42 Rev 2	WP/B/5-11	Need to fix 2.2.13.1.2.a.(2)	Need to fix 3.17.1.b.(1).(ii)
S/15	Surface State Validation (partially revises WP/B/6-04 in S/7 above)	WP/B/7-22		Need to fix 2.2.18.2.7.b 2.2.18.2.7.c 2.2.23.3.7	Need to fix 3.20.2.7.b 6.2.13
S/16	ES Altitude Insertion	WP/B/7-26 Rev 1		N/A	N/A
S/17	Transponder Zeroing of Data Link Capability Bit	WP/B/7-35 Rev 3		Need to fix 2.2.24.4	New Version Number Section In new ELS
S/18	Civil - Military Interoperability with Mode S Format 22	WP/B/7-39 Rev 3		Need to fix Figure 2-4 Figure 2-5	Need to fix Figure 3-3 Figure 3-4
S/19	SARPS Editorial Issues to Meet ICAO Standards Recommendations	WP/B/7-19		N/A	N/A

Following SCRSP/1, because of the slow process to review SCRSP/1 material, some additional CPs have been added in SCRSP/1 material. Here are those resulting from the Paris meeting in October 2005 (none from the 2005 May meeting in Brisbane):

Change Number Assigned by Rapporteur	Title of Change	Final Working Paper	Originating Working Paper	DO-181D § (if needed)	ED-73C § (if needed)
S/20 (incorporated in SCRSP/1 material)	CP for transmission of acquisition squitter when surface position extended squitter is suppressed	WP B/9-10 Rev 1	WP B/9-10	Need to fix 2.2.23.1.7 ref:2.2.18.2.6.b.4	Need to fix 3.28.7 ref:3.21.2.6.b
S/21 (incorporated in SCRSP/1 material)	SARPs CP to clarify maximum number of IC codes	WP B/9-08	WP B/9-08	N/A	N/A
S/22 (incorporated in SCRSP/1 material)	Proposed SARPs clarification with respect to on-the-ground status	Flimsy B/9-3	WP B/9-26	Done See WP B/10-18 2.2.14.4.6	See WP B/10-18 3.18.4.5

The meeting in Montreal (May 2006) further suggested additional CPs for Volume 4, the first 5 ones in the list below have been incorporated in SCRSP/1 material (I browsed the minutes to be sure of this) :

Change Number Assigned by Rapporteur	Title of Change	Final Working Paper	Originating Working Paper	DO-181D §, (if needed)	ED-73C § (if needed)
S/23	SARPS CP for Temporary Alert Timer	WP B/10-17	WP B/10-17	Done 2.2.18.2.7.a	Need to fix 3.20.2.7.a
S/24	Level 2 Transponder reporting 0 in the CA field (see working paper ModeS-WP02-03 on same topic)		WP B/10-18	Done 2.2.14.4.6	Need to fix 3.18.4.5
S/25	SARPS CP to correct the Uplink and Downlink Format Summary Figures		WP B/10-20 Att. 1	N/A	N/A
S/26	SARPS CP to correct the Uplink and Downlink Format Summary Figures		WP B/10-20 Att. 2	N/A	N/A
S/27	SARPS CP to correct the Uplink and Downlink Format Summary Figures		WP B/10-20 Att. 3	N/A	N/A
S/28	SARPs CP for a Note Clarifying the Use of the X bit	WP B/10-15 Rev 1	WP B/10-15	Might need to fix 2.2.4.1.2	Might need to fix 3.5.2

THE FOLLOWING IS FURTHER ANALYSIS BY TOM PAGANO OF SPECIFIC CHANGES THAT ARE REQUIRED:

S/3 Transponder Performance in the Presence of CW Interference

Sections §2.2.8.6, §2.2.9 updated to incorporate CW requirements added to SARPS. Test procedures in §2.4.2.7 and §2.4.2.8 added.

S/4 SARPs Change for Updating the Data Link Capability Report

Change to DO-181 – None required.

S/6 Criteria for Broadcast of Surface Format (accepted)

This CP modifies criteria for selection of airborne and surface formats. Since these requirements are contained in DO-260A, recommend changing DO-181D as follows:

2.2.23.1.5.1 Automatic Format Selection

The criteria for selection of airborne or surface formats are contained in the latest version of RTCA DO-260A, section 2.2.3.2.1.2. ~~Aircraft with an automatic means of determining on the ground condition shall use this input to select whether to report the airborne (airborne position and airborne velocity) or surface (surface position) message types, except airborne format is selected if airborne status is determined when the input indicates on the ground condition as specified in §~~**Error! Reference source not found.**

S/7 Validation of on-the-ground status with a Squat Switch

Change to DO-181 – None required.

S/8 To allow a transponder to reply to a Comm-A if it can't buffer the Comm-A message (accepted)

Modifications to §2.2.13.3.1, §2.2.19.1.1 and Figure 2-16 have been incorporated.

Additionally modify 2.5.4.15 text as follows:

“One second after the first burst, verify that the content of at least the first 50 interrogations has appeared at the interface. ~~and that the transponder has not generated a reply to those interrogations whose content has not appeared at the interface.~~

This test applies only if a storage design has been used.”

S/14 25 foot altitude quantization

Amendment 82 clarifies that Mode S transponder that is receiving altitude data in 25 foot or better resolution will use the 25 foot format. Conversely, if the altitude data to the Mode S transponder is not 25 foot or better, the 100 foot altitude format is to be used.

Change to DO-181 – None required.

S/15 Surface State Validation

Change to DO-181 – None required.

S/18 Civil – Military Interoperability (accepted)

This SARPs update reserves UF 22 and DF 22 for military.

Update Figures 2-4 as follows: In row with Format #22, in the last column, add text “... Reserved for Military Use”

Update Figures 2-5 as follows: In row with Format #22, in the last column, add text “... Reserved for Military Use”

S/20 Suppressing Extended Squitters while on the surface (accepted)

Update §2.2.18.2.6.b.(4) as follows:

- (4) Acquisition squitters **shall** only be transmitted when in the on-the-ground state if the transponder is not reporting the surface ~~position~~ type of Mode S Extended Squitters, or as specified in subparagraph “c.”

Update the table in §2.2.23.1.7 for RCS as follows:

The following codes have been assigned:

Code	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

Acquisition squitters **shall** be emitted during the time period when Extended Squitters are inhibited as specified in §2.2.18.2.6.c.

Note 4: *The definition of high and low squitter rate is given in §2.2.23.1.3.*

Note 5: *As stated in §2.2.18.2.6.b.4, Acquisition squitters are transmitted when Surface extended squitters are suppressed by using RCS=3 or 4.*

S/28 Clarifying the use of the X Bit:

It is our position that there probably is no need to make any modifications in the MOPS for the X Bit.