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EUROCAE WG-51, SG-1**

ADS-B 1090ES MOPS Maintenance

**WG-3 Meeting #28
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Joint Session**

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**Proposed Changes to DO-260B for Broadcasting the
Mode A Code in the Emergency/Priority Message
[Revision 1](#)**

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Summary
This Working Paper addresses proposed updates to the MOPS sections for broadcasting the Emergency / Priority Status Message under the various conditions that apply since it now depends on Mode A Code transmission and if there is a Mode A Code change.

2.2.3.2.7.1.3.15 “Emergency/Priority Status” Subfield in Target State and Status Message

The “Emergency/Priority Status” subfield is a 3-bit (“ME” bits 54 through 56, Message bits 86 through 88) field is used to provide additional information regarding aircraft status. Encoding of the “Emergency/Priority Status” subfield **shall** be as specified in §2.2.3.2.7.8.1.1.

➔ IT WAS AGREED DURING DISCUSSION IN MEETING #28 THAT THE EMERGENCY/PRIORITY STATUS SUBFIELD WOULD NO LONGER BE BROADCAST IN THE THREE BITS OF THE TARGET STATE AND STATUS MESSAGE SINCE IN VERSION=2 THE EMERGENCY/PRIORITY STATUS MESSAGE, SUBTYPE=1 WILL BE BROADCAST WITH THE MODE A CODE AT A CONSTANT RATE TO SUPPORT RECEPTION OF THE MODE A CODE ←

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2.2.3.2.7.8.1 Emergency / Priority Status Message (Subtype=1)

The Extended Squitter Aircraft Status Message (TYPE “28”) is used to provide additional information regarding aircraft status. Subtype=1 is used specifically to provide Emergency/Priority Status data and the broadcast of the Mode A (4096) Code.

The format of the TYPE “28,” Subtype=1 shall be as depicted in Figure 2-2.2.3.2.7.8.1.

“1090ES Aircraft Status Message (Emergency/Priority Status) (TYPE=28, Subtype=1)”					
Msg Bit #	33 --- 37	38 ----- 40	41 ----- 43	44 ---- 56	57 ----- 88
“ME” Bit #	1 ----- 5	6 ----- 8	9 ----- 11	12 ---- 24	25 ----- 56
Field Name	TYPE=28 [5]	Subtype=1 [3]	Emergency/ Priority Status [3]	Mode A Code [13]	Reserved [32]
	MSB LSB	MSB LSB	MSB LSB	MSB LSB	MSB LSB

Figure 2-2.2.3.2.7.8.1: 1090ES Aircraft Status Message (Emergency/Priority Status) (TYPE=28, Subtype=1)

2.2.3.2.7.8.1.1 “Emergency/Priority Status” Subfield in Emergency/Priority Message

The “Emergency/Priority Status” subfield **shall** be encoded in accordance with Table 2-2.2.3.2.7.8.1.1. If the pilot enters a Mode A Code of 7500, the “Emergency/Priority Status” subfield **shall** be encoded with a value of 5 indicating “Unlawful Interference”. If the pilot enters a Mode A Code of 7600, the “Emergency/Priority Status” subfield **shall** be encoded with a value of 4 indicating “No Communications”. If the pilot enters a Mode A Code of 7700, the “Emergency/Priority Status” subfield **shall** be encoded with a value of 1 indicating “General Emergency”. The emergency condition initiated by the pilot entry of Mode A Code 7500, 7600 or 7700 **shall** be terminated when the pilot changes to any other Mode A Code.

Note: The “Surveillance Status” subfield value of ONE corresponds to the emergency condition activated by Mode A Code 7500, 7600 or 7700 and the change from the value of ONE signals the termination of the emergency condition (see §2.2.3.2.3.2).

If an update has not been received from an on-board data source for the “Emergency/Priority Status” within the past 5 seconds, then the “Emergency/Priority Status” subfield **shall** be encoded with a value of ZERO (0) indicating “No Emergency”.

Note: The encoding of the “Emergency/Priority Status” subfield values 2, 3 and 6 do not have a corresponding Mode A code that denotes the emergency condition. The establishment of these emergency conditions by providing a pilot interface to activate them is optional in these MOPS.

Table 2-2.2.3.2.7.8.1.1: “Emergency/Priority Status” Subfield Encoding

Coding		Meaning
(Binary)	(Decimal)	
000	0	No emergency
001	1	General emergency
010	2	Lifeguard/medical emergency
011	3	Minimum fuel
100	4	No communications
101	5	Unlawful interference
110	6	Downed Aircraft
111	7	Reserved

2.2.3.2.7.8.1.2 “Mode A Code” in Emergency/Priority Message

The Mode A Code **shall** be encoded as defined in RTCA DO-181D, §2.2.13.1.2.b and §2.2.4.1.2. Starting with “ME” bit 12, the code sequence **shall** be C1, A1, C2, A2, C4, A4, ZERO, B1, D1, B2, D2, B4, D4.

Note: *The broadcast of the Mode A Code in the Aircraft Status Message with Subtype=1 is provided as a transitional feature to aid operation of ATC automation systems that use Mode A Code for Flight Plan correlation. Provisions are included in these MOPS to disable the broadcast of the Mode A Code. The requirement for the broadcast of the Mode A Code may be removed from future versions of these MOPS.*

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2.2.3.3.1.4.3 “Extended Squitter Aircraft Status” ADS-B Event-Driven Message Broadcast Rates

2.2.3.3.1.4.3.1 “Emergency/Priority Status Message” Broadcast Rates

The “Emergency/Priority Status Message” (TYPE=28, Subtype=1), (see §2.2.3.2.7.8) **shall** be broadcast using the Event-Driven protocol. The rate of transmission varies depending on other conditions. If the transmission of the Mode A Code is disabled, the transmission of the “Emergency / Priority Status Message” occurs only when an emergency condition is active and the transmit rate depends on whether or not the “Target State and Status Message” is broadcast. When the transmission of the Mode A Code is enabled, the transmission rate of the “Emergency / Priority Status Message” depends on whether the Mode A Code is changed or if an emergency condition is active.

When the Mode A Code is set to “3000”, the 1090ES transmitter **shall** disable the transmission of the Mode A Code and broadcast the “Emergency / Priority Message” in accordance with §2.2.3.3.1.4.3.1.1. Otherwise, the Mode A Code transmission is enabled and the broadcast rates of §2.2.3.3.1.4.3.1.2 apply.

Note: *The use of Mode A Code “3000” for this purpose is in accordance with the ICAO Doc 9871 provision to disable the transmission of the Mode A Code on 1090ES. This will occur at such time that the ATC systems no longer depend on the Mode A Code to identify aircraft.*

2.2.3.3.1.4.3.1.1 “Emergency/Priority Status Message” Broadcast Rates When Transmission of Mode A Code is Disabled

When the Mode A Code transmission is disabled as per §2.2.3.3.1.4.3.1, the following transmit rates apply:

- a. ~~In the case where the “Target State and Status Message” with Subtype=1 is not being broadcast, then the “Emergency/Priority Status Message” (TYPE=28, Subtype=1) shall be broadcast at random intervals that are uniformly distributed over the range of 0.7 to 0.9 seconds relative to the previous “Emergency/Priority Status” for the duration of the emergency condition which is established by any value other than ZERO in the “Emergency/Priority Status” subfield in accordance with (§2.2.3.2.7.8.1.1).~~
- b. ~~In the case where the “Target State and Status Message” with Subtype=1 is being broadcast, then the “Emergency/Priority Status” (TYPE=28, Subtype=1) Message shall be broadcast at random intervals that are uniformly distributed over the range of 2.4 to 2.6 seconds relative to the previous “Emergency/Priority Status Message” for the duration of the emergency condition established by any non-ZERO value in the “Emergency/Priority Status” subfield in accordance with (§2.2.3.2.7.8.1.1).~~
- c. In the case where there is no emergency condition established by a ZERO value in the “Emergency/Priority Status” subfield, then the “Emergency/Priority Status Message” shall not be broadcast.

2.2.3.3.1.4.3.1.2 “Emergency/Priority Status Message” Broadcast Rates When Transmission of Mode A Code is Enabled

When the Mode A Code transmission is enabled as per §2.2.3.3.1.4.3.1, the following transmit rates apply:

- a. The “Emergency/Priority Status” (TYPE=28, Subtype=1) shall be broadcast at random intervals that are uniformly distributed over the range of 0.7 to 0.9 seconds relative to the previous “Emergency / Priority Status” under the following conditions:
 - i. For a duration of 24 +/- 1 seconds following a Mode A Code change by the pilot except if the Mode A Code is changed to 7500, 7600 or 7700.

Note: *The case where the Mode A Code is set to 7500, 7600 or 7700, the transmission of the emergency condition is covered by ii. below. Setting the Mode A Code to 7500, 7600 or 7700 is indicated by a Permanent Alert in the “Surveillance Status” field (value of 1) (see §2.2.3.2.3.2). A change in the Mode A Code, except to 7500, 7600 or 7700, is indicated by a Temporary Alert in the “Surveillance Status” subfield (value of 2) (see §2.2.3.2.3.2).*

- ii. For the duration of an emergency condition by any non-ZERO value in the “Emergency/Priority Status” subfield in accordance with (§2.2.3.2.7.8.1.1). If the emergency code is cleared by the pilot changing the Mode A Code to other than 7500, 7600 or 7700, the broadcast of the “Emergency/Priority Status” Message **shall** be continued for 24 +/- 1 seconds as i. above.

- b. In the absence of conditions specified in a. above, the “Emergency/Priority Status” Message **shall** be broadcast at random intervals that are uniformly distributed over the range of 4.8 to 5.2 seconds relative to the previous “Emergency / Priority Status” Message.

2.2.3.3.1.4.3.2 “TCAS RA Broadcast Message” Broadcast Rate

A TCAS RA Broadcast (TYPE=28, Subtype=2), **shall** be broadcast at random intervals that are uniformly distributed over the range of 0.7 to 0.9 seconds relative to the previous “TCAS RA Broadcast Message” for the duration of the TCAS RA in accordance with §2.2.3.2.7.8.2.