Trigger in Flight Label 202

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EUROCAE WG-98 White Paper to SAE

This community has contacted the SAE AEEC ARINC Global Aircraft Tracking (GAT) working group end of 2016 with a White Paper addressing the need to development an ARINC 429 Trigger in Flight (TiF) label comprising the required ELT input and output information.

- The inputs/outputs of the ELT may be fulfilled by discretes or by an ARINC 429 labeled message(s) for large transport category aircraft.
- The requirements for information to be provided to (inputs) and from (outputs) from the ELT are summarized in the following lists.

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ELT Inputs

- Manual trigger from flight deck ➔ todays ELT design (flight deck)
- Manual cancellation of the manually triggered alert ➔ tEd
- Automatic trigger from airplane ➔ TiF Label 202
- Automatic cancellation information of the automatic trigger ➔ TiF Label 202
- Information on criteria triggering the activation ➔ TiF Label 202
- External navigation (GNSS) device input ➔ Separate Labels for Lat, Long, Alt (optional)
- Self-Test command (ED-62 2.7.2) ➔ tEd
- Reset command (ED-62 2.7.2) ➔ tEd
- Armed (ED-62 2.7.2) ➔ tEd / TiF Label 202
- Indication of availability or loss of power External power supply (28 V DC) ➔ New ELT design

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ELT Outputs to aircraft systems

- Information to the cockpit indicating the ELT has started transmitting ➜ tEd
- Self-test results ➜ tEd
  - Sufficient information to assure that the battery has enough power for the ELT to operate at specifications
  - GNSS self-test results, both external or internal GNSS receiver
  - Status of the antenna system
- Indication of receipt of RLS acknowledgment Service feature ➜ Optional, new ELT design
- Indication that the ELT received an automatic trigger from airplane ➜ tEd
- Indication that the ELT received an automatic cancellation of an automatic trigger ➜ tEd
- Indication that the ELT received a cancellation of a manually activated trigger ➜ tEd

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ARINC definition of the Trigger in Flight label 202

The definition of the Trigger in Flight (TiF) label 202, is still ongoing

The specific challenge of the GAT working group is that the TiF label shall be used for the various Autonomous Distress Tracking (ADT) solutions

Consequently it was decided to reduce the label content to a minimum that should suit the different ADT solutions

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ARINC definition of the Trigger in Flight label 202

Label definition

Bit	Definition	Content	Comment	Need	State
1	First Label 2	1			
2		0			
3	Second Label 0	0			
4		0			
5		0			
6	Third Label 2	0			
7		1			
8		0			
9	SDI	0	SDI of Trigger Host		
10		0			
11					
12				Required for ELT(DT)	
13		Trigger / Cancel Matrix	Trigger / Cancel Matrix		
14					
15					
16					
17		Air or Ground	to arm/disarm the ADT	Required for ELT(DT)	Air = 0 / Ground = 1
18					
19		Distress Trigger Origin min	Distress Trigger Origin min (optional)	Optional	
20					
21					
22					
23		Distress Trigger Origin ext	Distress Trigger Origin extended (optional)	Optional	
24					
25					
26					
27		Flight Phase	Flight Phase (optional)	Optional	
28					
29					
30	SSM		SSM of Discrete Data Word		
31					
32	Parity bit		ODD		

ARINC definition of the Trigger in Flight label 202

Trigger/Cancel/Heart Beat Matrix

18	17	16	15	14	13	trigger/cancel/heart beat
0	0	0	0	0	0	not used
0	0	0	0	0	1	not used
0	0	0	0	1	0	not used
0	0	0	0	1	1	not used
0	0	0	1	0	0	not used
0	0	0	1	0	1	not used
0	0	0	1	1	0	not used
0	0	0	1	1	1	**Trigger Signal**
0	0	1	0	0	0	not used
0	0	1	0	0	1	not used
0	0	1	0	1	0	not used
0	0	1	0	1	1	not used
0	0	1	1	0	0	not used
0	0	1	1	0	1	not used
0	0	1	1	1	0	not used
0	0	1	1	1	1	not used

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0	1	0	0	0	1	not used
0	1	0	0	1	0	not used
0	1	0	0	1	1	not used
0	1	0	1	0	0	not used
0	1	0	1	0	1	not used
0	1	0	1	1	0	not used
0	1	0	1	1	1	not used
0	1	1	0	0	0	not used
0	1	1	0	0	1	not used
0	1	1	0	1	0	not used
0	**1**	**1**	**0**	**1**	**1**	**Heart Beat Signal**
0	1	1	1	0	0	not used
0	1	1	1	0	1	not used
0	1	1	1	1	0	not used
0	1	1	1	1	1	not used

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1	0	0	0	0	0	not used
1	0	0	0	0	1	not used
1	0	0	0	1	0	not used
1	0	0	0	1	1	not used
1	0	0	1	0	0	not used
1	0	0	1	0	1	not used
1	0	0	1	1	0	not used
1	0	0	1	1	1	not used
1	0	1	0	0	0	not used
1	0	1	0	0	1	not used
1	0	1	0	1	0	not used
1	0	1	0	1	1	not used
1	0	1	1	0	0	not used
1	0	1	1	0	1	not used
1	0	1	1	1	0	not used
1	0	1	1	1	1	not used

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1	1	0	0	0	1	not used
1	1	0	0	1	0	not used
1	1	0	0	1	1	not used
1	1	0	1	0	0	not used
1	1	0	1	0	1	not used
1	1	0	1	1	0	not used
1	1	0	1	1	1	not used
1	1	1	0	0	0	Cancel Signal
1	1	1	0	0	1	not used
1	1	1	0	1	0	not used
1	1	1	0	1	1	not used
1	1	1	1	0	0	not used
1	1	1	1	0	1	not used
1	1	1	1	1	0	not used
1	1	1	1	1	1	not used

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ARINC definition of the Trigger in Flight label 202

Trigger Origin Minimum Matrix

23	22	21	20	Trigger Origin Matrix	First Generation Beacon	23	22	Second Generation Beacon	23	22	21	20
0	0	0	0	Spare	NA			spare	0	0	0	0
0	0	0	1	Manual Trigger	manual	0	0	manual	0	0	0	1
0	0	1	0	Spare	NA			spare	0	0	1	0
0	0	1	1	Spare	NA			spare	0	0	1	1
0	1	0	0	G-switch/deformation activation	g-switch	0	1	g-switch	0	1	0	0
0	1	0	1	Spare	NA			spare	0	1	0	1
0	1	1	0	Spare	NA			spare	0	1	1	0
0	1	1	1	Spare	NA			spare	0	1	1	1
1	0	0	0	Automatic Distress Trigger (Other, or non-specific, multiple or currently undefined)	ADT	1	0	ADT	1	0	0	0
1	0	0	1	ED-237 Scenario 1: Unusual Attitude	NA			sc1	1	0	0	1
1	0	1	0	ED-237 Scenario 2: Unusual Speed	NA			sc2	1	0	1	0
1	0	1	1	ED-237 Scenario 3: Collision with Terrain	NA			sc3	1	0	1	1
1	1	0	0	ED-237 Scenario 4: Total Loss of thrust/propoulsion	NA			sc4	1	1	0	0
1	1	0	1	Reseved for OEM	NA			reserved for ADT				
1	1	1	0	Reseved for OEM	NA			reserved for ADT				
1	1	1	1	Spare CospasSarsat	spare	1	1	spare	1	1	1	1

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ARINC definition of the Trigger in Flight label 202

Trigger Origin Extented Matrix

27	26	25	24	Trigger Origin Matrix
0	0	0	0	Spare
0	0	0	1	Spare
0	0	1	0	Spare
0	0	1	1	Spare
0	1	0	0	Spare
0	1	0	1	Spare
0	1	1	0	Spare
0	1	1	1	Spare
1	0	0	0	Spare
1	0	0	1	Spare
1	0	1	0	Spare
1	0	1	1	Spare
1	1	0	0	Spare
1	1	0	1	Spare
1	1	1	0	Spare
1	1	1	1	Spare

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