



FEDERATION INTERNATIONALE DE L'AUTOMOBILE

INSTALLATION SPECIFICATION FOR
FIA-APPROVED 8872-2018 ACCIDENT DATA RECORDER (ADR)

08-07-2021

FOREWORD

Accident Data Recorder (ADR) devices are designed to measure and record accident data such as in-car accelerations along three axes (X, Y and Z) – also referred to as “G-forces”, as well as context vehicle data, when available.

The aim of this specification is to provide objective installation requirements of FIA-approved 8872-2018 ADRs listed in Technical List no. 88, so that meaningful data is recorded.

Competitors shall install the ADRs according to the instructions defined in this document (INSTALLATION SPECIFICATION FOR FIA-APPROVED 8872-2018 ACCIDENT DATA RECORDER (ADR)), and in the User’s Manual provided by the manufacturer. In case of conflicting information, this document will prevail.

In addition, the ADR installation shall also comply with the requirements set out in Appendix J, the relevant championship technical regulations, or the car Homologation Form.

1 System specification

For the system specification, fixation, orientation and connectivity details, please refer to the User’s Manual provided by the manufacturer.

2 System position

- 2.1 - The ADR shall be as close to the nominal centre of gravity* of the car as practical,
- GT / Touring / Rally cars: between the driver and passenger spaces, typically on the tunnel (where applicable).
 - Prototypes: within the monocoque, as close as possible to the car centre line.
 - Single-Seaters: within the monocoque, under the driver’s seat back or under the seat-kick.

* ADRs cannot be installed further than 200 mm along the longitudinal axis of the car from the CoG, unless a specific derogation has been issued by the FIA. The competitor or car manufacturer must provide a justification to the FIA Safety Department in case they wish to install the ADR at a greater distance.

- 2.2 - The mounting position shall be sufficiently stiff for its purpose.
- 2.3 - The underside of the device shall be in full contact with the mounting surface.
- 2.4 - The ADR shall be easily accessible to help scrutineering and allow easily the replacement of the device.
- 2.5 - The ADR has a built-in status light to show the unit has recorded an accident. It also provides relevant diagnostics to the user and FIA/ASN officials regarding the status of the ADR. As such, the unit shall be mounted in a location where the status light is visible to the FIA/ASN official when the occupant(s) is(are) seated normally. Where this is not possible, a remote status light shall be installed in a visible location for scrutineering and connected to the relevant pins of the ADR.

3 System orientation

- 3.1 - The device shall be mounted in accordance with the manufacturer User’s Manual. The positive X-axis shall point forward along the longitudinal axis of the car ± 2.5 degrees.
- 3.2 - The mounting surface shall be horizontal ± 2.5 degrees.

4 System fixation

- 4.1 - An interface plate may be used to simplify the installation and strengthen the mounting surface to isolate the device from vibrations. In this case:
 - (i) the device must be in sufficient contact with the plate, and the plate must be in sufficient contact with the chassis.
 - (ii) the interface plate shall be made from steel or aluminum of minimum 5 mm thickness.
- 4.2 - The device and its interface plate, if used, must not be fitted to any form of unsupported tray.
- 4.3 - The device shall be hard mounted using all the holes provided for such purposes, and secured to the mounting surface or interface plate using the number and type of bolts defined by the manufacturer. The length of the bolts shall be sufficient to ensure 4 mm MIN engagement with the nut or insert.
- 4.4 - The ADR device shall not be modified.
- 4.5 - The use of Velcro, double or single sided tape, rivets or anti-vibration mounts is prohibited in any of the interfaces between the device, chassis and interface plate (if used).
- 4.6 - Any exception to these installation rules must be authorised directly by the FIA.

5 Power supply

- 5.1 - If the ADR system operates on external power supply, it must be connected to the car's battery in accordance with the specification in the manufacturer User's Manual provided by the manufacturer.

6 Environment

- 6.1 - The device must not be mounted close to, or coupled to, sources of extreme vibration, such as the engine or gearbox. The device should not be installed close to any mechanical driveshaft components (such as bearings).
- 6.2 - A minimum clearance of 5 mm between the device and any other devices should be maintained around the entire external surface of the device. No devices can be fitted on top of, or in contact with, the ADR or interface plate.
- 6.3 - The ADR shall be mounted in an area where the mounting surface temperature does not exceed 85°C at any time. It must also be ensured that no device around the ADR [typically 10-20 mm] will generate heat in excess of 85°C. The use of temperature stickers is recommended for monitoring purposes.

7 Car connection

- 7.1 - The ADR shall be connected in accordance with the pinout defined in the manufacturer User's Manual.
- 7.2 - If available, and unless otherwise forbidden by the relevant championship or category regulations, the ADR shall be connected to the ECU of the car via CAN to receive and record context vehicle data (car speed, engine rotational speed, throttle, brake, steering, etc.), according to the CAN messages and IDs as defined in the device specification or user manual.

8 Led flashing scheme

- 8.1 - Normal running and communicating with ECU/CAN: LED solid green at 50% brightness;
- 8.2 - Accident stored: LED flashing red at full brightness at 4Hz with 5% duty cycle.
The LED shall indicate this status from when a new accident is stored until the device is turned off.
When the device is turned on, if any accidents are stored, the LED shall show the status for a duration of 60 seconds, then return to its normal status.
- 8.3 - If the system relies solely on an internal battery, an additional LED shall be used to indicate the status of the battery. The flashing scheme for this LED should clearly indicate the state of charge of the battery as follows:
 - (i) Fully charged: LED solid.
 - (ii) Less than 24 hours of normal operation is remaining: LED flashing ON for 100ms every 2s.

9 CAN Protocol Requirements

- 9.1 Each FIA-approved 8872-2018 ADR has a CAN protocol complying with the below requirements.
- 9.2 ADR manufacturers are permitted to include additional channels for the CAN. The additional channel(s), if any, for each manufacturer's CAN protocol can be found in their respective user manual.

Input packets (external to ADR)

Message 1

Message ID: 0x200
Message rate: $f = 100\text{Hz}$
Format: Big Endian

Byte	Description	Scaling	Type
0-1	Engine rotational speed	rpm/bit	16-bit unsigned
2	Front brake pressure	bar/bit	8-bit unsigned
3	Rear brake pressure	bar/bit	8-bit unsigned
4-5	Lap distance	1 m/bit	16-bit unsigned
6-7	Throttle actuator position	0.1 %/bit	16-bit signed

Message 2

Message ID: 0x204
Message rate: $f = 100\text{Hz}$
Format: Big Endian

Byte	Description	Scaling	Type
0-1	Vehicle speed	0.1 km/h/bit	16-bit unsigned
2-3	Steer angle	°/bit	16-bit signed
4-5	Throttle pedal position	0.1 %/bit	16-bit signed

Message 3

Message ID: 0x680
Message rate: $f = 10\text{Hz}$
Format: Big Endian

Byte	Description	Scaling	Type
0-3	GPS latitude	1e7 degrees	32-bit fixed point (7dps) value
4-7	GPS longitude	1e7 degrees	32-bit fixed point (7dps) value

Message 4

Message ID: 0x681
Message rate: $f = 10\text{Hz}$
Format: Big Endian

Byte	Description	Scaling	Type
0-3	GPS time	HHMMSS.sss	32-bit unsigned
4-5	GPS speed	0.1 km/h/bit	16-bit unsigned
6-7	GPS altitude	0.1m/bit	16-bit signed

Message 5

Message ID: 0x682
Message rate: $f = 10\text{Hz}$
Format: Big Endian

Byte	Description	Scaling	Type
0-2	GPS date	DDMMYY	24-bit unsigned

Output packets (ADR to external)

Message 6

Message ID: 0x7B
Message rate: $f = 10\text{Hz}$
Format: Big Endian

Byte	Description	Scaling	Type
0	Accident Severity Index	0 = no accident 1-255 = severity of last accident detected since power on	8-bit unsigned
1	ADR software version	10 (e.g. 0x25 = 37d => 3.7)	unsigned
2-3	ADR status	See table below	bitmapped
4-5	ADR serial number	-	16-bit unsigned

ADR status:

Bit	Description	Note
0	Logging in progress	1 if logger is in LOGGING state, otherwise 0
1	Logging config OK	1 if configuration table is good, otherwise 0
2	CAN Team OK	1 if ADR is receiving CAN messages from ECU, otherwise 0
3	Accident stored	1 if an accident is stored in memory, otherwise 0
4	Accident active	1 if an accident is being detected
5	Download mode	1 when USB is connected for data download
6-15	0	Always zero

Message 7

Message ID: **0x81**

Message rate: $f = 100\text{Hz}$

Format: **Big Endian**

Byte	Description	Scaling	Type
2-3	Acc Y (G-Lateral)	0.006125 G/bit	16-bit signed
4-5	Acc X (G-Longitudinal)	0.006125 G/bit	16-bit signed
6-7	Acc Z (G-Vertical)	0.006125 G/bit	16-bit signed

LISTE DES MODIFICATIONS LIST OF AMENDMENTS

Dernière publication :

- Nouveau texte : ainsi
- Texte supprimé : ~~ainsi~~

Modifications depuis la première publication :

- Nouveau texte : ainsi
- Texte supprimé : ~~ainsi~~

Latest publication:

- New text: thus
- Deleted text: ~~thus~~

Changes since first publication:

- New text: thus
- Deleted text: ~~thus~~

Date	Modifications																								
05.02.2021	<i>Initial release</i>																								
08.07.2021	2.5 - The ADR has a built-in status light to show the unit has recorded an accident. It also provides relevant diagnostics to the user <u>and FIA/ASN officials</u> regarding the status of the ADR. As such, the unit shall be mounted in a location where the status light is visible <u>to the FIA/ASN official</u> when the occupant(s) is(are) seated normally. Where this is not possible, a remote status light shall be installed in a visible location for scrutineering and connected to the relevant pins of the ADR.																								
08.07.2021	<p>9 CAN Protocol Requirements</p> <p>9.1 <u>Each FIA-approved 8872-2018 ADR has a CAN protocol complying with the below requirements.</u></p> <p>9.2 <u>ADR manufacturers are permitted to include additional channels for the CAN. The additional channel(s), if any, for each manufacturer's CAN protocol can be found in their respective user manual.</u></p> <p><u>Input packets (external to ADR)</u></p> <p>Message 1</p> <p>Message ID: 0x200 Message rate: f = 100Hz Format: Big Endian</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Byte</th> <th style="text-align: center;">Description</th> <th style="text-align: center;">Scaling</th> <th style="text-align: center;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0-1</td> <td>Engine rotational speed</td> <td>rpm/bit</td> <td>16-bit unsigned</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Front brake pressure</td> <td>bar/bit</td> <td>8-bit unsigned</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Rear brake pressure</td> <td>bar/bit</td> <td>8-bit unsigned</td> </tr> <tr> <td style="text-align: center;">4-5</td> <td>Lap distance</td> <td>1 m/bit</td> <td>16-bit unsigned</td> </tr> <tr> <td style="text-align: center;">6-7</td> <td>Throttle actuator position</td> <td>0.1 %/bit</td> <td>16-bit signed</td> </tr> </tbody> </table>	Byte	Description	Scaling	Type	0-1	Engine rotational speed	rpm/bit	16-bit unsigned	2	Front brake pressure	bar/bit	8-bit unsigned	3	Rear brake pressure	bar/bit	8-bit unsigned	4-5	Lap distance	1 m/bit	16-bit unsigned	6-7	Throttle actuator position	0.1 %/bit	16-bit signed
Byte	Description	Scaling	Type																						
0-1	Engine rotational speed	rpm/bit	16-bit unsigned																						
2	Front brake pressure	bar/bit	8-bit unsigned																						
3	Rear brake pressure	bar/bit	8-bit unsigned																						
4-5	Lap distance	1 m/bit	16-bit unsigned																						
6-7	Throttle actuator position	0.1 %/bit	16-bit signed																						

Message 2

Message ID: 0x204
Message rate: f = 100Hz
Format: Big Endian

Byte	Description	Scaling	Type
0-1	Vehicle speed	0.1 km/h/bit	16-bit unsigned
2-3	Steer angle	°/bit	16-bit signed
4-5	Throttle pedal position	0.1 %/bit	16-bit signed

Message 3

Message ID: 0x680
Message rate: f = 10Hz
Format: Big Endian

Byte	Description	Scaling	Type
0-3	GPS latitude	1e7 degrees	32-bit fixed point (7dps) value
4-7	GPS longitude	1e7 degrees	32-bit fixed point (7dps) value

Message 4

Message ID: 0x681
Message rate: f = 10Hz
Format: Big Endian

Byte	Description	Scaling	Type
0-3	GPS time	HHMMSS.sss	32-bit unsigned
4-5	GPS speed	0.1 km/h/bit	16-bit unsigned
6-7	GPS altitude	0.1 m/bit	16-bit signed

Message 5

Message ID: 0x682
Message rate: f = 10Hz
Format: Big Endian

Byte	Description	Scaling	Type
0-2	GPS date	DDMMYY	24-bit unsigned

Output packets (ADR to external)

Message 6

Message ID: 0x7B
Message rate: f = 10Hz
Format: Big Endian

Byte	Description	Scaling	Type
0	Accident Severity Index	0 = no accident 1-255 = severity of last accident detected since power on	8-bit unsigned
1	ADR software version	10 (e.g. 0x25 = 37d => 3.7)	unsigned
2-3	ADR status	See table below	bitmapped
4-5	ADR serial number	-	16-bit unsigned

ADR status:

Bit	Description	Note
0	Logging in progress	1 if logger is in LOGGING state, otherwise 0
1	Logging config OK	1 if configuration table is good, otherwise 0
2	CAN Team OK	1 if ADR is receiving CAN messages from ECU, otherwise 0
3	Accident stored	1 if an accident is stored in memory, otherwise 0
4	Accident active	1 if an accident is being detected
5	Download mode	1 when USB is connected for data download
6-15	0	Always zero

Message 7

Message ID: 0x81
Message rate: $f = 100\text{Hz}$
Format: Big Endian

Byte	Description	Scaling	Type
2-3	Acc Y (G-Lateral)	0.006125 G/bit	16-bit signed
4-5	Acc X (G-Longitudinal)	0.006125 G/bit	16-bit signed
6-7	Acc Z (G-Vertical)	0.006125 G/bit	16-bit signed

19.10.2022

2.1 - The ADR shall be as close to the nominal centre of gravity* of the car as practical:

- GT / Touring / Rally cars: between the driver and passenger spaces, typically on the tunnel (where applicable).
- Prototypes: within the monocoque, as close as possible to the car centre line.
- Single-Seaters: within the monocoque, under the driver's seat back or under the seatkick.

* ADRs cannot be installed further than 200 mm along the longitudinal axis of the car from the CoG, unless a specific derogation has been issued by the FIA. The competitor or car manufacturer must provide a justification to the FIA Safety Department in case they wish to install the ADR at a greater distance.