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ADR4 CAN Protocol

Revision	Reason	Author	Date	Check by
1.0	Creation	I. Gamboa	25/01/2021	
1.1	Removed 0x681, 0x682 non-mandatory channels	I. Gamboa	27/03/2021	
1.2	Removed 0x82, 0x220	I. Gamboa	26/05/2021	
1.3	Pedal Position not logged as per FIA 8872-2018 Mandatory Channels – Appendix C.3	I. Gamboa	03/03/2022	
1.4	Layout review	L De Angelis	27/06/2023	

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1 Introduction

This document describes the CAN protocol used by the ADR4.

2 System overview

The ADR4 uses the CAN bus to:

- receive data to be logged from the ECU
- send/receive the GPS/inertial sensor information
- send the logger/accident status

3 Standard protocol

3.1 Input packets

3.1.1 ECU to ADR4 (CAN ID 0x200)

Message ID: **0x200**
Message rate: **f = 100Hz**
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 1: ID 0x200, rate 100Hz

3.1.2 ECU to ADR4 (CAN ID 0x204)

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

Message 2: ID 0x204, rate 100Hz

3.1.3 ECU to ADR4 (CAN ID 0x680)

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

Byte	Description	Scaling	Type
0-3	GPS Latitude	1e7 degrees	32-bit signed
4-7	GPS Longitude	1e7 degrees	32-bit signed

Message 3: ID 0x680, rate 10Hz

3.1.4 ECU to ADR4 (CAN ID 0x681)

Message ID: **0x681**
Message rate: **f=10Hz**

Format: Big Endian

Byte	Description	Scaling	Type
4-5	GPS Speed	0.1 km/h/bit	16-bit unsigned

Message 4: ID 0x681, rate 10Hz

3.2 Output packets

3.2.1 ADR4 to ECU (CAN ID 0x7B)

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 (0x25=37d=>3.7)	8-bit unsigned
2-3	ADR Status	See Table 1	bitmapped
4-5	ADR serial number	-	16-bit unsigned
6-7	Car ID	MS first	16-bit Signed

Message 6: ID 0x7B, rate 10Hz

Bit	Description	Note
0	Logging in progress	1 if logger is in LOGGING state, else 0.
1	Logging config OK	1 if configuration table is OK, else 0.
2	CAN Team OK	1 if ADR is receiving CAN messages from ECU, else 0.
3	Accident stored	1 if an accident is stored in memory, else 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

Table 1: ADR Status

3.2.2 ADR4 to ECU (CAN ID 0x81)

Message ID: **0x81**
Message rate: **f = 100Hz**
Format: Big Endian

Byte	Description	Scaling	Type
0-1	Yaw rate	8.75 mdps/bit	16-bit signed
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

Message 7: ID 0x81, rate 100Hz