

CAN BUS Communication Protocol

1. Confidentiality Commitment

As a supplementary attachment to the technical agreement signed by Party A and Party B, this communication protocol is an integral part of the technical agreement and has equal legal effect. Both parties must promise that the content of the communication protocol shall not be disclosed or released to a third party.

2. Reference Standards or Documents

SAE J1939-71 Standard Tire Pressure CAN Communication Protocol

3. CAN Network Basic Information

Basic information is as follows:

- Bus Rate: 250Kbps
- TPMS Controller does not contain a 120Ω terminal resistor
- TPMS Controller Sample Point: 87.5%
- TPMS Controller SA Address: 0x33
- Instrument SA Address: 0x17
- Message Data Format: Intel format; for specific communication protocol see: Tire Pressure CAN Communication Protocol

4. Instrument Section

4.1 Communication Protocol

4.1.1 Instrument Transmitted Messages

The instrument sends messages according to the communication protocol: TCO1 or CCVS1 vehicle speed message;

TCO1 Message:

OUT	IN	ID:0CFE6CEE				Cycle
Dash Board Instrument	TPMS	P	R	DP	PGN	50ms
		3	0	0	FE6C (65132)	
Position	Data Name			Definition		
BYTE7-8	Tachograph vehicle speed SPN:1624			1/256 km/h per bit, 0 offset		

CCVS1 Message:

OUT	IN	ID:18FEF117				Cycle
Dash Board Instrument	TPMS	P	R	DP	PGN	100ms
		6	0	0	FEF1 (65265)	
Position	Data Name			Definition		
BYTE2-3	Wheel-Based Vehicle Speed SPN:84			1/256 km/h per bit, 0 offset		

4.1.2 Tire Pressure Messages

TPMS Controller transmitted messages:

Note: After the controller is powered on, it transmits all tire messages within 1s. After that, the transmission interval for each tire message is 200ms. The data update cycle for all vehicle tires is N times 200ms (N is the number of tire pressure sensors installed on the vehicle). All tire messages are sent within 10s. Refer to the attached figure; communication protocol as follows:

OUT	IN	ID:18FEF433				Cycle
TPMS	Dashboard	P	R	DP	PGN	See example figure 1 for details
	Instrument	6	0	0	FEF4 (65268)	
Position	Data Name			Definition		
Byte1	Tire Location			Data Length: 8 bits Resolution: 256 states/8 bit, 0 offset Data Range: 0 to 255 0x00 Front Left 0x03 Front Right 0x10 Axle 2, tire 1 0x11 Axle 2 tire 2 0x12 Axle 2, tire 3 0x13 Axle 2 tire 4 0x20 Axle 3 tire 1 0x21 Axle 3 tire 2 0x60 Spare 1 0x61 Spare tire2 see figure 2		
Byte2	Tire Pressure			Resolution: 5.5 kPa/bit, 0 offset Data Range: 0 to 1298kPa		
Byte3	Tire Temperature			Data Length: 2 bytes		
Byte4				Resolution: 0.03125 deg C/bit, -273 deg C offset Data Range: -273 to 1735 deg C		
Byte5	CTIWheelEndElectricalFault (Unable to receive tire signal alarm)			Data Length: 2 bits 5.6 ~ 5.5 : CTI(Central tire inflation and deflation system) Tire status 00=Normal, 01=Sensor malfunction alarm (indicating that the tire signal has not been received within 10 minutes) others=Reserved ; When the signal alarm flag position 1 is not received, the pressure and temperature values in the tire pressure message will be invalid, and the corresponding position of the instrument should display "---". This alarm priority is the highest priority, and pressure and temperature alarms will no longer be judged		
	CTITireStatus (Tire leakage alarm)			Data Length: 2 bits 5.4 ~ 5.3: CTI Tire Status 00=Normal, 01=Tire leakage, 10=Retain, 11=Retain		

	CTIWheelSensorStatus (Tire high temperature alarm)	Data Length: 2 bits 5.2~5.1: CTITire high temperature alarm 00=Normal,01=Tire high temperature alarm, 10=Retain, 11=Retain
Byte6	Tire burst emergency device (left front wheel)	Bit 2,1 00 Not available 01 The left front wheel is not equipped with a tire burst emergency device (indicating that the sensor signal has not been received within 10 minutes) 10 The left front wheel has been installed with a tire blowout emergency device 11 Not available
	Tire burst emergency device (right front wheel)	Bit 4,3 00 Not available 01 The right front wheel is not equipped with a tire burst emergency device (indicating that the sensor has not been received within 10 minutes)

The following example shows the message sending status of only the left and right front wheels. When the tire pressure module is powered on, all tire message information is sent within 60 seconds, and then each tire message is sent with a cycle of 200ms. All tire messages are sent within 10 seconds. As shown in Figure 1.

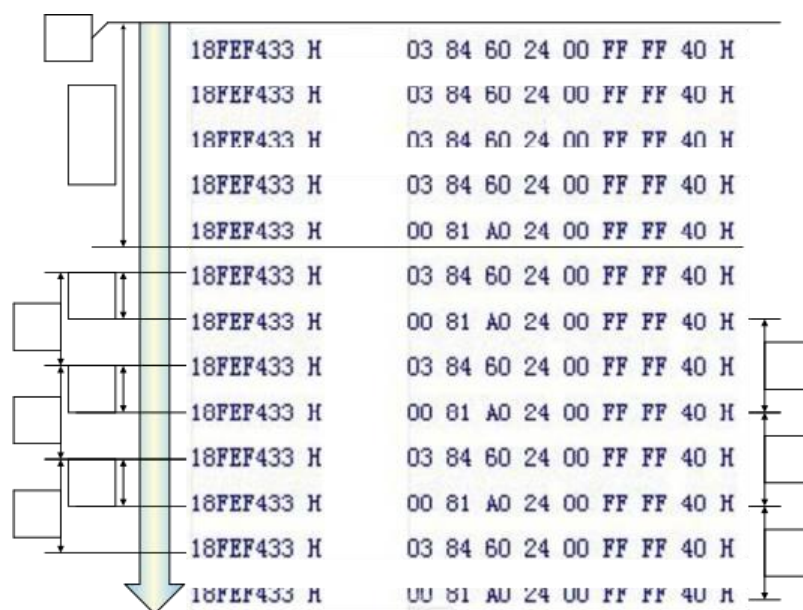


Figure 1: Message Transmission Example

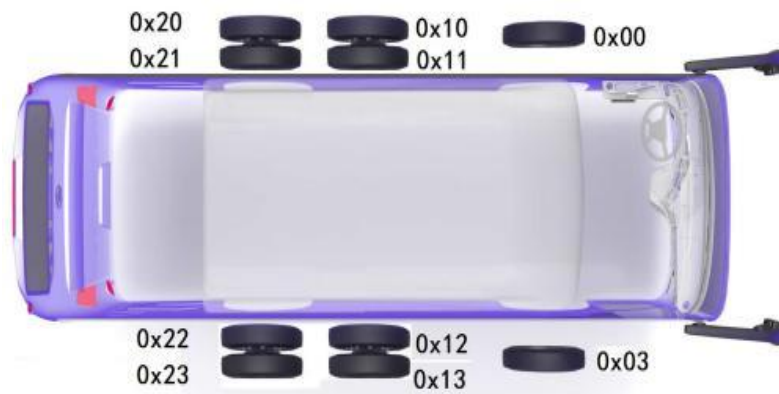


Figure 2: Tire Location Example

4.2 Tire Pressure Display

4.2.1 Tire Pressure Faults

Duration: Light up fault indicator light according to actual state;
 Fault Indicator Light: Display symbol as shown in Fig 3, color: yellow;
 Sound Alarm: Beep alarm; Other Alarms: Trigger conditions...

Other alarms:

Trigger conditions: (1-4 sound alarms shall be triggered in a loop of 3 times according to the enterprise standard "Specification for the Definition of Alarm Control Logic for Automotive Electrical Indicators and Buzzers", with an alarm frequency of every 2 seconds of operation (constant sound of 2Hz) and a stop interval of 2 seconds;)

1. High temperature alarm: Message: When 5.2-5.1 in 18FEF433 is 01b, the fault light is on, and the text reminder and sound alarm of " * Tire High Temperature Alarm" are displayed, such as the left front tire high temperature alarm; Alternatively, the solution shown in Figure 4 can be adopted, automatically switching to the corresponding tire position in Figure 4 and adding auxiliary text or sound alarms at the same time;

2. Leakage alarm: Message: When 5.4-5.3 in 18FEF433 is 01b, the fault light will light up and display a text reminder or sound alarm of " * Tire Leakage Alarm", such as the right rear outer tire leakage alarm; Alternatively, adopt the scheme shown in Figure 4 and automatically switch to Figure

4 corresponding tire positions, and at the same time add auxiliary text or sound alarms;

3. Signal loss alarm: Message: When 5.6-5.5 in 18FEF433 is 01b, the fault light will light up and display a text reminder or sound alarm of " * Tire message loss alarm", such as "Right rear outer tire message loss alarm"; Alternatively, the solution shown in Figure 4 can be adopted, automatically switching to the corresponding tire position in Figure 4 and adding auxiliary text or sound reminders at the same time; This message has the highest priority. When receiving 01b for 5.6-5.5 in 18FEF433, the pressure and temperature values in the tire pressure message will be invalid, and the corresponding position of the instrument should display "---". This alarm has the highest priority and no longer judges pressure and temperature alarms;

4. Pressure alarm: According to the corresponding alarm in bytes 8.7-8.6 of message 18FEF433, the fault light will be on, and a text reminder or sound alarm will be displayed; Alternatively, the solution shown in Figure 4 can be adopted, automatically switching to the corresponding tire position in Figure 4 and adding auxiliary text or sound reminders at the same time;



Figure 3: Tire Pressure Fault Symbol

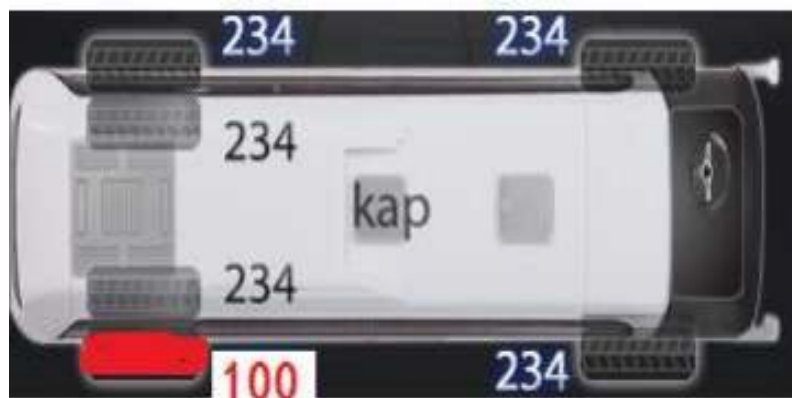


Figure 4: Tire Pressure Fault Location Display

5. Blowout Emergency Device Indicator

Read Byte6.2-6.1 in message 18FEF433: Emergency device status for left front tire blowout, as well as in 18FEF433

Byte6.4-6.3:Emergency device status for right front tire blowout,displayed as shown in Figure5

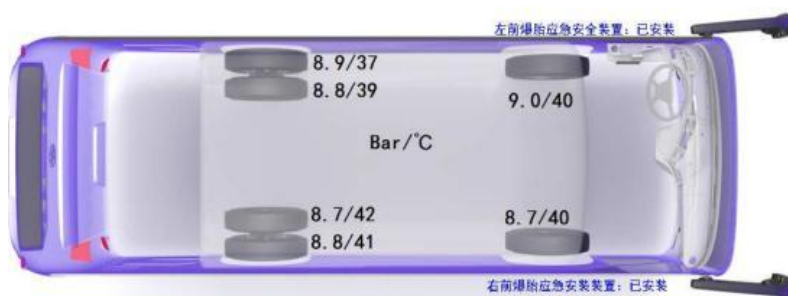


Figure 5: Blowout Emergency Device Status

4.2.2 Instrument Display Interface

The combination instrument panel has corresponding display switching buttons to switch the tire pressure display interface, which is convenient for the driver to view. The tire pressure display interface is recommended to use the following methods:

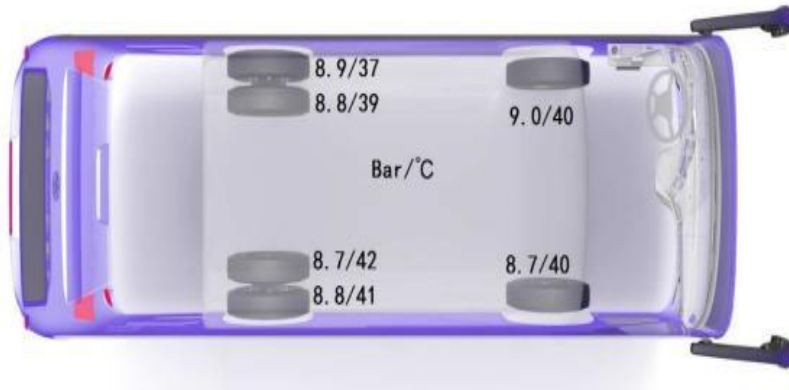


Figure 6: Tire Pressure Display Interface