

# VAD Pro-901 OBD-II Universal Standards



## OBD-II Diagnostic connector



The OBD-II specification provides for a standardized hardware interface—the female 16-pin (2x8) J1962 connector. Unlike the OBD-I connector, which was sometimes found under the hood of the vehicle, the OBD-II connector is nearly always located on the driver's side of the passenger compartment near the center console or driver footwell. SAE J1962 defines the pinout of the connector as:

1. -
2. Bus positive Line of SAE-J1850
3. Ford DCL(+) Argentina, Brazil (pre OBD-II) 1997-2000, Usa, Europe, etc.
4. Chassis ground
5. Signal ground
6. CAN high (ISO 15765-4 and SAE-J2284)
7. K line of ISO 9141-2 and ISO 14230-4
8. -
9. -
10. Bus negative Line of SAE-J1850
11. Ford DCL(-) Argentina, Brazil (pre OBD-II) 1997-2000, USA, Europe, etc.
12. -
13. -
14. CAN low (ISO 15765-4 and SAE-J2284)
15. L line of ISO 9141-2 and ISO 14230-4
16. Battery voltage

The assignment of unspecified pins is left to the vehicle manufacturer's discretion.

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## Signal protocols

There are five signaling protocols currently in use with the OBD-II interface. Any given vehicle will likely only implement one of the protocols. Often it is possible to make an educated guess about the protocol in use based on which pins are present on the J1962 connector:

- SAE J1850 PWM (pulse-width modulation - 41.6 k-baud, standard of the Ford Motor Company)
  - pin 2: Bus+
  - pin 10: Bus-
  - High voltage is +5 V
  - Message length is restricted to 12 bytes, including CRC
  - Employs a multi-master arbitration scheme called 'Carrier Sense Multiple Access with Non-Destructive Arbitration' (CSMA/NDA)
- SAE J1850 VPW (variable pulse width - 10.4/41.6 k-baud, standard of General Motors)
  - pin 2: Bus+
  - Bus idles low
  - High voltage is +7 V
  - Decision point is +3.5 V
  - Message length is restricted to 12 bytes, including CRC
  - Employs CSMA/NDA
- ISO 9141-2. This protocol has a data rate of 10.4 k-baud, and is similar to RS-232. ISO 9141-2 is primarily used in Chrysler, European, and Asian vehicles.
  - pin 7: K-line
  - pin 15: L-line (optional)
  - UART signaling (though not RS-232 voltage levels)
  - K-line idles high
  - High voltage is  $V_{batt}$
  - Message length is restricted to 12 bytes, including CRC
- ISO 14230 KWP2000 (Keyword Protocol 2000)
  - pin 7: K-line
  - pin 15: L-line (optional)
  - Physical layer identical to ISO 9141-2
  - Data rate 1.2 to 10.4 kbaud
  - Message may contain up to 255 bytes in the data field
- ISO 15765 CAN (250 kbit/s or 500 kbit/s). The CAN protocol is a popular standard outside of the US automotive industry and is making significant in-roads into the OBD-II market share. By 2008, all vehicles sold in the US will be required to implement CAN, thus eliminating the ambiguity of the existing five signalling protocols.
  - pin 6: CAN High
  - pin 14: CAN Low

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## **Signal protocols**

Note that pins 4 (battery ground) and 16 (battery positive) are present in all configurations. Also, ISO 9141 and ISO 14230 use the same pinout, thus the connector shape does not distinguish between the two.

## **Diagnostic data available**

OBD-II provides access to numerous data from the ECU (Electronic Control Unit) and offers a valuable source of information when troubleshooting problems inside a vehicle. The SAE J1979 standard defines a method for requesting various diagnostic data and a list of standard parameters that might be available from the ECU. The various parameters that are available are addressed by "parameter identification numbers" or **PIDs** which are defined in J1979.

Manufacturers are not required to implement all PIDs listed in J1979 and they are allowed to include proprietary PIDs that are not listed. The PID request and data retrieval system gives access to real time performance data as well as flagged DTCs. Individual manufacturers often enhance the OBD-II code set with additional proprietary DTCs.