

## **OBD-II Fault Code Reading with OBDKey**

This document assesses the fault code (mode 3 and mode 7) responses read by the OBDKey vehicle interface device ([www.obdkey.com](http://www.obdkey.com)) .

This should be used to assist with developers wishing to write software to decode the possible responses that vehicles will give when fault codes are requested.

The tests were carried out on

### **Ford ECU – CAN based OBD-II protocol with the OBDKey 1.10K**

### **VW Golf, Subaru WRX, Mitsubishi Evo 8, Triumph Motorcycle ECUs– ISO 9141 based OBD-II protocol with the OBDKey 1.10K**

In all tests the OBDKey was reset with ATZ to start communications followed by a mode 1, PID 0 supported PIDs request to initialize communications between the OBDKey unit and the vehicle's engine ECU.

## No Fault Codes Found

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If the ECU has no fault codes it may be reported as one of:

1. **NO DATA**
2. **43 00**
3. **43 00 00 00 00 00 00**

The "43" is the response to the mode 03 request.

Generally, the response may be NO DATA as the ECU will not respond (on older vehicles) if no codes are present. In example 2 and 3 the response following the 43 byte is "00" and "0000" respectively. The first is from a CAN based OBD-protocol which indicates zero fault codes, the second from an ISO 9141/14230 or J1850 vehicle where the response frame is filled with zeroes to indicate no faults found.

## Single Fault Codes Found

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If the ECU has a single fault codes it may be reported as one of:

1. **43 01 01 76**
2. **43 06 85 00 00 00 00**

The "43" is the response to the mode 03 request.

The first case is from a CAN based OBD-II protocol. Note that the CAN protocols will have as the first byte following the "43" response a fault code count. This tells you how many fault codes there are in the response. In this case 1, with a fault code of "0176" or P0176.

The second example here is from an ISO based OBD-II compliant vehicle, any would be the same from a J1850 vehicle in that the fault codes are reported without a total count byte. In this case the code is "0685", or P0685

## Multiple Fault Codes Found

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If the ECU has a multiple fault codes it may be reported as one of:

1. 47 09 21 76 01 06 01 23 02 22 01 07 05 00 01 18 01  
13 C0 01
2. 47 C1 21 01 13 01 18
3. 43 01 08 01 13 01 18 FD 48 6B D1 43 01 22 02 01 02  
02 F1 48 6B D1 43 02 03 03 51 03 52 75 48 6B D1 43  
03 53 11 08 15 52 9D 48 6B D1 43 16 14 16 32 00 00
4. 43 16 03 01 15 01 20 46 48 6B 00 43 01 10 05 13 01  
05

The "47" is the response to the mode 07 request.

Example 1 is from a CAN based OBD-II protocol. Note again, that the CAN protocols will have as the first byte following the "47" response a fault code count. This tells you how many fault codes there are in the response. In this case there are 9. Note how OBDKey 1.10K presents the CAN frame as a single line.

Example 2 shows an ISO9141/14230 or J1850 OBD-II protocol response with 3 fault codes "C121", "0113" and "0118". This is the maximum number of fault codes that the ISO9141/14230 or J1850 OBD-II protocols can convey in a single frame.

Examples 3 and 4 show what happens when there are more fault codes to be reported than will fit in a single frame.

Note how OBDKey 1.10K presents the ISO multiple frame responses as a single line.

What has happened is that the checksum from the first frame is presented as are the three header bytes from the next frame, except in the last frame received where the checksum/CRC is stripped out.

As the frame lengths are static it is be simple to skip the header bytes for multiple frame responses from single ECU's.

In example 3 this can be read as

```
43 01 08 01 13 01 18 FD 48 6B D1 43 01 22 02 01 02 02 F1  
48 6B D1 43 02 03 03 51 03 52 75 48 6B D1 43 03 53 11 08  
15 52 9D 48 6B D1 43 16 14 16 32 00 00
```

Stripping out the header and checksum data leaves us with

```
43 01 08 01 13 01 18
43 01 22 02 01 02 02
43 02 03 03 51 03 52
43 03 53 11 08 15 52
43 16 14 16 32 00 00
```

The "43" is the response to the mode 03 request.

The fault codes are read in pairs as 0108 0113 0118 0122 0201 0202  
0203 0351 0352 0353 1108 1552 1614 1632.

Example 4 is similar in that there are more than 3 DTC's, so further frames are sent by the ECU. OBDKey presents this as:

```
43 16 03 01 15 01 20 46 48 6B 00 43 01 10 05 13 01 05
```

Stripping out the header and checksum data leaves us with

```
43 16 03 01 15 01 20
43 01 10 05 13 01 05
```

The "43" is the response to the mode 03 request.

The fault codes are read in pairs as 1603 0115 0120 0110 0513 0105.



*Product Support Information*

**Full log traces of communications between the PC and the OBDKey device.**

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Ford Focus 2004  
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ISO 15765-4 CAN 11 bit ID, 500K Speed  
>  
03  
43 00  
>  
07  
47 09 21 76 01 06 01 23 02 22 01 07 05 00 01 18 01 13 C0 01  
>

-----  
VW Golf 2006  
-----

ISO 9141-2 keywords 08 08  
>  
03  
43 06 85 00 00 00 00  
>  
07  
47 C1 21 01 13 01 18  
>

-----  
Triumph Motorbike  
-----

ISO 9141-2 keywords 08 08  
>  
03  
43 01 08 01 13 01 18 FD 48 6B D1 43 01 22 02 01 02 02 F1 48 6B D1 43 02 03 03 51 03 52 75 48 6B D1  
43 03 53 11 08 15 52 9D 48 6B D1 43 16 14 16 32 00 00  
>  
07

NO DATA

>

-----  
Mitsubishi EVO 8  
ISO 9141-2 keywords 08 08

>  
03  
43 16 03 01 15 01 20 46 48 6B 00 43 01 10 05 13 01 05  
>  
07

NO DATA

>

-----  
Subaru WRX 2002  
ISO 9141-2 keywords 08 08

>  
03  
43 00 00 00 00 00 00  
>  
07  
47 00 00 00 00 00 00  
>



*Product Support Information*

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