

OBD-II: Using an ELM327 and Torque Pro App

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In the US, every light duty car sold since 1996 sports an OBD (on-board diagnostics) port. Later medium and heavy duty vehicles followed suit. The European Union (EU) introduced OBD systems with petrol cars in 2001, and diesels in 2004. Australia followed with emission control for light vehicles in 2005 based on OBD-II. In a nutshell, every vehicle monitors its activities via some 100 standard Parameter ID (PID) codes, and the vehicle must be capable of sending resulting data via these codes and a connected diagnostics tool. There are some 900 possible error codes in the OBD-II standard covering engine, drive-train and more.

The codes are presented raw and so it can be useful to know what these codes represent. For example, on a BMW 5-series with a V8/10/12 engine, the fault code P0174 means that bank 2 is running too lean. Manufacturers do chose some codes that relate solely to their vehicles. For a list of BMW error codes, visit the OBD Codes website: obd-codes.com/trouble_codes/bmw/.

On the BMW e82 the OBD-II port is located on the right-hand side of the driver's side foot well, immediately above the bonnet-opening handle. Flick the plastic cover off, and there lies the port that is used primarily for emissions testing and engine diagnostics, but can also be used by car owners for checking error codes and much more. It can also be used by employers to check on their employee use of company vehicles, and by the parents of teenagers to snoop on the same thing. However, it is the data logging aspect that this article focuses upon.

While there are many scanners on the market and a variety of software, this article reviews an inexpensive

ELM327 scanner run through an Android smartphone/tablet app. – Torque Pro. This OBD-II combination is capable of reporting on the car's operation, and is also available to use on the fun side. In the tale that unfolds in this paper, your reporters played follow-the-leader and suddenly found themselves leading a gaggle of BMWs on the BMWCCV's cruise to the Shepparton Motor Museum in March. In this tag team event, your reviewers took the wrong – and long – way to Shepparton. Nonetheless, we enjoyed the drive, lunch and camaraderie. Importantly, the cruise provided data to report on in this OBD-II review.

OBDII Hardware and software

OBD-II hardware and software as used by automotive service centres is expensive. However, the ELM327 bluetooth scanner and Ian Hawkins' Torque Pro Android app. reviewed here, together cost less than AUD25. We start by examining each before delving into the output and fun side. For this article, we examine the output from the logged data from the aforementioned cruise between Yea and the Shepparton Motor Museum. The images presented tell the tale.

ELM327

Arguably, all ELM327 hardware units come from China. The unit used in this review cost AUD19 on eBay. Despite the software on the accompanying CD-ROM being shown to hold viruses (according to McAfee VirusShield on a Win7 desktop), this unit has worked flawlessly for over six months. Not all such units do so, it seems – so choose carefully.

ELM327 units come in Bluetooth and USB cable variants for both Android devices and computers. The Bluetooth model featured in this review is shown in Image 1.

Image 1. ELM327 OBDII Auto Car v2.0 Bluetooth CAN-BUS Diagnostic Interface Scanner

There are smaller versions that users might be tempted to leave in the OBD port with the plastic cover in place. This is not a good idea, as the BMW electrical system does not shut down after 10 minutes if the OBD unit is left in the socket, and a flat battery will be the result.

Torque Pro for Android smartphones and tablets

The Android devices used in this review were Google's Nexus 4 smartphone and a Nexus 7 tablet both running Android 4.2.2, and both running the Torque Pro app. available on Google's Playstore for AUD4.95 (see the home screen in Image 2).



Image 1



On the day of the cruise, the tablet was the chosen device, mainly because of the 7" screen size, which made for better viewing and showing other club members.

Image 2. Torque Pro Engine Management Diagnostics and Tools: Main screen



This is one very clever and useful app. It is anticipated that most users will not get past the gauges shown in Image 3, and the configurable outputs shown in Image 4. Many more outputs are available, and the number of dashboards is also configurable.

Image 3. Torque Pro: Main gauges

We started out this way in that we wanted to know the normal operating temperature of our BMW e82 123d. It turns out that this is 86.0 Celcius. A convenient feature is that Torque Pro gives an audio message when the engine reaches this operating temperature.



Image 4. Torque Pro: Sample on-screen output

There's even a RacingMeter add-on for those who do track work, showing which gear you are in and various gauges (see Image 5).

Image 5. Sample RacingMeter add-on Android app.

Data logging

It is the data logging feature that impresses us most. As it transpired, we went the long way from Yea to lunch at the Chocolate Stop Café at the Shepparton Motor Museum. Instead of being concerned with data logging, we should have entered the GPS co-ordinates of the Museum and followed Google's directions. Then, we would have taken the C366 to Euroa and then the C312 into the back of Shepparton Airport and the museum. Instead, we played follow the leader and went the long way around through Mansfield and Benalla on the B300 and A300 as Image 6 shows.



Image 6. Torque Pro data logger: Goulburn Valley Cruise / Drive Day 23 March 2014 – The wrong way (orange line)

The output in Image 6 is Torque Pro's output using Google Maps.

Users can share this information in a variety of ways including exporting it to email, Dropbox.com or Google Drive and more.

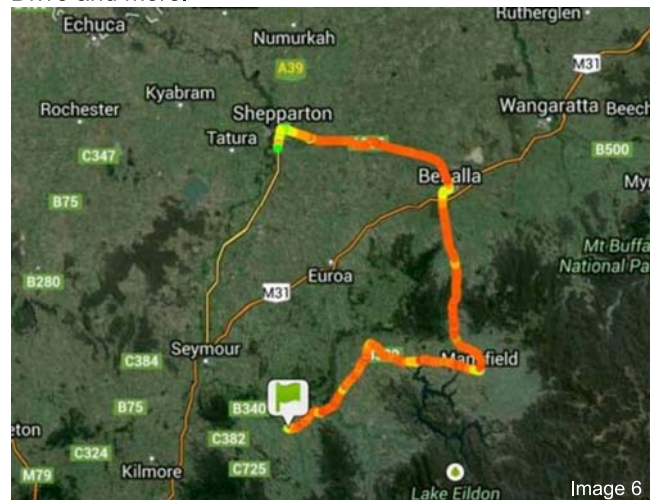


Image 7 shows an export of a .kml file which Google Earth reads and renders. The data can be presented in line or points format. In Image 7, we see points format used to graphically depict 10 minute GPS polls (user definable) and the vehicle speed. On the left of Image 7, we see the correct route along C366 winding its way through Gooram to Euroa and to the C312 and on to the back of Shepparton Airport and the museum destination.

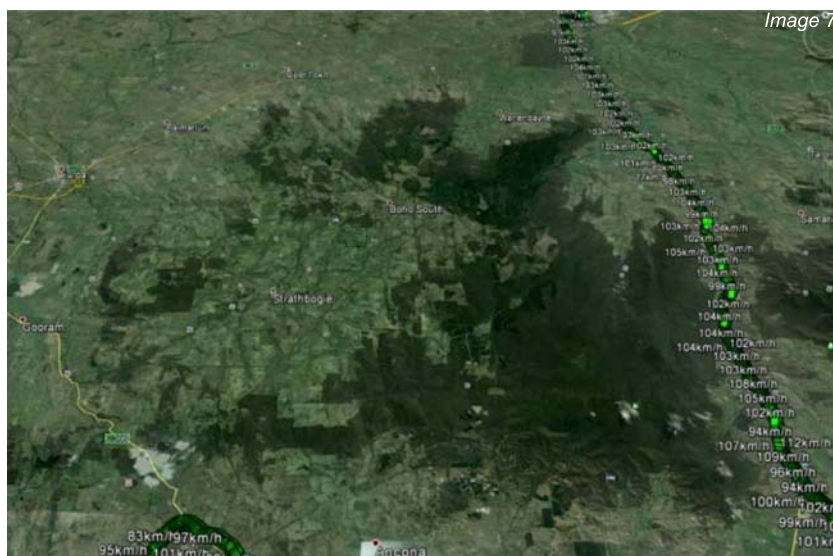


Image 7. Data logger output to Google Earth: Should have taken C366 then C312

Image 8 presents this data as rendered by Google Earth in close range, while Image 9 presents an extract of the data exported in .csv (comma separated values) format and shown as an Excel spreadsheet.

An interesting question arises as to whether this GPS speed data would be admissible in a court of law in defence of an accusation of speeding by the police. Torque Pro allows users to set up the vehicle profile and in that process define the wheel/tyre diameter and any correcting factor if non-OEM wheels are being used.

The e82 was in cruise control mode for most of this trip, so the variances in speed are due to going up hill and down dale.

Image 8. Data logger output to Google Earth: No officer we were NOT speeding

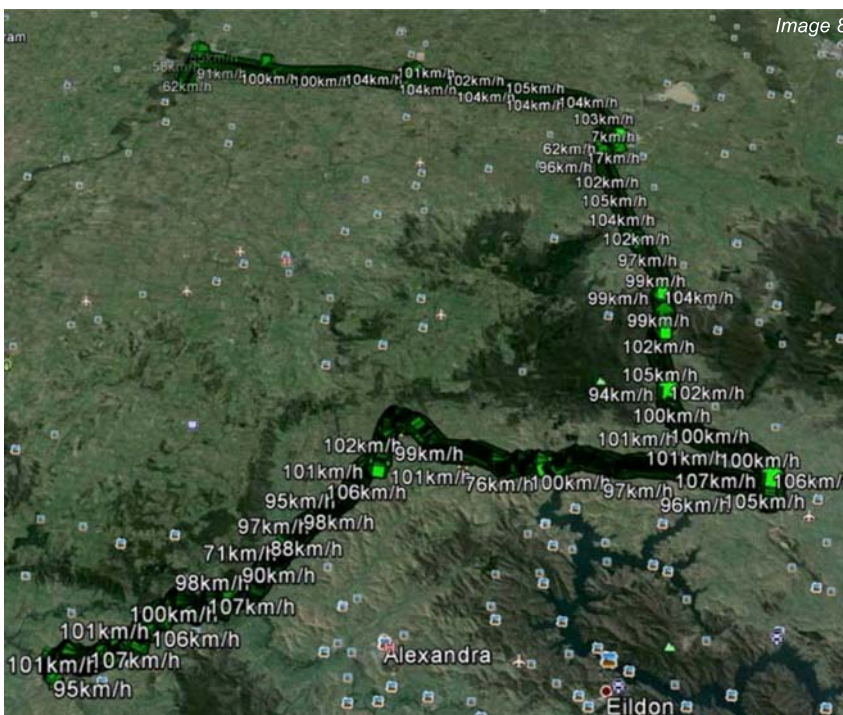
Concluding remarks

We live in an ever-changing digital world. There is no doubt in our minds that future use of OBD-II hardware and software will evolve to presenting the information on the fly through Google Wear software as newly released on the Moto 360 watch – the first of many such devices.

In the meantime, our smartphones and tablets enable us to use OBD-II to monitor our BMWs using the many PIDs made available by the standards and the manufacturer. Moreover, the information can be used for such serious purposes as checking emissions and trouble-shooting through to the

fun side presented in this article. Yes, there is a darker side given the reporting of a 1M being stolen in under three minutes using OBD-II scanning tools. That stated, the positive uses as reported in this article would seem to outweigh the security side.

The next BMW Cruises will be even more fun as more of us resort to OBD-II technology to share our experiences.



Despite the plethora of digital technology available, we are also going to take a hard copy map of Victoria as backup.

For more on OBD-II, see Antuan Goodwin, 'What is OBD-II?' c|net Australia, available at cnet.com.au/what-is-obd-ii-339302529.htm, accessed March 2014.

For more on OBD-II codes see obd-codes.com/ accessed March 2014; Image source: ebay.com.au/itm/ELM327-v2-0-Bluetooth-OBD2-OBDII-Interface-Diagnostic-Scanner-Car-Tool-/121294693434?pt=AU_Car_Parts_Accessories&hash=item1c3dba243a&_uhb=1; See the YouTube video where this claim is made: youtube.com/watch?v=YLHo-GYG25Q, accessed March 2014.