

OBD Now

What is OBD Now? – Design considerations and how is it different.

OBD Now has been designed with the workshop manager of a large dealership in mind. A workshop manager(s) is required to access many vehicles at the start of a working day, to determine which vehicles require normal maintenance as compared to vehicles presenting with problems which require more work than normal servicing. Because OBD Now is designed to report on all the OBDII Services of the OBDII specification in a minimal amount of time, the workshop manager can connect with an ELM327 scan tool to his phone or tablet to each vehicle as presented. Within a minute or two of connecting with OBD Now, an experienced operator can quickly determine if a vehicle is running normally or has faults and requires further investigation.

This allows the workshop manager to plan his daily workload and assign more highly skilled technicians to the vehicles presenting with the most serious problems.

OBD Now has a simple menu driven structure. Each menu choice represents an OBDII Service. Each OBDII Service takes seconds only to run. There is no laborious waiting while a report is compiled. Tap the read button on the chosen OBD Service and the results are virtually instantaneous. Most OBDII Service tests result in a pass or fail. If there is fail in any test, then obviously that vehicle requires more in-depth analysis.

Vehicles that pass all tests can be put aside for normal servicing.

OBD Now by its design, also suits the home mechanic or car enthusiast. Granted, the home mechanic or car enthusiast might not have the knowledge or experience of the workshop manager, but the home mechanic isn't dealing with the pressure of 30-40 vehicles every morning. He is usually dealing with one particular vehicle at a time. He has the time to research the problem as reported by OBD Now. So the home mechanic can use OBD Now in exactly the same way as the workshop manager. The home mechanic can rely on the internet to research his problem, which is something the workshop manager, with his experience doesn't need to do, nor have time to do.

If the home mechanic, can't repair the problem because of lack of specialized equipment or time, then he at least can be knowledgeable about discussing the problem with the technician he chooses to repair the problem. Knowing what is wrong with the vehicle before it is repaired, must give peace of mind, especially when the vehicle can immediately be retested after the repair to ascertain that the repair has been performed correctly.

OBD Now fully supports the OBDII specification SAE 1979 or ISO 15031-5. The specification was first available in 1996 and is regularly revised. At the time of writing, the latest amendment covers vehicles through to

2016, J1979-DA June 2014. Whenever the specification is updated, OBD Now will also be updated to reflect the new changes.

Getting Started

This section is divided into two sections – as the setup is different for Bluetooth scan tools as compared to Wi-Fi scan tools.

Tip: To use OBD Now, you need to first obtain either an evaluation license or purchase a subscription. Either of these requirements requires an internet connection. If your Android device doesn't support a cellular connection, then you may find it is more convenient to obtain the evaluation license or purchase your subscription before venturing out to your vehicle. Please skip ahead to either instruction section and then return to this section.

Bluetooth scan tools

Before you can start using OBD Now, you need to take a few moments to setup your Bluetooth scan tool. The instructions throughout this manual will refer to either the OBDLink MX (Black) or the OBDLink LX (Green) Bluetooth scan tools from Scantool.net, however most of the instructions will also apply to any ELM327 Bluetooth scan tool.

This guide will just refer to the OBDLink MX Bluetooth scan tool from Scantool.net, as the OBDLink MX, if yours is a LX, just substitute LX for MX.

Note: OBD Now only supports scan tools containing chips based on the ELM327 chip v1.3a or greater.

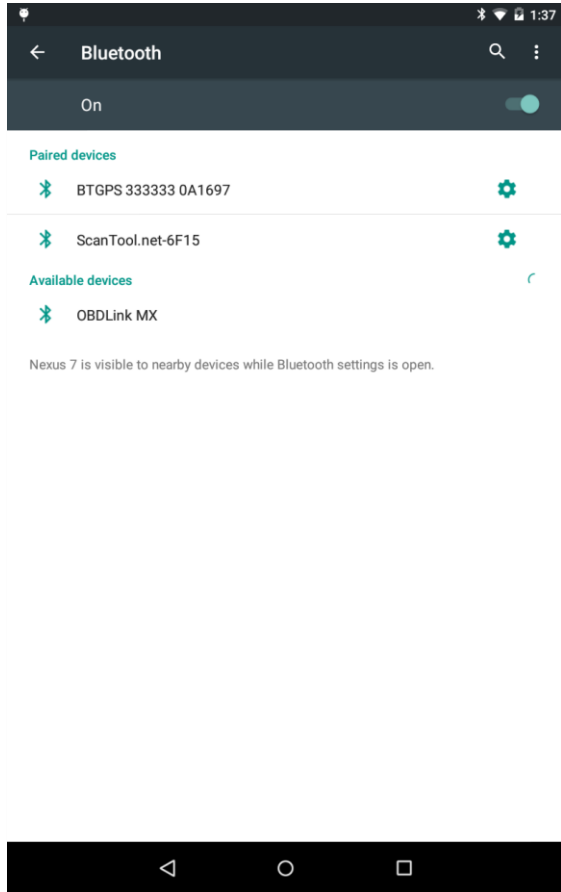
If you have already paired your scan tool with your Android device's Bluetooth radio, you can probably skip this section. If not read on.

Unlike other external Serial Port Profile (SPP) devices, such as external Bluetooth GPS units, Bluetooth OBDII scan tools are not battery-powered, therefore to power an OBDII Bluetooth scan tool, the scan tool must be connected to the vehicle's OBDII Data Link Connector (DLC). Power is supplied to the vehicle's OBDII DLC and hence to the scan tool via the vehicle's battery. Once the scan tool is powered, it then can be paired to your Android device's Bluetooth radio through the Android operating system menu **Settings**. When the OBDLink is powered, the power light (marked as Power) will at first flash a couple of times and then settle to a steady light. The Bluetooth light (marked as BT) will start to flash slowly, once per second.

Pairing your scan tool

From the Android **Settings** menu, choose **Bluetooth**. If your Android device's Bluetooth radio is off, you should position the switch to on. Once the Bluetooth radio is switched on, the Android operating system will immediately start searching for nearby Bluetooth devices. For most scan tools this will result in your scan tool being immediately found. However, for scan tools such as the OBDLink MX, the scan tool itself has to be first put in discovery mode before it can be discovered. The OBDLink MX has small button directly beneath the "O" of OBDLink.

This button has two purposes. 1. To put the OBDLink MX in discovery mode and 2. To reset the OBDLink MX to factory default specifications. To put the OBDLink MX in discovery mode, hold the button down for about 3 seconds. A reset of the OBDLink MX to factory defaults requires the button to held down for approximately 15 secs. More on the reset use later.



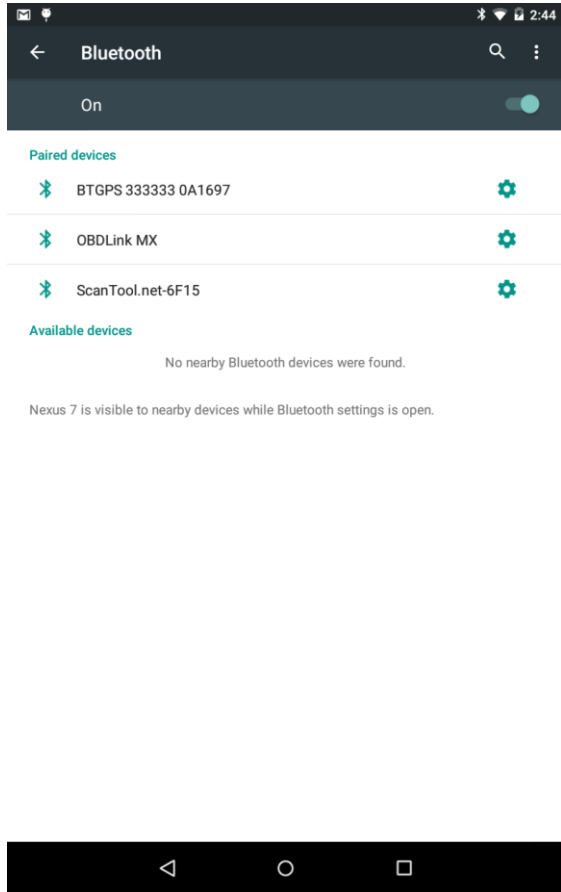
At this time, we obviously need to put the OBDLink MX in discovery mode, so hold the button down for 3 seconds and let go. The BT light, which should have been flashing slowly, will now start flashing quickly, indicating that the OBDLink MX is in discovery mode and can be found by other devices, such as your Android device, that is also in discovery mode. Discovery mode on both devices normally terminates after approximately 2 minutes. If you fail to connect and pair within that period, then both devices will need to put back into discovery mode. Your Android device should show that it is scanning for nearby devices. If it doesn't, because the discovery scanning time has expired, just turn the Bluetooth switch off and then on again and it will immediately start scanning again.

Since the OBDLink is now also in discovery mode, the OBDLink MX will be found. Tap the OBDLink MX entry and your Android device will ask you if you want to pair the device and automatically offer a pairing key.

Accept the pairing key and your OBDLink MX is paired to your Android device. It will then be listed under paired devices. Internally the Android operating system has

stored the Bluetooth Device Name and the Bluetooth Address of the scan tool, which means any app, including OBD Now can use it.

If your scan tool doesn't require a discovery mode switch, the scan tool will be found, but Android may instead of offering an automatic pairing key, request a pairing key from you. You will need to obtain the 4-character passkey from the documentation which came with your scan tool. If not readily available, you can always try the two most commonly used numeric passkeys 0000 or 1234.



The OBDLink MX entry moves from the heading Available devices to Paired devices at the completion of pairing.

OBDLink MX Reset

As mentioned above, holding the button down for approximately 15 secs will reset the OBDLink MX to factory default settings. Normally this is never required, but you may have reset it or have been advised at some time to reset your OBDLink MX. Please be aware, if you do choose to reset your OBDLink MX, then the above pairing procedure **needs to be repeated**. Your Android device will still show your scan tool as being paired, but it has no knowledge of the fact that you have reset the scan tool to default settings, therefore the existing pairing information stored by your device is now stale information.

Proceed as follows.

On the Android device follow the original steps **Settings** menu then **Bluetooth**. Then turn on the Bluetooth radio, if not already on. Your device, if previously paired will be in the list of paired devices. You need to tap on

the gear icon of the OBDLink MX entry. A dialog window, or something similar (depending on your Android version) will open with two button options, Forget and OK. You need to tap Forget (or Unpair). When the dialog window closes the old entry for your OBDLink will be removed from the “paired” list. You are now ready to repeat the pairing procedure, see above under **Pairing your scan tool**. Failure to do so, will prevent your scan tool from connecting to any OBDII app, including OBD Now.

OBD Now will never directly present a pairing request while running. If the Android operating system does present a pairing request, while OBD Now is trying to Connect, it is an indication that you are trying to connect to a scan tool that is incorrectly paired. The pairing request will fail!!!! Please exit OBD Now and pair your scan tool as outlined above.

NOTE. *If you normally use the same scan tool with other Android devices, that had been previously paired and the OBDLink MX has been reset, you must perform this procedure with each of those devices.*

When your OBDLink MX has been restored to default specifications, Sleep mode is automatically enabled. In Sleep mode, the power consumption of the unit is considerably reduced when the vehicle is idle, so there is no possibility of a permanently connected OBDLink MX draining the vehicle battery. When in Sleep mode the power light will blip approximately every 3 seconds, but the Bluetooth radio light will be permanently off. The next time you enter the vehicle and turn on the ignition, the scan tool will wake up. Please be aware that

some OBDII Android apps will override the default sleep settings and therefore prevent the device from sleeping.

A simple check, is to come back to your vehicle approximately 10 minutes after locking the vehicle and observe through the driver's window if the Bluetooth light is still flashing slowly (you may need a strategically placed mirror). If it is still flashing, then the scan tool is not in sleep mode.

At no time during the operation of OBD Now are the sleep settings altered. When you exit OBD Now the sleep settings will be as they were before you started OBD Now.

Wi-Fi scan tools

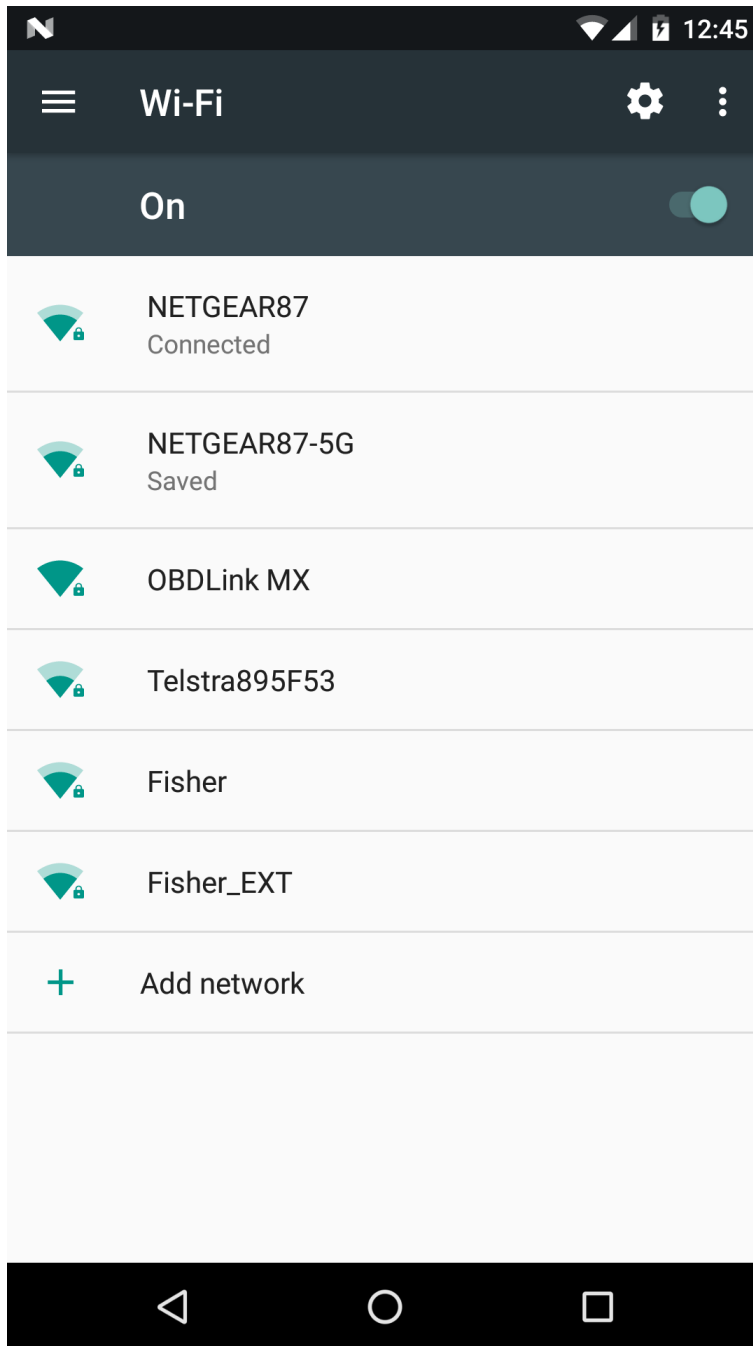
OBD Now also supports Wi-Fi scan tools. However, Wi-Fi scan tools are more complicated to setup than Bluetooth scan tools and the settings are different for each make of scan tool, so the instructions presented here should be modified as per the documentation that came with your scan tool. In this manual, we will again use Scantool.net's OBDLink MX Wi-Fi scan tool as an example. Unlike Bluetooth scan tools, Wi-Fi scan tools can only be partially setup outside of OBD Now, so there are several steps firstly via the Android Settings menu and then within OBD Now after the Android settings have been made. The actual order of the steps is not important, but both steps must be made.

There are several limitations imposed when using a Wi-Fi scan tool, depending on what type of Android device you are using. Tablet devices can always connect to the internet via Wi-Fi, but unlike Phones, not all tablets support Sim cards which also provide internet support. Therefore, tablets that are Wi-Fi only will lose their internet connection each time they are connected to a Wi-Fi scan tool. This is not necessarily a problem when in the vehicle using OBD Now, as a Wi-Fi only connection to the internet is not normally obtainable in your vehicle, but one needs to be aware that you no longer have an Internet connection. There are two occasions when OBD Now requires an internet connection. 1. Obtaining an evaluation license and 2. Purchasing a subscription or adding an additional Android device to your subscription. In both cases your Wi-Fi scan tool cannot be connected to your vehicle.

What we suggest is obtain the evaluation license or subscription first and then setup up your Wi-Fi scan tool. The evaluation license and purchase of a subscription is covered later in this manual, so if you are a first-time user, using a Wi-Fi scan tool, please jump ahead to those sections of this manual, and either obtain your evaluation license or purchase your subscription and then return here to continue the Wi-Fi setup.

To connect your Wi-Fi scan tool, select from Android **Settings** and then under **Wireless & networks** tap **Wi-Fi**. If your Wi-Fi scan tool is powered (via the DLC connector of your vehicle) you should see an entry for your scan tool as in the following screenshot. If you don't see the name of your scan tool – turn off Wi-Fi and then turn it back on again to see your scan tool in the list of network devices. If at this point you still can't see the name of your Wi-Fi scan tool device, then there is something wrong with your scan tool. There is no point proceeding further until this problem is rectified. Please contact the manufacturer of your scan tool.

Assuming you can see the name of your scan tool, tap the name of your scan tool. Just like any other network device, Android will then ask for a password for your scan tool. Enter the password supplied in the documentation of your Wi-Fi scan tool and tap the Connect button. The scan tool will attempt to obtain an IP

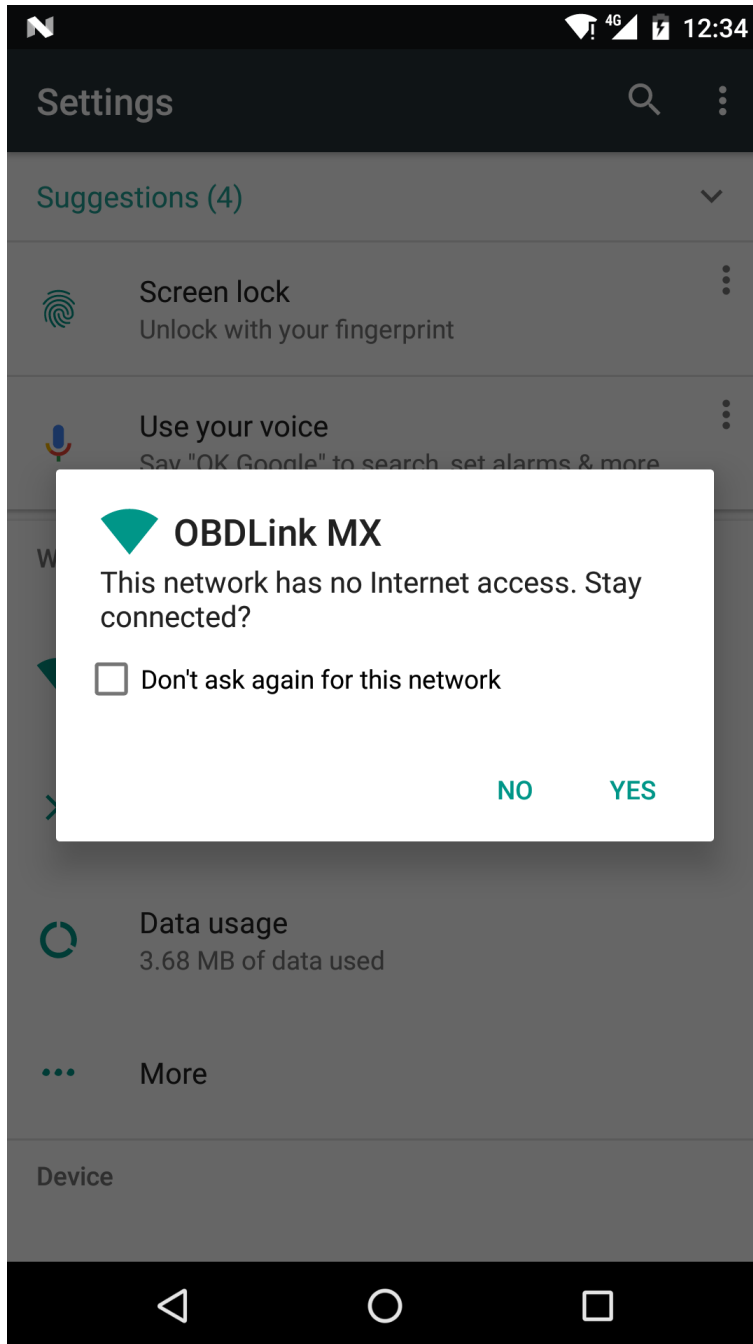


address from your Android device. This can take a few seconds so be patient. On most late model Android devices, after the connection is made, another notification will appear stating **Wi-Fi has no internet access – tap for options**

If you tap for options, the following dialog will appear.

Android is warning you that you have lost the internet. Tap Yes to acknowledge that you know what you are doing and for good measure check the Don't ask again checkbox.

You will notice now that the Wi-Fi icon has an exclamation mark through it indicating that you have no

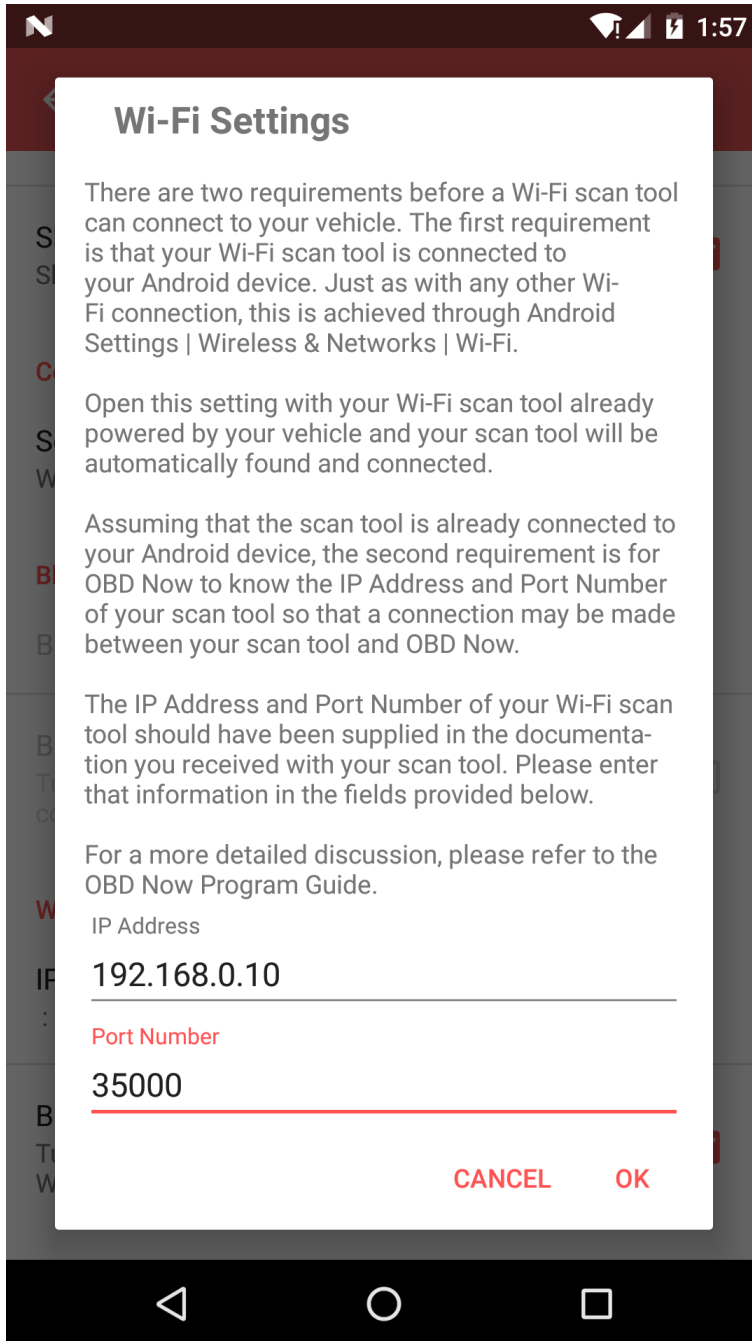


internet connection. In the case of a phone, as in our screenshot here, you should also notice that the phone icon has now swapped to 4G indicating that this phone is still connected to the internet via 4G, via your data plan.

Unfortunately, you are still not done at this point. We now need to inform OBD Now of the IP Address and the Port Number (from your scan tool's documentation) that the scan tool communicates with the Android device.

To do that start OBD Now and go to the Settings menu. Because OBD Now defaults to using Bluetooth, if you Bluetooth radio is turned off, you will be prompted to turn it on. Since you are not using a Bluetooth scan tool you can deny that request. Under Communication Type tap the selection and change the selection from Bluetooth to Wi-Fi. All the Bluetooth settings will now be disabled (greyed out) and the Wi-Fi settings enabled. You may need to scroll the page to see the Wi-Fi settings.

Tap on the entry below Wi-Fi Settings to enter the IP Address and Port Number. The following window will

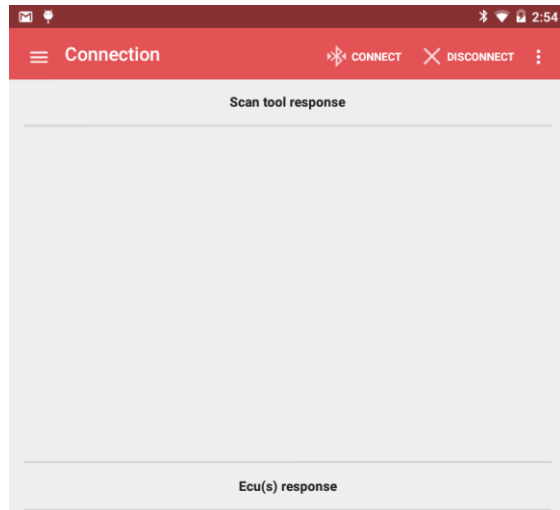


appear. Enter the IP Address and Port Number as per your scan tool's documentation. Tap OK to save the settings.

When the dialog window closes, you are returned to the OBD Now Settings window. You should now be able to see the IP Address and the Port Number you just entered, separated by a colon, displayed on one line under Wi-Fi Settings. The OBD Now Wi-Fi setup is done and you are now ready to connect.

Exploring OBD Now

Bluetooth Connection



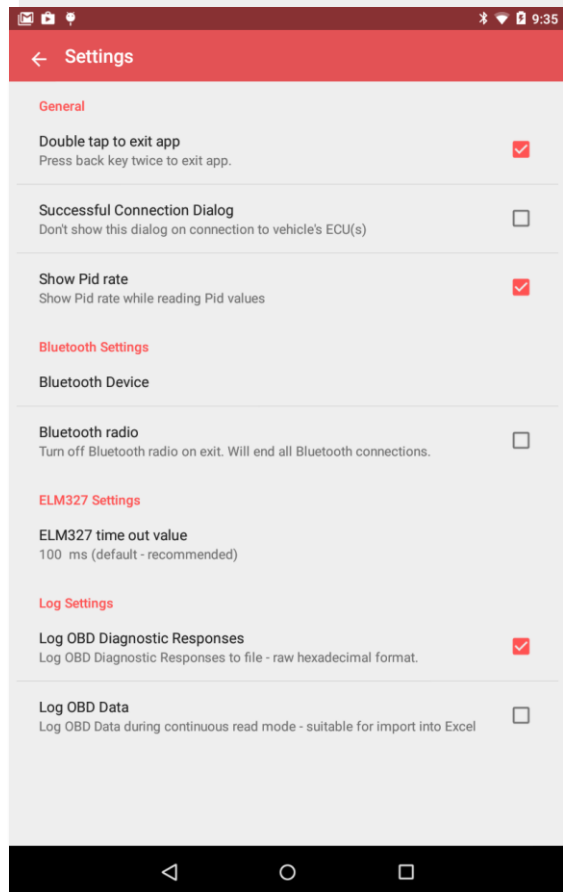
Now that your scan tool is paired you are ready to run OBD Now. Tap on the App drawer, find and start OBD Now. The following window will open.

If your device's Bluetooth radio is off, OBD Now will prompt you to turn it on.

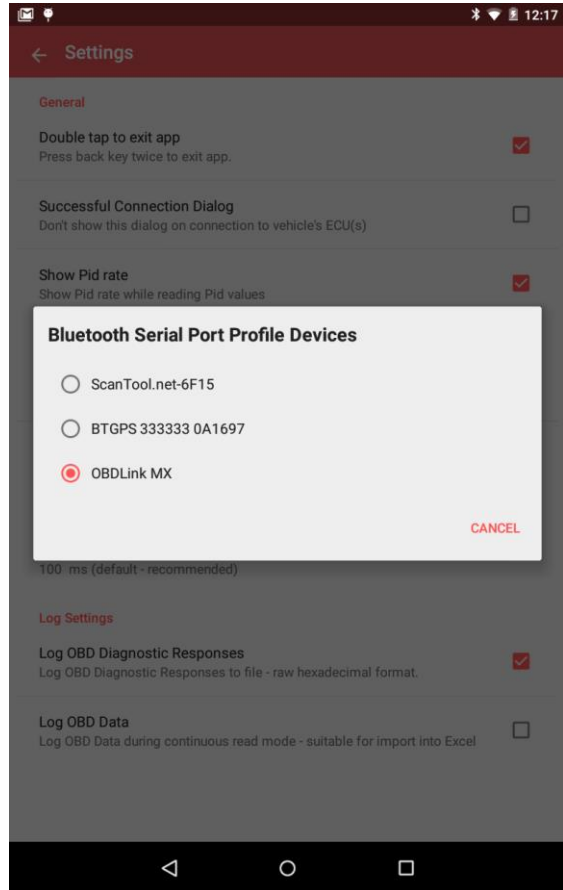
There are still several items to check off before you can connect to your vehicle. At this point, as this is the first time you have run OBD Now, it has no knowledge of your scan tool. For example, if you tapped the Connect button you would receive the following message. ***A Bluetooth scan tool has not been chosen.***

Choosing a Bluetooth scan tool

Your scan tool must be set in OBD Now Settings window. Tap the 3 dot **Settings** menu (Overflow menu) at top right and choose **Settings**. The Settings window will open. First choose **Communication Type** and then choose Bluetooth. Under the heading, **Bluetooth Settings** is Bluetooth Device. Tap that entry and a separate dialog window will open, displaying a list of paired Serial Port Profile Bluetooth device(s). Choose your scan tool from the list by tapping on the entry.



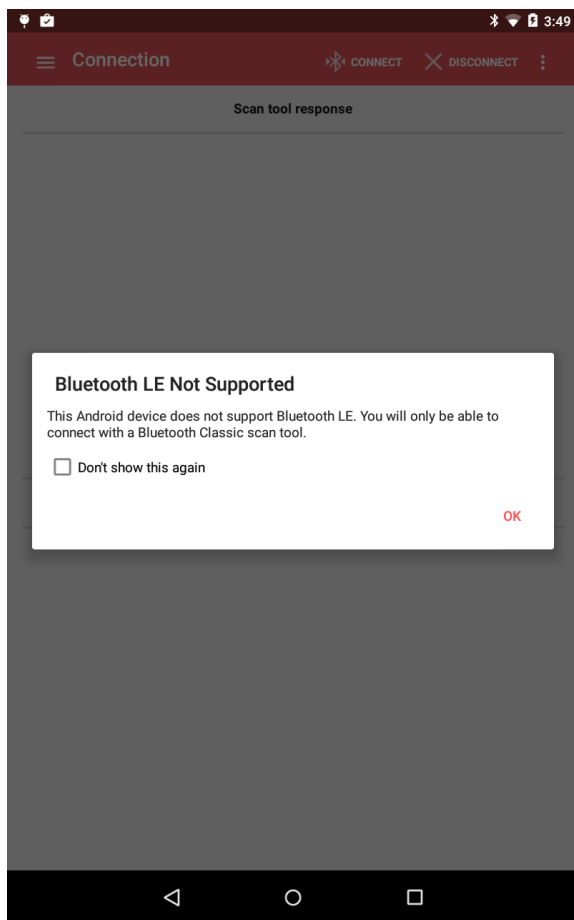
The dialog window will immediately close and the chosen scan tool's name will now be displayed under the entry Bluetooth device. OBD Now saves the value and will always attempt to connect to this device when you click Connect button. If you wish to connect to a different Bluetooth scan tool then you will need to repeat this procedure, selecting another scan tool.



Bluetooth LE Connection – Kiwi 3 scan tool

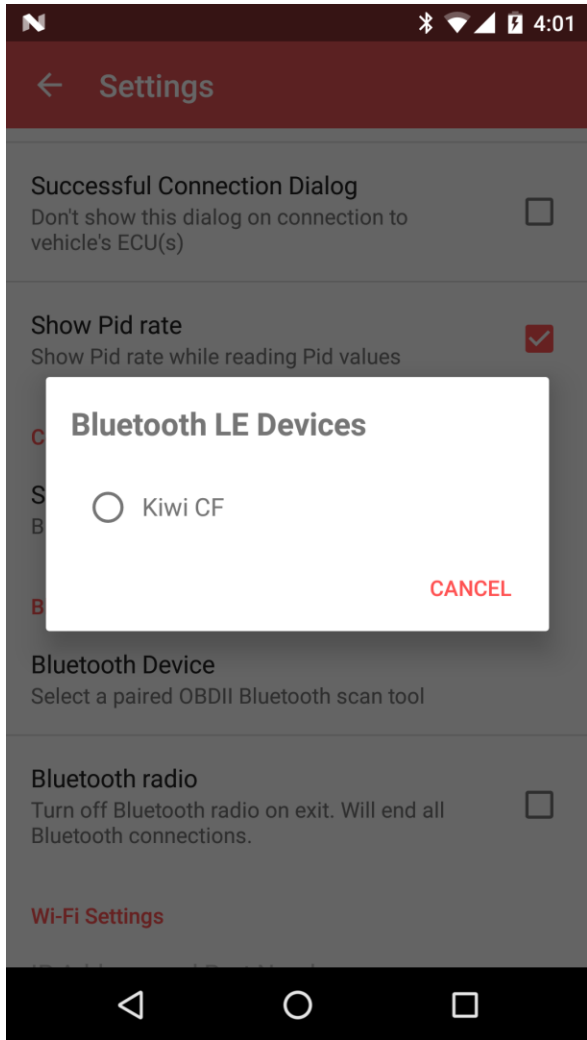
A Bluetooth LE connection setup is slightly different to a Bluetooth Classic connection. Bluetooth LE scan tools aren't paired in the same way as Bluetooth Classic scan tools. The correct term for Bluetooth LE scan tools is bonding. You scan for the Bluetooth LE scan tool in the same way as a Bluetooth Classic scan tool. However instead of the Android device either offering a pairing code or asking for a pairing code, the Bluetooth LE scan tool, once discovered, bonds (pairs) to the Android device without the need of a pairing key. Once bonded, it then can be used in the same way as a Bluetooth Classic scan tool, even though the underlying code to transmit and receive data from Bluetooth LE scan tool is completely different.

Many older Android devices don't support Bluetooth LE (e.g. Nexus 10, Nexus 7 2012) as they don't have the necessary hardware. Those older devices will only connect via a Bluetooth Classic scan tool such as the OBDLink MX Bluetooth scan tool or a Wi-Fi scan tool. If your device doesn't support Bluetooth LE, OBD Now will display the following dialog at start up.



In general Bluetooth LE scan tools, are also not as performant as Bluetooth Classic scan tools, due to the design of Bluetooth LE. Please note the pid/rates for the Kiwi 3 in the section *Speed – Pid Rate*

Once your Kiwi 3 is bonded with your Android device, all you need to do is start OBD Now and select Settings and then Communication Type – and then select Bluetooth LE. The next step under Bluetooth Settings is to select the Kiwi 3 from the next dialog. Your Kiwi 3 device will appear as Kiwi XX, where xx is the last 2 characters of its Bluetooth Address. See the dialog window below.



Once you have selected the Kiwi 3, you can then connect to your vehicle.

Wi-Fi Connection

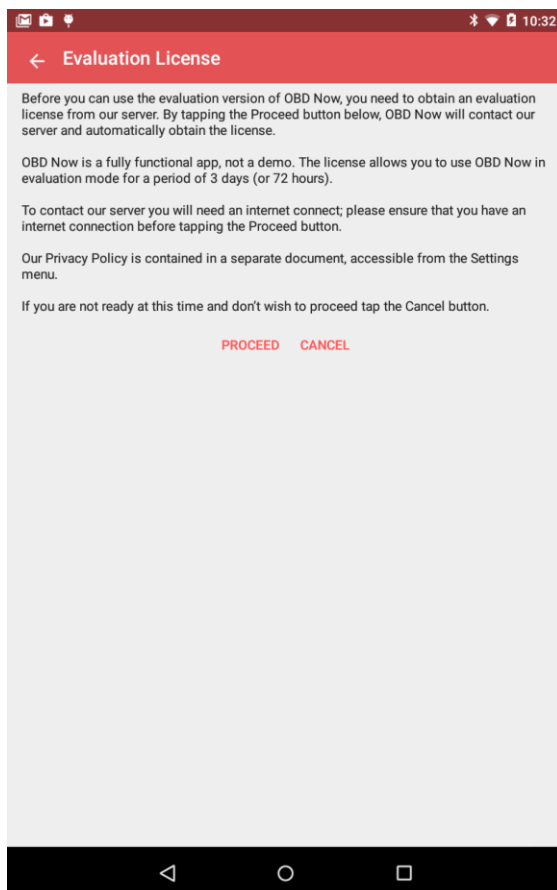
Choosing a Wi-Fi scan tool

All your work is already done re choosing a Wi-Fi scan tool. As we said earlier whenever you connect to a Wi-Fi scan tool via Android's Setting | Wireless & Networks | Wi-Fi you lose your Internet connection, so if this is the first time you have run OBD Now, you will need to either obtain an evaluation license or purchase a subscription. Both requirements require an internet connection, so if you are already connected to your scan tool, you need to reconnect to internet via your router so as you can obtain an Evaluation license. Since most users will want to try OBD Now before purchasing a subscription, we will next describe obtaining an Evaluation license. We cover purchasing a subscription later in this guide.

Obtaining an evaluation license

The last step before connecting to your vehicle is to obtain an evaluation license from our server. OBD Now is a subscription product, but we allow a 3-day (72 hr) evaluation period for you to fully evaluate OBD Now before committing to purchasing a subscription. To obtain a license tap the 3 dot **Settings** menu and choose **Obtain evaluation license**. A new window **Evaluation License** will open.

An internet connection is required to contact our server. If you are still in your vehicle and your Wi-Fi only



tablet device doesn't have an internet connection, you will need to first move your Android device to a location with a Wi-Fi connection. If you are using a phone, then you can utilize the data connection of your phone, or alternatively move the phone to a location with a Wi-Fi connection, if you are concerned about data charges. An insignificant amount of data is transferred to our server during the connection, including your Google account details, make and model of your device and a unique identifier for this installation.

If you are not ready to proceed (no scan tool available or any other reason), don't waste the evaluation period, you can always obtain the evaluation license later when you are ready.

Evaluation licenses are not re issuable for a particular Android device. You can however obtain another license on a different Android device.

Tap Proceed and a couple of seconds later the server will respond with License issued. You are now ready to connect.

You can check the remaining time of your evaluation license from the About menu item on the **Settings** menu (3 dot menu).

Once you have obtained your license, connecting to your Wi-Fi scan tool is much like connecting to a Bluetooth scan tool. If you don't require Bluetooth while in the vehicle, you may also like to check the option of turning off the Bluetooth radio while using a Wi-Fi scan tool. This will automatically ensure your Bluetooth radio is turned off.

NOTE Android does it best to maintain a Wi-Fi connection to the internet, which under normal circumstances would be desirable. However, this obsession with an internet connection can play havoc with Wi-Fi scan tools. It is not uncommon that after a successful connection and a delay of some minutes between attempting another connection results in an "unable to connect" because Android has switched back to a normal internet connection and disconnected the supposedly connected Wi-Fi scan tool. Therefore, the procedure of selecting the Wi-Fi scan tool must be repeated. It is for this reason that we don't recommend Wi-Fi scan tools for users that need to make multiple connections to many vehicles during a normal working day.

Notes for Android 6 and above Users

With the introduction of Android 6, the Android Permissions model has changed. Prior to Android 6 when a user installed an app, the user was presented with a list of permissions that the app required. If the user installed the app those permissions were automatically granted by the Android OS.

That is still true to a certain extent with many permissions, however some permissions have had their use raised to a level where the user of the app can now control whether a particular permission can be granted. The user can also change those permissions at any time. OBD Now requires two of these type of higher level permissions, along with others that are automatically applied at install time. Each time OBD Now uses one of those permissions, it will request the permission from the user if the permission hasn't already been granted, or if granted and then later revoked. Both these permissions are required, if they are revoked then OBD Now will shut down.

If you have accidentally revoked the permissions, you may grant them again, via the Android Settings | Apps. Scroll down to OBD Now, tap it and then tap Permissions. Move both switches to On.

Purchasing a Subscription

From the 3-dot menu (Overflow menu), choose Purchase subscription. The Purchase Subscription window will open. Select the type of OBD Now subscription, either 6 or 12 month and tap the Purchase button. Google Play will then present its normal purchase dialog. Confirm your purchase and the purchase will proceed. After a successful purchase, another dialog will appear verifying your purchase. The verification process allows your subscription to be available on a further two devices for a total of three devices per subscription.

Once your subscription has been verified, the next time you install OBD Now on a different device and attempt to obtain a new Evaluation license or Purchase a subscription, you will see a dialog indicating that you have subscriptions available. Tap the Add this Device to your subscription button. The device will be added to your subscription. To complete the Add this Device to your subscription, requires that OBD Now shuts down. On restart your subscription will be available.

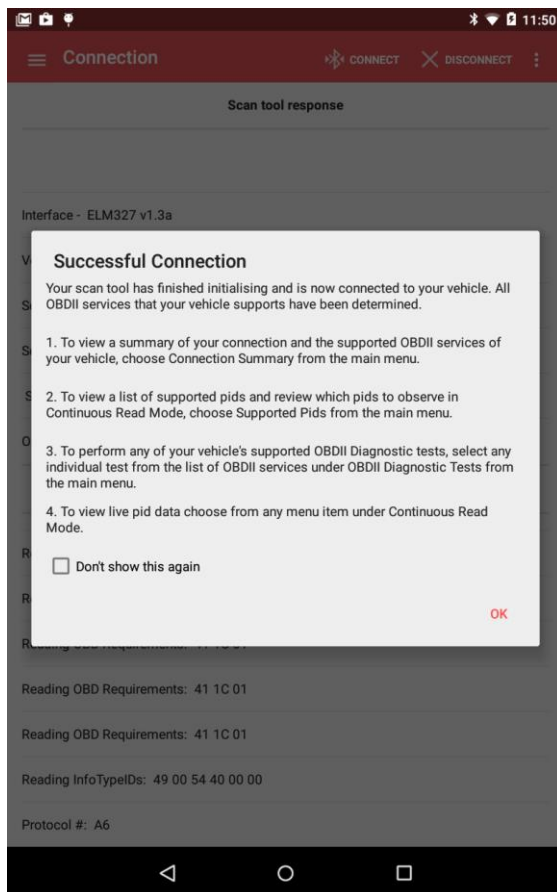
Please note, subscription purchases via Google Play are not refundable. You may cancel a subscription at any time via Google Play, however your subscription and therefore your access to OBD Now will remain current until your subscription reaches its expiry date.

Connecting

Before you tap the **Connect** button, ensure the ignition is on. You will not make a successful connection with the ignition off. The engine can be running, but for many of the tests, the engine should not be running.

When you tap the **Connect** button, OBD Now will immediately open a Bluetooth or Wi-Fi connection with the scan tool and attempt to establish a connection with the ECU(s) of your vehicle. While establishing the connection, a **Bluetooth/Wi-Fi Connection** dialog window will open displaying a progress bar. The Connection dialog window overlays the Connection window. As the connection proceeds the Connection window will also display entries in both halves of the window, the top half displays responses from the scan

tool and the bottom half display responses from the ECU(s). This information is just to provide feedback to the user that the initialization is taking place. When the initialization has completed the following dialog window will be displayed.



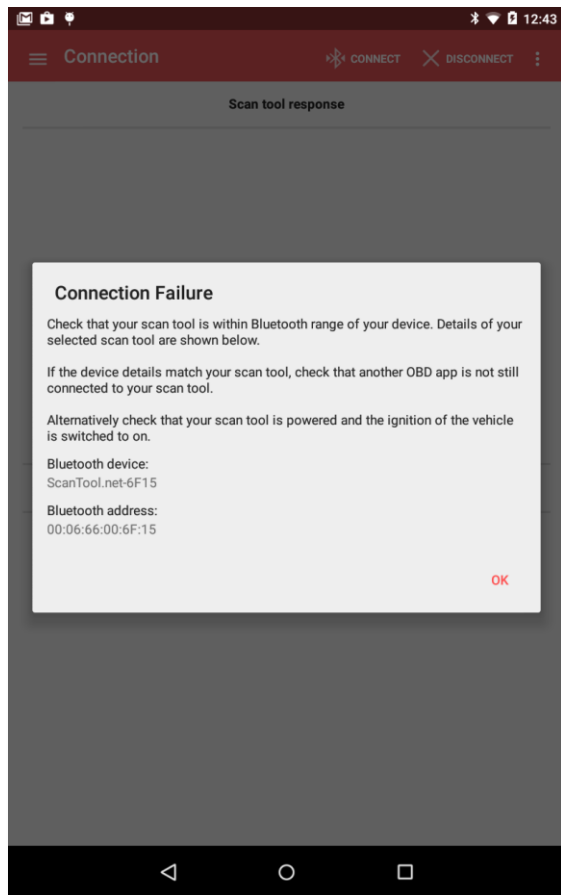
The **Successful Connection** dialog window signifies that OBD Now is now fully initialised, all the information about your vehicle has now been read. The OBDII protocol, all the supported OBDII services and a list of supported Pids have all been established. The Successful Connection dialog also lists what you can do next.

Note that it also contains a *Don't show this again* checkbox. Once you familiar with OBD Now, this dialog can become tiresome, so we provide the option for turning it off. It can be reinstated from the Settings menu (Overflow menu) if preferred.

Connection failure

Before we go any further, we need to discuss what happens when a connection fails. Connection failures fall into two categories. 1. User error 2. OBDII Protocol failures.

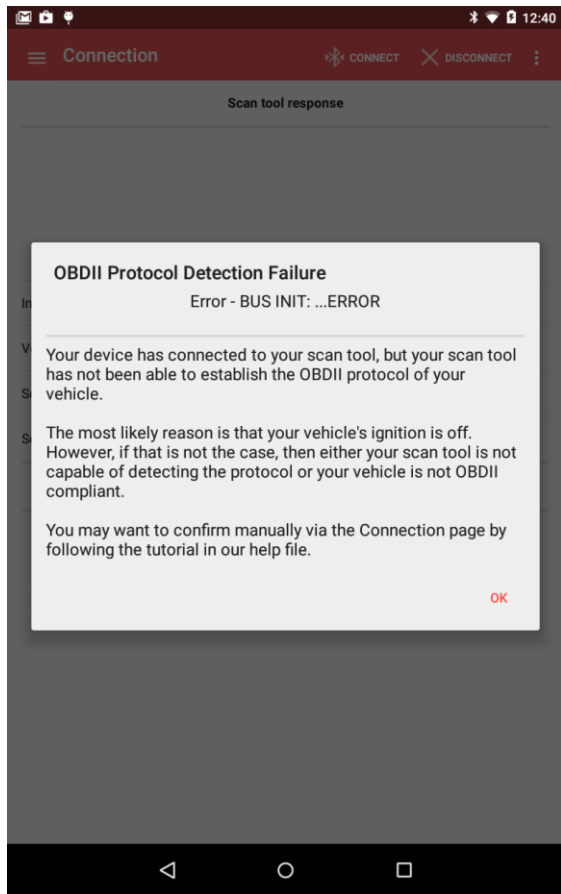
Lets take the simple case first - User Error. The following dialog window will appear in the case of user error. This covers the following user errors and their remedies.



1. Trying to connect when another OBDII app is still connected to the same scan tool. Disconnect and exit from the other app. Remove the app from memory if necessary.
2. Trying to connect when the ignition of the vehicle is off. Turn on the ignition.
3. Trying to connect when the Android device is not within range of the Bluetooth scan tool. Bring your Android device closer to the OBDII scan tool.
4. Trying to connect to the wrongly selected scan tool. Very easy to do, if you have multiple scan tools. Select the correct scan tool before trying to connect.

Yes, user errors are careless, but even people as experienced as ourselves still make these errors. The Connection failure dialog window will always catch these errors.

The second type of failed connection is an OBDII Protocol failure. This is an unrecoverable error because the vehicle is either not OBDII compliant or the scan tool in use is not capable of detecting the protocol of the vehicle. It is also possible to get this error if the ignition is off, but that is easy to check for.



A simple check here is to first eliminate the scan tool. If another make of scan tool will connect to the vehicle then obviously the vehicle is OBDII compliant and the scan tool is at fault. That is the most likely scenario when using a cheap clone scan tool, which will sometimes connect fine with some protocols and not others. If the vehicle is not OBDII compliant then there is nothing more to be done, as a vehicle can't be made OBDII compliant, if it wasn't designed to be compliant.

Of course there is the grey area, where vehicles that are meant to be OBDII compliant, either fail to connect because the vehicle manufacturer hasn't got the implementation right or the scan tool is not capable of detecting the OBDII protocol. In many instances, these problems can be fixed by forcing the protocol, by first setting the protocol before connecting.

OBD Now doesn't allow forcing the protocol, because we have seen too many instances of inexperienced users causing all sorts of problems, by forcing a vehicle to try to connect with the wrong protocol. The types of problems that can be experienced include the

“Christmas tree” effect, lighting up the dashboard with every light on. Usually the only way to then correct the situation is to disconnect the battery. Normally, no permanent damage is done, but it doesn't leave the inexperienced user very confident to try any further experimentation. The correct solution is either to use a scan tool from a reputable scan tool manufacturer or in the case of a faulty implementation by the manufacturer, to seek a firmware upgrade to the ECU of vehicle.

The second reason for not allowing forcing the protocol, is that professional users, simply don't have the time to ascertain what the protocol of each vehicle is before connecting. They just want to automatically connect to as many vehicles as they need to at the start of their working day. They of course only use scan tools from reputable manufacturers and therefore expect automatic protocol detection.

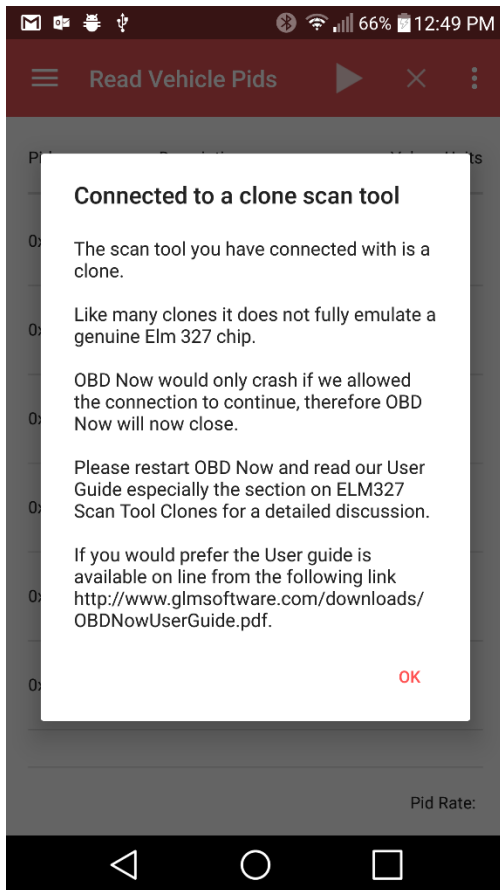
If a user is confident that their vehicle is OBDII compliant and will not connect with OBD Now, we invite the user to send us an OBD Now diagnostic log file of the failed connection and we will then confirm for them, what the problem is. For more information on OBD Now diagnostic log files, please see the dedicated section further along in this manual.

For enthusiast users who are experienced with the ELM327 command set and enjoy experimenting, we provide another Android app **OBD Now Terminal**, which allows sending any ELM327 AT command or issuing any OBDII command to any ECU the vehicle may support. Please see the app on Google Play for more information. **OBD Now Terminal** is a free app with no license requirements.

It has been 20 years since the OBDII Specification was first published. Today, there are still new vehicles being produced for countries that don't regulate for OBDII compliance, that are not OBDII compliant (compliance is turned off). So it is not necessarily a surprise when a vehicle fails to connect.

One other connection failure is when we detect a clone scan tool that doesn't fully emulate a **genuine** ELM327 v1.3 (and above) chip. The responses of ELM327 chips are thoroughly documented in the following document from Elm Electronics <https://www.elmelectronics.com/wp-content/uploads/2016/07/ELM327DS.pdf>.

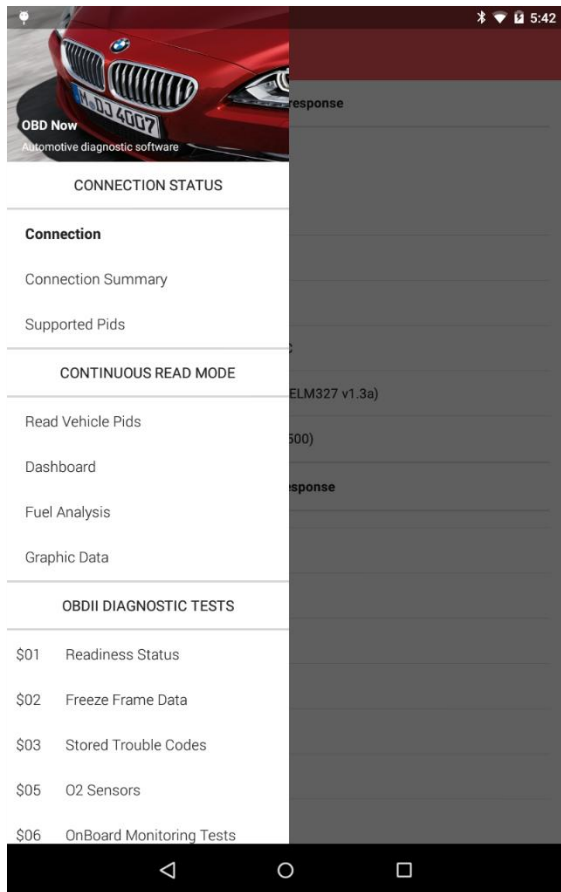
During the connection phase OBD Now initialises by making multiple queries of the ECUs of the vehicle, to determine the information you see on the Connection Summary and the Supported Pids windows. During this time if OBD Now determines that any other responses don't comply with the Elm327 specification then we immediately display the following dialog window and shutdown OBD Now.



For a more detailed discussion on the pro/cons of clone scan tools, see the section on Clone Scan tools.

Connected – Connection Summary

Ok, we are now Connected, where do we go from here? Tap the hamburger menu button or swipe from the left for the Navigation Menu of OBDII Service items. Note the screen shot here does not show all the menu items as they are not all visible without scrolling the menu.

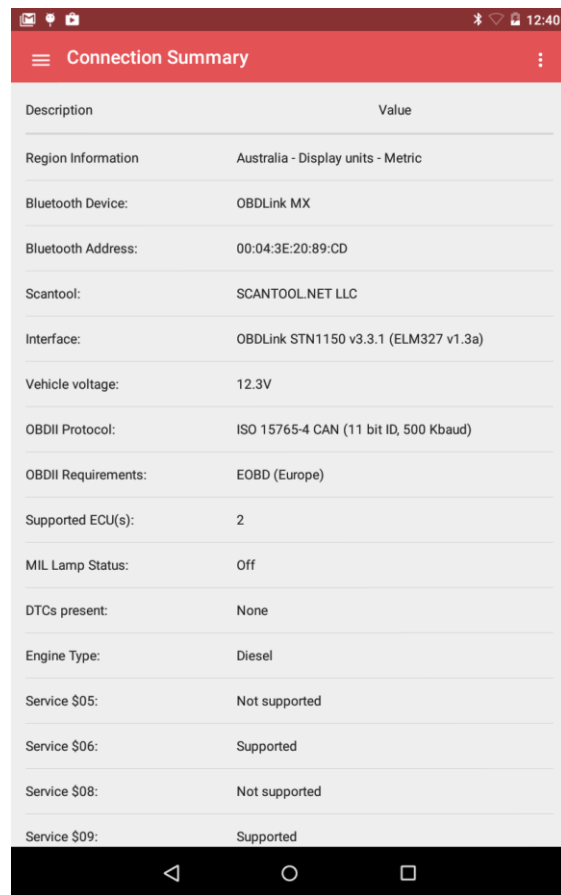


The Connection Summary, displays general information about your scan tool, the OBDII protocol of the vehicle, the engine type, the OBDII Services that the vehicle supports and summary information about Diagnostic Trouble Codes (DTCs). The Connection Summary also displays information about the Region Information of the Android device. This is important, as this setting determines the units that are used for displaying Pid Information, in either Metric or Imperial units. If you find that OBD Now is displaying Pid information in units you didn't expect, check the Language setting in Android's Setting under the heading Language & Input settings. Exit OBD Now, and change the Language to be appropriate for the language of your country. This change in Android

As you can see under the heading OBDII Diagnostic Tests, all the OBDII Services are listed in numerical order. This makes it very easy and efficient to select a particular service and run the individual tests.

However if you are still becoming familiar with OBD Now, we suggest that you examine the first two items **Connection Summary** and **Supported Pids** to get an overall feel of what is supported by the particular vehicle you are connected to.

Tap the Connection Summary selection and the Navigation menu will close and the Connection Summary window opens.



can take a few moments, so expect a small delay. We have noticed on some devices e. g. Nexus 7 (Android 5.1.1) that date formats can fail to change. Restarting your Android device will then fix the incorrect date format.

Supported Pids

To see the **Supported Pids** window, as usual swipe from the left or tap the hamburger button to display the Navigation menu.

Pid	Description	
0x62	Actual Engine - Percent Torque	<input checked="" type="checkbox"/>
0x63	Engine Reference Torque	<input checked="" type="checkbox"/>
0x65	Auxiliary Inputs / Outputs	<input checked="" type="checkbox"/>
0x67	Engine Coolant Temperature	<input checked="" type="checkbox"/>
0x69	Commanded EGR and EGR Error	<input checked="" type="checkbox"/>
0x6B	Exhaust Gas Recirculation Temperature	<input checked="" type="checkbox"/>
0x6D	Fuel Pressure Control System	<input checked="" type="checkbox"/>
0x70	Boost Pressure Control	<input checked="" type="checkbox"/>
0x71	Variable Geometry Turbo(VGT) Control	<input checked="" type="checkbox"/>
0x78	Exhaust Gas Temperature (EGT) Bank 1	<input checked="" type="checkbox"/>
0x79	Exhaust Gas Temperature (EGT) Bank 2	<input checked="" type="checkbox"/>
0x7A	Diesel Particulate Filter (DPF) Bank 1	<input checked="" type="checkbox"/>
0x83	NOx Sensor	<input checked="" type="checkbox"/>
0x85	NOx Control System	<input checked="" type="checkbox"/>
0x88	SCR inducement system actual state	<input checked="" type="checkbox"/>
0x8B	Diesel Aftertreatment Status	<input checked="" type="checkbox"/>

Tap on the **Supported Pids** menu item and the following window will open. The Pids shown are those supported by this vehicle. The Pids are ordered in ascending Pid number order. Pid Numbers are in hexadecimal notation as specified by the OBDII specification. OBD Now supports all the Pids of the OBDII specification, which range from Pid 0x01 to Pid 0xA2 for a total of 162 Pids.

All vehicles only support a subset of those Pid numbers. The number supported varies with each vehicle. Older vehicles using protocols ISO-9141-2 and SAE J1850 usually only support Pids in the range 0x01-0x20 and maybe a couple from the range 0x21-0x40. As we move to more modern protocols ISO-14230-4, the number of supported Pids increases. CAN protocol vehicles, ISO 15765-4, (all vehicles since 2008) can support Pids from 0x01–0xA2.

The latest amendment to SAE 1979 or ISO 15031-5 added many Pids, including many for modern diesel engines. Many of the new Pids from 0x64 onwards, support multiple values for each Pid. This can be seen in a one of our screen shots further along in this guide.

As you scroll the list of Supported Pids you will notice that some Pids have an additional pad lock icon beside them. This indicates that the Pid is not viewable when dynamically reading Pids on the **Read Vehicle Pids** window. The reason for this, is that those Pids either have static values, e.g. (0x1C) and are reported elsewhere or are only involved in another Pid's calculated value, e.g. (0x13, 0x1D) or are directly read through another OBD Service such as Pids 0x01 and 0x41.

Each selectable Pid is associated with a checkbox. The checkbox allows you to choose which Pids you would like to see when reading Pids on the **Read Vehicle Pids** window. Tap on the Pid item to turn the checkbox on/off, or use the Toggle button to turn all Pids off and then selectively choose which Pids you wish to view. To revert to the original selection, tap the Overflow menu (three dot menu) and select Reselect all Pids.

Read Vehicle Pids – Continuous Read Mode

If you now swap to the **Read Vehicle Pids** Window (swipe from the left for the Navigation Menu – choose the Read Vehicle Pids menu item) you will see a similar window to the **Supported Pids** window, except that this



Pid	Description	Value - Units
0x03	Fuel system status	Closed loop / Open loop
0x04	Calculated load value	19.0%
0x05	Engine coolant temperature	90°C
0x06	STFT Bank 1	-53.1%
0x07	LTFT Bank 1	-45.3%
0x0C	Engine RPM	2464rpm
0x0D	Vehicle speed	95km/h
0x0F	Air intake temperature	25°C
0x10	MAF Air flow	112.82g/s
0x14	O2 sensor B1S1	0.670v - 0.0%STFT
0x1F	Time Since Engine Start	00hr : 10min : 00sec
0x21	Distance travelled while MIL on	1000km
0x2F	Fuel level input	50.2%
0x33	Barometric pressure	100kpa
0x42	Control Module Voltage	12.00V

Pid Rate: 55.48 pids/sec

time the Pids displayed will not include those Pids that were associated with the padlock icon. Tap the **Read** button and you will instantly see data displayed for each Pid. This is what we term Continuous Read Mode for the scan tool is now communicating continuously with the ECU(s) of the vehicle, populating the Pid items you have chosen, from the **Supported Pids** window or all supported Pids for this particular vehicle if you have by passed the **Supported Pids** window.

If you check the scan tool, you will see the Host and OBD lights rapidly flashing. At the bottom of the screen, is the optional display of Pid Rate which is the number of Pids/second that are being read. Pid Rate varies dramatically between OBDII protocols, the older protocols such as ISO 9141-2, SAE J1850 being quite slow, to fast CAN vehicles as can be seen in this screenshot. We will have more to say on Pid Rate in a later section of the guide, where we discuss all the different factors that affect Pid Rate including the choice of Android device.

Rotate the device and additional values, Average, Maximum and Minimum are also available for those

Pids where such values are appropriate.

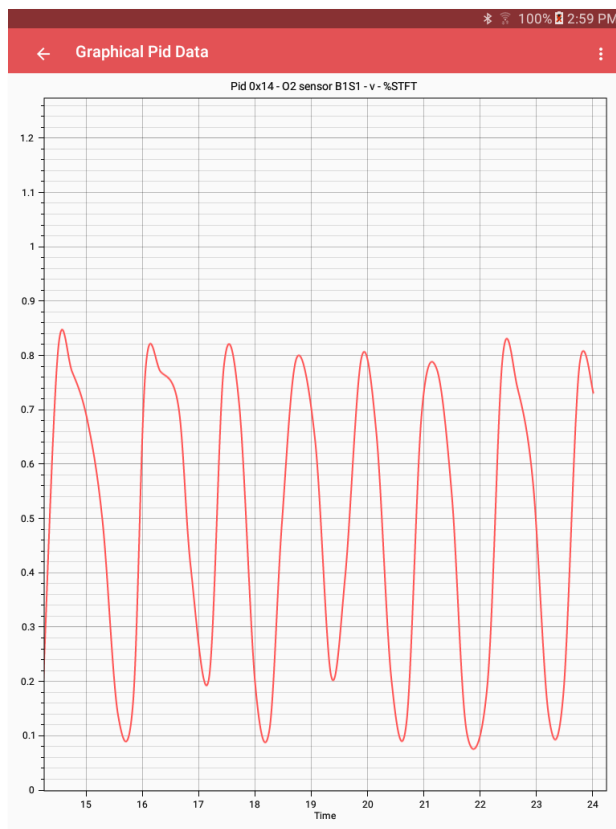
Because of small screen sizes in comparison to a laptop, we abbreviate the Pid description names, using the common acronyms that are associated with the SAE definitions. The **Supported Pids** window uses the full definition description, but the more constrained Read Vehicle Pids window will dynamically change some of

those longer descriptions to shorter descriptions.

The screenshot shows the 'Read Vehicle Pids' application interface. At the top, there is a red header with a hamburger menu icon, the text 'Read Vehicle Pids', and buttons for 'READ' and 'CANCEL READ'. Below the header is a table with the following columns: Pid, Description, Value - Units, Max, Min, and Ave. The table contains the following data:

Pid	Description	Value - Units	Max	Min	Ave
0x10	MAF Air flow	112.82g/s	112.98	13.47	109.96
0x14	O2 sensor B1S1	0.670v - 0.0%STFT	-	-	-
0x1F	Time Since Engine Start	00hr : 10min : 00sec	-	-	-
0x21	Distance travelled while MIL on	1000km	-	-	-
0x2F	Fuel level input	50.2%	50.2	50.2	50.2
0x33	Barometric pressure	100kpa	100	99	100
0x42	Control Module Voltage	12.00V	13.78	12.00	12.05
0x46	Ambient Air Temperature	20°C	38	20	20

At the bottom right of the table, it says 'Pid Rate: 51.08 pids/sec'. Below the table is an Android navigation bar with back, home, and recent apps icons.



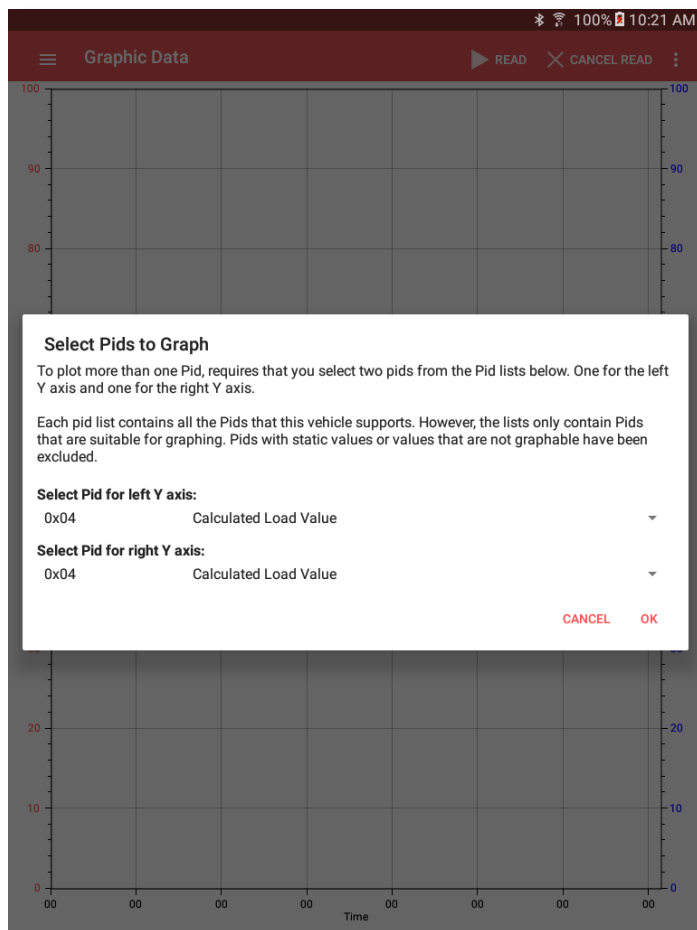
A graph of a Pid can be displayed by tapping the particular Pid you wish to graph. If the Pid you want to graph is not visible scroll the display and find the Pid, then tap it anywhere within its display area. A graph will appear in a new Window. When finished viewing the graph, tap the back arrow and the Read Vehicle Pids window will again be displayed. Choose another Pid to graph and repeat the process. Note not all Pids are graphable, to be graphable the pid must have a dynamic value.

The overflow menu (3 dots) contains a menu item that allows the toggling of the actual data points as they are received. Toggle it on to see the data points, toggle it off for a smooth line graph.

Graphic Data – graphing of multiple Pids

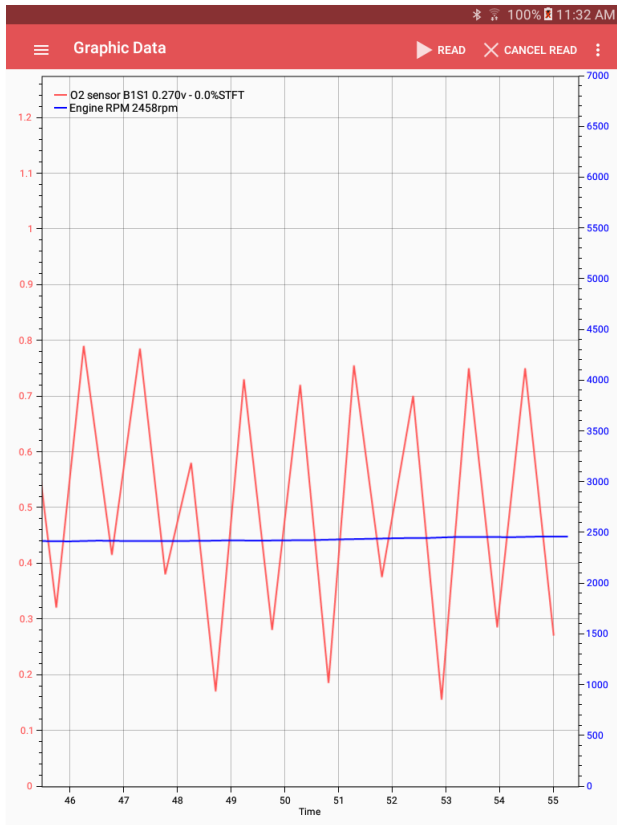
In addition to the single graph per pid option above, build 104 of OBD Now introduced graphing of multiple pids. This option is selected via the main navigation drawer (swipe from the left or tap the hamburger button). When selected a blank graph will displayed in a new window. It has the usual Read and Cancel options in the toolbar. There is also an additional menu item in the overflow flow menu (3 dot) that allows the selecting of the Pids you wish to graph.

To display a graph of Pids you obviously need to be connected, so Connect to the vehicle as usual, and then select Graphic Data. You will then need to select Choose Pids to Graph from the 3 dot menu. The following window will be displayed. You need to select two pids, one for the left Y axis and one for the right Y axis. Note that the pids that are displayed in the picker are filtered. Pids with static values or values that are not graphable are excluded. The pids are displayed in the picker in the usual Pid number ascending order.



You can further exclude Pids, as you can when Reading pids, by first going to the Supported Pids window and choosing the Pids that you are interested in graphing. Once you have limited your selection of Pids via the Supported Pids window, only those Pids will be shown in the window opposite. To revert to the full list of Pids, go back to the Supported Pids window and reselect all Pids.

When you click OK on the Select Pids to Graph window, that window will close and the Graphic Data window will be in focus. Click on the Read button and the graph will begin to be displayed. The graph will start scrolling when the data points reach the right Y axis. The left-hand Y axis is always coloured red and the right-hand Y axis is always coloured blue. The legend at the top of the graph lists the Pid names you are graphing, plus the current data point value of each pid. If you prefer you can always swap the Pids around so that what was the right Y axis becomes the left Y axis.



The following graph shows the O2 Sensor Pid, Voltage against RPM. Typically, O2 Sensor Voltage is hard to pick up while reading the values digitally as you do on the Read Vehicle Pids window because the values change very quickly, from positive to negative and back again. Even though this screenshot is from an older BMW running the very slow ISO 9141-2 protocol which runs at about 4-5 pids/sec, the graph still clearly shows the correct voltage switching pattern when the engine is running at approximately 2500 rpm.

If the vehicle did have suspect O2 Sensors, then it could very easily have been diagnosed, by comparing the graphing pattern of the various O2 sensors one after another.

Without the ability to graph these values, the diagnosis via only digitally reading the values would be next to impossible.

OBD Now Dashboard Gauges

A third method of viewing Pid data is via analogue gauges. With build 1.0.120 we have included 24 custom built gauges (representing 24 different Pids) via the Dashboard menu choice of the main menu. The gauges are grouped 4 to a page and the Dashboard can be scrolled back and forth (swiping) to see each page of gauges. When viewing any page, a single tap on the Needle Knob of a gauge will open a full screen version of that gauge.

To maximise the area for the gauges and enhance the Dashboard, the Dashboard screen is displayed in full screen. That is, the Status Bar, Toolbar and Navigation bar are all temporarily hidden. Google calls this “immersive mode”. The Status bar, and Navigation bar can be redisplayed at any time by pulling down from the top of the screen. Note – many tablet devices don’t have an on screen Navigation bar, as they have an off screen hardware only Navigation bar, so obviously on those devices it is only the Status bar that is hidden. The pull-down effect is transient. After re displaying the Status bar and the Navigation bar, they will both disappear after a second or two.

Because of “immersive mode” there are no visible controls to start or end continuous reading of the Pid data as there are on other screens of OBD Now. The user can only swipe from one page to another or use the back key to close the Dashboard, which will automatically stop the continuous read.

There are two ways to start the Dashboard reading values. The first is the same as if reading values via the Read Vehicles Pids window. Make a normal connection via the Connection window, the start-up window of OBD Now, and wait for the initialisation of your scan tool to complete. When the Successful Connection dialog appears, dismiss it and then choose the Dashboard from the main menu. The dashboard will then open with the various gauges already reading the Pid’s values. You can then swipe through the collection of gauges viewing the values of those gauges that are supported by that vehicle.

The second way is to select the Dashboard, after first viewing the Read Vehicle Pids window. Once the pids are being read on the Read Vehicles Pids window, select the Dashboard from the main menu. As with the previous method, the Dashboard will again open with the various gauges already reading the Pid’s values.



Phone in Landscape mode

While the Dashboard is open and reading values, OBD Now can go into the background (example you receive a call) and the continuous read mode will continue, so that when OBD Now comes back to the foreground, the gauges will still be reading values. To finish displaying the Dashboard, pull down from the top of the screen, so that the Status Bar and Navigation Bar are visible – then tap the back key of the Navigation Bar, which will cause the Dashboard to close and the continuous read to end. By default, when Dashboard closes, the Read Vehicles Pids window will replace it. We assume that the user would most likely wish to continue reading pids. However, if that is not the case, then just choose whatever main menu item you wish.

When viewing any gauge page, you can select to view any individual gauge, as a single gauge in full screen mode by tapping the area around the Needle Knob of the gauge. This obviously, displays a larger version of that gauge. The full screen version of a single gauge also uses “immersive mode”, so to finish with full screen mode of a single gauge, the back key is again used. Tapping the back key will take you back to the multi gauge screen you just left.



Phone: Tachometer Full Screen Mode

Settings options for Dashboard Gauges

From the Settings menu, you can choose from three different background colours for the Dashboard. Dark (default), Light and Carbon Fibre.

You can also select to Keep the Screen on. This setting will override the default Screen timeout setting of your device and prevent your screen from turning off while reading the Dashboard gauges. The setting is only applicable while viewing the Dashboard and your screen timeout will revert to your default setting when the Dashboard closes.

Tips for using Gauges

If a gauge does not show a value, first check that the Pid of that gauge is shown as supported and is checked on the Supported Pids page. Don't assume that if it is supported by one vehicle, that it will be supported by another vehicle.

A full screen gauge is just a tap away.

Gauge lag

Older vehicles which run ISO 9141-2 and ISO 14230-1 protocols (mainly European vehicles from 2000-2007) will mostly show gauge lag. This is not a fault of either your Android device, or your scan tool or even the software, these OBD protocols are just slow – having a pid rate of about 4-6 pids/sec. You can minimise the lag effect by selecting a minimal number of Pids from the Supported Pids window before opening the Dashboard. The same can be said of both the SAE J1850 protocols (PWM and VPW used by earlier GM and Ford models). They certainly aren't as slow as the two European protocols, but we still consider them slow as compared to late model vehicles using either of the CAN protocols ISO-15765-4.

For further information re Pid/Rates – please see the discussion below headed **Speed - Pid Rate**.

How does it work

Now that we have seen OBD Now dynamically rotating the screen, this would be an appropriate point to take a break from the window descriptions to explain in non-technical terms, a little about how Android works and the design of OBD Now.

When you rotate an Android device from portrait to landscape and vice versa, as in the above example, the Android operating system destroys the window (Android calls each window an Activity) and then rebuilds the Activity in the new orientation. That is quite obvious in the case of the Read Vehicle Pids Activity, because we actually see a different window layout in Landscape mode as compared to Portrait mode (more information in Landscape mode).

The same thing happens when another Activity takes over the foreground, such as your phone receiving a call. If you are running OBD Now in Continuous Read Mode when a phone call comes in, OBD Now disappears (gets destroyed) and the Phone application takes over the screen. When the phone call ends and you dismiss the phone application, the OBD Now Activity is rebuilt and comes to foreground still running and updating the Pid values.

This is achieved by running OBD Now as a background service, which we call the OBDSERVICE. This type of service runs in the background and will not be destroyed by Android in the above situation. The OBDSERVICE starts as soon as you launch OBD Now and is running even before the **Connection** window is displayed, which is obviously even before you have made a Bluetooth connection with your scan tool by tapping the Connect button on the **Connection** window. The only way to quit the OBDSERVICE is to exit OBD Now with a double tap on the back key. When you double tap the back key, if OBD Now is connected to your scan tool, the connection is first automatically disconnected, all logging files are closed and then the OBDSERVICE is terminated and so the app ends.

The obvious advantage to creating the OBDSERVICE is that all logging components are still logging even when OBD Now goes into the background. So, you could be viewing OBD Now, start Continuous Read mode with logging on and then swap to listen to music via your favourite music app while driving and your logging will not be interrupted.

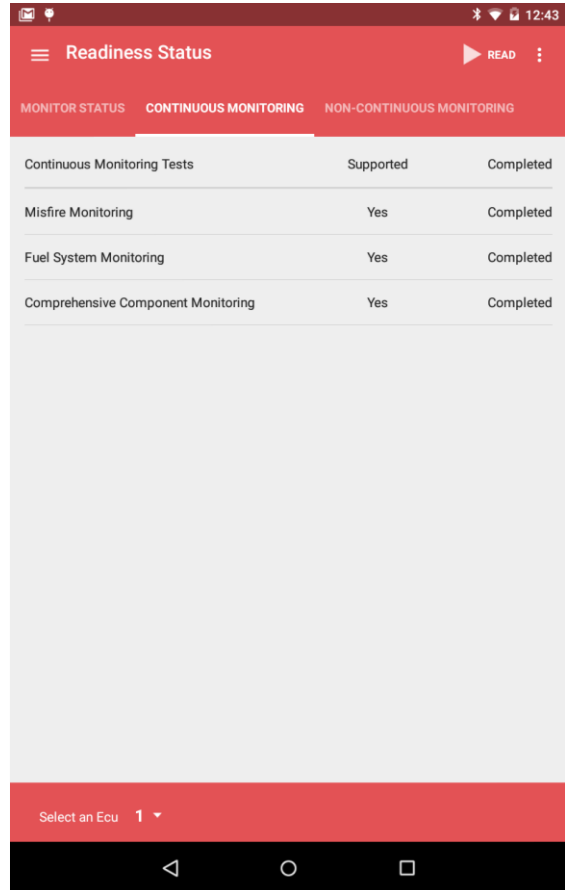
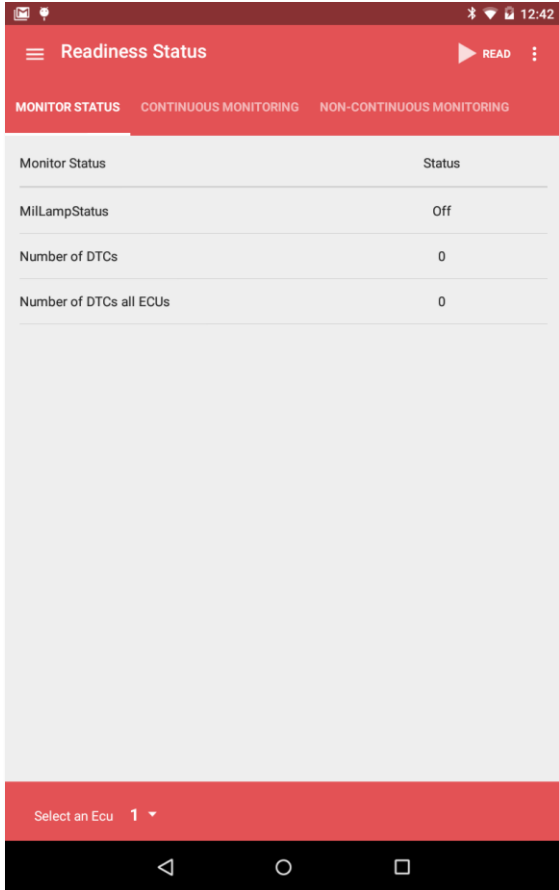
More on the types of logging available in later section in the Guide.

Well that is about as technical as we like to go here with the explanation, but if you need or would like to know more you can always drop us a line at support@glmssoftware.com.

Readiness Status Service \$01

The Readiness Status window is split into three tabs, Monitor Status, Continuous Monitoring and Non-Continuous Monitoring, but all the tab's data are controlled by the single Read button.

Tap the Read button. The results indicate whether your vehicle is ready for emission testing. Note that the result data differs quite markedly between petrol and diesel vehicles. To read different ECU(s) select the ECU number at the bottom of the window and tap the Read button again. The following is a series of screenshots for a petrol vehicle. The results of the Non-Continuous tab have to be scrolled to see all the results.



Readiness Status

MONITOR STATUS CONTINUOUS MONITORING **NON-CONTINUOUS MONITORING**

Non Continuous Monitoring Tests	Supported	Completed
Catalyst Monitoring	Yes	Completed
Heated Catalyst Monitoring	Yes	Completed
Evaporative System Monitoring	Yes	Completed
Secondary Air System Monitoring	Yes	Completed
A/C System Refrigerant Monitoring	No	N/A
Oxygen Sensor Monitoring	Yes	Completed

Select an Ecu 1 ▾

The following is a similar screenshot for a diesel vehicle.

Readiness Status

MONITOR STATUS CONTINUOUS MONITORING **NON-CONTINUOUS MONITORING**

Non Continuous Monitoring Tests	Supported	Completed
NMHC Catalyst Monitoring	Yes	Completed
NOx/SCR Aftertreatment Monitoring	Yes	Completed
Boost Pressure System Monitoring	Yes	Completed
Exhaust Gas Sensor Monitoring	Yes	Completed
PM Filter Monitoring	Yes	Completed
EGR and/or VVT System Monitoring	Yes	Completed

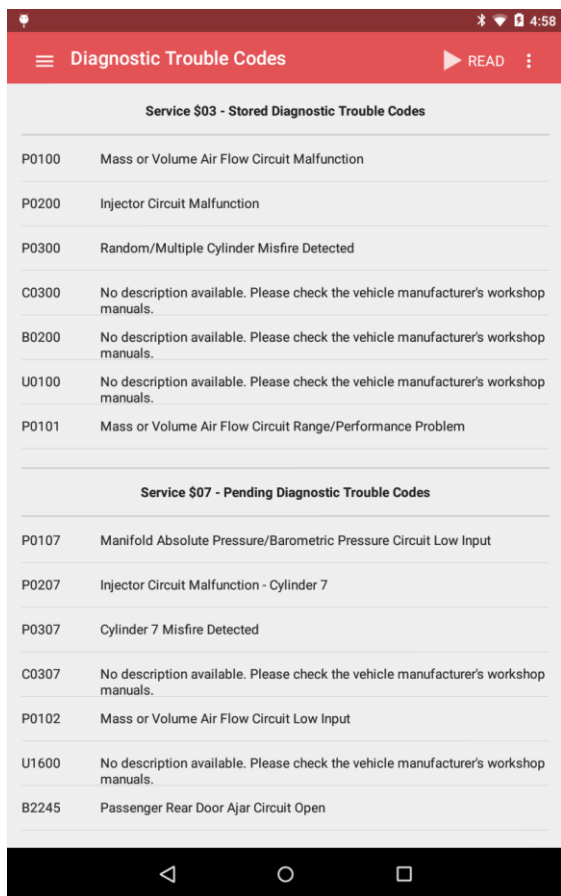
Select an Ecu 1 ▾

Freeze Frame Data Service \$02

Freeze Frame data is only available when at DTC is set, so it is more appropriate that we should first discuss Services \$03, \$07 and \$0A first.

Services \$03, \$07 and \$04

The same window is used for both Stored and Pending Diagnostic Trouble Codes (DTCs). Tap the Read button. The top half displays the Stored DTCs and the bottom half the Pending DTCs. To populate the following screenshots, we are going to make use of a OBDII simulator as it is not always possible to have a vehicle available that actually has its Check Engine or MIL light on. The OBDII simulator contains a switch that allows us to turn the MIL light on. Notice that some DTCs do not have a description, for that particular code is



not in our database. To learn more about a particular DTC, search the code at dtcsearch.com.

Now that the MIL is on, we can also read the Freeze Frame data. Select Service \$02 from the menu and the Freeze Frame window will open. Tap the Read button to read the freeze frame data. The following screenshot shows the freeze frame data including the DTC that caused the MIL to illuminate.

Pid	Description	Value - Units
0x02	DTC that caused required freeze frame data storage	P0100
0x05	Engine coolant temperature	100°C
0x0C	Engine RPM	5000rpm
0x0D	Vehicle speed	120km/h

When you are done, viewing DTCs and the Freeze Frame data, you should be ready to clear the DTCs.

Don't prematurely clear the DTCs until you have either fixed or have had the problem fixed. There is nothing to be gained and a great deal of valuable diagnostic ECU information to be lost by prematurely clearing the DTCs without fixing the problem.

You can clear DTCs on the Diagnostic Trouble Codes window by selecting the Overflow menu (3 vertical dots) and choose the menu item Clear DTCs.

The following dialog window will be displayed containing the warnings about what data will lost when

the DTCs are cleared.

We know of one app that sends the command to clear DTCs whenever the vehicle is started. This app uses the command to zero out Pid 0x31, *The Distance travelled since DTCs were Cleared*. This effectively allows Pid 0x31 to act as a trip odometer for this app which provides distance travelled and therefore costs associated with trips. As you can see from the above warning, this is a very dumb idea, as the ECU will continually be in learning mode and of course will not be delivering optimum fuel consumption. It would also fail an emission test, if one was due.

Clear Diagnostic Trouble Codes

CAUTION:

This command will clear all emission-related diagnostic information from all ECUs.

This includes the following:

- Number of diagnostic trouble codes.
- Clear the I/M (inspection maintenance) readiness bits.
- Confirmed diagnostic trouble codes.
- Pending diagnostic trouble codes.
- Diagnostic trouble codes for freeze frame data.
- Freeze frame data.
- Status of system monitoring tests.
- On-board monitoring test results.
- Distance travelled while MIL is activated.
- Number of warm-ups since DTCs cleared.
- Distance travelled since DTCs cleared.
- Minutes run by engine while MIL is activated.
- Time since DTCs cleared.
- Reset misfire counts of standardized Test ID 0x0B to zero.

Other manufacturer specific clearing/resetting actions may also occur in response to this command.

If you wish to proceed - please ensure the ignition is ON, and with the engine not running.

You will be advised whether this command was successful or not.

CANCEL PROCEED

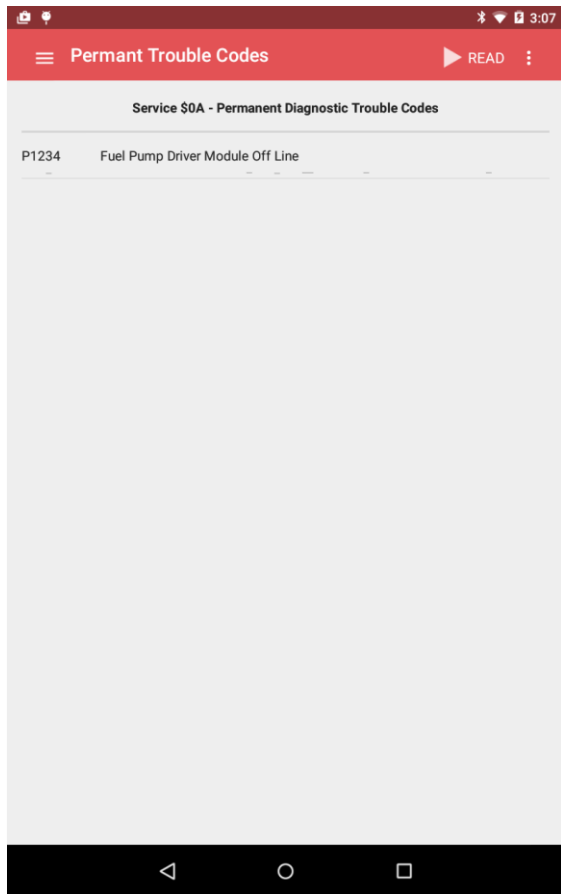
U1600 No description available. Please check the vehicle manufacturer's workshop manuals.

B2245 Passenger Rear Door Ajar Circuit Open

Service \$0A – Permanent Diagnostic Trouble codes - CAN vehicles only

Service \$0A was introduced to the OBDII specification in the 2010 revision of the specification. Therefore, it applies to all vehicles from approximately 2009 onwards. The following is a quote from the specification.

The intended use of this data is to prevent vehicles from passing an in-use inspection simply by disconnecting the battery or clearing DTCs with a scan tool prior to the inspection. The presence of permanent DTCs at an inspection without the MIL illuminated is an indication that a proper repair was not verified by the on-board monitoring system.

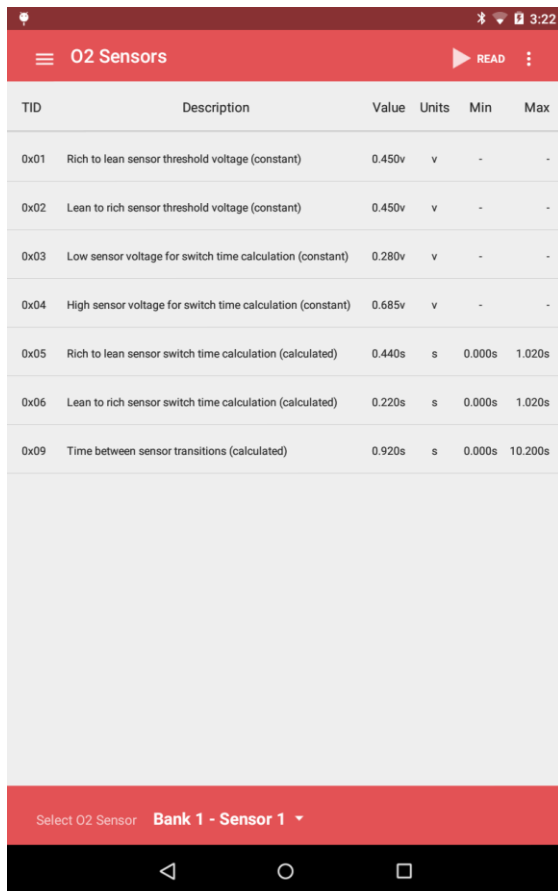


This test is very similar to Service \$03 and \$07, however Service \$0A has its own dedicated window. To perform the test, select the Service \$0A item from the navigation menu and then tap the Read button. The following screenshot is a typical display.

Permanent Diagnostic Troubles Codes cannot be cleared by a scan tool. They will only be cleared after the repair of the Permanent Trouble Code is performed and the OBDII system of the vehicle has determined that the fault has been repaired.

Service \$05 - Oxygen Sensors – Non-CAN vehicles only

Select O2 Sensors from the navigation menu. The Oxygen Sensor Windows opens. Tap the Read button and detailed information about each O2 Sensor will be displayed. During the initialization sequence *OBD Now* determined the location of the Oxygen sensors and the Test IDs (Tids) that the Oxygen sensors support. Select each O2 Sensor in turn and tap the Read button. Oxygen sensor tests should be considered in conjunction with Pid 0x03 Fuel System status. When the engine is cold and during warm up, the O2 sensors are not used to adjust fuel trims and the Fuel System Status will report Open Loop. When the engine and O2 sensors have warmed up the Fuel System will go Closed Loop using the O2 sensor(s) as feedback for fuel control. It is possible for one Fuel System to be in Closed Loop and the other Open Loop, the O2 Sensors values should indicate which. A typical O2 Sensor window is displayed below.



The screenshot shows a mobile application interface for O2 Sensors. At the top, there is a red header bar with a hamburger menu icon on the left, the text "O2 Sensors" in the center, and a "READ" button with a play icon on the right. Below the header is a table with the following columns: TID, Description, Value, Units, Min, and Max. The table contains nine rows of data. At the bottom of the screen, there is a red bar with the text "Select O2 Sensor Bank 1 - Sensor 1" and a dropdown arrow. The bottom of the screen shows the standard Android navigation bar with back, home, and recent apps icons.

TID	Description	Value	Units	Min	Max
0x01	Rich to lean sensor threshold voltage (constant)	0.450v	v	-	-
0x02	Lean to rich sensor threshold voltage (constant)	0.450v	v	-	-
0x03	Low sensor voltage for switch time calculation (constant)	0.280v	v	-	-
0x04	High sensor voltage for switch time calculation (constant)	0.685v	v	-	-
0x05	Rich to lean sensor switch time calculation (calculated)	0.440s	s	0.000s	1.020s
0x06	Lean to rich sensor switch time calculation (calculated)	0.220s	s	0.000s	1.020s
0x09	Time between sensor transitions (calculated)	0.920s	s	0.000s	10.200s

Service \$06 - On Board Monitoring

Select On-Board Monitoring Tests from the navigation menu.

The information displayed by the On-Board Monitoring window differs depending on the protocol of the vehicle being tested. There is a separate layout for Non-CAN vehicles and another for CAN vehicles.

On Board Monitoring includes standardised Test IDs plus manufacture specific Test IDs. O2 sensor information for CAN vehicles is only available via On Board Monitoring as service \$05 is not supported for CAN vehicles. On Board monitoring allows access to the results of tests of specific components that are either continuously monitored (e.g. misfire monitoring) and components that are non-continuously monitored (e.g. catalyst system). The vehicle manufacturer is responsible for the assignment of manufacturer defined test ids and therefore you may have to consult the respective workshop manuals for the definitions of these test ids.

Tap the Read button, a few moments later, the display will look similar to the following screenshot.



The screenshot shows a mobile application interface titled "OnBoard Monitoring Tests". At the top right, there is a "READ" button with a play icon. Below the title bar is a table with the following columns: OBDM..., Description, TestID, Description, Value, Min Va., Max V., and Result. The table contains 18 rows of test data, all of which are marked as "Passed".

OBDM...	Description	TestID	Description	Value	Min Va.	Max V.	Result
0x01	Oxygen Sensor Monitor Ban...	0xC2	Manufacture test ID descript...	1100 se...	0	4000	Passed
0x01	Oxygen Sensor Monitor Ban...	0xC5	Manufacture test ID descript...	20 %	15	25	Passed
0x02	Oxygen Sensor Monitor Ban...	0xE0	Manufacture test ID descript...	0 bit	-10	1	Passed
0x02	Oxygen Sensor Monitor Ban...	0xE1	Manufacture test ID descript...	0 bit	-1	10	Passed
0x02	Oxygen Sensor Monitor Ban...	0xE7	Manufacture test ID descript...	4 ppm	-35	32767	Passed
0x02	Oxygen Sensor Monitor Ban...	0xEC	Manufacture test ID descript...	0 ppm	-327...	100	Passed
0x02	Oxygen Sensor Monitor Ban...	0xED	Manufacture test ID descript...	0 ppm	-80	32767	Passed
0x03	Oxygen Sensor Monitor Ban...	0xE4	Manufacture test ID descript...	4 %	0	15	Passed
0x03	Oxygen Sensor Monitor Ban...	0xE7	Manufacture test ID descript...	3 ppm	-35	32767	Passed
0x03	Oxygen Sensor Monitor Ban...	0xEA	Manufacture test ID descript...	0 ppm	-327...	100	Passed
0x03	Oxygen Sensor Monitor Ban...	0xEB	Manufacture test ID descript...	0 ppm	-80	32767	Passed
0x21	Catalyst Monitor Bank 1	0xC1	Manufacture test ID descript...	85 %	10	328	Passed
0x31	EGR Monitor Bank 1	0xC0	Manufacture test ID descript...	3 mg/st...	-50	3000	Passed
0x31	EGR Monitor Bank 1	0xC2	Manufacture test ID descript...	1 bit	0	1	Passed
0x42	Oxygen Sensor Heater Monit...	0xE0	Manufacture test ID descript...	0 secs	0	180000	Passed
0x43	Oxygen Sensor Heater Monit...	0xE0	Manufacture test ID descript...	4300 se...	0	180000	Passed

Because space is at a premium on smaller devices, it will be easier to read by rotating the screen to landscape mode. Alternatively, each item can be view separately in a single dialog window by tapping the individual item.

Service \$08 - In-use Performance Tracking

To be added

Service \$09 – Vehicle Information

Select Vehicle Information from the navigation menu. Vehicle information includes items such as Vehicle Identification Number (VIN), Calibration Identifications and Calibration Verification Numbers for supported ECU's.

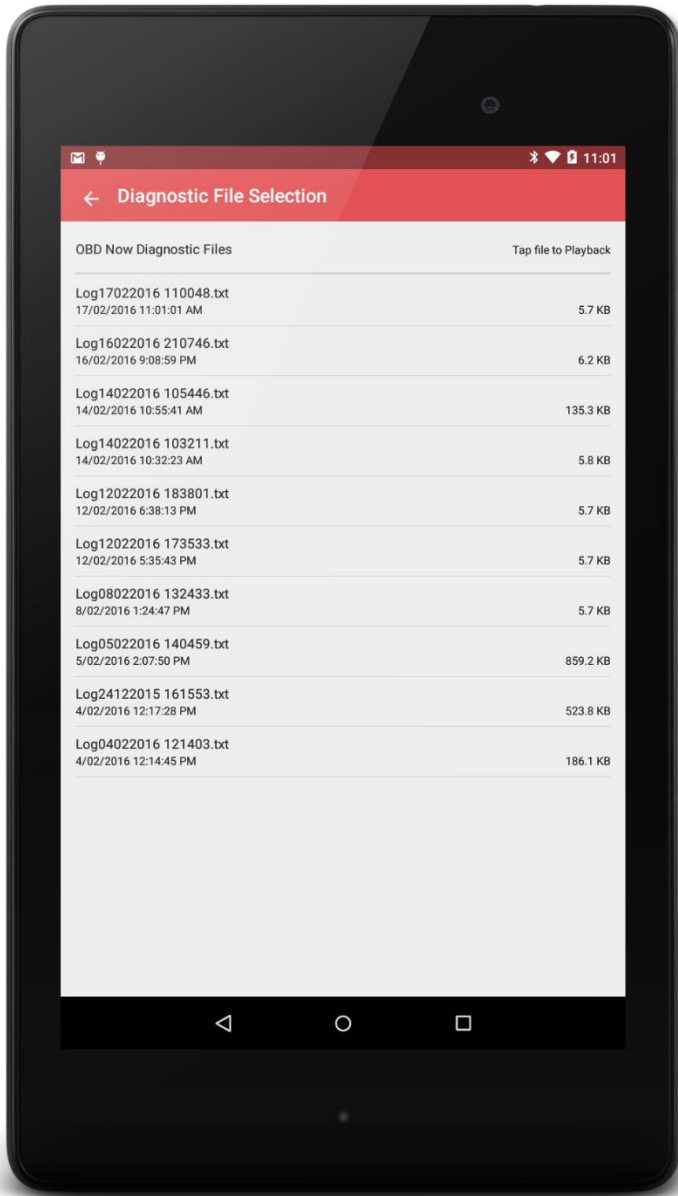
Please note that many early OBDII vehicles do not support Service \$09. Tap the Read button for the information. If a vehicle doesn't support Service \$09, OBD Now will respond "This vehicle doesn't support Service \$09"

Playback OBD Now Diagnostic File

The Playback menu option allows you playback a previously recorded OBD Diagnostic log file. Playback files can be played back at various speeds, so allowing careful examination of any Pid values in slow motion. The first step is to select a diagnostic file to playback, so a file selection window opens upon selecting the

Playback menu option as per the following screenshot.

Each filename is date and time stamped at creation time in the format "Logddmmyyyy hhmmss.txt". The file date and time at the time of closure is available under the file name and on the right the size of the file in KB. The files are listed in descending date and time order; therefore, the most recent files are always at the top of the list. Tap a file to select it and the Playback window will appear as shown below.



Tap the Play button to play back the OBD Now diagnostic file. The file will be played back at the default speed which can then be changed during play back from Slowest to Fastest for 4 different speeds. A progress bar at the bottom right of the window displays the progress of the play back. The play back can be paused at any time via the Pause button or cancelled by tapping the Stop button.

Please note that during playback we don't provide Pid rate. The data is being read from a file, not the ECU of the engine, therefore Pid rate is not relevant as the speed of reading from a file is infinitely faster than reading directly from the ECU(s) of the vehicle.

Speed - Pid Rate

Bluetooth Classic scan tools

The following tables demonstrates Pid/rates of various Android devices connected to an OBDII simulator. Because all the tests are connected to the simulator and not different vehicles, we eliminate the OBDII implementation differences between vehicle manufacturers and can therefore see a much clearer picture between the different Pid/rates and the protocols used. A reasonably conservative ELM327 time out value of 100msecs, the default setting for OBD Now was used for each test. The scan tool used for all tests was Scantool.net's OBDLink MX Bluetooth.

As can be seen in all cases, the OBDII protocols range from slowest ISO 9141-2 to fastest, both ISO 15765-4 variants (CAN vehicles). ISO 9141-2 and both variants of J1850 were the first protocols in use when the OBDII specification was first introduced in the USA in 1996. After the EU countries embraced the standard in 2000-01, most EU manufacturers chose ISO 9141-2. A couple of years later, some European manufacturers then switched to ISO-14230-4. The CAN protocols were introduced around 2006 in the US and were adopted by all manufacturers from 2008.

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	4.82
ISO 14230-4 – 5 baud init, 10.4 kbaud	6.43
ISO 14230-4 – Fast init, 10.4 kbaud	6.53
J1850 VPM	15.11
J1850 PWM	18.98
ISO 15765-4 11/500	40.08
ISO 15765-4 29/500	40.11

Nexus 4 Android 5.1.1

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	4.83
ISO 14230-4 – 5 baud init, 10.4 kbaud	6.34
ISO 14230-4 – Fast init, 10.4 kbaud	6.37
J1850 VPM	13.94
J1850 PWM	19.73
ISO 15765-4 11/500	52.11
ISO 15765-4 29/500	50.95

Nexus 7 (2012) Android 5.1.1

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	4.91
ISO 14230-4 – 5 baud init, 10.4 kbaud	6.52
ISO 14230-4 – Fast init, 10.4 kbaud	6.45
J1850 VPM	14.01
J1850 PWM	21.66
ISO 15765-4 11/500	57.81
ISO 15765-4 29/500	58.91

Nexus 10 Android 5.1.1

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	4.61
ISO 14230-4 – 5 baud init, 10.4 kbaud	6.15
ISO 14230-4 – Fast init, 10.4 kbaud	6.24
J1850 VPM	13.06
J1850 PWM	18.71
ISO 15765-4 11/500	40.05
ISO 15765-4 29/500	40.24

Samsung Galaxy Tab 3 Lite Model SM-T113 Android 4.4.4

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	4.51
ISO 14230-4 – 5 baud init, 10.4 kbaud	5.94
ISO 14230-4 – Fast init, 10.4 kbaud	6.01
J1850 VPM	12.38
J1850 PWM	17.06
ISO 15765-4 11/500	39.94
ISO 15765-4 29/500	43.21

LG 4 Model H815 Android 6.0

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	4.21
ISO 14230-4 – 5 baud init, 10.4 kbaud	5.61
ISO 14230-4 – Fast init, 10.4 kbaud	6.21
J1850 VPM	10.11
J1850 PWM	14.43
ISO 15765-4 11/500	27.40
ISO 15765-4 29/500	27.32

Nexus 5x Android 7.0

All measurements were done while viewing the Read Vehicle Pids window. The number of Pids displayed on the window obviously varies from device to device. The Nexus 10 with its large screen size, can obviously display more Pids than say the small Nexus 4 phone.

This is important because it means that Android has to update more Pids on the Nexus 10 as compared to the Nexus 7. At any one time, the way Android works, the only Pid values that get updated are the visible Pids. As you scroll the view to make other Pids visible, the previously visible Pids are now not visible and the newly

visible Pids are. Android doesn't waste cpu cycles updating Pid values that can't presently be seen. Another more laborious method of measuring Pid/rate and a confirmation of the Pid/rate shown on the screen, is to view any of the OBD Now log files, where the response from each Pid is logged with a time stamp. Just count the number of responses between any one second period.

Some discrepancies can be seen from screen values when OBD Now is automatically put into the background, when another app comes to the foreground. While the OBD Now is in the background, Android has no need to update the any Pid values on the screen, therefore Android has less work to do and behind the scenes the Pid/rate can potentially increase, so that when OBD Now returns to the foreground you may notice that the Pid/rate reads higher.

As a comparison, between an Android device and a Windows laptop using our OBD 2007 Windows program, the Pid/Rate for a CAN vehicle using the OBDLink MX on the same simulator, with the same code is just under 100 Pids/second. Of course, that is to be expected as the Windows laptop is a more powerful and faster than any smartphone or tablet.

What is interesting from the above testing is that not all Android devices perform as one would expect. Compare the results of the old Nexus 4 phone, with the LG 4 phone and Nexus 5x phone. The LG 4 and the Nexus 5x are far superior to the Nexus 4 in regards to specification, but only out performs it by a tiny margin. So, we believe that the only obvious differences are the Bluetooth and Wi-Fi radios.

We were recently able to test a Samsung 6 Edge and this was by far the fastest of any of the more modern phones.

The other variables effecting pid/rate that should be considered is the scan tool itself and the implementation of the OBDII protocol by the vehicle manufacturers. The OBDLink MX (Bluetooth or Wi-Fi) is in a class by itself when it comes to speed. We have yet to see any other scan tool that approaches the speed of the OBDLink. Unfortunately, some vehicle manufacturers seem to consistently lag behind others when it comes to pid rate speed, so please consider all these variables when assessing the speed of your particular vehicle with your particular scan tool.

Bluetooth LE Scan tools – Kiwi 3

The following tables were made using the Kiwi 3 Bluetooth LE scan tool. The Nexus 7 (2012) and Nexus 10 devices don't appear because neither of those device supports Bluetooth LE.

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	3.5
ISO 14230-4 – 5 baud init, 10.4 kbaud	4.21
ISO 14230-4 – Fast init, 10.4 kbaud	4.20
J1850 VPM	14.2
J1850 PWM	15.9
ISO 15765-4 11/500	26.3
ISO 15765-4 29/500	25.4

Samsung Galaxy Tab 3 Lite Model SM-T113 Android 4.4.4

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	2.90
ISO 14230-4 – 5 baud init, 10.4 kbaud	3.50
ISO 14230-4 – Fast init, 10.4 kbaud	3.48
J1850 VPM	7.23
J1850 PWM	9.06
ISO 15765-4 11/500	10.7
ISO 15765-4 29/500	10.6

Nexus 5x Android 7.1.1

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	2.84
ISO 14230-4 – 5 baud init, 10.4 kbaud	3.50
ISO 14230-4 – Fast init, 10.4 kbaud	3.48
J1850 VPM	8.9
J1850 PWM	8.8
ISO 15765-4 11/500	10.04
ISO 15765-4 29/500	10.01

Samsung Galaxy Tab A 8.0 Model SM-T350 Android 6.0.1

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	3.1
ISO 14230-4 – 5 baud init, 10.4 kbaud	3.84
ISO 14230-4 – Fast init, 10.4 kbaud	3.48
J1850 VPM	13.3
J1850 PWM	12.65
ISO 15765-4 11/500	20.91
ISO 15765-4 29/500	20.80

LG 4 Model H815 Android 6.0

OBD Protocol	Pid Rate (Pids/sec)
ISO 9141-2	3.25
ISO 14230-4 – 5 baud init, 10.4 kbaud	4.11
ISO 14230-4 – Fast init, 10.4 kbaud	4.02
J1850 VPM	14.94
J1850 PWM	14.3
ISO 15765-4 11/500	23.76
ISO 15765-4 29/500	23.56

Nexus 4 Android 5.1.1

Logging

OBD Now has two forms of logging, OBD Diagnostic logging and OBD Data logging. All our logging files are in a folder called OBD Now. You will need a file manager to locate these files. We use and recommend AirDroid by Sand Studio, but any file manager will do. The files (both forms) are stored in a folder called OBD Now. When using a file manager look for a folder in the following format /storage/emulated/0/OBD Now. This is a folder that Android deems as External Storage. The zero in the folder name can be any number and related to the number of users of device.

OBD Diagnostic logging

OBD Diagnostic logging is always on by default although it can be toggled off via the Settings menu. The log file names are in the format "logddmmyyyy hhmss.txt". The data in the diagnostic log files is in raw mode or hexadecimal format as received from your scan tool. We don't expect all users to be able to interpret these files, but anyone who is familiar with the AT command set of the ELM327 chip and OBDII commands and responses should be able to follow. They can be viewed with any HTML browser, which most devices provide by default. An alternative way of viewing them is to drag them into any internet browser. Their primary purpose is to assist us in providing support to a user who may be experiencing problems, such as connecting to a particular vehicle. From the diagnostic log file, we can determine what the problem is and so assist the user. If we request a diagnostic log file of the connection, this is what we are requesting.

The second purpose is their use in the Playback option found at the bottom of the main menu. The Playback option allows you to playback a previously recorded session of Continuous Read Mode data at varying speeds, ranging from very slow to fast. It allows careful inspection of any Pid value for the period of the previous connection. Obviously driving and viewing your device at the same time is not recommended, so the Playback mechanism is a safety option, that still allows you to diagnose your vehicle without the need of an assistant.

Please note the use the Playback option is to playback Continuous Read Mode data. It does not support playback of other OBDII Services. As OBD Diagnostic files will normally also contain response data from other OBDII Services, it is important that when you want to use the Playback option that you ensure that only Continuous Read Mode data is recorded. Do not mix Continuous Read Mode data with the responses from other OBDII Service results. To be used successfully it is best to Disconnect the connection, make a new Connection, record your data session and then Disconnect. This will ensure that the only data contained within the file is Continuous Read Mode data of all the pid values that you selected via the Supported Pids window.

Diagnostic files can grow very quickly, so OBD Now provide a maintenance option to allow selective deleting of the files when you are done using them. See the menu item Maintenance – OBD Now Log files.

OBD Data logging

OBD Data logging is off by default. It can be toggled on via the Settings menu. These log file names are in a similar format to the Diagnostic log files, except they are prefixed with "OBD", therefore the format is "OBDLogddmmyy hhmss.txt". The data in these files is the Pid data of a connection session in human readable format suitable for importing into a spreadsheet program such as Excel. The data consists of Pid Number, Pid Description, Pid Value, Units and Time Stamp. The data fields are delimited by the '|' character known as the vertical bar character. Obviously, you are then free to manipulate the data anyway you wish within the spread sheet program once the data is imported.

Clone Scan tools

There is an endless list of cheap clone ELM327 scan tools available on eBay and other websites. Some work, most don't. If they do work, they may work with one protocol and then not another. They report that they are genuine ELM327 chips, but often report version numbers that have never been made by ELM Electronics. The following is a list of version numbers v1.3a, v1.4b, v2.1 and v2.2 that have been produced by ELM Electronics. For more information and datasheets for each of these versions we suggest that you visit their website www.elmelectronics.com.

Determining a clone

Just because a scan tool reports a correct version number of the ELM327 chip doesn't guarantee that it is using a genuine ELM327 chip. On the Connection Summary window, OBD Now displays the name of the scan tool manufacturer. A clone scan tool will only display the default value "OBDII to RS232 Interpreter".

As stated earlier under the heading Connection Failure, OBD Now will attempt to determine whether a scan tool is a clone or not, by examining non-standard responses from standard queries. We don't do this to act as "Clone Police", but to prevent OBD Now from crashing. If the clone scan tool responds as a standard ELM327 chip should then there will be no problems because we won't prevent it from being used with OBD Now.

We also provide a free Android app, OBD Now Terminal which allows a user to directly access a Bluetooth scan tool in raw mode. The following screenshots show the output from two different scan tools both claiming to contain an ELM327 v2.1 chip.



CLONE ELM327 v2.1



ELMSCAN5 ELM327 v2.1

The scan tool containing the clone chip is on the left and the scan tool with the genuine chip is on the right. They are both connected to the same ECU simulator. The same commands have been issued to both scan tools. The ElmScan 5, which we fitted with a v2.1 chip obtained directly from Elm Electronics responds to the 0100 command as an ELM327 v2.1 should respond, that is there is a response from 3 different ECUs. The clone responds correctly to the first ECU, but not to the second and third ECUs.

This clearly indicates why OBD Now includes code that will trap the faulty chip. If we didn't, OBD Now would crash at a later point during the initialization sequence. The example, only includes two commands ATZ and 0100. Both commands would be familiar to even a first-time user, using a terminal program. The ATZ command is the standard reset command of the ELM327 chip and the 0100 command queries the ECU(s) to establish the protocol of the vehicle and returns a list of supported pids for the ECU(s) of the vehicle. Every single published OBDII app would issue those same commands.

If a clone fails to respond properly to these two standard ELM327 commands, then quite obviously, it is likely to fail again when OBD Now issues even more complex queries.

These cheap clones don't feature upgradable firmware, therefore a user's only recourse for a faulty unit is to request refund.

OBDII Compliance by Country

The following is a list of countries that have regulated for OBDII compliance. This list has been made in conjunction with several other OBDII web sites. We can't guarantee the accuracy of some of the countries as some of the information has been supplied by users in those countries. Please treat the list as an indicative list. If in doubt, check with the regulatory body in your country.

Country	Year
USA	1996
Canada	1998
EU Countries (Petrol)	2000-2001
Israel	2003
Japan	2003
Peru	2003-2004
EU Countries (Diesel)	2004
Australia	2006
Hong Kong	2006
New Zealand	2006
South Korea	2007
Mexico	2007
Argentina	2008
China	2008
Taiwan	2008
Brazil	2010
Russia	2010
Chile	2013
India	2013
Thailand	2013
Turkey	2013
Algeria	2014
Singapore	2014
Philippines	2016

Please note that we do not maintain a list of OBDII compliant vehicles. We are in Australia, so we are conversant with most of the vehicles made in or imported to Australia, but we obviously can't comment about vehicles in another country, other than from feedback supplied by our users.

One of the questions always asked re OBDII compliance is what country was your vehicle sold in when new. Obviously if the country didn't regulate for OBDII compliance at that time, there is no guarantee that a vehicle will be OBDII compliant, even if the same make and model for that model year was compliant in another country that does regulate for OBDII compliance. However, because a country doesn't regulate for OBDII compliance does not automatically mean that the vehicle is not OBDII compliant.

The only definitive way to know is to try and connect with OBD Now and a reputable scan tool. We also supply a terminal program for Android called OBD Now Terminal which allows any end user with basic knowledge of the AT commands of the ELM327 chip to attempt to connect to any vehicle. If the vehicle is not OBDII compliant then when the attempt is made to connect to a non-compliant vehicle, the standard ELM327 response of "UNABLE TO CONNECT" will be returned, indicating a non OBDII complaint vehicle. For more details please refer to the OBD Now Terminal Guide.

Requesting Support

If you do have problems connecting to a vehicle, please don't hesitate to contact us. We are here to help. Our support email address is support@glmssoftware.com.

To help us help you, please supply the following information:

Vehicle: Make/Model/Year and Country where the vehicle was purchased new.

Scan tool: Make/Model – Type of Connection – Bluetooth or Wi-Fi.

Fuel Type: Petrol/Diesel.

Android Device: Make/Model/Operating system version number.

Please attach the OBD Diagnostic log file of your connection.

You can use OBD Now's built in Email Developer option and attach the diagnostic file from there. If you prefer you can use a file manager to copy the diagnostic log file to your computer (we use a recommend AirDroid as a file manager) and write your email on your computer.

Privacy Policy

The following statement describes the privacy policy of GLM Software in relation to our Android application OBD Now as required by Google for apps made available on Google Play.

OBD Now when either obtaining an evaluation license or purchasing a subscription, records details of your email address and display name as well as details of your device, including manufacturer, model and brand and the current version of the Android operating system. All data is transferred and stored using secure communications. No data communicated to our servers will ever be shared or transferred to third parties.

When requesting support, we will normally request OBD Diagnostic log files. These log files include information about your scan tool, such as make and model and version information and potentially detailed output from the ECU(s) of your vehicle. We ask for them as a means of providing support to you for problems associated with connecting to the vehicle. Details of vehicle make and model are not included in the log files as those properties are not part of the OBDII specification. We will however request that you supply them. Please see the section in our Guide re Requesting Support.

If our policy changes, this statement will be changed to reflect those changes.

