Engine Polygraph

EPReader®

Installation and User Guide

by Predictive Fleet Technologies

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EPReader®

Contents

Introduction

EPReader (Engine Polygraph Reader) is a software to enable a 'user friendly' procedure to collect data from an engine and provide it to the web-based application, Engine Polygraph, to store the data for later reference and optionally request an Assessment report indicating the relative status of various physical components of the engine or Diagnostic report analyzing the data to identify issues with the engine and suggestions for fix.

EPReader is a part of Engine Polygraph and requires all users be authorized by the Engine Polygraph Administrator for your company. The *Terms & Conditions, Warranty,* and *Privacy Policy* available on the Engine Polygraph website, www.enginepolygraph.com, apply equally to EPReader.

EPReader is a Windows PC application that requires an active connection to the internet and an Engine Polygraph subscription to process the data obtained from an EP kit containing a PicoScope to connect sensors (SenX FirstLook® and optionally others) attached to the PicoScope channels by coax cables. The PicoScope is also connected to the PC by a 3.0 or 2.0 **high-speed** USB cable. The application provides a User Interface for the authorized user to input data about the vehicle and engine being tested.

If you have an OBDII reader with Bluetooth connectivity (using ELM327 protocol for Windows laptops) to your laptop, you may choose to have the engine computer, the ECM, provide the RPM and the engine coolant temperature to EPReader to send those values at the time the engine data is read, simplifying, and increasing the accuracy of the data sent for your reports.

The EPReader and EnginePolygraph internet application both support multiple languages as available from the Language pulldown on the upper right of the Login screens.

The EPReader application takes the information that you input about the engine you are 'working on' and typical usage rules to edit your inputs for 'reasonableness'. It also needs the Internet interface to interact with our databases of engine models and engine specs. After passing the edits, it then calculates parameters to control the PicoScope 4x25 Oscilloscope device that digitizes the voltage (pressure) oscillations from the engine and sends the data to Predictive Fleet Servers for analysis to get a report about your engine.

The EnginePolygraph web-based application (EP web) has a Users Guide that describes a procedure for when you are not connected to the Internet to use your PicoScope with the *PicoScope 6 Automotive* software (see the PicoAuto website, https://www.picoauto.com/downloads) to collect and save the files on your PC. Then, when you have Internet connectivity, you may use the www.EnginePolygraph.com application to upload the data and obtain the reports.

Next, the system provides a list of steps in appropriate sequence to 'warm-up' the engine, position your equipment in a safe and convenient position, attach cables, and review your inputs again for accuracy.

When ready, hit the **Start** button and the system then provides instructions for accelerating the engine to an appropriate speed and holding that speed constant for a short while. The 'Processing' light will turn yellow. The system checks the signals coming in from the sensors to be sure they are connected and that meaningful data is being supplied. After collecting less than a second of uniform speed data, the Reader 'Complete' light will turn to green, indicating successful data collection and transmission to the Engine Polygraph web application for analysis. Your requested report will soon be available on the www.EnginePolygraph.com web application (Reports tab). And the system will email the report to the address provided in the user's profile. The user may also choose to sign onto the web application, www.enginepolygraph.com, and view the report from the Reports tab.

NOTE: If the vehicle's owner were a Fleet that uses EngineAngel (www.engineangel.com) and the vehicle were on the owner's vehicle database, the report will be sent to that Fleet's Engine Angel Fleet Management system to be put into their database and displayed on the Vehicle Condition Report.

Download EPReader

An authorized user of Engine Polygraph may download the EPReader software from the 'home page' of the enginepolygraph.com application by clicking on the button "Engine Polygraph Reader Install".
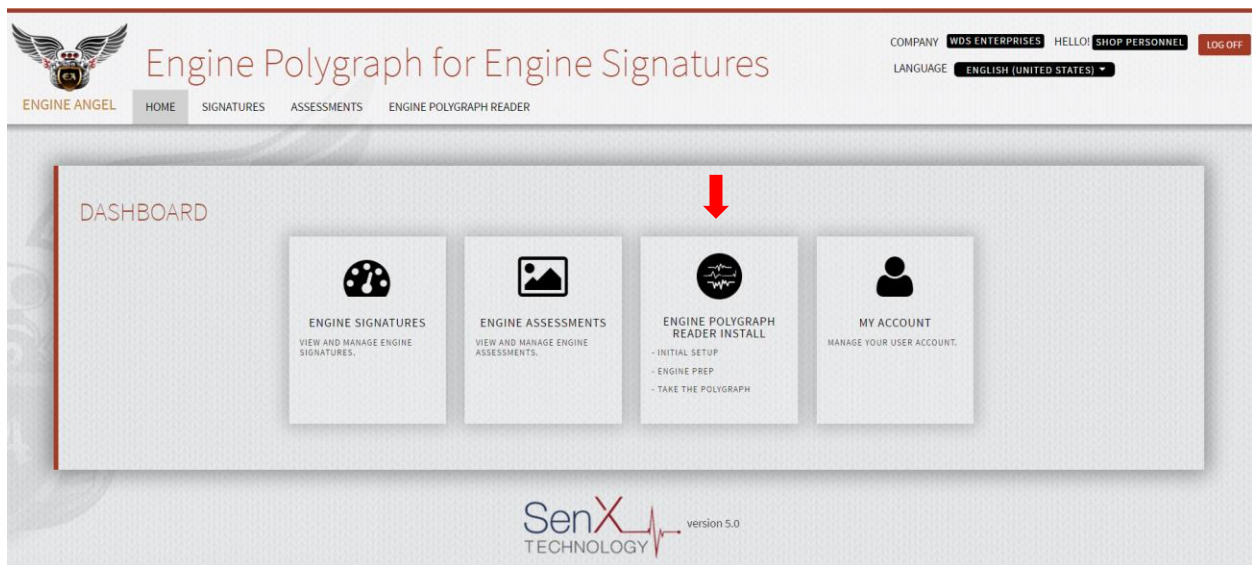

Figure 1: The Home screen of the Engine Polygraph web-based application (www.enginepolygraph.com)
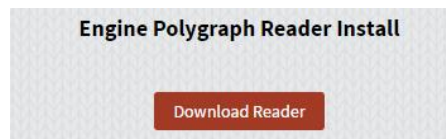
The system will then return:

Figure 2: Button to initiate the download of the EPReader Install on your device.

Click on **Download Reader** to download the Install Wizard and follow the instructions.

Sign-in to EPReader

The Install Wizard will place an icon on your PC desktop. Double-click on the icon to open the Login screen:

Figure 3 (Left): Panel displayed to initiate your session on your device.

Enter your Username and password. If you have forgotten your password, open the web-based application, www.enginepolygraph.com. From there, you can click on the 'Forgot your password?' to provide your Username. The system will send a Reset Password email to the email address attached to your User Name; that email will contain a link to a 'Reset Password' screen.

The session can proceed only if your device is attached to the Internet. If you want to collect a signature from a location without internet access, use the procedure described in the *Engine Polygraph Users Guide.* It describes how to use the **PicoScope 6 Automotive** software to collect the data and save the psdata file for later upload to www.enginepolygraph.com after you have established an Internet connection.

It you are using an OBDII reader to provide the engine RPM and coolant temperature, you might want to verify that the OBDII reader is visible to your laptop by checking the laptop's Settings → Bluetooth page and verify if it is 'visible'. See the OBDII Appendix for more details, if desired.

Enter the 'Signature' data

After you have logged in, you will obtain a screen as shown in figure 4. On the upper-right side of the Engine Polygraph Reader screen, the Company name, User Name, Language, and Version number are provided. If you are not running the most recent version of the software, the system will provide a message that there is a newer version available and a button allowing you to start the download and install the newer version to provide the latest features. The supported languages are displayed in the Language pull-down in the upper right section of the display. Pick the language of your preference.

As indicated in the blue text box, enter requested data in the fields or use the pull-downs and select the appropriate values.

If this is the first time that you are using this screen, the screen will have a number of default values that are most common. Be sure to check that these values are appropriate for your situation.

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If this is not the first time that you are using this screen, many data elements will be copied from the previous signature your company submitted. Be sure to verify all inputs.

Owner identifies the vehicle owner or Fleet name. NOTE: If the name you enter in the Owner field is the name for a Fleet that has a subscription to Engine Angel Fleet Management software and has requested that your company provide reports, the Fleet name will appear in the Fleet field and the Engine Angel Subscriber box will be checked.

Vehicle ID is an identifier visible on the vehicle to determine which vehicle in your shop you are working on. This might be a license plate number, the number painted on the sides of the vehicle (as is often the case for Fleet vehicles) or the model of the vehicle. NOTE: If the Owner is an Engine Angel subscriber, the system will check the Vehicle ID on the vehicle registry for the indicated Fleet. If the Vehicle ID is not on the registry, the Vehicle ID will turn red and no data will be sent to the Fleet's Engine Angel system. If the Vehicle Id is on the Fleet's Vehicle list, additional data from the Fleet database (e.g., Engine Serial Number) will be sent requested and printed on the reports.

Engine Manufacturer is a pull-down of many engine manufacturers from around the globe. Although most of the engine manufacturers can be determined from the vehicle brand/manufacturer, buyouts and joint ventures can "cloud the waters". In rare cases, you may need to search the internet to pin down unusual situations. A common confusion is with International vehicles often propelled with Navistar engines.

Engine Model is a pull-down that shows the Engine Models associated with the chosen Manufacturer, sorted in engine displacement (in liters). If your exact engine model is not on the list, select one with similar configuration, number of cylinders and displacement (displacement does not need to be an exact match), even if from a different manufacturer. Record the exact engine model and manufacturer in the Comments area and notify support@PredictiveFleetTechnologies.com so we can include the new model in our database.

Note: If the Vehicle ID is on an Engine Angel subscriber's system, the **Engine Manufacturer** and **Model** will be obtained from the Fleet's database.

The **Engine Configuration** and **Displacement** are obtained from our engine database and displayed for your verification of Model choice.

Figure 4. The Engine Polygraph screen to define the engine and conditions for the signature to be collected and stored, and analyzed, if requested. Fleet can be presented and 'Engine Angel Subscriber' checked to indicate that your company (DemoFleet1) has an agreement to provide signature data and reports to the fleet, DemoFleet1. In such a case, there will be no additional fee for the report.

Location is provided for companies that have multiple shops performing engine work and want to share results among them. It can be helpful for later search and retrieval of signatures and reports to know where the testing occurred.

Measurement Date displays as 'today' and cannot be altered from this application. For edits of data after submission, use the web-based www.EnginePolygraph.com application, EDIT screen.

Odometer is stored for future reference and comparisons over time. Use the units of measure (mi, km, or hours-of-service) appropriate for your company. Only a number will be shown since the units of measurement will be assumed by the Owner (Fleet) policy. Notice that we use the term 'Odometer', but really mean a measure of usage of the engine since new.

Engine Temperature is stored since many engines behave differently when 'cold'. The unit of measure (°F, °C) is derived from the value provided. If it is over 110, it will be assumed as Fahrenheit; otherwise, Celsius. Engine temperature should be an estimate of what the temperature will be when you will record the data – ideally with the thermostat open and the fan & air conditioning not running. If you have a Bluetooth connected OBDII ECM reader, Engine temperature and RPM will be provided and updated every few seconds until the data is sent to the servers for analysis and reporting.

Condition indicates the engine power status for the test. The options are **Load**, **Idle**, and **c-c** (cold-crank). This is used to determine which analysis models/rules will be used to interpret the signature data. It is important that the RPM is reasonable relative to the Condition specified. Load is for about 1500 RPM; Idle means the accelerator is not depressed at all. C-C is for a no-fuel cranking with the starter motor.

RPM and **RPM Source:** There are a number of ways that the RPM can be determined depending on the hardware you have:

1. Some engines (many diesel engines) have an electronic speed control by means of a computer attached to the Electronic Control Module (ECM). If you use such a capability, enter the rpm that you will be setting as the controlled engine speed in the **RPM** value AND choose '**Set RPM'** from the **RPM Source** pulldown.
2. If you have a wireless ECM reader (OBDII reader) plugged into the OBD port, leave the **RPM** value blank or 0 AND choose '**ECM'** from the **RPM Source** pulldown. As soon as you select 'ECM', the system will wait for the RPM value and the Engine Temperature from the OBDII reader. If no value is provided after a few seconds, you will get the message that it could not find the OBDII reader. In that case, either open your windows settings to connect to the OBDII reader or change the RPM Source to 'Estimate' and then input the value of RPM that you expect to use for the test.
3. If you have an accurate tachometer, you may input the **RPM** value you will run the engine at while the data is being collected. It will be important that the value you provide will be within 15% of the actual value or you may get an erroneous analysis. In this case, select '**Estimate'** from the **RPM Source** pulldown.
4. If you do not have an accurate **RPM** value, leave the value field blank or 0 AND select 'None' from the **RPM Source** pulldown. In this case, an estimate will be provided from the **Condition** option you select [Load, Idle, c-c (Cold-crank)] and the number of cylinders in the engine. Often this estimate is accurate enough to give a good analysis, but this is the least reliable of the options.

Channels A, B, C, and D indicate which attached sensors are connected to the PicoScope channels. By default, Channel A is reserved for exhaust; Channel B is reserved for the oil tube (dipstick); Channel C or D may be used for any of the other choices from the pull-downs. Each must have a value and the list includes 'none'. If the values were erroneously input in the wrong sequence, the assignment can be edited using the internet application, www.enginepolygraph.com.

Comments are free-text remarks about the engine/testing to enable accurate retrieval in the future.

Engine Poly Purpose indicates the 'purpose' for the report. The pull-down options allow: *Single* for a one-off test; *Before* to indicate that the test is to document the engine 'health' before an anticipated remedial procedure; *After* to indicate an assessment following a remedial procedure; *Base* to mark a signature as a baseline for future reference. (The *Base* is appropriate for a new engine.)

Trigger Cylinder indicates which cylinder number is the cylinder with the 'trigger' to sense ignition events. If no trigger sensor is used, this should be empty. The number specified must match the cylinder so named by the manufacturer. The trigger sensor (usually a current inductor clamp) obtains a strong voltage from only one cylinder; however, if the trigger file contains signals from multiple cylinders, leave the **trigger cylinder** empty.

Report Selection allows the technician to request the **Assessment** report, a **1-pge Assessment** report, the **Diagnostic** report, or **'none'** for no report. In this latter case, the signature will be stored for later reference – and may later be 'Edited' to obtain the desired report at that time. Detailed documentation for each report type can be selected for download from the EnginePolygraph.com website, 'Documents' section, below the log in area.

Send Report (PDF) to: is an optional field to contain the email address that you may wish the PDF report to be sent. It may be 'blank', in which case, the report will only be displayed on the web-based EnginePolygraph.com Reports page.

After you have completed the data entry for the vehicle and test conditions, start the engine unless it is already running; then click on Next. The PicoScope will be opened before the next step is initiated. You will be informed if there are problems communicating with the PicoScope.

Collect the data from your engine

In figure 5, we show a screen image for a vehicle that is in the Fleet, DemoFleet1. The Fleet Name and checkbox are provided by the system. The selected report will be generated, the data sent to the DemoFleet1 system, and presented on the Reports screen in the web-based EnginePolygraph.com application AND the data from the analysis is sent to Engine Angel. The price for the report in this case is built into the EngineAngel subscription price.

If the vehicle is not in an Engine Angel subscriber fleet, it is necessary to select the Report desired. In this case, the company would be charged the agreed price after the report appears. (The price per report is set at the time of the company registration.)

If RPM Source is selected to be 'ECM' and you have a blue-tooth connected ECM reader, the ECM will provide the Engine Temperature, and RPM values. Otherwise enter your estimates.
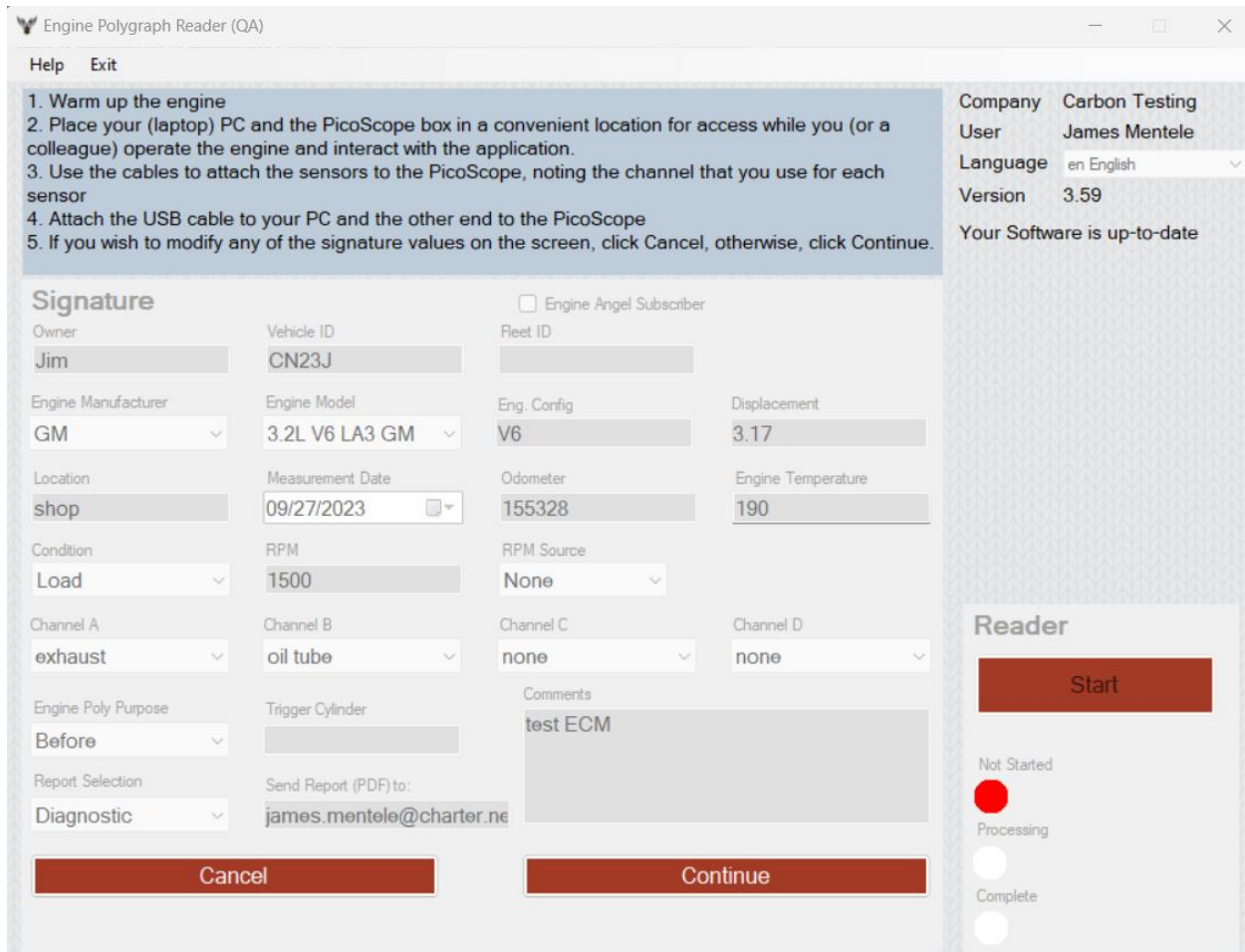
Figure 5. Screen showing the prompts and data after submission of the vehicle information and request, but before 'pushing' the 'Continue' button.

After the data looks correct and your engine is running at the desired speed, 'push' the 'Continue' button and then when the engine is running stedily at the desired speed, click on the red 'Start' button to begin the data capture and validation process. While the validation is occurring, the 'light' will turn yellow until the data has been sent to the EP servers and the **Complete** button turns green.

After the **Complete** light turns green, you may push the Next/Continue button to start the next engine test while the system prepares the report for the engine just tested.

View the Report

To view the selected report, one may see it attached to an email message from the system to the user's email address as specified in the EP User profile, or modified as you see fit. The detailed documentation for the reports are available in the *EP Assessment Report* and *EP Diagnostic Report* documents (downloadable from the EnginePolygraph.com website).

Or one can sign onto the web application, www.EnginePolygraph.com and look at the Reports page. It might be up to two minutes before the report is completed and presented. Your report should be near the top (last report for the company shows on top). Click on the 'eye-ball' to see the report or click on the envelope to specify an email address to send the report.

The list of previously collected Signatures on the web application can be sorted by any of the columns on the screen: just click on the column title to sort the signatures by that column, toggling between ascending or descending sequence. Or one can use the Search filters in the upper right of the screen to search the list for specified values or ranges of values.

Support

Please notify us of problems or questions related to Engine Polygraph at support@PredictiveFleetTechnologies.com or call us at (833) 364-2645.

Copyrights

Engine Polygraph, EPReader, and Engine Angel are copyrights of Predictive Fleet Technologies, Inc.; SenX and FirstLook are trademarks of SenX Technology, Inc.; Pico and PicoScope are trademarks of Pico Technology.

Appendix: Setup of the OBDII reader

You must have an OBDII reader with Bluetooth connectivity (ELM327 protocol) for Windows. We have successfully tested with two products: **KitBest** OBDII for Android and BAFX Bluetooth OBDII reader compatible with Android and Windows.

Connecting your laptop to the OBDII reader:

1. You can follow the instructions that came with your OBDII reader, or
2. Establish the connection by following this tutorial below.

First, check the status of the Bluetooth software on your laptop with your Windows 'Settings'. [In the Windows Search box, type 'settings' and then select 'Bluetooth and devices']:
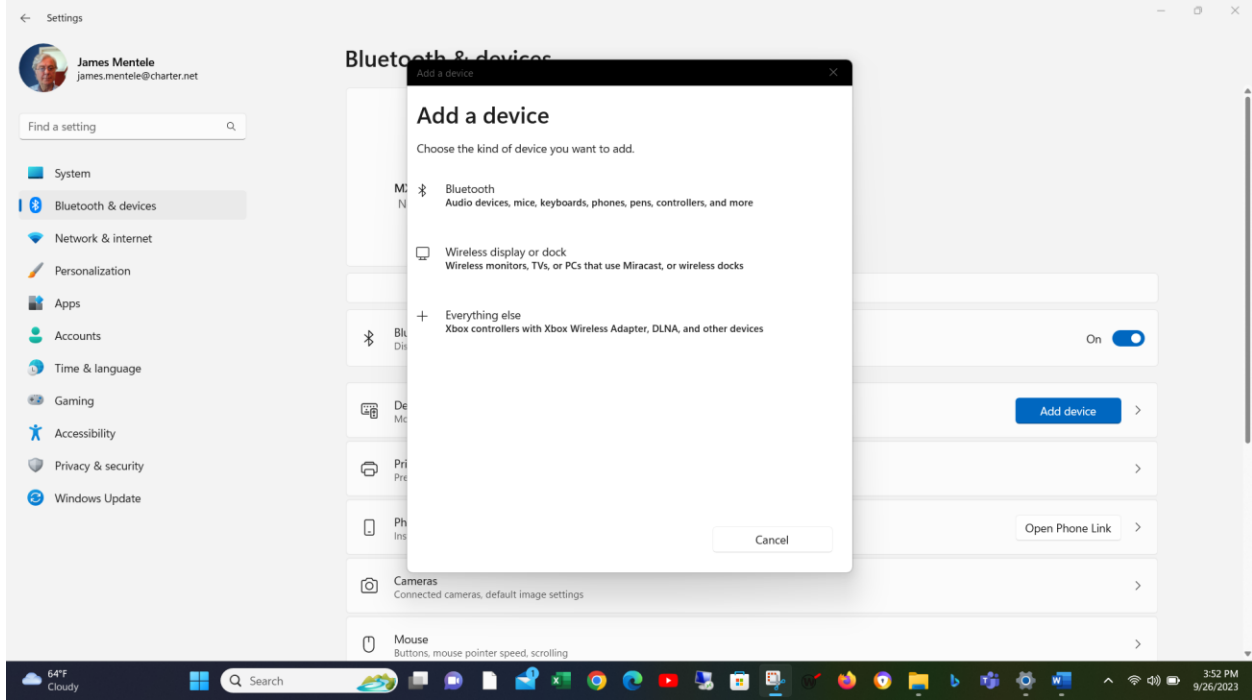

You should get the following screen:
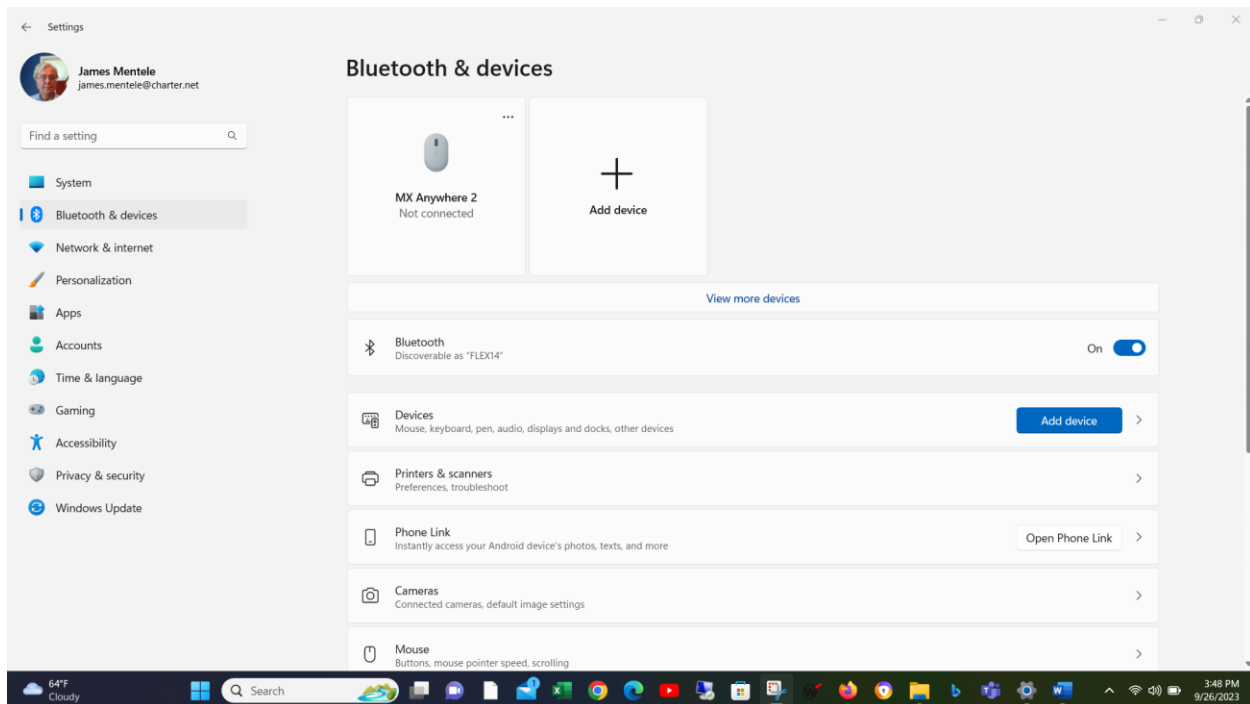
If there is an OBDII entry in the **Bluetooth and devices** list, you might first want to delete it with a 'right-click' over the '…' in the upper right of the OBDII icon and then click on the 'Remove device'.

Then, with the OBDII reader installed in the car reader port and the engine running, click the 'Add a device'. Select the 'Bluetooth' option.

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The system will now show all Bluetooth options; highlight the 'OBDII' entry. (It may take a number of seconds for the full list to appear.) You will then be prompted for the unit's PIN code (often '1234' or '0000'). The system should now acknowledge the OBDII reader, so you may close the settings panel.
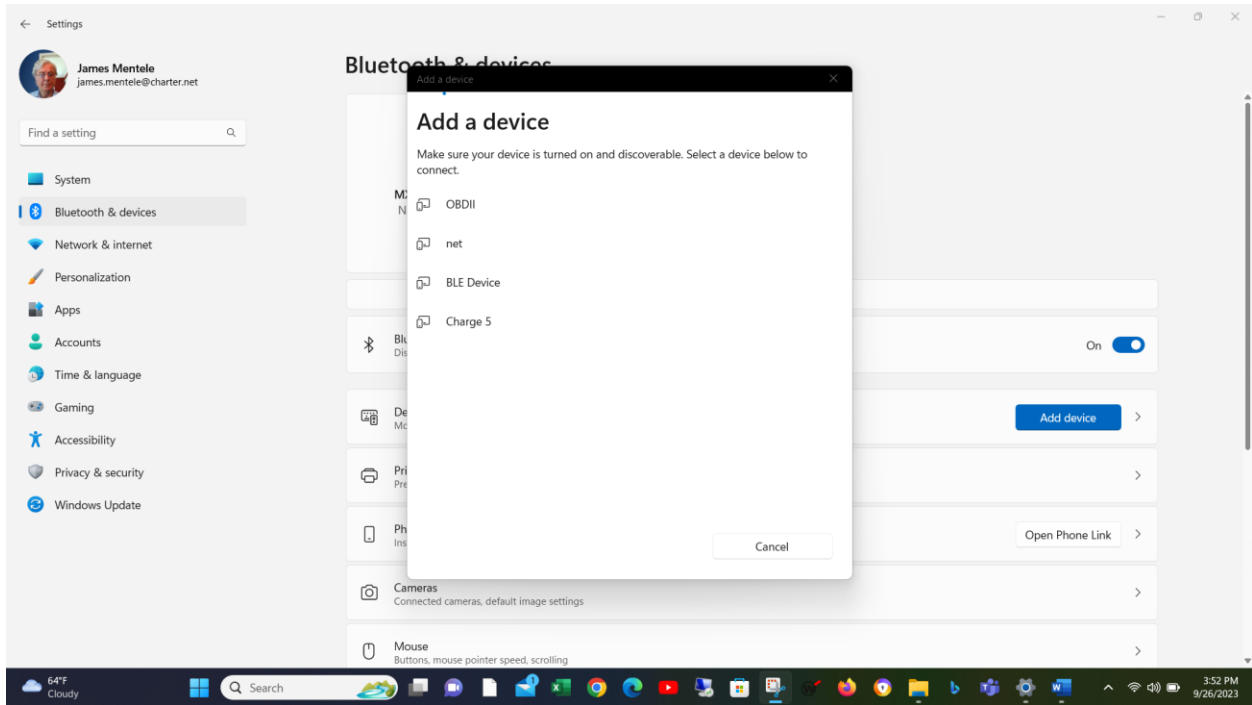
You will then be prompted for the unit's PIN code (often '1234' or '0000'). The system should now acknowledge the OBDII reader, so you may close the settings panel.
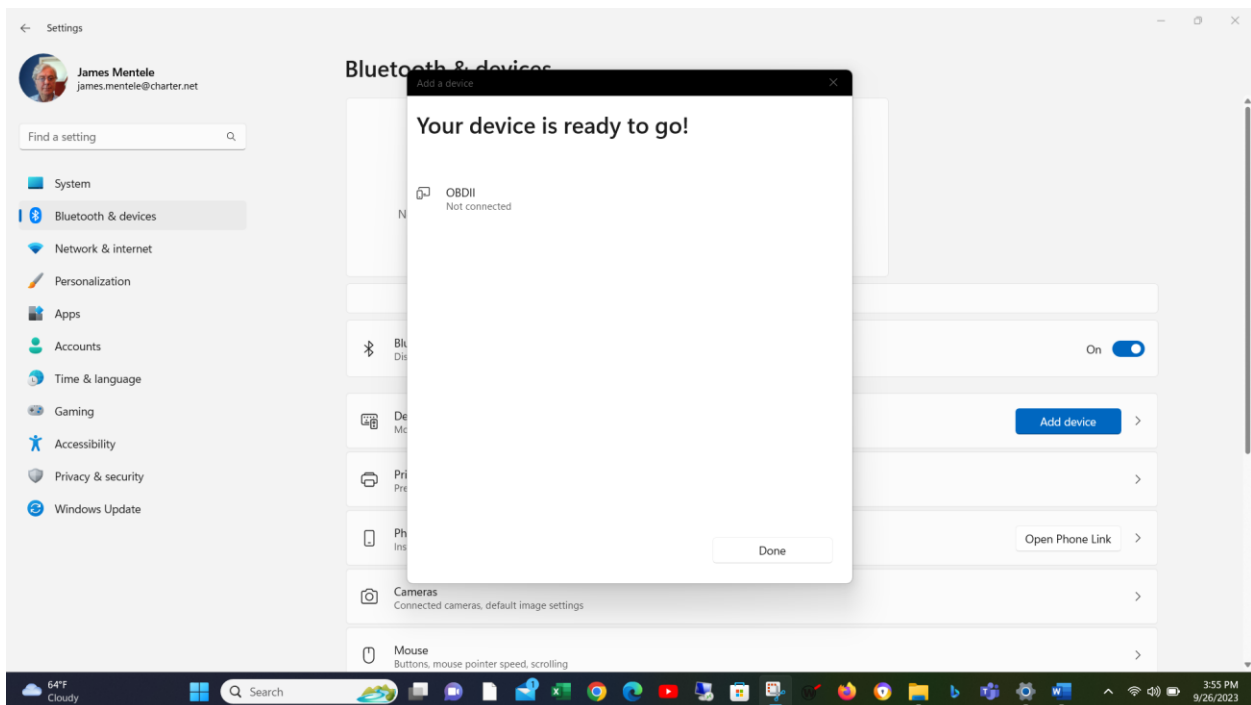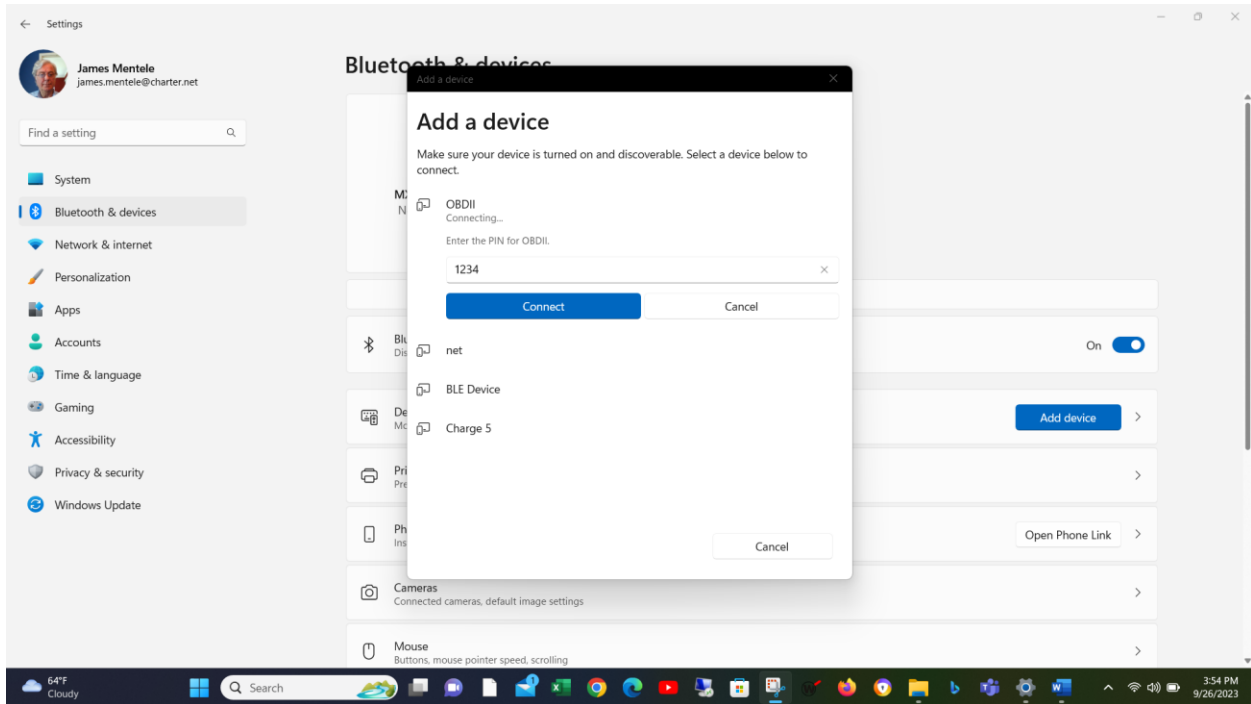
Click 'Done' and at this time you may minimize this screen and bring up EPReader and Sign-in.

Fill in the needed data, including an estimate of the Eng Temp and desired RPM. Do not select the ECM as **RPM Source** until you have filled the other data fields because the system will start connecting with the OBDII as soon as you choose 'ECM'. It will relace your estimated with the value from the ECM.

When you select **Next**, you will be asked if you want to proceed with the following input for RPM. If you want to use the accelerator to increase the RPM, click '**No**' and start accelerating the engine and click Next. When the engine is near your desired **Load** speed, click 'Yes' and then **Next**.