Service Bulletin

Bulletin No.: 19-NA-233
Date: October, 2019

INFORMATION

Subject: **Diagnostic Tip for Misfire, Malfunction Indicator Lamp (MIL) Illuminated - DTCs P0300, P0301, P0302, P0303 and/or P0304**

Brand:	Model:	Model Year:		VIN:		Engine:	Transmission:
		from	to	from	to		
Chevrolet	Colorado	2016	2020			LWN	
	Express	2017					
GMC	Canyon	2016					
	Savana	2017					

Involved Region or Country	North America
Condition	Some customers may comment on one or more of the following conditions: • MIL illuminated • Misfire Some technicians may find one or more of the following DTCs set in the Engine Control Module (ECM): • P0300 • P0301 • P0302 • P0303 • P0304
Cause	This condition may be caused by one or more of the following conditions: • Fuel Injector • Electrical issue • Loss of cylinder compression
Correction	**Note:** The purpose of this bulletin is to show you a way to confirm if you have a mechanical engine issue or not. A Relative Compression test can be used to determine if the misfire is caused by an engine compression issue or not.

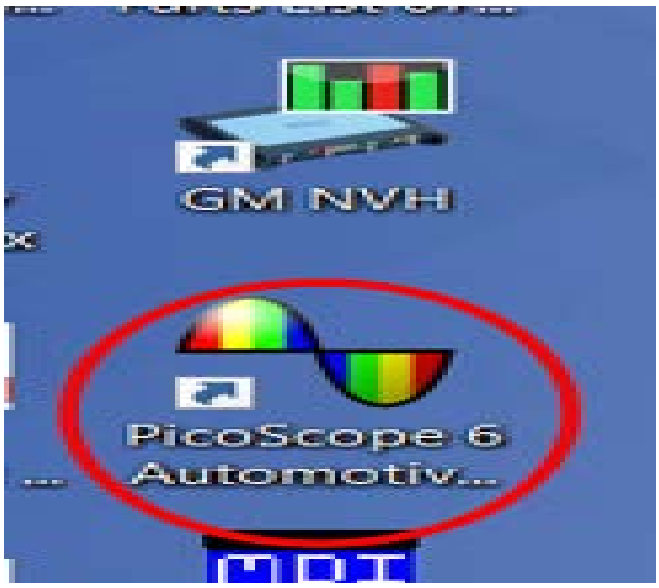
Service Procedure for Running a Compression Test

A technician may find that a relative compression test can be used to rule out an engine compression issue. A relative compression test can be performed with different tools and the engine can be cranked over using many different methods.

For this communication, use the PicoScope CH-51450 and available CH-51450-LEAD kits or equivalent.

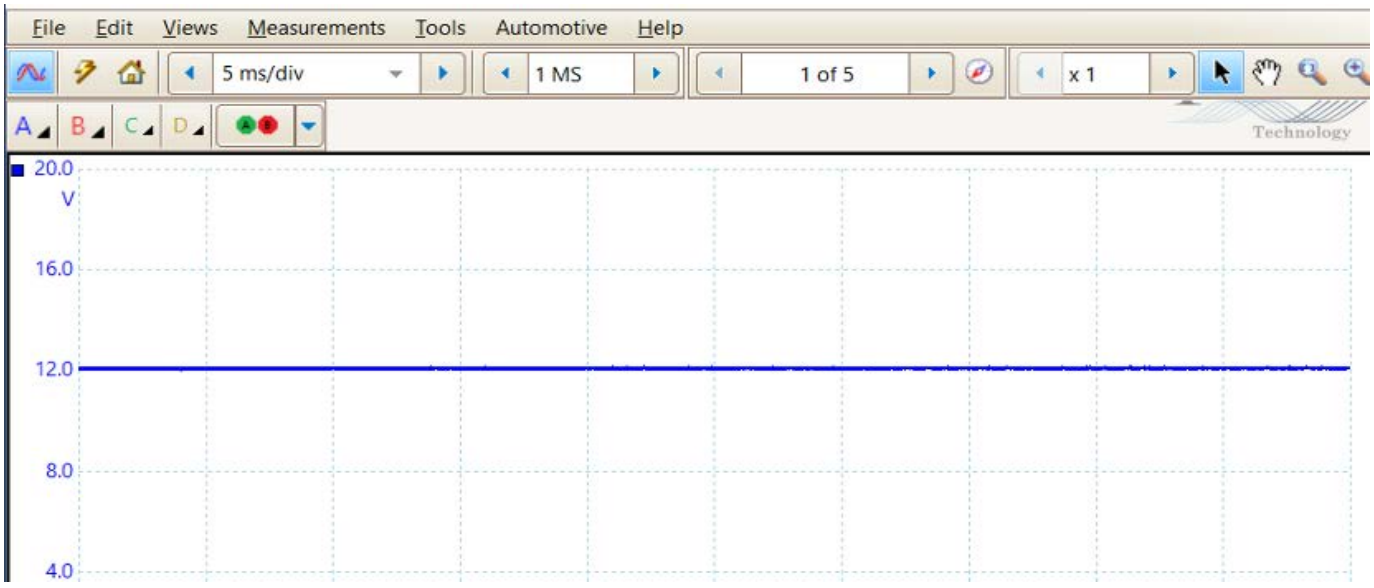
Note: Pull the Fuel Pump Relay so the engine can be cranked without any fuel being delivered to the engine.

1. Remove the Fuel Pump Relay from the Underhood Fuse Block.
2. Connect the PicoScope to the computer using the included USB cable as you would do using GM NVH.
3. Connect test leads to the battery (hook the colored lead to Battery (+) and the black lead to Battery (-)) and to channel A of the PicoScope.



5419685

4. Open the most current version of PicoScope 6 Automotive for GM software that is loaded when GM NVH software is installed.
   ⇒ If Picoscope 6 Automotive is not on your computer, download the newest version of Pico Scope NVH Software Update V.R.1.11.1_September_2018 or later.



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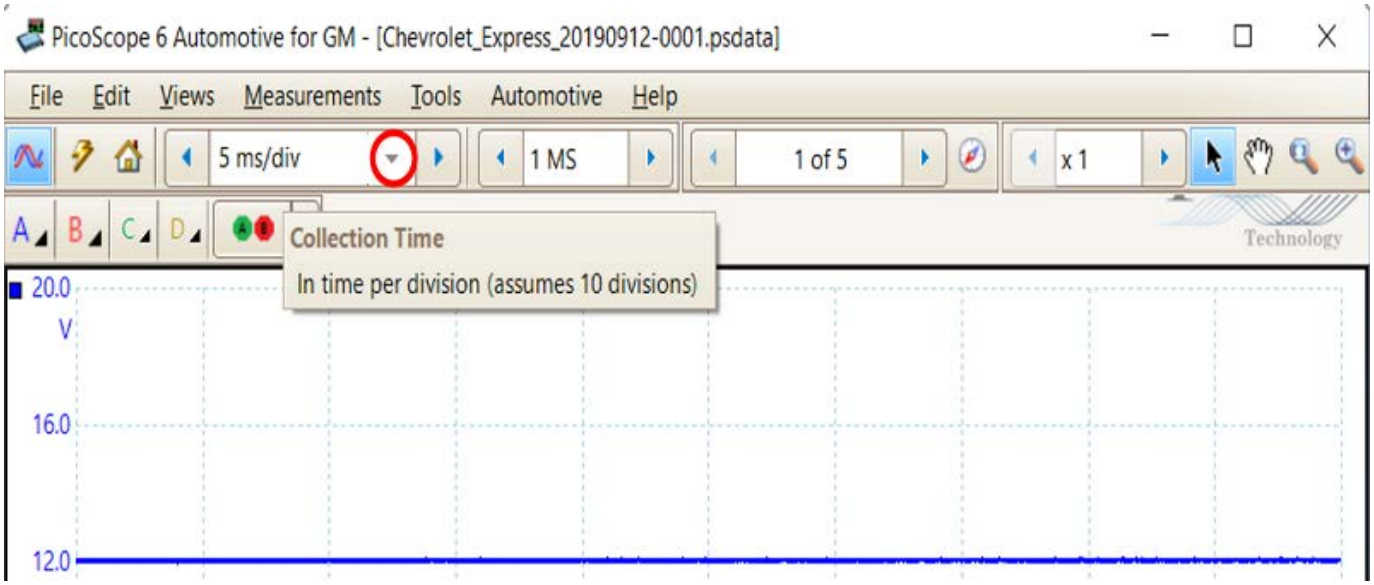
5. With the PioScope hooked up and the software running, a steady line at battery voltage on the graph should be displayed.



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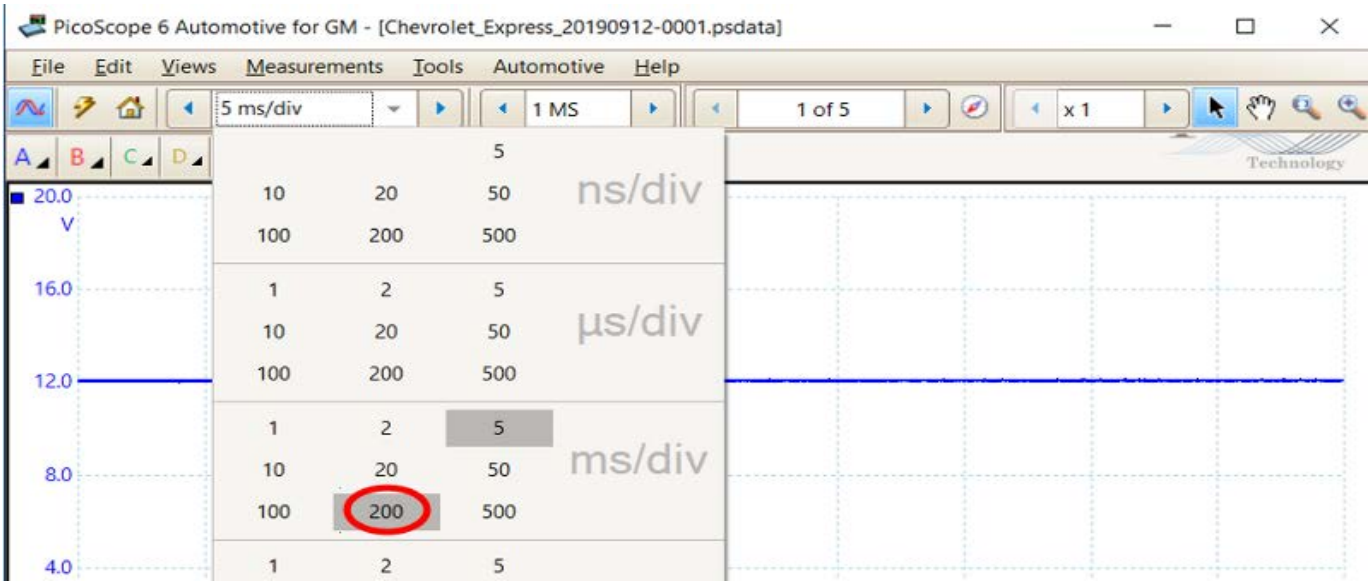
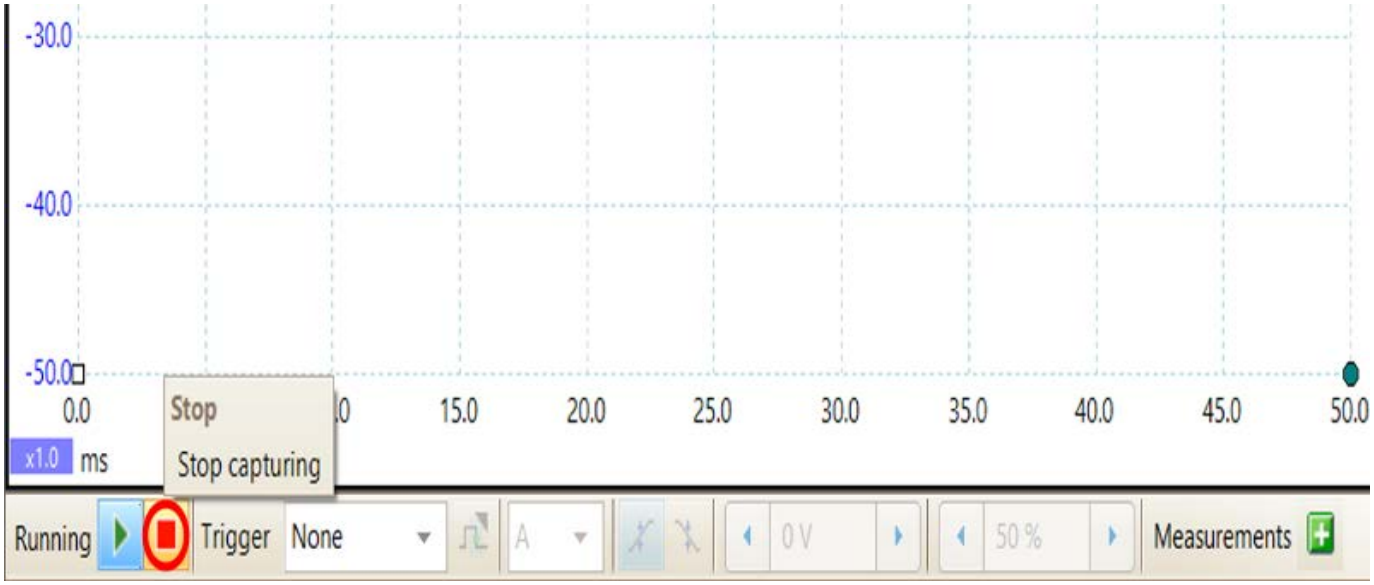
6. Select the Collection Time drop down.



5419718

7. Change the collection time from 5ms/div to 200 ms/div.



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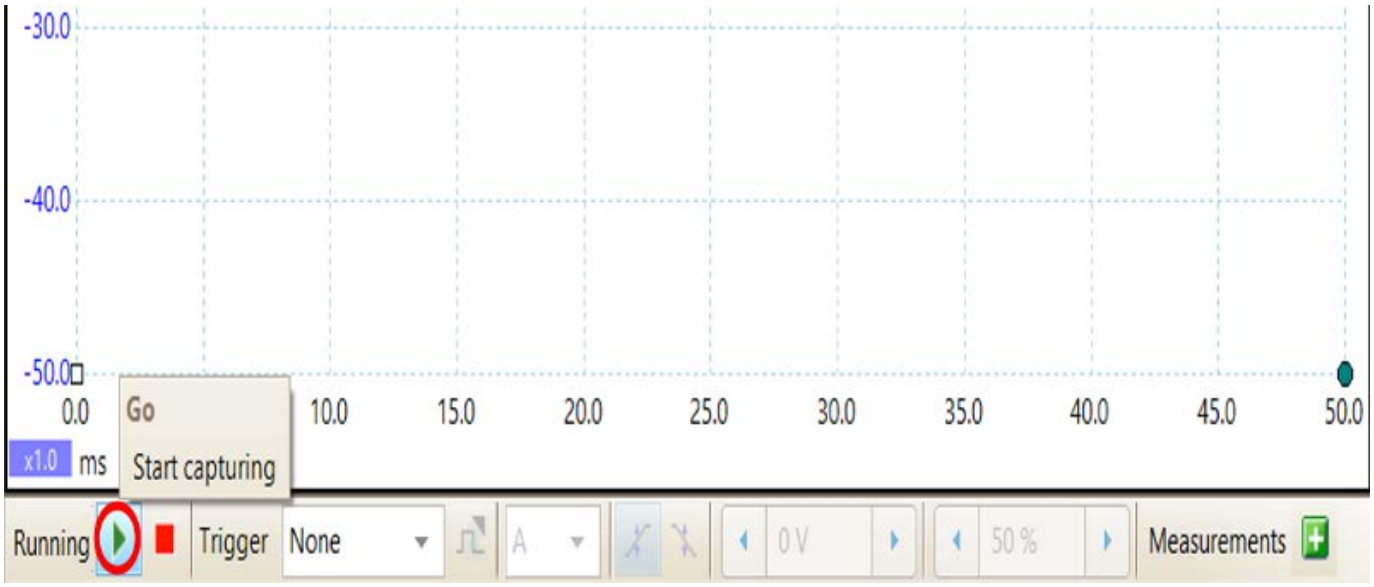
8. Crank the engine for two to three seconds.
9. Immediately after cranking the engine, select the Stop capturing button at the bottom of the screen.



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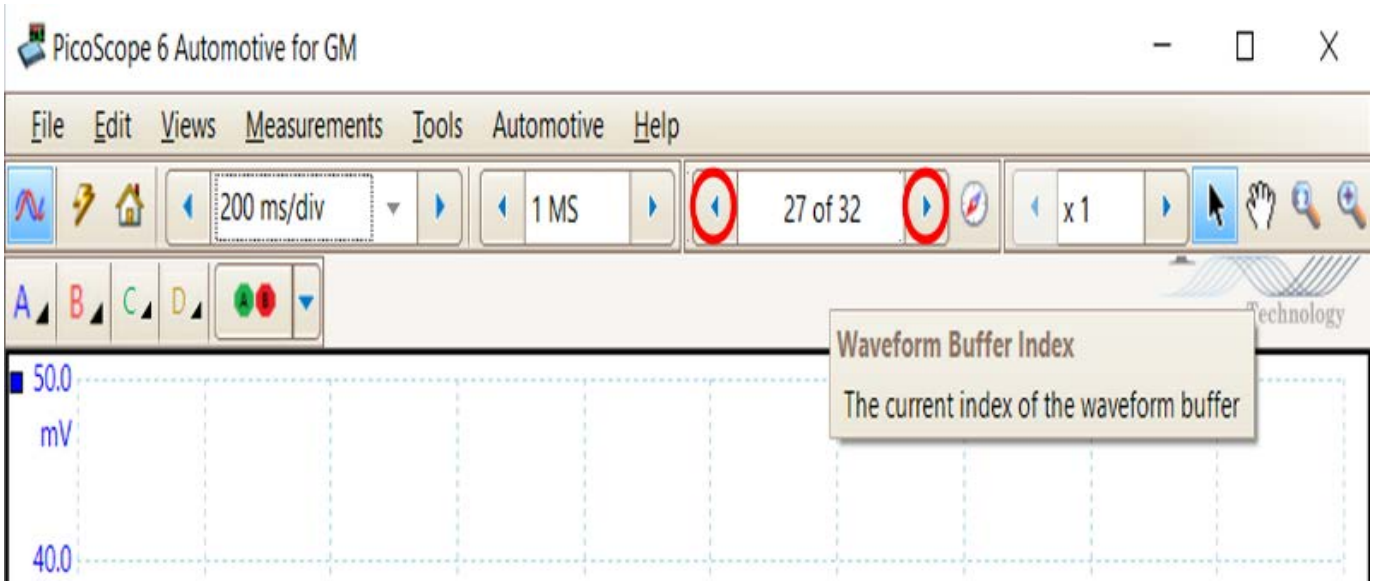
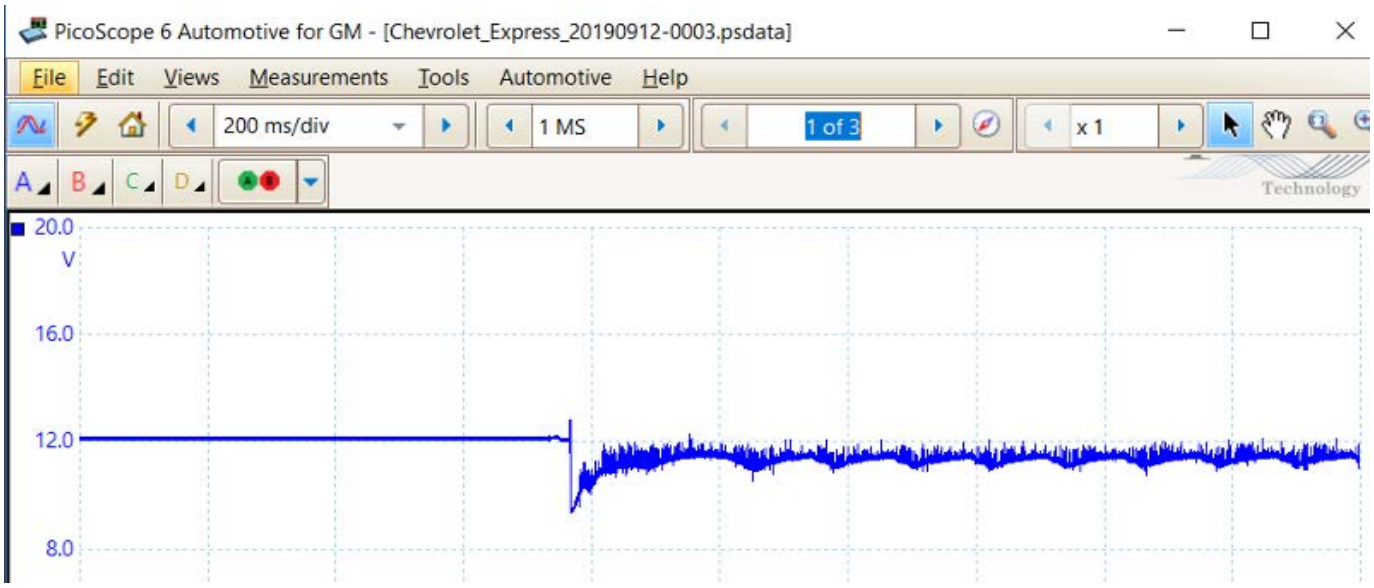
10. Save this file to the PC.
    ⇒ It may be useful to repeat steps 8 thru 10 a few more times to collect additional wave forms. To do this, you will need to hit the Go or Start capturing button prior to cranking the engine.
11. Disconnect the PicoScope.
12. Reinstall the Fuel Pump relay.
13. If any codes have set as a result of removing the fuel pump relay, clear them.

Setting Up PicoScope 6 Software to View Waveforms



5419752

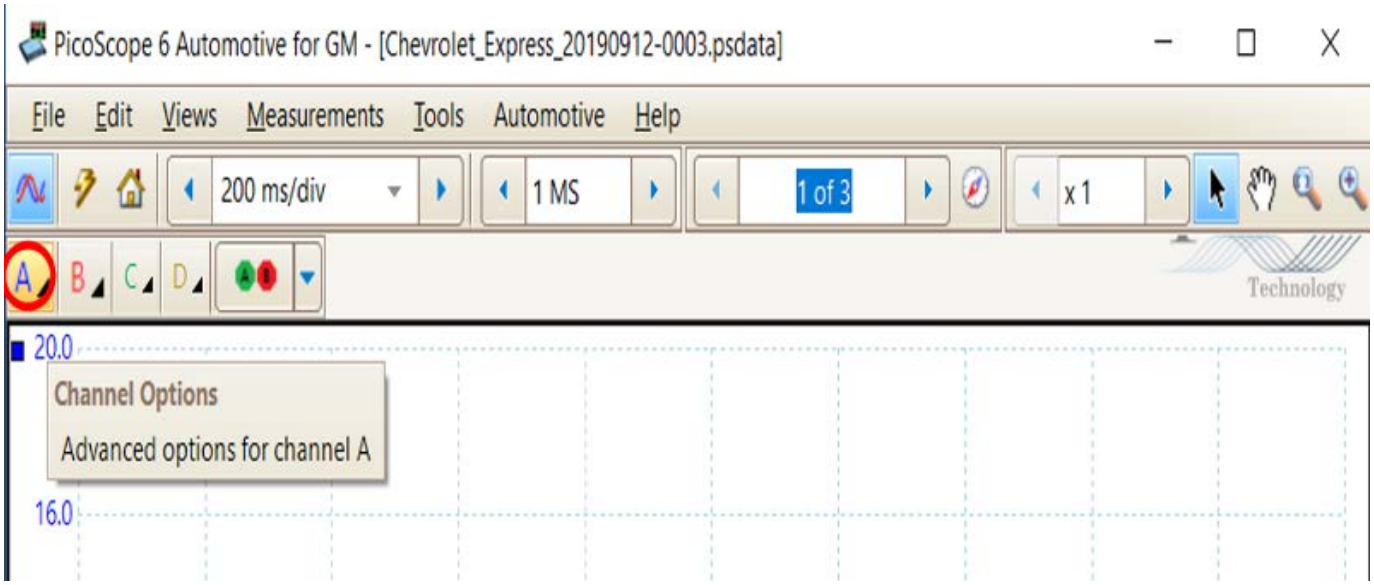
To examine one of these wave forms, use the Waveform Buffer Index navigation buttons to locate the start of the cranking.



5419756

To view the Wave Form, zoom in to the right side of the graph.

The graphic above depicts a viewable Wave Form Pattern.



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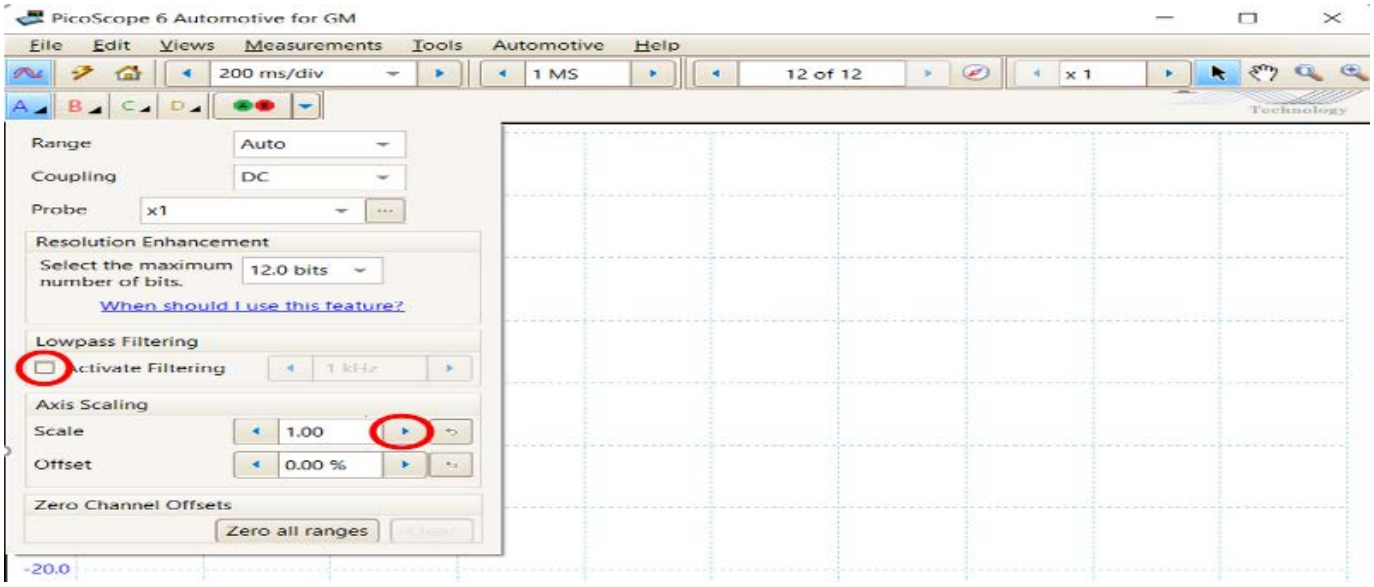
Change settings.

⇒ Select the drop down next to the blue “A” (for channel A).

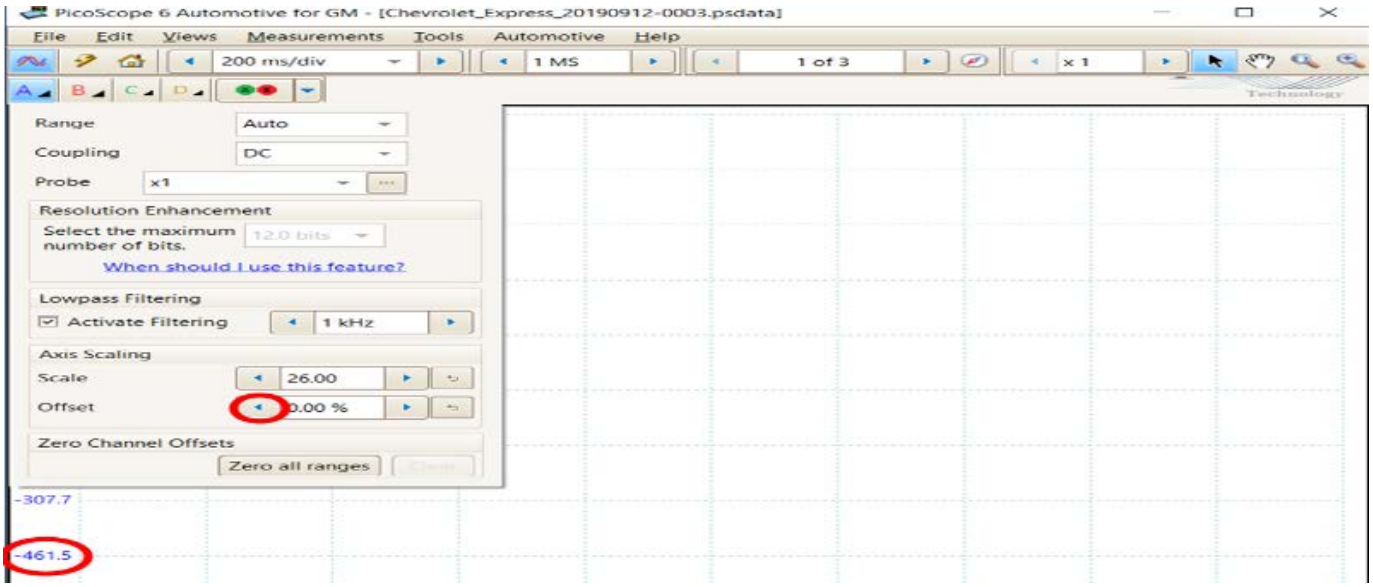


5419767

The channel options screen should be displayed.

⇒ Select the Lowpass Filtering Active Filtering check box (1kHz to start).

⇒ Change the Axis Scaling Scale value to 26.00.



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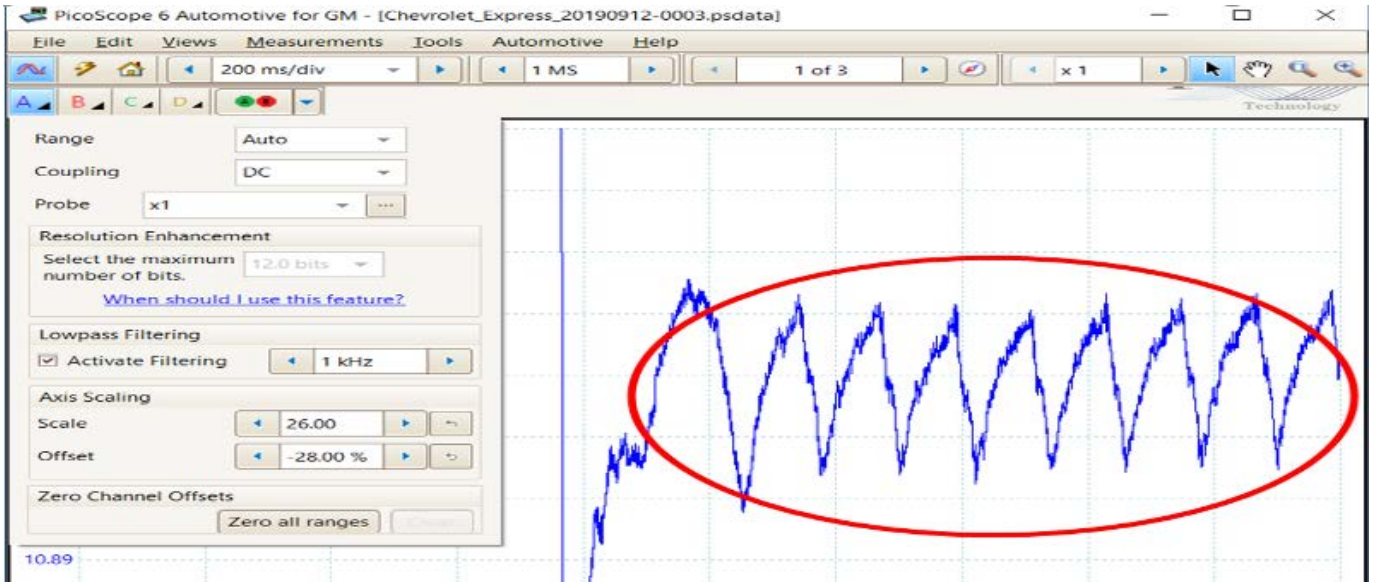
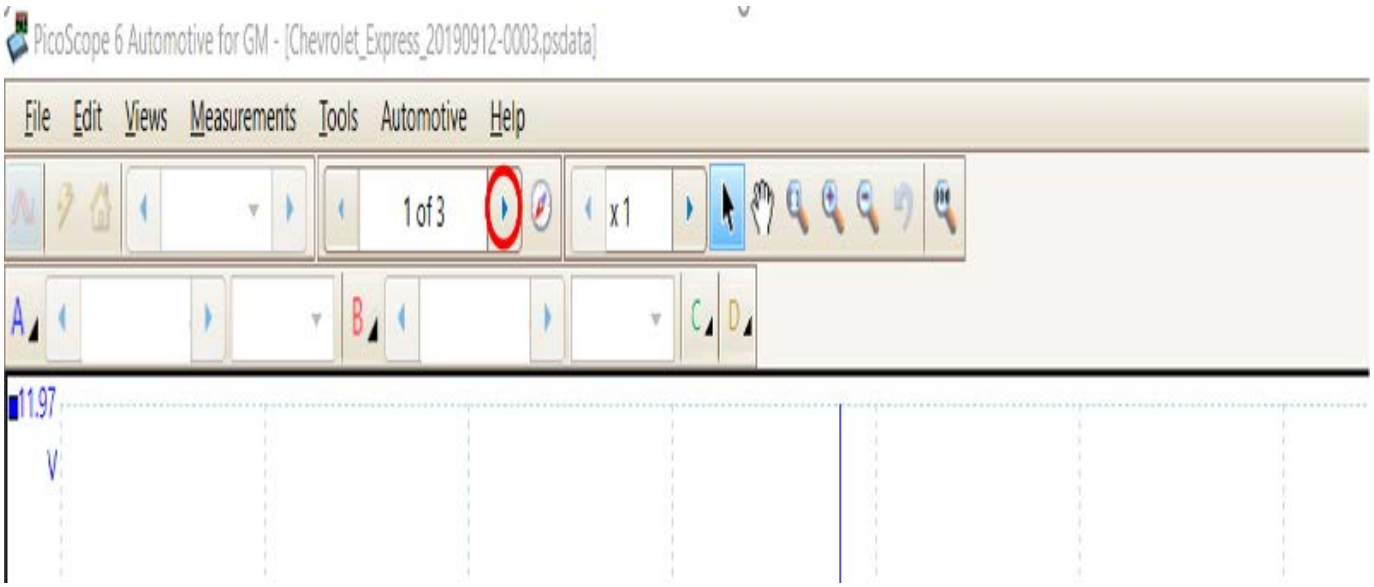
Take note, the voltage graph appears to have disappeared, but if you look at the scaling on the left, you will see that the value is a very high negative number.

⇒ Use the axis scaling offset to bring the graph back into view.



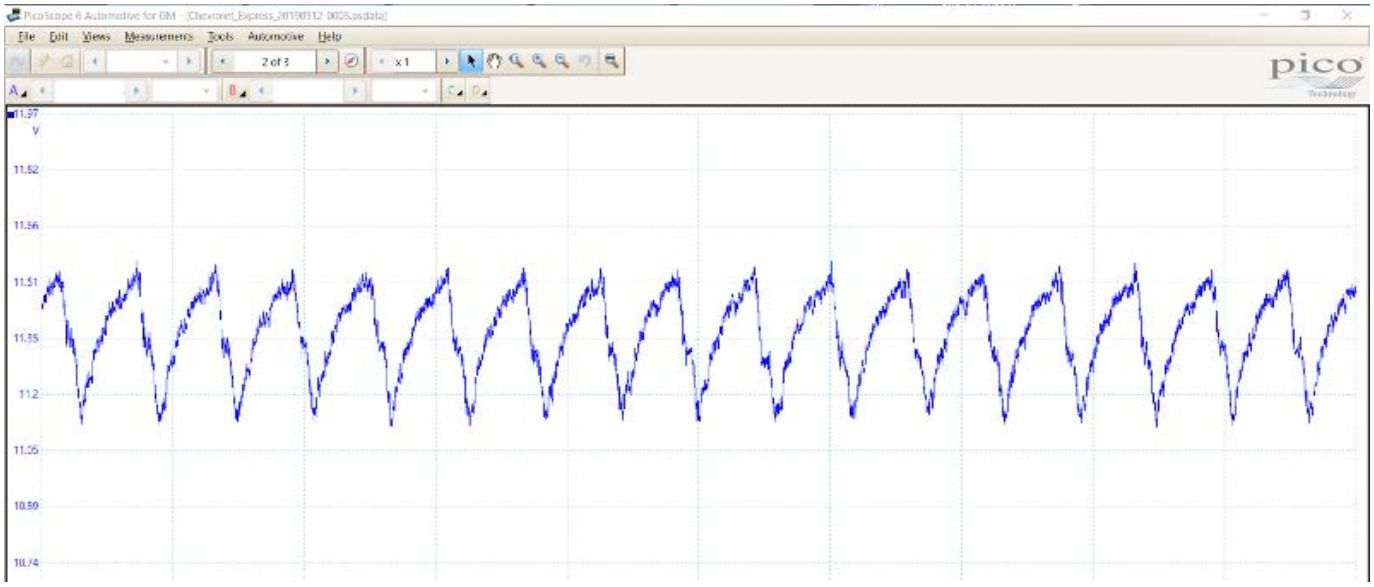
5419787

The graphic above depicts a viewable Voltage Graph Pattern.



5419810

Use the waveform Buffer button to move to the next window.

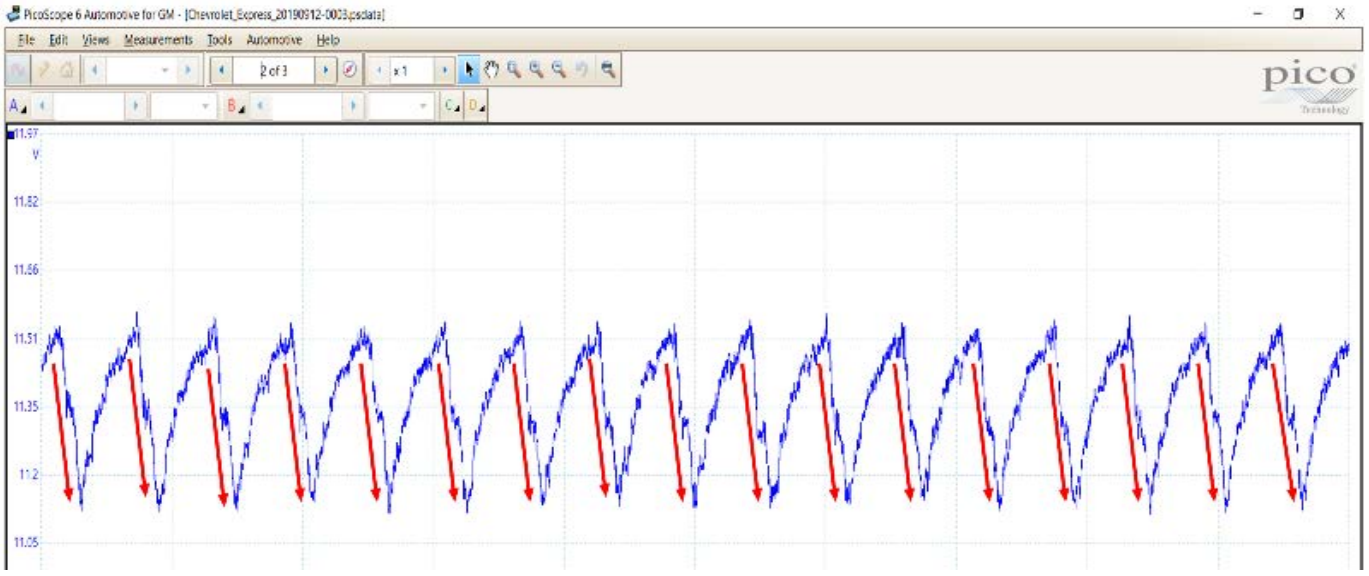


5419821

The graph above illustrates an engine that will pass a compression test and there is no reason to think that there is anything mechanically wrong with the engine.

⇒ If the graph does not look like the graph above, Refer to Analyzing Relative Compression Graphs section below.

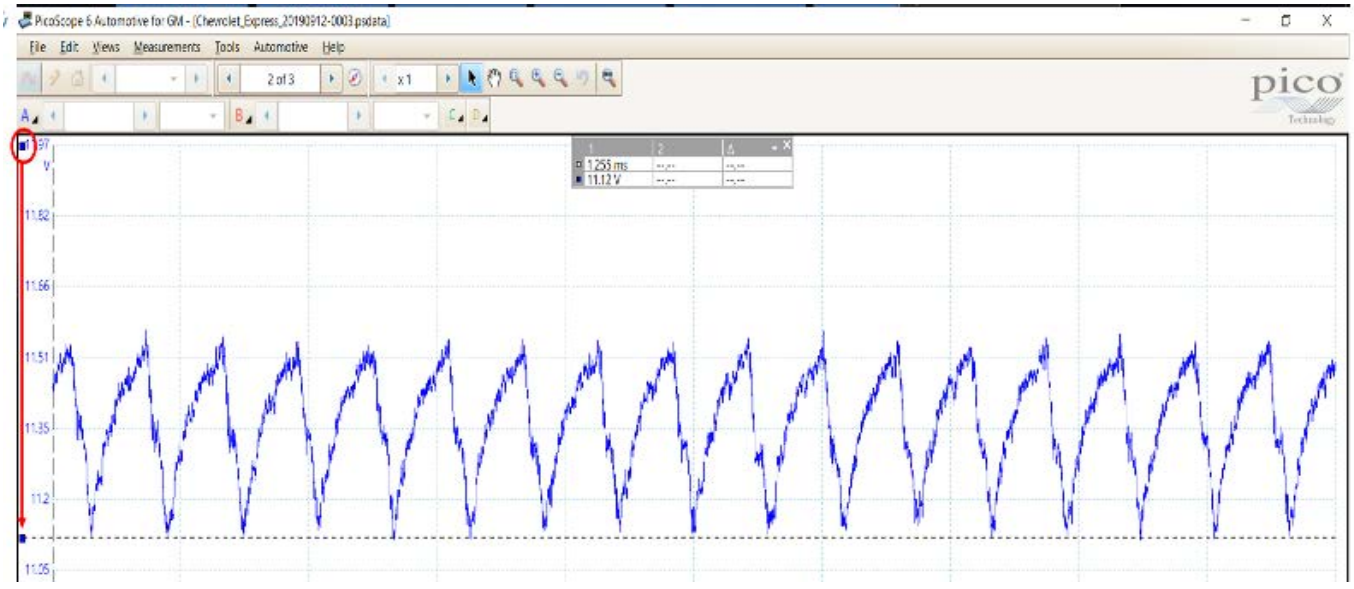
Analyzing Relative Compression Graphs



5419916

When examining these graphs, view the downward portion of the waveform.

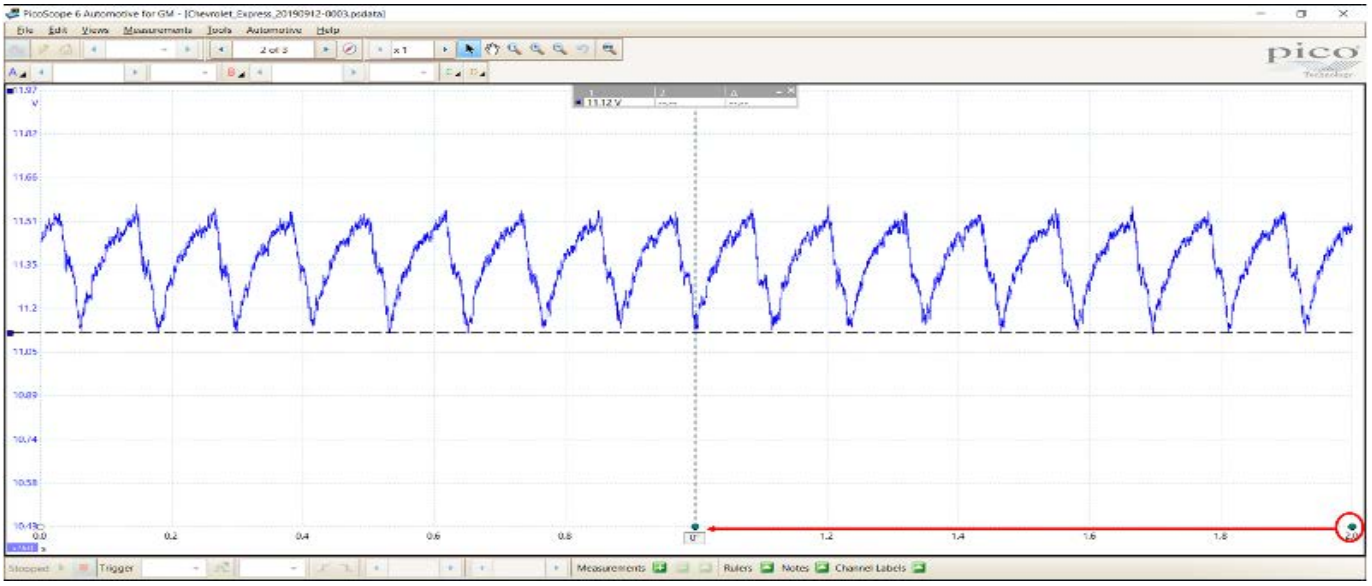
This area of the graph is the engine starter pulling more electricity from the battery during a compression stroke.



5419910

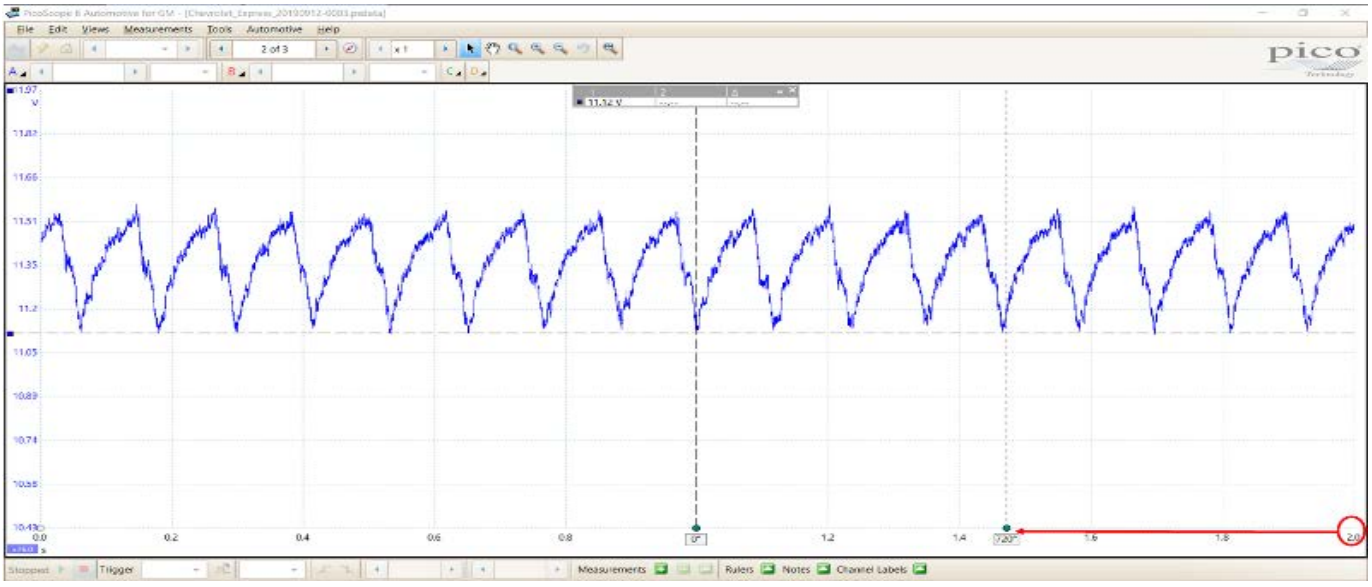
Utilizing a horizontal ruler, line up the bottom of the waveform.

⇒ Select the blue box and drag it to the location that's viewable.



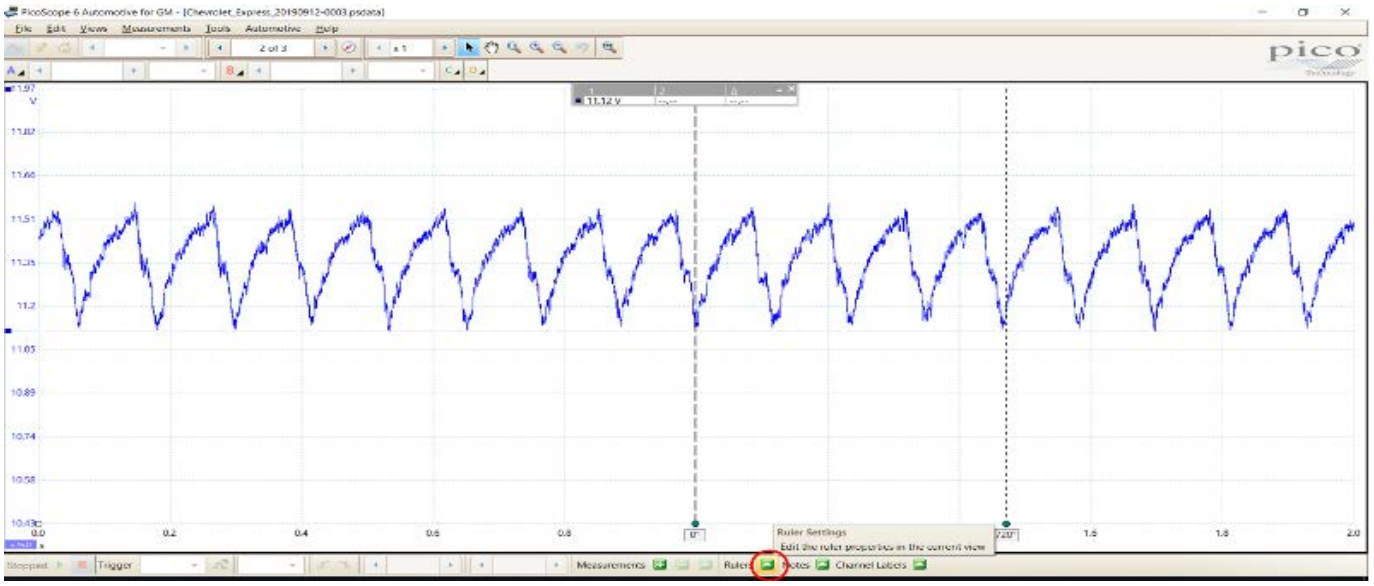
5419940

Vertical rulers may be used as well.



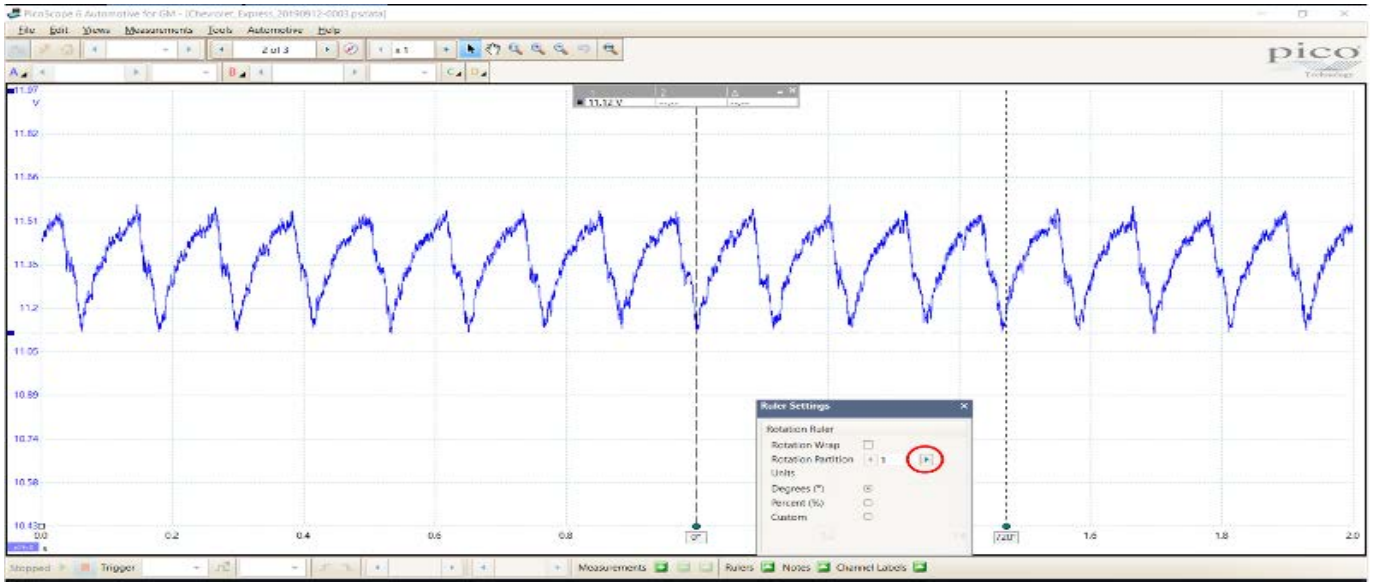
5419944

Utilize a second ruler.



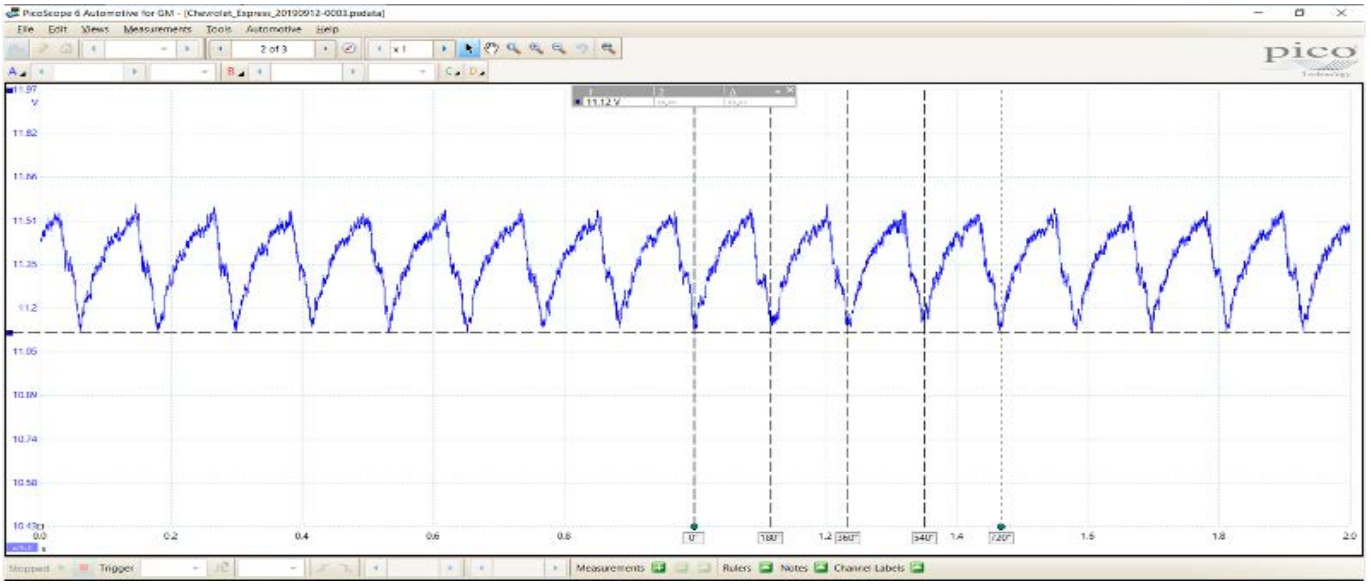
5419948

Select the Ruler Settings Button to display the Ruler Setting menu options.



5419955

Change the rotation partition to 4, to represent the number of cylinders in the engine.

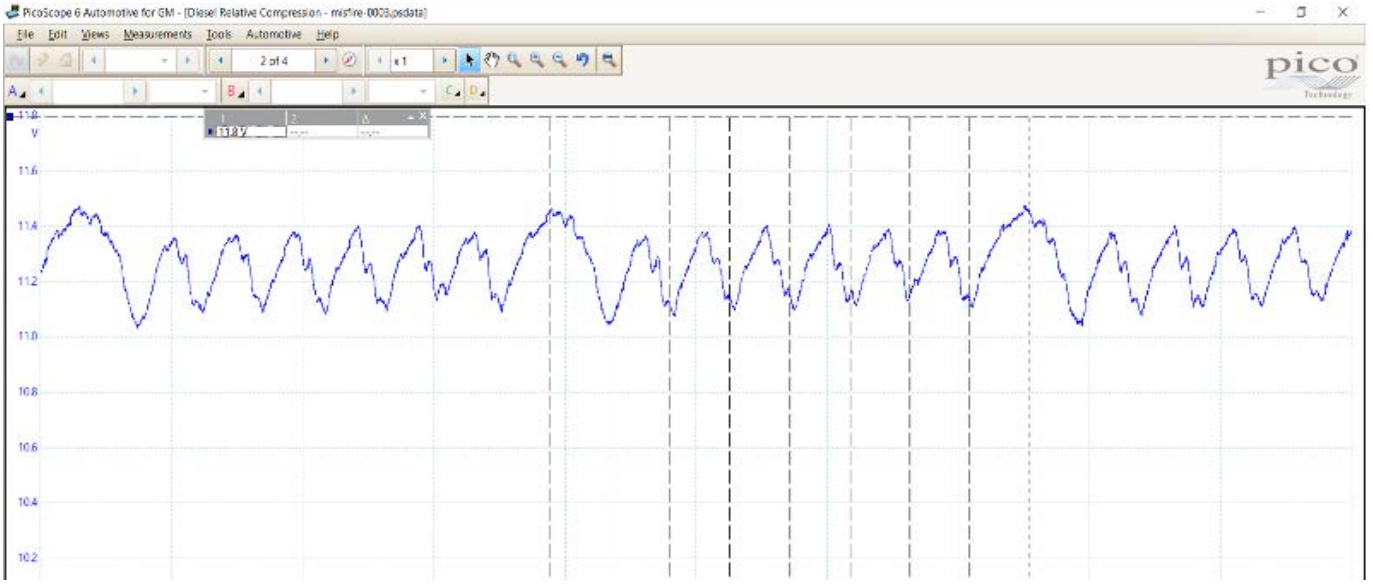


5419966

This should help to identify the top of each compression stroke in two rotations of the engine.

It is not an issue if you see a few of these “tips” that do not touch the line. What we are looking for is consistently one of every four points not hitting the line for a four cylinder engine.

Sample Waveforms for Reference

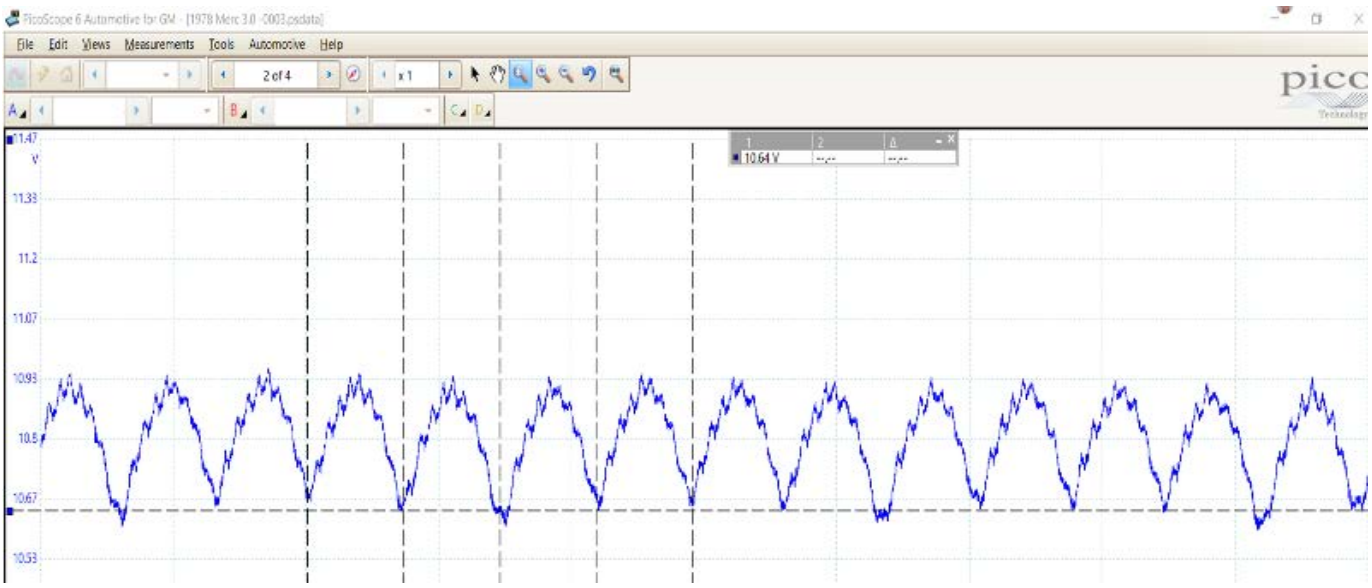


5420017

The graphic above depicts an example of an eight-cylinder engine with a cylinder that has no compression in one cylinder.

Note that one of the dips is missing and it repeats every eight dips.

– This is a clear indication that there is an issue with this engine.

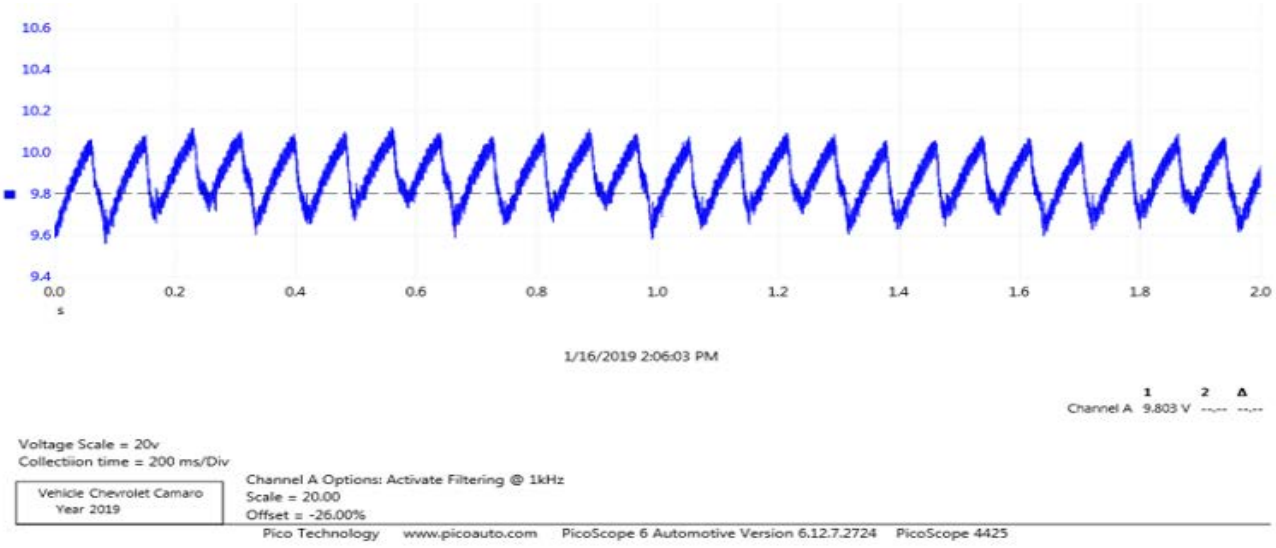


5420027

The graphic above depicts an example of a four-cylinder engine with a bad exhaust cam lobe.

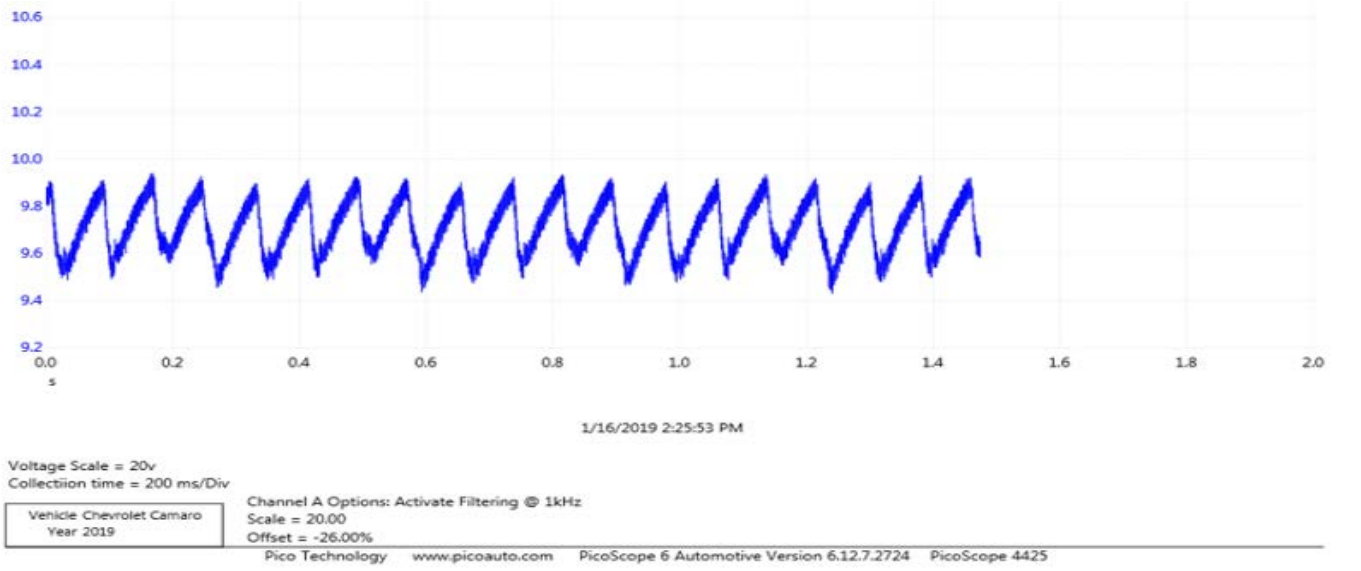
Note that consistently there is one cylinder with an extra-long compression stroke.

– Examination of this engine showed that cylinder number four had a worn down cam lobe.



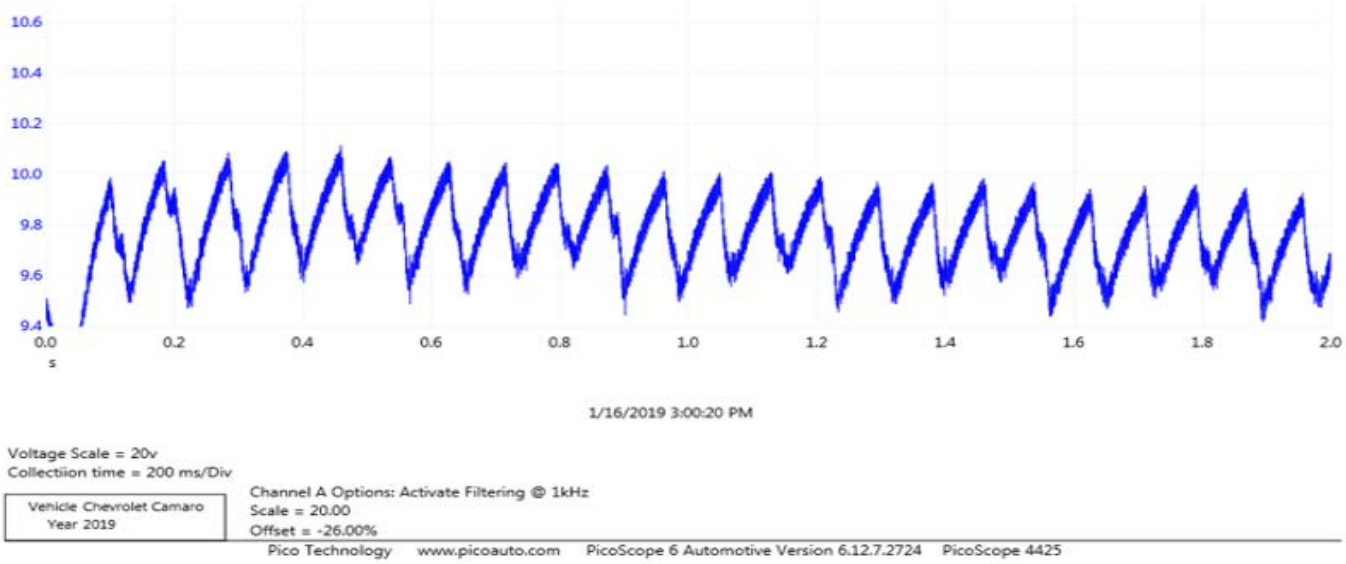
5420028

This is a four-cylinder engine with a 20 PSI loss in one cylinder



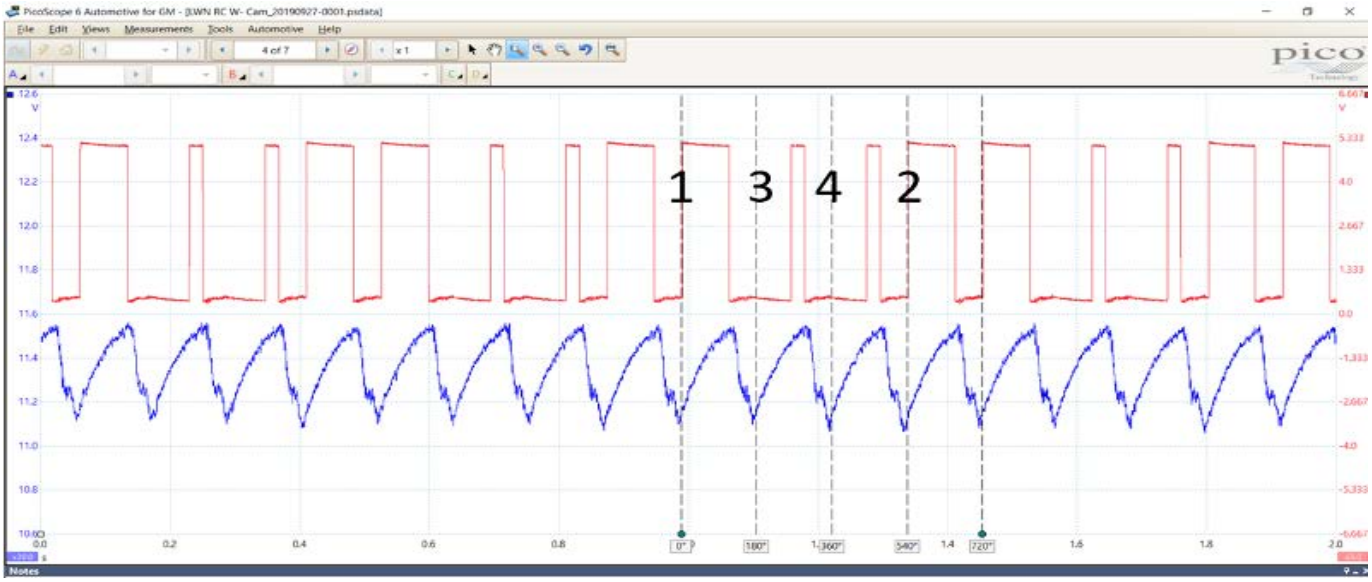
5420034

This is a four-cylinder engine with a 40 PSI loss in one cylinder.



5420040

This is a four-cylinder engine with a 60 PSI loss in one cylinder.



5420048

If an engine has low or high compression on one cylinder, it may be useful to add an injector pulse or a Camshaft Position Sensor to help determine which cylinder has an issue.

The graphic above shows the signal from the Cam Position Sensor for reference.

Background Information

By graphing the battery voltage while cranking an engine we can get a good picture of how the compression in each cylinder compares to the compression in each other cylinders in the engine. When you think about an engine being cranked over by the starter, each time a piston compresses the charge in the cylinder, the drag on the starter increases which in turn increases the starter draw and decreases the battery voltage until the air in the cylinder is compressed.

After this compression stroke and before the next cylinder in the firing order begins its compression stroke, there is a short period of cranking where the voltage increases. This is what gives the us the pattern to examine on a scope as well as the distinctive sound of an engine being cranked.

If each cylinder in the engine are of very close compression, the resulting pattern on the scope will be equal all the way across the screen. If one of the cylinders in a four-cylinder engine has low compression compared to the other three, then every four “waves” will look different than the other three. The same can be said of an eight-cylinder engine that has a weak cylinder, the wave pattern will look different on every eighth wave.

Version	1
Modified	Released October 14, 2019