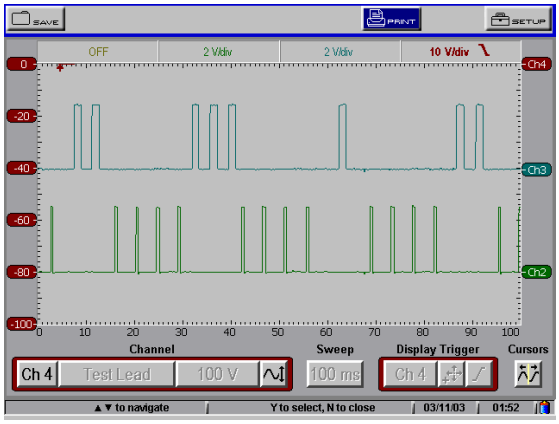
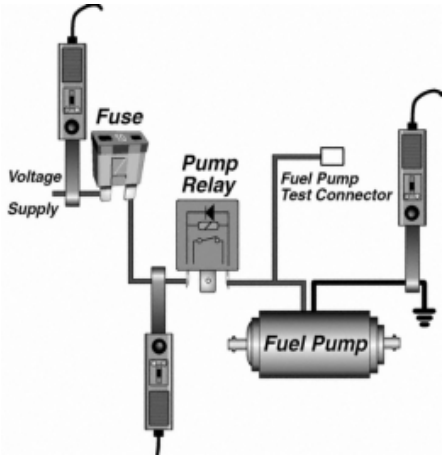
Mastering Your Snap-on MODIS



Remember:
The only limit to your knowledge, are the limits that you put on yourself…



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Introduction:

One of the biggest problems I have noticed when talking to technicians lately is their lack of understanding in the use of a Lab Scope and how to properly set it up to view the signals correctly.

I have compiled this manual solely for this reason. The information found here has been accumulated over many years of my real world experience using a Lab Scope. All the examples found in this manual have been captured from vehicles with, and without problems. There are no simulated waveforms. One thing I can not stress enough (and you will repeatedly see it mentioned throughout this manual) is that you need to look at good waveforms and compare their relationship with each other considerably more than you need to look at all bad examples. What good does it do to look at a bad waveform when you do not know how it normally should look?

When I was creating this manual many techs wanted it to be on a particular scope. This is a good idea - but, would be almost impossible for me to do. You see, there are so many different scopes on the market that I can't possibly collect waveforms on all of them. Also, I do not have all the scopes available to me. Although you may not see your particular scope in this manual, these set-ups and waveforms will be the same on any scope available now and in the future. All waveforms will display the same, and since the laws of electricity will not change, neither can a waveform. They will always be displayed as voltage over time.

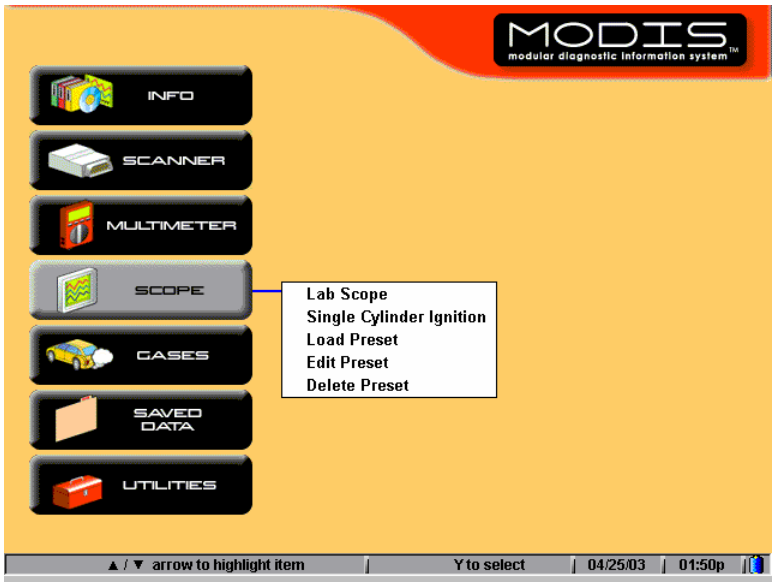
You can e-mail me if you have any suggestions for future manuals, changes you would like to see… or something you do not understand in the manual. Contact me at mherbert1@woh.rr.com. If you would like a hands on training class on Lab Scopes contact me at 937-498-4384 or 937-492-5397 8 am – 5 pm Mon. – Fri. EST.

Scope Menu Terminology & Navigation:

Before we go too far with this manual, we first need to go through some of the basic functions and menu selections available.

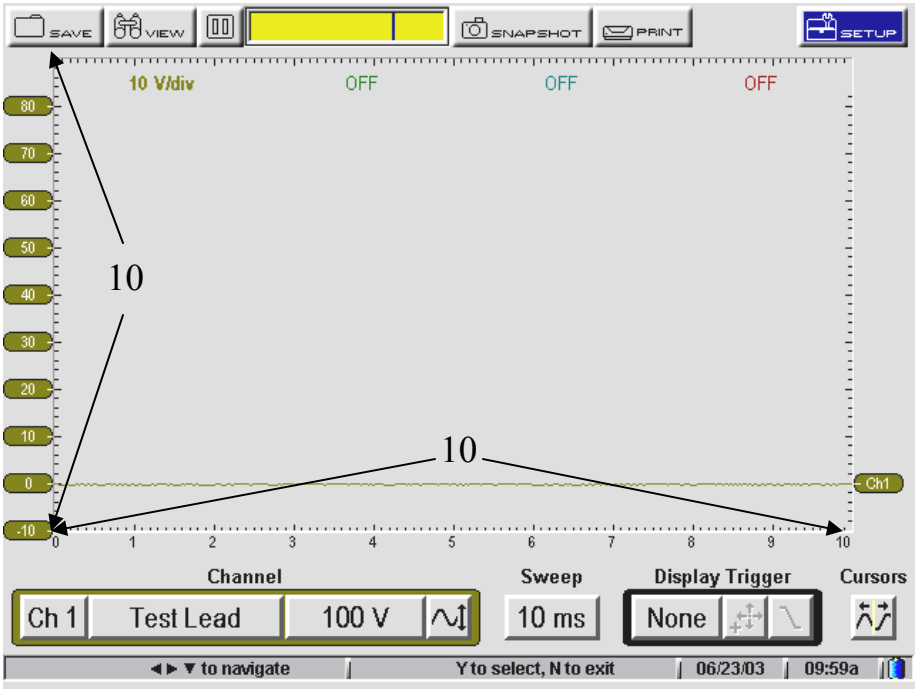
When you power up your MODIS, the info menu will be the first screen you see. You will access everything on the MODIS through this screen.

- Info Menu: All the Vantage functions are in this menu. You can select a new vehicle ID… previous vehicle… or access specific component tests.
- Scanner Menu: This is where you will access all the functions of the scanner. Depending on which module you have purchased, you can access Domestic, Asian, BMW, Mercedes, Volkswagen or Audi information. This includes drivability, transmission & ABS service info along with the troubleshooter.
- Multimeter Menu: Here you will access the basic multimeter along with the graphing meter functions.
- Scope Menu: This is where you can access the lab scope and the ignition scope.
- Gases Menu: This is for the 5 gas module that is available for your MODIS.
- Saved Data Menu: Here you will find all the information that you have saved. For example, images you saved from your lab scope or scanner recordings.
- Utilities Menu: In this section you will find all the settings for your MODIS.



To access the lab scope, use the thumb pad to highlight the scope menu. Then highlight "lab scope" and press the "Y" button or push the thumb pad to the right… if you have the "easy scroll" option activated. If you do not have the "easy scroll" option activated, go to the utilities menu to enable this function.

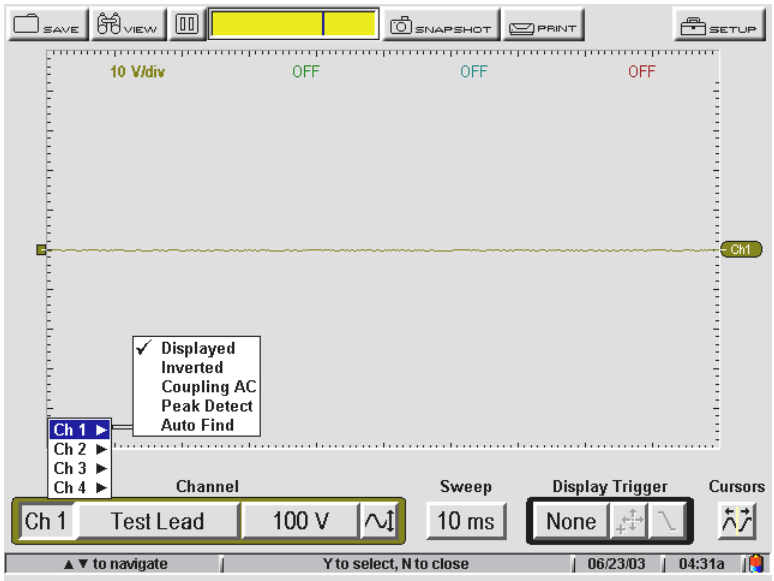
Scope Divisions



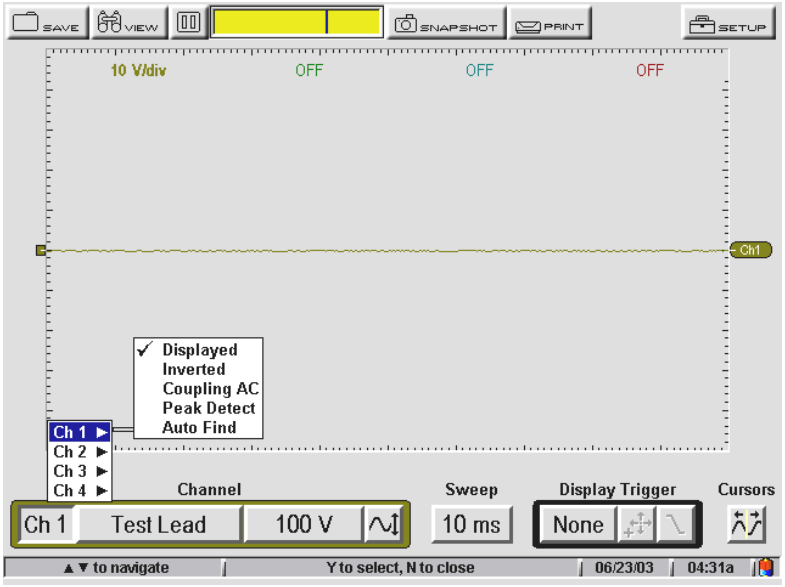
Refer to the image on the previous page.

Across the bottom and on the left of the screen you will notice a series of numbers. These numbers indicate divisions of time (left to right) and divisions of voltage (bottom to top). As a rule most scopes are divided off by 10 divisions of time and 8 divisions of voltage. This is where the MODIS is different… you will notice that there are 10 division of voltage. Looking at the bottom of the screen, you will notice the sweep menu. On our screen the sweep is set at 10 ms – this indicates total screen time. So, each number across the bottom represents 1 ms of time. Next, we will focus on the voltage scale. Under the channel menu you will find your adjustment for the voltage scale. Notice, we are set at 100 V per screen. So, since there are 10 divisions per screen, our time per division would be 10 V.

Channel Menu



The first menu option we will discuss is the channel menu. First you would want to highlight the channel menu and press "Y" or press up on the thumb pad. You will now see all 4 channels listed. Highlight channel 1 and you will then notice a new menu appear. Highlight "Displayed" and you will now notice a check mark appear. This indicates that channel 1 is active. On the next page we will discuss the other options available in this menu.



Now lets cover the rest of the menu options available under the channel selection menu:

- Inverted: This function does exactly what it says… It inverts or flips the pattern over. This would be useful if you were viewing an ignition pattern on an EI (distributorless) ignition system, where one of the patterns were upside down, or if you were using your amp probe & the pattern needed flipped over.
- Coupling AC: This function is used to view an ac signal – such as a pick-up coil or an ABS speed sensor.
- Peak-Detect: This function tells the scope to sample at its maximum sampling speed. This is useful when you're trying to find a glitch in a TP sensor or if you were looking at an ignition pattern and are having trouble seeing the voltage spike. Normally, you do not use this option. If you have Peak-Detect turned on when viewing most signals you will pick up too much noise in the pattern. This may lead to believe that there is a problem… when actually there is not.
- Auto Find: This function will help you find a signal when you are not sure how to set up the scope for the signal you are viewing. Keep in mind that this may not give you the best set-up for the pattern – but, it will get you close enough to see the pattern. You may then make further adjustments as needed.

Crank Position Sensor – 24x – GM 3100 & 3400:

Scope Hook-up: Red lead is on the signal return from the sensor & the black lead is on the battery ground terminal.

Set the voltage to 20 V per/screen.

Set the sweep to 20 - 50 ms per/screen. This will vary as the RPM changes.

Set the scope to dc coupling.

Move the ground indicator one division up from the bottom of the screen.

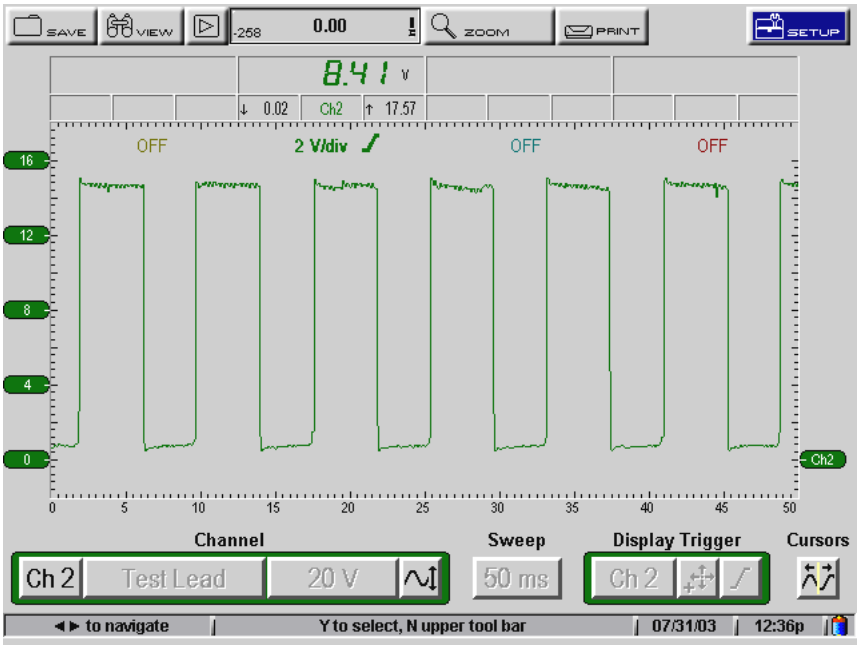
Make sure your trigger source is set to the channel you are using.

Set the trigger on rising slope.

Set trigger level to 3 volts.

Set trigger position one division over from the left of the screen.

This will help you find problems in the circuit easier. The waveform will not update on the screen if the trigger requirements are not met.



Fuel Pump Amperage – d/c: Using an Amp Probe

Scope hook-up: Clamp amp probe around the positive wire going to the fuel pump. If the pattern is upside down reverse the probe & re-clamp.

Set the voltage level to 5 - 10 A per/screen.

Set the sweep to 20 - 50 ms per/screen.

Set to dc coupling.

Set the ground indicator on division up from the bottom.

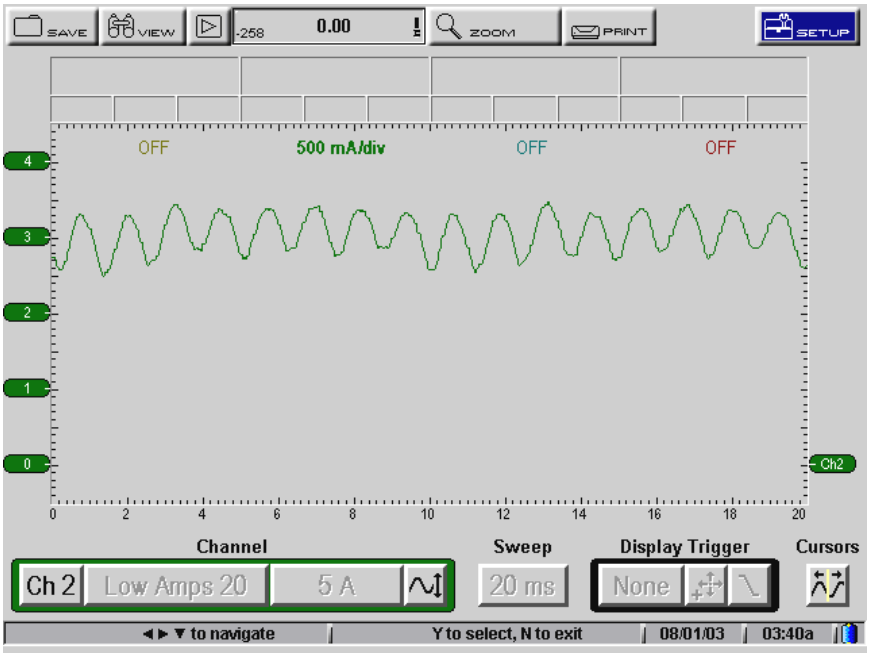
Turn the peak-detect function off.

First set the trigger to none - until you determine where the pattern is.

Then, Set the trigger to the channel you are using

Set to trigger on rising slope.

Set trigger level at 100 -800 mV - depending on where you pattern was.



With most fuel pumps you want to see at least 8 humps on your screen at once. This will be one revolution of the pump.

Ignition Amperage – EI – Ford: Using an Amp Probe

Scope Hook-up: Clamp the amp probe around the positive wire going to the module. If the pattern is upside down reverse the probe & re-clamp.

Set the voltage level to 10 A per/screen.

Set the sweep to 5 - 10 ms per/screen.

Set to dc coupling.

Set the ground indicator one division up from the bottom.

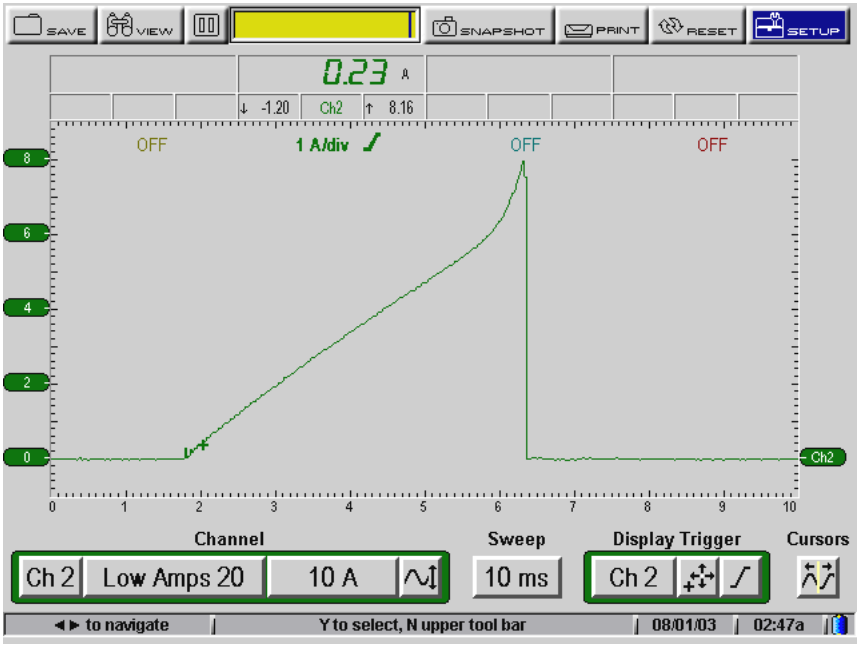
Make sure the peak-detect function off.

Make sure you set trigger source on the channel you are using.

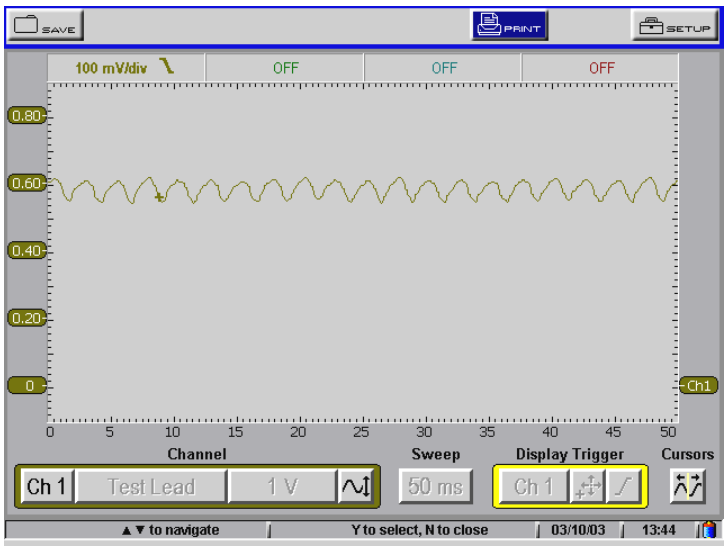
Set the trigger level at 100 mV.

Set the trigger position one division over from the left.

Set to trigger on the rising slope.



1995 Chevy Lumina 3.1 “m”



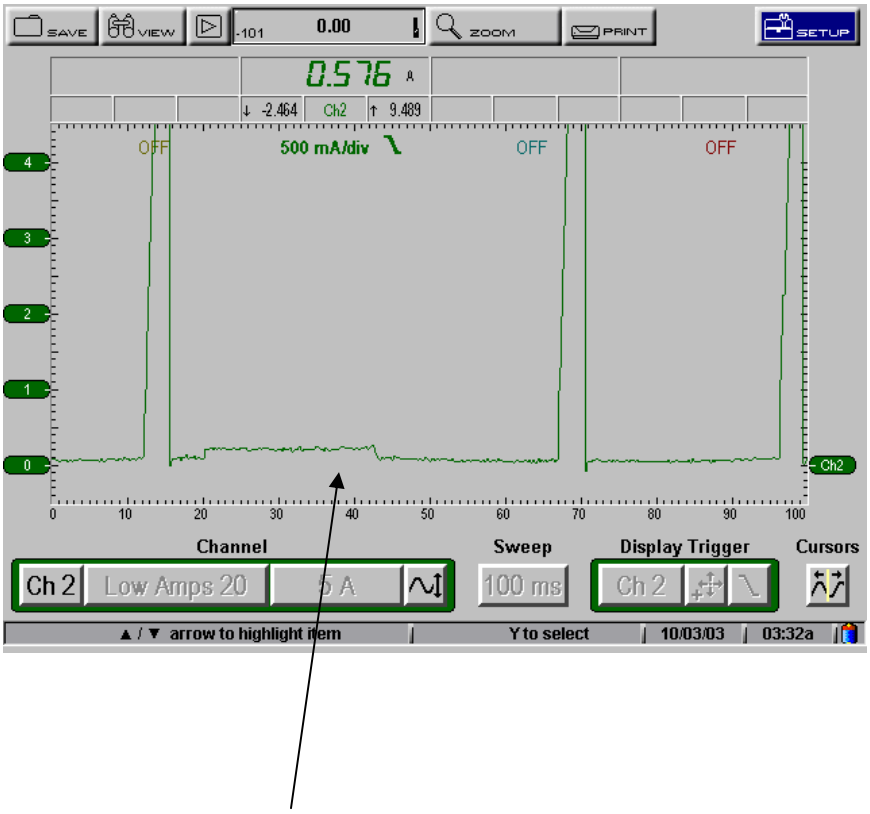
Is a normal fuel pump amperage pattern to the left? Notice that we are set up at 100 mV per/div. On my amp probe, every 100 mV = 1 A. By looking at this pattern we can tell that this pump is drawing just over 6 amps. The speed of this pump, according to our calculations, is 3000 rpm’s. So, the answer would be no. Although this pattern looks normal at first glance, the amperage is too high & the speed is to slow. Normal amperage would be around 4 amps & the speed would be around 4000 – 5000 rpm. This car had a plugged fuel filter.

Keep in mind, an amperage test is a good test on a fuel pump – but, make sure you always get a total picture of everything. Make sure you test pressure & flow. Always check power & grounds on the circuit. Remember, the pump is not always bad if the pattern is not normal.

Ignition Amperage – Open Coil:

In the example below we are looking at a vehicle with an open winding in the coil pack. By changing the voltage level to enlarge the pattern we can get a close-up look at what is happening.

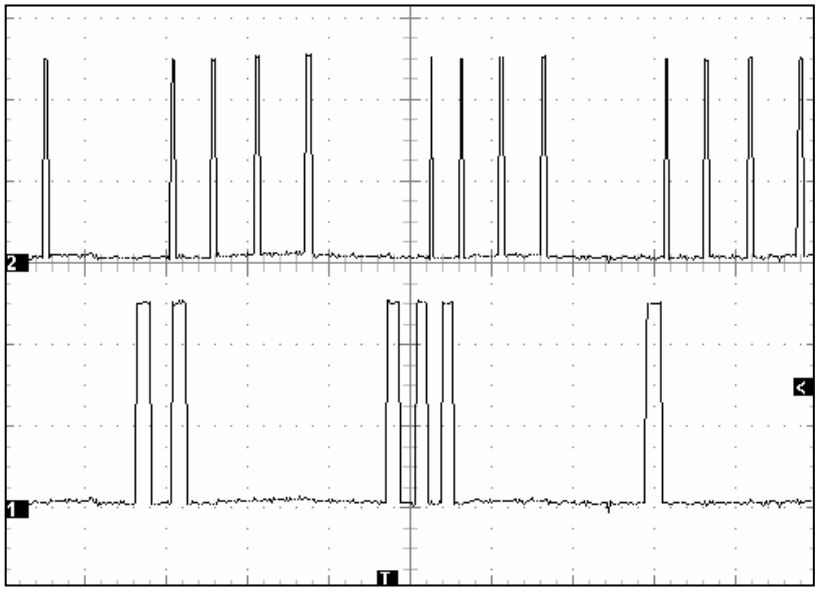
As you can see by the low rise in the third event the current does not build up like in the previous two patterns. But, the module driver still functioned. This is a very quick way to determine whether the coil is the problem or, if the problem is in the module.



Notice that the module did trigger – but, since the coil windings were open it could not build up any amperage.

Cam & Crank Sensor Relationship – Jumped Belt – Chrysler:

In the example below we are looking at a cam & crank sensor waveform. By using what we learned in the previous example, what can we determine has happened?



By using this method we can quickly determine that the timing belt has slipped a tooth.