New England Chapter
2014 Summer Events

Waiting for the numbers ……..

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VETTEFORMATION

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Contents:

Be sure to register early for our next regional judging meet at the Best Western Royal Plaza Trade Center in Marlborough MA September 25 to 28 2014 – More information on the chapter web page.

Going to the Kansas City National?

Your newsletter would love to hear about your trip. Event scribes always needed.

NOTE: Please check in on the web page for updated and time sensitive information
http://newenglandchapterncrs.homestead.com




June 8th **Corvette Day at Larz Anderson Museum**

Glenda says …. I have been asked numerous times as to why Scleroderma is our choice charity at Corvette Day at Larz Anderson. Years ago, one of our members passed away from this disease. It is an autoimmune disease that affects about 300,000 people in the US. Scleroderma causes tightening of the skin externally & internally affecting many parts of the body and can be life threatening. The New England Chapter of the Scleroderma Foundation works hard to help those in need and to get the word out about this little known and basically ignored disease. So now you know why! http://www.scleroderma.org/site/PageServer

The NCM Ambassadors Report

The interest in the sinkhole and damaged Corvettes continued to grow as did the attendance, so much so that it was decided to leave the hole and display the cars until after the Caravan and the upcoming **20th Anniversary Celebration Aug.27-30.** There is still time to register and join the Caravan! You must register with the Museum as well our New England Caravan. Contact Randy Flock at vetteflock@cox.net There are about 6500 Corvettes registered! And the Museum will soon be coming up on its 3 millionth visitor since the Grand Opening Sept. 1994. On June 25, meetings determined the final details for construction going forward and announcements will be made. Rick Hendrick made a special visit to the sinkhole and racing legend Emerson Fittipaldi arrived recently with Brazilian journalists. He was extremely impressed with the Museum and stated he was proud to have had a small part in Corvette's history with the 2008 Pace Car. Other good news, Michelin has committed to a 3-year sponsorship of the Motorsports Park! Phase I paving is done and ready for Caravan events! Finally, I want to thank all of you who have supported the NCM either by donation or by buying raffle tickets from me! As you can see, this Museum is now "World-Class". If you have any questions or comments, you can contact me at either...ncmambassador@aol.com or vettewitch@aol.com
Glenda Fischer NCM Ambassador

Build Your Own Distributor Test Machine for Under $100 – Part 2

By Joe Randolph

Introduction

Part 1 of this article included a short description of mechanical advance and vacuum advance, and described how a Sun distributor test machine measures these parameters. Part 2 describes how to build a low cost fixture that allows you to make these measurements without using a Sun machine.

At the conclusion of Part 1, it was noted that only four ingredients are required to allow a distributor to be tested off the engine:

1) A method for spinning the distributor at controlled speeds.

2) A method for generating a trigger signal for a conventional timing light.

3) Some sort of rotating disc that replaces the engine's harmonic damper as an item to watch with the timing light.

4) Power supplies for the trigger signal circuit, motor speed control, and timing light.

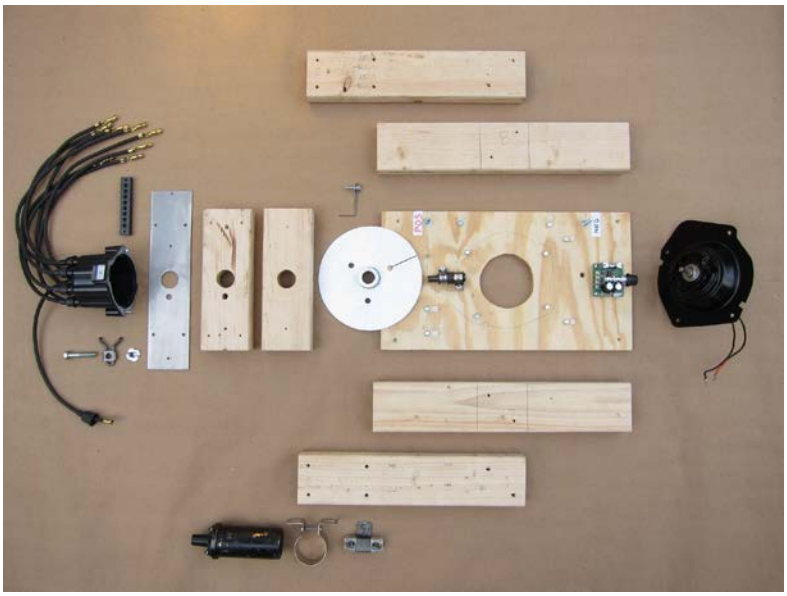
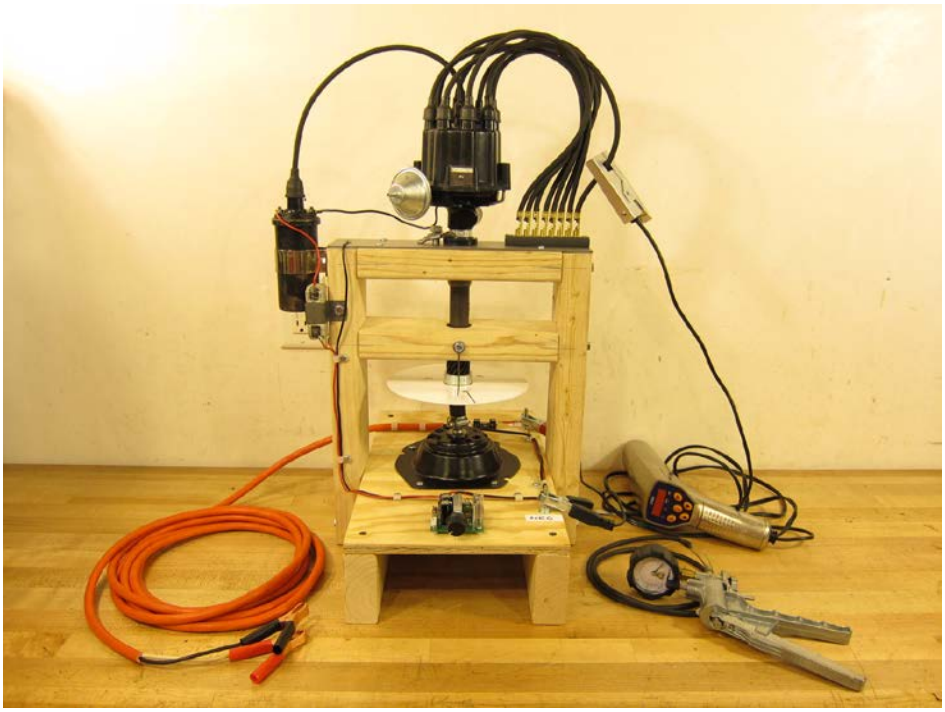


Figure 1 shows a fixture that accomplishes this. The fixture is used in conjunction with a dial-back timing light (discussed below) and a hand operated vacuum pump. Figure 2 shows all of the components of the test fixture except the wiring. All of the parts are easy to fabricate.



This distributor machine is intended for use with the points-type distributor used on Chevy V8's from 1955 to 1974, including distributors where the owner has installed an electronic points elimination device such as those sold by Pertronix and Lectric Limited. For HEI distributors used from 1975 to 1991, only minor changes to the distributor connections are needed, since HEI distributors have no external coil or ballast resistor.

Design Details

To spin the distributor, I used a standard 12 volt automotive heater motor and built a fixture to couple the motor to the distributor. Most 12 volt heater motors have a maximum speed in the range of 3000 to 4000 RPM. Since the distributor turns at half the engine speed, a distributor speed of 3000 RPM corresponds to an engine speed of 6000 RPM.

I found that a heavy duty heater motor (such as one intended for a car that has air conditioning) works fine for this application. The motor must turn in the clockwise direction when viewed from the shaft end. The blower motor from a C2 A/C car is one candidate. In the aftermarket, Siemens VDO part numbers PM102, PM241, and PM3328X are suitable candidates.

To generate the trigger signal for the timing light, I set up the test fixture with a dedicated distributor cap, coil, and plug wires. All the plug wires were electrically terminated in a shorting block. The timing light needs a clean trigger signal from one of the spark plug wires, and this termination method achieves that. It is not necessary to terminate the plug wires with actual spark plugs.

For the rotating disc, I used the back side of a nine inch camshaft degree wheel from Comp Cams. However, any reasonably balanced round disc with a precisely located center hole can be used. I attached the degree wheel to a steel collar that has a set screw and an internal diameter that matches the smooth portion of the distributor gear. This allowed the degree wheel to be mounted directly to the distributor gear with a simple set screw.

To power the arrangement, the simplest option is to use a 12V car battery. I cut the ends off an old heavy duty extension cord and equipped one end with clamps for connecting to a battery. The cord was long enough that I could put the distributor test fixture on my garage workbench and connect it to the battery in my Corvette about ten feet away.

To control the speed of the motor, I used a PWM (Pulse Width Modulation) motor speed controller purchased for $12 on ebay. PWM is the preferred method for controlling the speed of a DC motor.

Using a Dial-Back Timing Light

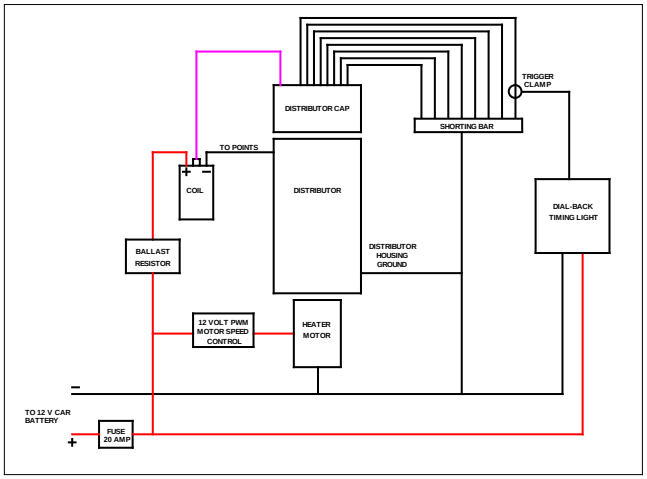
For simplicity, this distributor machine uses a dial-back timing light with built-in tachometer. When using a dial back timing light, no degree markings are needed. A single mark on the rotating disc is all that is necessary.

The dial-back timing light contains a “dial” (or button) that delays the firing of the strobe light by an adjustable number of crankshaft degrees. The user adjusts the dial until the mark on the damper lines up with the zero degree mark on the timing tab. Once the dial is adjusted to make these marks line up, the amount of advance is read from the dial or from a display on the timing light.

Construction Details

Very few aspects of the design are critical. However, following are some helpful hints:

1) Figure 3 shows the electrical schematic for the test fixture. If your coil was intended to be used with a ballast resistor or a resistor wire, this resistance should be included in the power connection to the coil.



2) For proper operation of the ignition circuit, the distributor housing and the ignition wire shorting block need to be reliably connected to the negative side of the 12 volt supply. I chose to use a metal top plate as shown in the photo.

Fig 4

3) To make up for minor misalignment between the motor and distributor, a flexible coupling made from 5/8" hose is very helpful. I found that common heater hose was too stiff, but a soft silicone hose worked very well. Figure 4 shows the components of the flexible coupler. The motor end is simply a standard shaft coupler that matches the 5/16 inch diameter of the motor shaft and also matches the 5/8 inch inside diameter of the silicone hose. The distributor end of the coupler is made by cutting off one end of an oil pump intermediate shaft that normally fits inside the bottom of the distributor. A second shaft coupler is used to obtain the correct 5/8 inch inside diameter for the silicon hose.

Making Measurements

Before any measurements of advance can be made, a zero-advance reference point must be established with the timing light. Interestingly, this reference point can be at any position on the rotating disc, because all we are interested in measuring is the relative change from the zero point.

Furthermore, any of the eight plug wires can be uses as the trigger wire, since all we are interested in is the relative change from the zero point.

The recommended procedure is to use a single mark on the rotating disc, and a moveable pointer constructed from a piece of bent wire. The sequence for establishing the zero-reference point is as follows:

1) To avoid activating the vacuum advance, disconnect the vacuum advance can from any source of vacuum.

2) To avoid activating the mechanical advance, run the distributor at about 500 RPM as indicated by the tachometer. This is actually just 250 RPM for the distributor itself, but for this discussion we will use the corresponding engine RPM as indicated by the tachometer.

3) Set the timing light for zero dial-back advance and connect the trigger to an arbitrary plug wire. Chances are the mark on the rotating disc will not be anywhere close to the bent-wire indicator. Move the timing light trigger to successive plug wires until the mark on the rotating disc is close to the wire indicator.

4) To fine tune the alignment, either bend the indicator wire or rotate the distributor housing until the wire lines up exactly with the mark on the rotating disc, and then make sure the distributor is adequately clamped down so that it can not rotate by accident.

The distributor test arrangement is now set at the zero-advance point, and you are ready to make precision measurements of the effects of either the mechanical advance or the vacuum advance.

To measure mechanical advance, leave the vacuum can disconnected. Vary the distributor speed using the motor speed control, and use the dial back timing light to measure the amount of mechanical advance at the indicated engine speed.

If you are testing a stock distributor, you can compare your measurements to the specifications in your car's shop manual.

If you are planning to "re-curve" your distributor to a non-factory curve, your measured results are the starting point for that process. Changing the springs and/or the weights in the mechanical advance will affect the shape of this curve. Changing the bushing on the limiting pin in the mechanical advance will alter the maximum amount of mechanical advance.

A discussion of how to optimize the mechanical advance curve for a particular engine is beyond the scope of this article, but in general, most hot rodders want to see the mechanical advance "all in" (at it's maximum value) by around 3500 RPM. Some builders also claim that reducing the amount of mechanical advance is advantageous for today's fuels. They use less mechanical advance combined with more initial advance to end up with a similar amount of total advance (the sum of the initial advance plus the maximum added mechanical advance). The nice thing about having a distributor machine is that you can easily measure and tune your mechanical advance to match a desired advance curve.

To measure vacuum advance, set the distributor speed at a fixed low value below where the mechanical advance starts to come in, such as 500 RPM. Use a hand operated vacuum pump to gradually increase the vacuum applied to the vacuum can, and measure the resulting advance using the dial back timing light.

Optimizing the vacuum advance for a particular engine is beyond the scope of this article, but at least one common problem can be noted. As originally designed, the vacuum advance for most engines is intended to be “all in” at normal idle speeds. So, if the idle vacuum is 20 inches, the vacuum can may have been designed to be all in at 17 inches.

If an owner subsequently changes the camshaft to a more aggressive grind that generates only 12 inches of idle vacuum, the vacuum advance system will not be “all in” at idle. The engine will run rougher and hotter, and the idle speed will be less stable because the amount of vacuum advance varies in response to minor fluctuations in engine vacuum. The solution is to substitute a vacuum can that is all-in at a vacuum level at least two inches below the level of the normal idle vacuum.

Cost to Build the Distributor Test Machine

To build the distributor test machine described here, your actual cost will depend on how many of the components you already have on hand. In my case, I already owned a dial-back timing light and a Mityvac vacuum pump. I also had on hand a spare distributor cap, plug wires, ballast resistor, coil, and some basic building materials and fasteners. So, in my case these were all no-cost items.

The major components I had to purchase were just the heater motor, speed controller, degree wheel, and various hardware items to mount the degree wheel and construct the flexible coupling.

Table 1 provides information on sourcing the key components that you might need to purchase. If you need to buy the timing light and Mityvac your total cost will exceed $100, but if you already have these in your tool collection (as I did), your cost will be much lower.

Summary
This article is a shortened version of one that I am preparing to submit to the Restorer. Chapter members who want to build one of these test fixtures can contact me for additional photos and construction details. Table 1 Parts information is below ……

Description	Source	Cost
Heater motor, Siemens/VDO PM 241	ebay	15
PWM motor speed controller, 12V, 20A, 13 KHz	ebay	12
Degree wheel, 9 inch, Comp Cams 4790	Summit Racing, part CCA-4790	17
Shaft collar, 7/8” ID, to attach to degree wheel	McMaster-Carr, part 6432K23	2
Shaft couplers (2), 5/16” ID, 5/8” OD	McMaster-Carr, part 6412K12	14
Very flexible silicone hose, 5/8” ID	McMaster-Carr, part 5236K49	7
Oil pump intermediate shaft	NAPA, Sealed Power 224-6146	7
Coil Bracket, Pertronix 10001	Summit Racing, part PNX-10001	8
Dial-back timing light, Actron CP7529	Amazon	80
Hand-operated vacuum pump, Mityvac MV8000	Amazon	29