Technical Information Bulletin Rev. C 9-11-05

How to Install your Chevy Distributor

by Lars Grimsrud
Lafayette, CO

(Point-Style Distributors. HEI systems can be installed using similar techniques, but photos in this article do not apply)

A distributor can actually be dropped into a block in virtually any orientation and made to function by re-arranging the spark plug wires to match the installation. You will see this approach to distributor installation quite frequently, and it is a sure-fire tip-off that the engine builder/distributor installer didn't have a clue about how to do the job right.

GM always installed the distributor in a specific orientation, and always used the same distributor cap "tower" for the #1 spark plug. By following this procedure, your distributor will be installed in the correct factory position for a professional appearance.

1. Bring the engine up to Top Dead Center on the Compression Stroke and align the timing mark on the harmonic balancer with the 8-degree mark on the timing chain cover (or wherever you want the engine to fire. 8 Degrees is a good starting point for an initial start-up, but you can set it anywhere from 6 to 12 degrees before top center).

   To Find Top Dead Center on the Compression Stroke with the engine in the car:

   a. Remove the #1 spark plug
   b. Disconnect the coil wire from the distributor cap and ground it
   c. Have a helper plug the #1 spark plug hole with a finger.
   d. With the starter, slowly "bump" the engine over until the helper feels air being forced by his finger.

      You are now coming up on the compression stroke. Align the timing marks as noted above.

   To Find Top Dead Center on the Compression Stroke with the engine out of the car:

   a. Remove the valve cover on the driver's side of the engine to expose the valves for cylinder #1.
   b. Rotate the crankshaft until the timing mark approaches top dead center. Observe the exhaust

valve.

c. If the exhaust valve is moving as you are approaching top dead center, you are on the exhaust stroke.

   You need to rotate the crankshaft one more time.

d. If neither valve is moving as you approach top dead center, you are on the compression stroke. Align the timing marks as noted above.

2. Install the rotor to the distributor.
3. Hold the distributor body in the orientation show in figure 1 relative to the engine/block and drop the distributor straight down into the block. Pay no attention to rotor orientation at this time. If the rotor is aligned with the oil pump driveshaft, the distributor will drop all the way down and seat. If the rotor does NOT line up, the distributor will not drop all the way down.
4. If the distributor does NOT drop all the way down (chances are best that it won't), pull the distributor up out of the block just enough to disengage the rotor from the camshaft gear, and turn the rotor a little bit. Drop it down again. Repeat this until the distributor drops all the way down and the rotor engages with the oil pump.
5. The distributor will now be all the way into the block, but the rotor will not be properly aligned. You can now pull the distributor up until the cam gear disengages, turn the rotor JUST A HAIR (half a cam tooth), and drop it straight back down again. The rotor will now move one tooth over, and the chamfer on the oil pump shaft will allow the oil pump to line back up. The distributor will drop all the way back in again, with the rotor moved over one tooth. (If it doesn't work, try rotating the rotor the opposite direction.) Repeat this operation (I call it "walking the distributor") by lifting the distributor up, slightly moving the rotor, and dropping it back in until you've "walked" the rotor around to its correct position as shown in the figure below. Once you get the technique down, you can do this very quickly – much quicker than trying to align the oil pump driveshaft with a screwdriver while looking down the hole. The screwdriver technique also requires that you pull the distributor ALL THE WAY OUT to fiddle around with the screwdriver several times until you get it right. So try my "walking" technique: it's quick and accurate.
6. Once you have "walked" the rotor into position, you should be able to obtain the orientation of the distributor body and the rotor as shown in Figure 1. Install the distributor hold-down clamp and bolt. Snug it, but leave it loose enough that you can rotate the distributor smoothly.
7. Attach an Ohm-Meter (continuity tester) between the distributor primary lead wire (the wire coming out of the bottom of the distributor body) and ground (any point on the engine). Rotate the distributor body SLIGHTLY clockwise from the orientation shown in Figure 1 until you read continuity (points are closed – giving continuity to ground). Now, SLOWLY rotate the distributor body counter-clockwise until the points JUST break open (loss of continuity on the ohm meter). The instant the points break open is the ignition firing point. Tighten your distributor hold-down bolt at this point. Your distributor body and rotor should now be aligned like Figure 1 (or VERY close).
8. Slip your distributor cap onto the distributor. Notice which "tower" is the #1 plug wire. With a felt marker, place a little mark on the distributor body at the #1 tower position. Pull the cap back off, and verify that the rotor is pointing to this mark (or VERY close). If it's not, you're most likely off by a tooth. Repeat the installation steps.
9. If everything is aligned (and it will be if you followed these steps), install the cap and install the plug wires as shown in figure 2.
10. Start the engine. It will fire and run immediately if the above steps have been followed.
11. Set the dwell to 30 – 31 degrees (always set dwell before setting timing. Changing the dwell changes the timing).

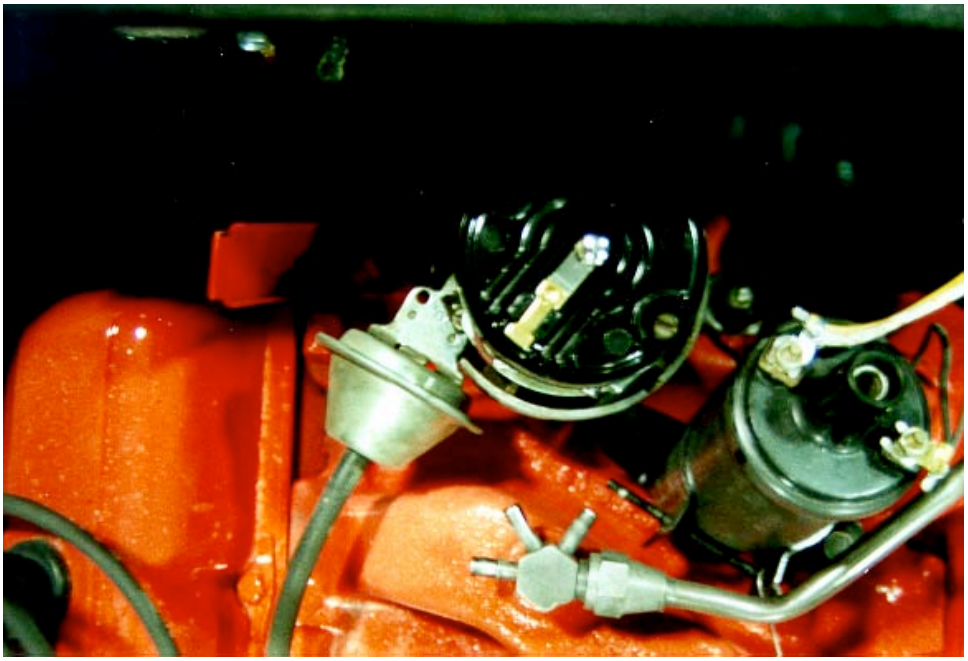


Figure 1: Distributor & Rotor Correctly Installed at #1 Firing Position

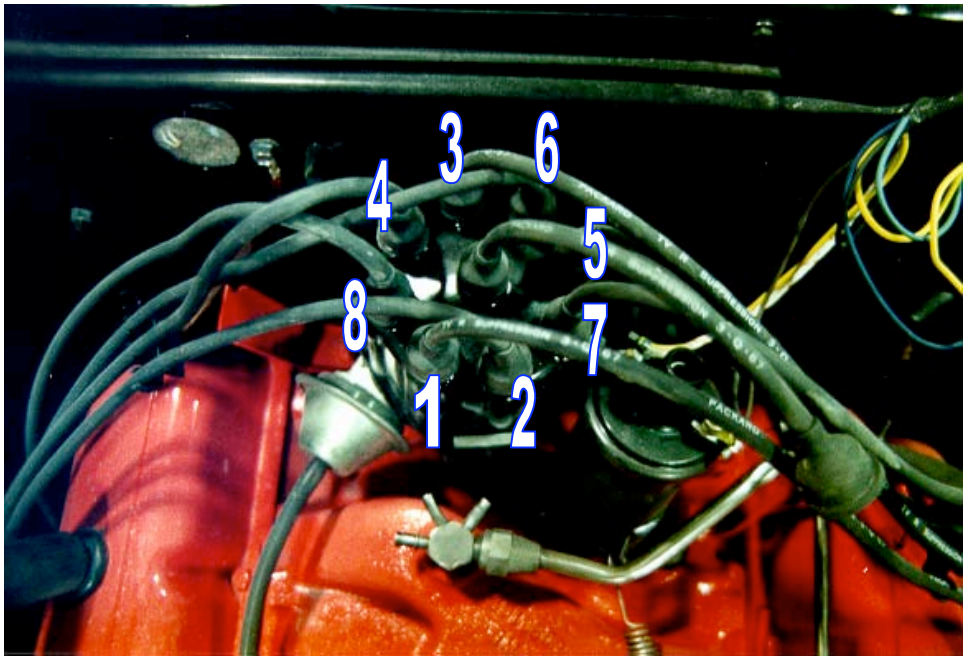


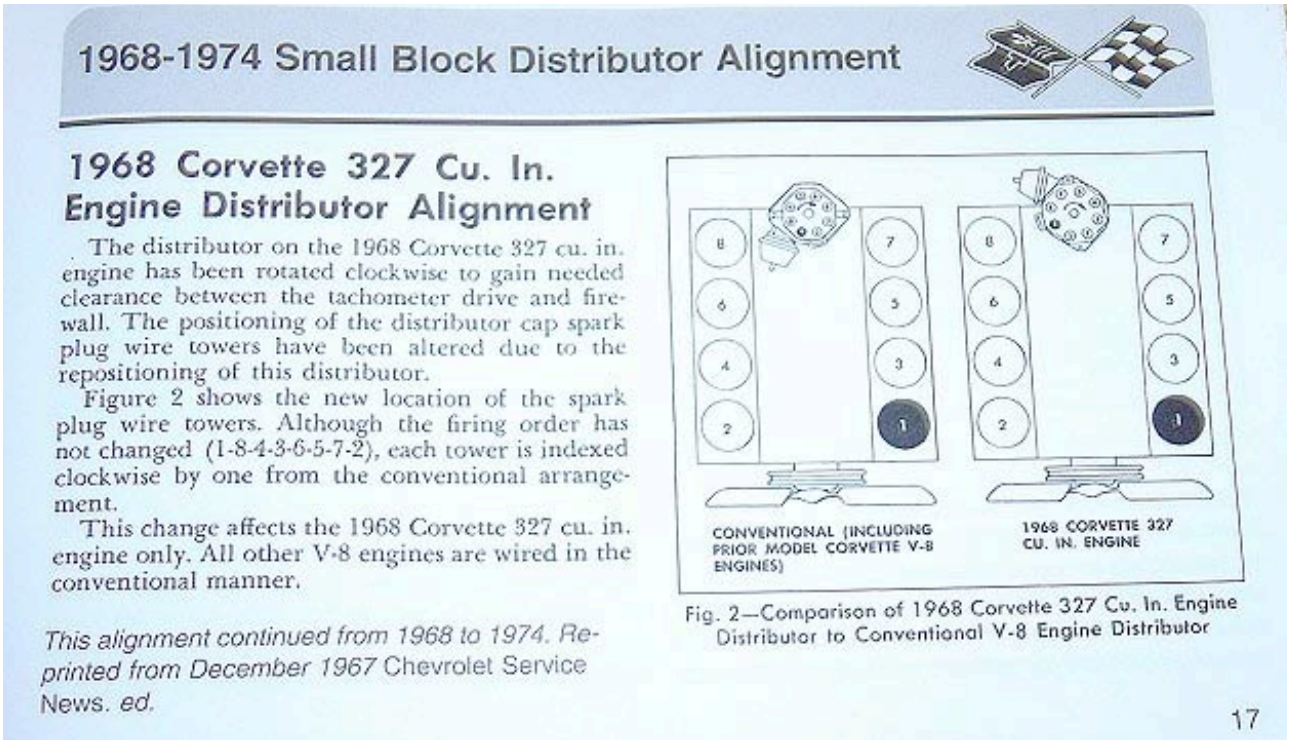
Figure 2: Correct Spark plug Wire Order and Placement

Alternate C3 Distributor Installation Orientation

Due to the relationship between the distributor tach drive cable and the firewall on the C3 Corvette (1968 – 1974), GM issued a Service Bulletin allowing an alternate distributor installed orientation in order to straighten out the tach drive cable and to promote longer cable life.

The distributor orientation shown in the above photos installs the distributor so that the vacuum advance control unit pokes out in front of the distributor shielding at about a 7:00 o'clock position as seen from the front of the engine. In order to straighten out the cable and still retain the shielding, GM allowed the distributor housing to be rotated clockwise 45 degrees. This rotation pokes the vacuum advance out from behind the shielding, pointing it towards the rear flange of the passenger-side valve cover at about the 9:00 o'clock position as seen from the front of the engine. This orientation straightens out the tach drive cable. When doing this, the spark plug wires were all shifted 1 tower counter-clockwise in the cap, so that the plug wires retained their same relative positions to the engine/vehicle (#1 wire was placed in the previous #2 cap location, thus retaining the #1 wire as the forward, passenger-side plug wire).

It is recommended that C3 distributor installations be done according to the Service Bulletin Alternate Orientation in order to increase cable life and to simplify cable & distributor installation.



1968-1974 Small Block Distributor Alignment

1968 Corvette 327 Cu. In. Engine Distributor Alignment

The distributor on the 1968 Corvette 327 cu. in. engine has been rotated clockwise to gain needed clearance between the tachometer drive and firewall. The positioning of the distributor cap spark plug wire towers have been altered due to the repositioning of this distributor.

Figure 2 shows the new location of the spark plug wire towers. Although the firing order has not changed (1-8-4-3-6-5-7-2), each tower is indexed clockwise by one from the conventional arrangement.

This change affects the 1968 Corvette 327 cu. in. engine only. All other V-8 engines are wired in the conventional manner.

This alignment continued from 1968 to 1974. Reprinted from December 1967 Chevrolet Service News. *ed.*

Fig. 2—Comparison of 1968 Corvette 327 Cu. In. Engine Distributor to Conventional V-8 Engine Distributor

17

(Courtesy "paul67" from CorvetteForum.com)

How to Set the Timing

When you think about it, setting the timing at idle speed makes no sense at all: You don't operate your car at idle, and timing changes as the rpm changes. Fact is, the timing spec at idle speed is provided as a simple way for most people to set the timing, and is not a good procedure for optimum performance.

Small block Chevys (and most other GM performance V8 engines) perform best when the total timing (full centrifugal advance plus the initial timing setting with vacuum advance hose disconnected) is all in by 2,500 – 2,800 rpm and is set to about 36 degrees. If you have an adjustable timing light, this is very easy to check. If you don't, you need to scribe a 36-degree mark on your harmonic balancer. Here's how:

Measure the circumference of your harmonic balancer using a sewing tape measure (or other flexible tape measure). Get it as accurate as you can. Take this measurement and divide by 10. The number you get is the distance to 36 degrees. Measure this distance CLOCKWISE from your existing harmonic balancer timing mark as viewed from the front of the engine and place a clear mark on the balancer.

Remove your distributor cap and rotor. If you have a points-style distributor with the stock, factory, heavy springs in place, remove one of the springs. Disconnect the vacuum advance. Install the rotor and cap. Loosen the distributor hold-down clamp bolt just enough so that the distributor can by turned, yet leave it snug enough that the distributor will hold its position.

Start the engine. If you're using an adjustable timing light, set the light to 36 degrees advanced. Now rev the engine while observing the timing marks with the light. You will notice that the stock line on the balancer will move up towards the timing plate as rpm increases. Continue to increase rpm until the line does not move any further (centrifugal advance is "pegged out"). Once the timing is "pegged out," the line on the balancer should line up with the "0" mark on the timing tab. Rotate the distributor to achieve this.

If you're using a non-adjustable light, perform the same process, but align your new 36-degree mark with "0" mark on the timing tab.

Shut it down.

Pop the cap and rotor and re-install the spring, if you removed it. Put everything back together, but leave the vacuum disconnected. Start it up. For future reference, make a note of the timing setting at idle. This is your new curb idle timing spec. Now give the engine a few quick rev's past 3,000 rpm and verify that the full timing (36 degrees) is coming in. If it's not, you need to change to a softer set of springs until you get full 36-degree advance before 3000 rpm. (**NOTE**: A stock set of springs will often not allow full centrifugal advance to come in before redline rpm. If you have heavy stock springs installed, don't rev the engine beyond its limits to try to force full advance in.) I suggest obtaining Mr. Gasket kit part number 927 or 928: Use the gold springs on HEI systems. For points-style systems, use one black spring and one silver spring – these

springs will get your total timing all in by 2500-2800 rpm, providing very good throttle response and power. The black & silver spring combo can also be used on MSD distributors if you widen out the spring hook ends.

Hook up the vacuum. Re-set your idle speed and idle mixtures if necessary to lower the idle speed. Now do a road test.

The 36-degree 2500 rpm advance curve is optimum for performance, but may require premium fuel. Lug the car around, and punch the throttle at low rpm while listening for detonation ("engine knock"). If you're getting any audible knock, you **MUST** retard the timing. Retard the timing in 2-degree increments until engine knock stops. Engine knock will seriously damage engine components if not corrected. If you get no knock, you may see slightly improved performance at 38 degrees total timing. This is particularly true if you're running at high altitude.

If you have no engine knock under acceleration, but the car "chugs" or "jerks" at cruising speed (light throttle application), you are getting too much vacuum advance on top of the mechanical advance. You may need to change out the vacuum advance diaphragm with a unit producing no more than 16 degrees of vacuum advance. See my paper on "Vacuum Advance Control Units Facts and Specs" for more info on this.

Your timing is now set for best possible performance. Make note of the new setting, and use this for your future tune-up work.

Lars' Suggested Timing Specs for GM V8 Performance Applications:

- 36 degrees total timing (vacuum advance hose disconnected), all "in" by 2500 rpm
- 18 degrees initial timing at idle (vacuum advance hose disconnected). Note that it may not be possible to achieve the 18-degree initial spec with the 36-degree total without modifying the distributor advance stop system. It is more important to achieve the 36 total than to hit an exact 18 initial. However, if your initial timing is very low (below 12 degrees) with the 36 total, it is important that you repair or modify your distributor in order to achieve correct engine performance
- 16 degree vacuum advance control unit with a pull-in spec that allows the full range of vacuum advance to be pulled in at the engine's idle manifold vacuum level. Connect to manifold vacuum for most applications (this will allow the engine to idle with actual timing at idle of 34 degrees).