The $40 Dizzy

Making the Bosch 009 Distributor work in a 356

By Bruce Smith

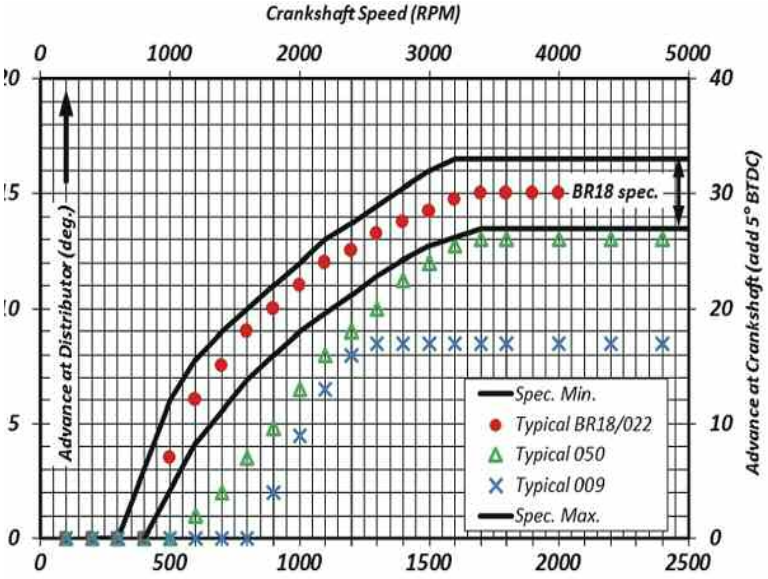
Why would anyone be interested in an article about fitting a sub-$50 non-original part into a vintage car that increases in value every 24 hours by nearly double that? (This, according to Hagerty for 2014.) Well, I'm a cheapskate at heart and I like to tinker. So to me, making an aftermarket VW distributor that will fit into a Porsche 1600 motor work nearly as well as the one that was designed for it becomes a worthy challenge. And since having a spare distributor for your old car is a good idea, and necessary insurance for a road trip, the notion of doing so is more manageable when the cost is far below the $500 needed for a rebuilt original. So if you like, consider this an article about spare parts. But only the concours police care whether you use such a distributor full time, and chances are it just might go unnoticed then as well.

Nearly all bug suppliers sell mechanical distributors with 'hot' advance curves designed for use in modified Type I motors. These are usually referred to as 009 distributors and cost as little as $30 and up to about $80. These are loosely based on original 019/010 Bosch cast iron distributors made for VW transporter motors, and the famous blue 019 Screamers popular with bug enthusiasts since the sixties. Older cast iron distributors were replaced with the aluminum body 009 (the full part number is 0231 178 009), which were made in Brazil by Bosch for a time and now are probably all made in Asia (although some claim to be Brazilian, for what it's worth). These distributors are really quite a bargain, sold with a condenser, rotor, points, and cap. The tune-up parts alone for an original BR18 cost more than these entire distributors.

But there are noteworthy differences in their inner-workings that need to be addressed in order to achieve the performance necessary for a Porsche motor. Aside from some 'you get what you pay for' differences in manufacturing quality (where it is tough to match the quality of the early Bosch precision instruments), the advance mechanism of the 009 differs in several ways from an original. Firstly, they use linear spring tension alone to counter the outward motion of advance weights, compared to the tension plus spring flexure of older mechanisms. The result is a linear timing increase versus the curved transition of the original. (For a more complete description of the advance mechanism of the Bosch distributors for Porsches, see the article in the July/August 2014 issue.) Secondly, these replacement distributors use a single stiff spring rather than two - but the advance plate does allow for another. There are a few other mechanical differences, most of which can be modified to fit our needs. But no easy modification can lead to the sweeping spring advance motion of an original distributor. The compromise is manageable though, and is what the Bosch aluminum 050 distributor (JFR4 9 230 081 050) used, made popular by the Maestro and installed since then on many Porsche 1600 motors. So what is described here is really about how to make an aftermarket 009 distributor behave as least as good as a Bosch 050 distributor, maybe even better. Read on if you're interested.

A Brief Primer

To save you from looking all of this up, early 356s (pre-A through 1955) were provided with Bosch 383 distributors, followed by BR9s in 1956-57, BR18s from 1957-63, and 022s starting in 1963. Advance curves differed slightly but the BR18 and 022 were identical, with curves as depicted below. The aluminum Bosch 031 was a later replacement and shared the same advance characteristics as the BR18/022. The later Bosch 050 was designed for use in VW industrial engines and found to be a reasonable match to Porsche 1600s, with the advance starting at about 1100 rpm and maxing out around 26° near 3200 rpm at the crank, plotted in the figure as well. The 009 advance curve is also shown, with an onset around 1700 rpm and maxing out at 17° at 2600 rpm. This is a distributor that has too often been used in Porsche motors, most of the times with compromised performance. It's just not good enough as is – static timing needs to be increased substantially to achieve an adequate total advance.

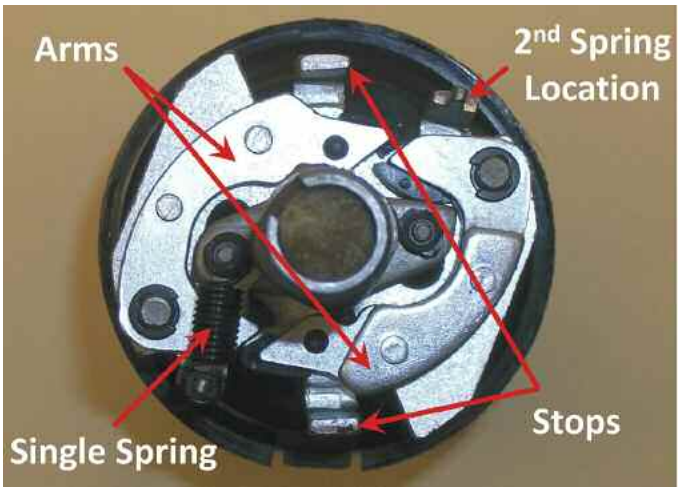


Tearing It Apart

Dismantling one of these 009 distributors is fairly simple by removing the cap, clips, condenser, dust cover, and the breaker plate. The bottom end retaining spring and drive gear are removed and the dog pin can be driven out. The shaft and driving assembly can then be removed from the body and the distributor disassembled as seen opposite. Pretty easy so far, and you might find that the quality of these distributors is a bit better than you expected.

Closer inspection of the advancing plate exposes a few weaknesses that will impact performance, as seen from the top down picture. One problem is the use of a single spring to control the outward casting of the two weighted arms. Another issue is the way that friction is reduced – with plastic tips on both ends of the weighted arms to slide over the somewhat rough metal base. These two deficiencies combine to give problems with both accuracy and stability. But they can be dealt with through some modification. Here are the steps to follow.

Left: A disassembled 009. Above: The original advance arms, left, and the modified arms at right. Below left: Top-down view of the original advancing plate.



Step-by-Step Instructions

1. The advance arms can be taken off once the e-clips retaining them are removed. You'll notice that the arms are not weighted equally. Some distributors, like those for early 911s, use unequal weighting combined with a two-stage advancing mechanism to achieve two distinct ramps in the advance curve. These distributors aren't that sophisticated and probably have unequal arms for simplicity, adding all of the necessary weight on just one. The heavier arm will exert greater force on the advancing mechanism with the help and balance from the lighter one. I think it'd be the same if the weight was 50/50, but I might be wrong. Regardless, the maximum advance angle is limited by a pair of metal stops combined with small 'shoes' on the tips of the arms. These shoes also serve as the contact surface to the base plate. Trimming these shoes back as shown below is the first modification, and allows for advance angles beyond the original limits.

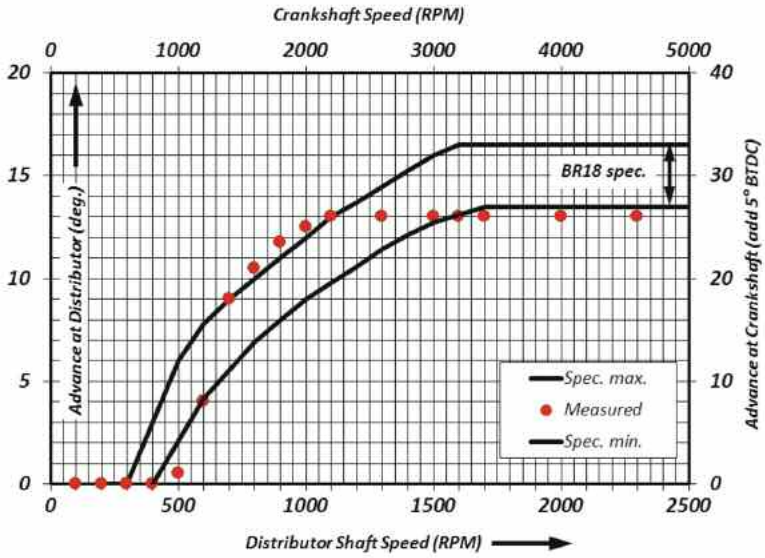
2. The next step is to improve the sliding surface for the arms to move across. The original design is for the plastic shoes at one end and caps at the other to move freely on the bottom base plate. This can be improved by adding a low-friction sliding surface, similar to what is used in most other Bosch distributors. The picture at right shows a customized Teflon slider inserted at the base, cut to fit from a Bosch-type slider available from most distributor parts suppliers.

3. Metal tabs in the base plate create limit stops for the weighted arms. These should be vertical or bent about 1mm outward at most. These tabs are usually OK as is but I've seen a few that needed some adjustment. It will be difficult to know their best position at this stage but there is a small access cover at the side of the distributor body for bending these or the spring posts after assembly. This normally isn't necessary. The access cover in the distributor body can be seen in the earlier figure.

4. Modifying the springs is next. This is done by replacing the single stiff spring with two weaker ones. The distributor is set up to accommodate two springs and using two will significantly reduce the float and bounce in the advance motion and will allow for better matching for revs in both up and down directions. The challenge of course is to find spring parameters that will bring the distributor into a performance window that's best for a Porsche motor. This takes a little trial-and-error, but after running through a few variations of wire size, diameter, and coil number then testing on a Sun distributor machine, I settled on some good ones. I've found extension springs made of 0.020" music wire with a 0.25" outer diameter using 11 coils and double loop ends work well. These can be cut from 11" pre-wound lengths available from W.B. Jones Spring Co. (part #688) at just a few pennies per spring. Making these from the stock lengths is really quite simple. If you contact me, I might even have some extras.

5. Once re-assembled, the cam lobe should be re-greased, the breaker plate with points replaced, and the condenser installed. At this point, the distributor could go onto a test machine for measurement. But without that luxury, testing can be done on your car with a timing light. I've modified and tested several of these 009s and so far each has fallen in close to the advance characteristic of the first. Typical results can be seen on the following graph. *Continued*

The onset of advance occurs around 1000 rpm at the crank. It increases steadily until about 2200 rpm, where it's all in at 26°. There is a limit to the range that the advance will increase over, determined by the mechanics of the distributor and not easily changed. But this advance curve is quite well suited for a Porsche 356/912 motor, especially using lower octane fuel and total advance on the low end of the spec. Adding 5-7° keeps advance below 33° or a bit higher if desired. Stops could be adjusted inward for a lower maximum advance if more static timing is desired for additional low end torque.



The final steps are to replace the rotor, clips, and cap. Prior to assembly, the body can be painted satin black to match the look of an old cast iron distributor. Or maybe cool Screamer Blue if you'd like. If you're going to use the distributor as a spare, you can mount it with a separate clamp and set the timing ahead of time. After tightening the clamp, remove the entire distributor/clamp assembly. This makes it easy to swap on the road if or when it's needed.

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