Ignition Timing Dwell & Backlash

By Lynn Sondenaa, Sandy, Oregon

Dwell is sometimes a misunderstood term. It is the period of time when the points are closed. This is when current flows through the circuit. When the points are open the magnetic field in the coil collapses sending high voltage into the secondary windings of the coil. This is where the spark is produced for each of the four spark plugs. For the original style Ford points the specifications for point gap is .018 to .022 with .020 being ideal, because of the fiber contact block. This fiber contact block is soft and will wear fast rubbing against the distributor cam causing the point gap to change. The point gap should be checked every 500 miles according to Ford specifications. If you are using the modern upper plate and points, they have a nylon contact block which is hard and wears very slowly. **(Fig.1)** Their point gap should be set at .018, and rechecked every 5,000 miles. A narrow point gap of .014 or less could damage the coil due to excessive current flow. The greater the dwell, the longer the points are closed conducting electricity. A narrow gap will produce more dwell as the points are closed longer. A wider gap will produce less dwell because the points are closed less time.

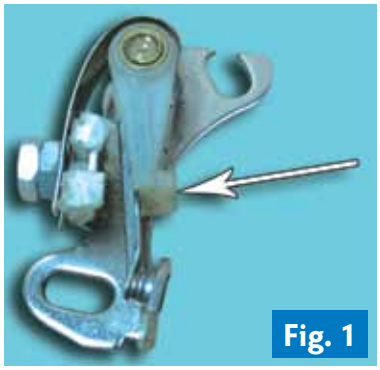

Fig. 1

Now for the technical people out there, the dwell of a Model A should be 31 degrees which is the number of degrees of rotation of the distributor shaft during which the contact points are closed. Mathematically that converts to a point gap of .018.

An interesting fact that people probably know, but don't think about is that the distributor cam lobes are equal to the amount of cylinders in the engine. The Model A has four lobes on the distributor cam and four engine cylinders. **(Fig.2)**

Fig. 2

On a Model A there can be play or backlash in the rotor. The rotor will move slightly in either direction even though the distributor cam screw has been tightened. This is a condition

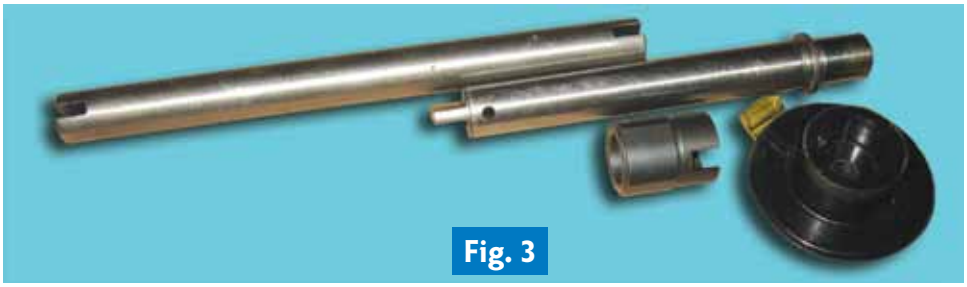

Fig. 3

created due to clearances between mechanical items. Sometimes mechanics will call this slack, but the correct term is backlash. Backlash is not harmful; it is designed into the system to act as the universal joint. This helps mechanical parts from being bent or broken. Backlash is a condition created due to clearance between moving metal parts. The amount of movement before a component begins to move is known as backlash. The rotor pushes the cam when the engine is running so there is no backlash present. The mechanical motion takes care of the backlash, but in a static engine there is backlash present and it must be removed from the rotor to correctly time the Model A.

The main source of backlash is developed from the camshaft to the oil pump-distributor drive gear and the two piece distributor shaft. **(Fig.3)** Now, how do you correctly time a Model A engine with lots of backlash?

The most accurate way to set the timing is to use a 6 volt/12 volt circuit tester light. These testers are available at any auto parts store and quite a few hardware stores. This job is best done with two people, although one person can complete the task. One person will operate the ignition key and spark lever. The second person will use the test light and set the distributor cam and rotor. **(Fig.4)**

Hopefully you have a basic understanding of ignition timing and have corrected any mechanical problems with the distributor body, points, and distributor plate shorts. The point gap is set at .020 for original points and .018 for modern points, rotor gap at .025, ignition key in the off position, and the transmission in neutral with the emergency brake set. Spark lever fully retarded. Here is the process in steps to remove the backlash and time the engine:

1. Remove timing pin and reverse into the same hole.
2. Hand crank the engine until the timing pin slips into the timing gear indent. #1 piston at T.D.C.
3. Place spark lever in full up (full retard) position.
4. Remove distributor cap and rotor. Replace the timing pin and remove the hand crank.

5. Loosen the distributor cam locking screw, replace the rotor and turn the rotor to opposite #1 distributor contact. (Starting point to remove backlash)

6. Remove rotor from cam and turn the cam in a counter clockwise direction until the breaker points just begin to open. Tighten cam screw in clockwise direction to remove the backlash. Points should be closed. If not, loosen cam screw and readjust cam in counterclockwise direction to compensate for backlash. When the cam screw is tightened, all backlash is removed and points should be positioned just before they open.

7. Connect the test light to the point arm and ground. (I like to use the alligator clip of the test light on the point arm so that the sharp point of the tester will scratch through oil and paint to obtain a good ground. **(Fig.5)**


Fig. 5

8. Spark lever all the way to the top of the steering column and turn on the ignition key. Safety Note: The ignition system is energized so do not touch, brush, or lean against the coil wire, spark plugs and their connectors, or you could receive a high voltage shock.

9. Have the person in the Model A slowly pull down on the spark lever (advancing) until the point gap reopens. (Person under the hood watches the point gap). If timed correctly the test light will come on about the first or second notch under the spark lever on the steering column. Double check that the distributor cam screw is tight, and replace the rotor and distributor cap.


Fig. 4

There may be some cases when this process will need to be completed several times. Ideally a correctly timed Model A Ford will be at the first or second notch on the spark lever. One item that can affect the timing is a worn or loose upper bushing in the steering column. This would allow the spark and throttle levers to rotate several degrees causing problems. So check the two set screws to be sure they are tight on the upper column bushing. Also check to be sure that the steering column on a two tooth unit is connected tight to the gear box. **(Fig.6)**. Check to see that the distributor arm has full swing between the distributor cap when the spark lever is advanced and retarded. **(Fig.7)**

With this timing and reference point set at Top Dead Center (T.D.C.) with points opening at 1st or 2nd click (notch) down on spark lever, normal driving position of the spark lever is mid-way down on the quadrant (6 clicks or notches) up to 40 mph. Over 40 mph move the spark lever down 8 clicks or notches (from the top). Never drive with the spark lever all the way down (11 clicks or notches), with the above timing setting. All the way down on the spark lever would be too far advanced and result in damage to the rod bearings.


Fig. 6


Fig. 7

Notes About Timing:

- If the distributor cam is turned clockwise it is advanced.
- If it is turned counter clockwise it is retarded.
- The distributor cam rotates in a counter clockwise direction when the engine is running.
- Have all backlash removed before timing.
- Double check point gap.
- Do not file contact points, use a wet stone or oil stone to remove pits or burnt spots.
- Double check that the timing pin has been installed.
- Double check that the hand crank has been removed and placed in storage.

One last note, if you really want to see what is happening inside your distributor take a distributor cap and cut it so that only the middle section is left **(Fig.8)**. Replace the solid cap with this modified cap and start the engine. With the engine idling, you will be able to see the spark between the rotor and distributor body contacts. You will be able to see if it is sparking at the leading edge, middle or trailing edge of the rotor. Also if you have any shorts in the point block you should be able to see that also. The Model A will need to be in a dark area, not bright sunlight. Do not run your Model A on the road with this cap; it is only for test purposes. The regular distributor cap is designed to keep out dirt and water from entering through the top to the inside of the distributor body. Also do not run your Model A in a confined space as carbon monoxide gas, which is colorless, odorless, and poisonous will kill!