

# Beaver Chapter

Distributor Seminar and Working Party



21 August 2021

# Distributor

- Distributor housing
- Shaft type
- Shaft bushings
- Lubrication requirements
- Lower plate type
- Upper plate type
- Condenser type
- Cam type
- Rotor
- Distributor cap
- Distributor body



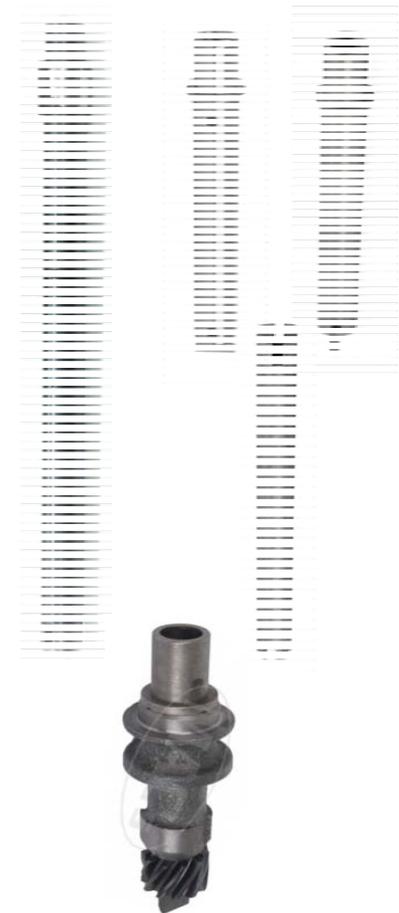
# Distributor Housing Style

- During the production years there were four variations of the housing produced.
- All variations are functionally equal and will perform well in your car.
- The housing should be free of rust and cracks.
- Care should be taken to ensure that the groove holding the upper plate, and the outside of the lower body, are free of grease and paint. Both points can reduce the effectiveness of the electrical ground.



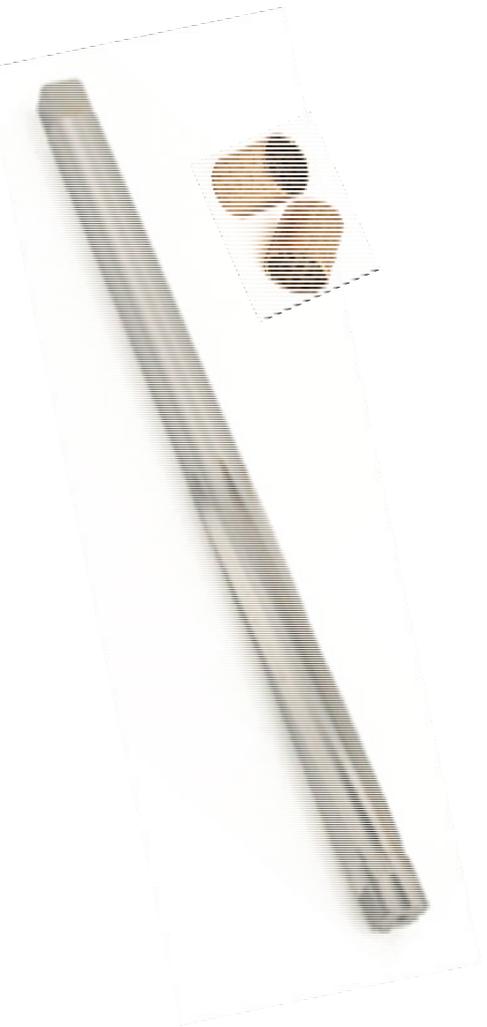
# Distributor Shaft Types

- The distributor shaft is driven by the same gear that drives the oil pump. The distributor, like and engine cam, turn at half the crankshaft RPM.
- Early production distributors used a long shaft with a single drive joint at the drive gear. This arrangement minimized lash, but resulted in excessive bushing wear caused by any slight shaft misalignment.
- Later production distributors use two shafts. A short upper shaft, and a lower shaft, sometimes referred to as an intermediate shaft. This arrangement has two drive joints, potentially increasing lash, but reduces bushing wear. This configuration has the additional benefit of easing the removal of the distributor.
- Reproduction upper shafts are available with the shaft drilled to provide oil to the upper bushing. This modification can be made to any standard upper shaft.



# Distributor Shaft Bushings

- Check the distributor for shaft end play (up and down) and side play. This is different than gear lash. End play should be less than .003" and side play should be less than .001"
- End play indicates that the thrust washers are worn, or missing. This can cause the slots in the ends of the shafts to wear, increasing lash.
- Side play indicates that the bushings, and perhaps, the shaft needs to be changed.
- Shaft side play causes the point gap to vary impacting engine performance.
- The shaft should be replaced if the diameter is less than .498" If the shaft is to be replaced consideration should be given to using one drilled to provide an oil reservoir for the upper bushing.
- Bushings should be reamed, or honed, for a free, but not loose fit.



# Distributor Lubrication Requirements

There are three lubrication points in a distributor.

1. Cam – apply a light coating of cam lubricant every 2000 miles. This will reduce the wear on the points fiber block.
2. Upper bushing lubrication requires the removal of the upper plate unless the shaft has been modified.
3. Lower bushing is lubricated via oil fitting on the distributor housing. This should be done every 500 miles.



# Original Distributor Components

- The points on an original top plate are set at .018 to .022. Care should be taken to ensure that point arm is not twisted and that the point faces close evenly.
- The Model A distributors weak point is the unreliable nature of the wiring between the upper and lower plate.
- Failure of the plate connecting wire results in an open circuit, or a short to ground.
- An open circuit has the same effect as turning off the ignition switch – no spark
- A direct short also results in no spark, but has the added problem of over heating the coil as current is continuously flowing as long as the ignition switch is on.



# Modern Distributor Components

- The points on a modern top plate relocates the condenser away from the exhaust manifold, but can be a little more challenging to adjust the point gap.
- The sometime troublesome wire link between the upper and lower plate can be eliminated.
- The two plates are electrically connected by a friction foot. If not adjusted correctly this foot can result in intermittent connection between the upper and lower plate.
- Failure of the foot generally results in an open circuit.
- An open circuit has the same effect as turning off the ignition switch – no spark
- I have found that I get better results if I remove the distributor from the car and make the point and foot adjustment on the bench. A meter can be used to verify continuous electrical contact across the spark advance range.



# Modern Is Not Always Better

The points and condenser used with the modern top plate were designed and manufactured for something other than a Model A Ford. This configuration moves the condenser inside of the distributor body away from the exhaust manifold. The capacitor will perform well as long as it has the correct value. Unlike original points, modern points rely on the two mounting screws to maintain the correct point gap setting.



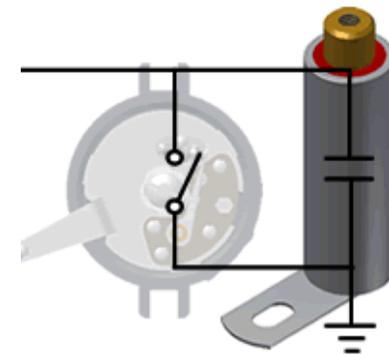
# Condenser

- Original style condensers are subjected to high heat.
- Early condensers used oiled paper as an insulator and suffered high failure rates.
- Currently available condensers use a plastic film for insulation and are very reliable.
- The most likely failure mode is an internal short resulting in loss of spark.
- Good condensers should have a value of about .3 microfarads.



Good  
Quality

Poor  
Quality



# Distributor Cam Options

- There are four variations of distributor cams in use today - original and reproduction A, and original and reproduction B. Both originals were heat treated and ground to within .0005" tolerance.
- Reproduction cams available today all seem to have an "A" part number, but are advertised as high quality hardened aircraft steel with B grinds.
- The difference between the two is the shape to the lobes. The A lobes are symmetrical providing a dwell of 32-35 degrees. The B lobes are blended on the trailing side resulting in a dwell of 44-50 degrees.
- The extra 10 degrees of dwell means that the points are closed longer allowing the coil additional time to become saturated, delivering a higher voltage discharge.

Note: When you time your car you are really only setting the ignition timing for the #1 cylinder. You are relying on the quality of the timing cam to correctly set the ignition timing for the other three cylinders

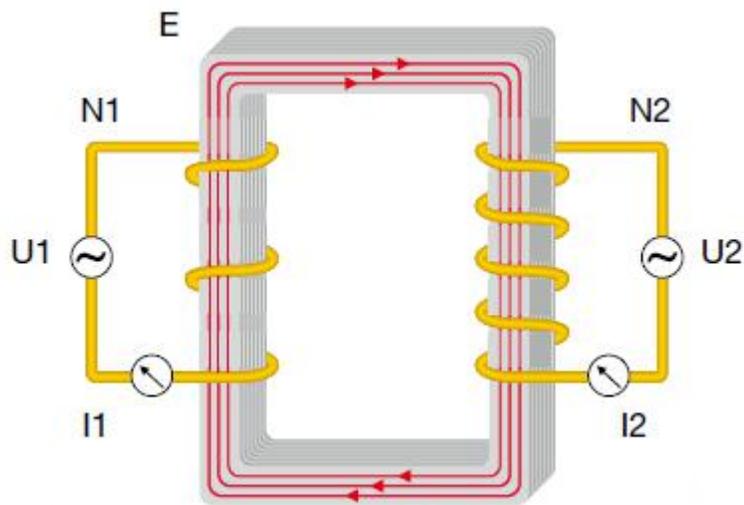


# Distributor Cap and Body

- The distributor cap electrically connects the high voltage coil wire to the rotor.
- The rotor connects the cap to the body. The spring top should make good connect with the cap. The rotor should also be free of pitting and maintain a .025" clearance at all four contact points.
- The distributor body connects the rotor and the spark plug connectors.
- Modern distributor caps use modern spark plug wires, but are functionally equivalent to original components. The use of a modern cap and wires will greatly reduce radio interference.
- Both styles of distributor bodies are designed to limit upper plate spark advance. Remember that 20 degrees distributor advance equals 40 degrees of crankshaft advance.



# Electrical Structure of Coil



E = Laminated iron core (magnetic)

N1 = Windings primary side 100–250 windings

N2 = Windings secondary side 10,000–20,000 windings

U1 = Primary voltage (battery voltage) 6-6.8 Volts

U2 = Secondary voltage 20,000–25,000 Volts

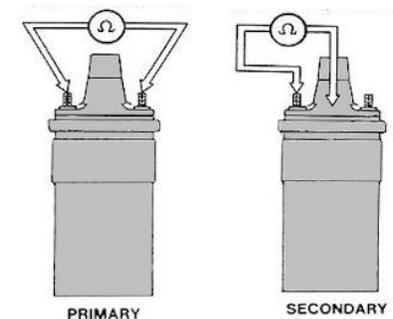
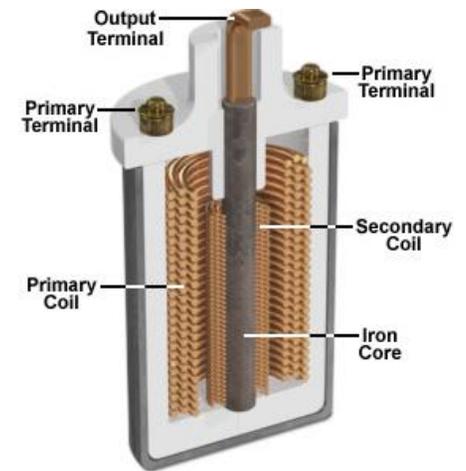
I1 = Primary current generally 3-5 Amps

I2 = Secondary current 60–80 mA

October 1928 – Ford coils had 250 turns in the primary, and 16,000 turns in the secondary.

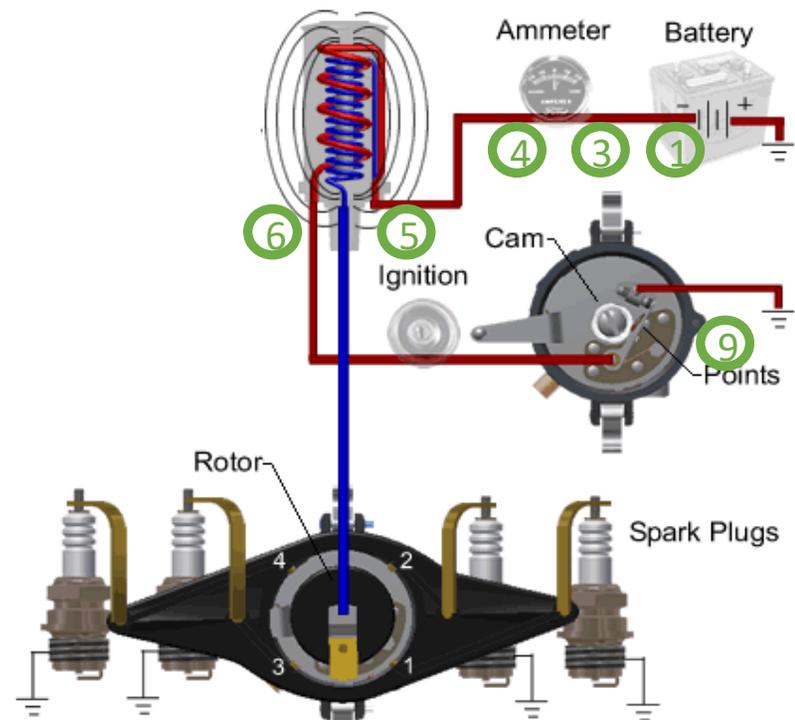
# Coil

- Coils basically consist of a primary winding, a secondary winding, an iron core and an isolation housing.
- The primary windings is switched on/off by the points.
- The secondary winding is a high voltage circuit supplying power to the spark plugs via the distributor.
- The primary winding is made of thick copper wire with approx. 200 windings. The secondary winding is made of thin copper wire with approx. 20,000 windings.
- The primary coil terminals are marked positive and negative. The negative terminal (black wire) provides power from the amp meter. The positive terminal (red wire) connects to the ignition switch. **Polarity Matters**
- Primary circuit resistance
  - Les Andrews 1.6 – 1.8 Ohms. This equates to 3.7 – 3.3 Amps.
  - Steve Pargeter 1.0 – 3.0 Ohms. This equates to 6 - 2 Amps.
- Secondary circuit resistance 6K – 12 K Ohms



# Troubleshoot Primary Circuit

1. Voltage at the starter motor – battery good
2. Fuse condition – if installed
3. Voltage at left (driver side) terminal post – fuse good
4. Voltage at right (passenger side) terminal post – amp meter good
5. Voltage at black wire on coil – wire good
6. Voltage at red wire on coil – primary coil winding good
7. Turn on ignition switch and remove distributor cap and body.
8. Hold points open
9. Voltage at movable points arm – ignition switch, armor cable connection, lower plate wire are good



# Troubleshoot Secondary Circuit

1. Points and primary circuit are normal
2. Coil could be warm to the touch, but too hot to touch,
3. Coil wire – copper tips in place and firmly seated
4. Distributor cap – not cracked and no sign of carbon trail. Black tip on underside in place.
5. Distributor rotor – tip not burned or pitted. Upper spring contacting the cap.
6. Distributor body – not cracked and no sign of carbon trails.
7. Spark plug connectors – ensure solid connection with distributor body posts.
8. Spark plugs – should have all four



# Meters Options

- Fluke 117 - \$147.00
  - Voltage
  - Resistance
  - Amperage
  - Capacitance
- Auto Multimeter MST2800B - \$25.73
  - Voltage
  - Resistance
  - Amperage
  - Capacitance
  - Dwell
  - Tachometer
  - Temperature
- Honeytek A6013L - \$15.98
  - Capacitance only
- Harbor Freight - \$5.99 or free
  - Voltage
  - Resistance
  - Limited amperage



# Voltage Tester Options

- Deluxe test probe - \$10
  - 6, 12 volt detection
- Standard test probe - \$4
  - 6, 12 volt detection
- Home made light - \$3
  - 6, 12 volt (bulb dependent) detection
- Not overly bright friend - \$0
  - Need to tell him to touch an electrical part, but not to worry because the key is off. Good for any voltage.



# Modern High Voltage Tester Options

- Spark tester – measures the spark plug firing voltage - \$20
- Coil polarity tester – checks polarity of primary coil circuit - \$25
- Ignition spark tester - measures the spark plug firing voltage - \$8
- Ignition spark tester – displays that high voltage is present - \$3



# Less-Modern High Voltage Tester Options

- Sears Model 244.2186 high voltage meter - measures the spark plug firing voltage - \$20
- Snap-on MT2700 – checks polarity and voltage of secondary coil circuit - \$35



# Parts Recommendation

The Model A is a pretty simple, reliable, machine. Like all machines it requires preventive maintenance, and from time to time repair. Many of us carry spare parts and tools. What parts you carry should be limited to what you are comfortable replacing, along with the tools required to complete the job. It is easier to build, test, and time, a distributor in your garage than it is on the side the road.

You are unlikely to need a hub puller and axel shims. You might however have need of a meter, some fuses, a distributor, some oil, and the hand tools needed for the task. The most important tool I carry is my extended towing AAA card.

# Credits and References

- Model A Basics - <http://modelabasics.com/ignition.htm>
- Model A Ignition Primer & Restoration Guidelines – Steve Pargeter
- Snyder’s web site – component pictures
- Mac’s web site – component pictures
- Dykes Automotive and Gasoline Engine Encyclopedia
- Model A Ford Mechanics Handbook – Les Andrews
- Ford Garage web site - <http://www.fordgarage.com/>