

MAFCA Distributor Seminar – Hershey 2012

Presented by Alex Janke

Model A Distributor

The properly functioning and adjusted Model A Distributor is key to a smooth running engine and driving comfort. The distributor, often called the “heart beat” of the engine, functions as a stationary switch for the coil and a rotary switch for the spark plugs. It must deliver the proper spark at the proper time for maximum power and efficiency.

A straight forward device, the Model A distributor has a number of wearing surfaces that can get out of alignment causing less than peak performance.

This paper will discuss:

- Types and identification of distributors per the Judging Standards
- Functioning
- Rebuilding the stock distributor
- Rebuilding with modern points
- Setting the point gap
- Lubrication

Types and Identification

There were four distributor housings or bases (A-12130) used by Ford. All of the bases can be successfully interchanged and used in the touring car. All bases are made of cast iron.

- Type 1 used from the beginning until March 1928 had a circular detent over the opening for the ignition cable and square notches for the upper plate
- Type 2 used from April 1928 to mid-1928 had a circular detent over the opening for the pop out connection. The notches for the upper plate are round. The base of this body is flush cut and the upper plate was forged rather than stamped.
- Type 3 used from mid-1928 through the end of production was similar except it lacked the detent and the base was chamfered slightly. The upper plate was stamped steel.
- Type 4 was an alternative style used in 1931 and features a bridged casting over the ears where the bails attach. The 1931 distributor may also feature a pop-top oiler.

Distributor bodies (A-12104) came in three types only 2 of which were “true” Model A Ford.

Type 1 - The distributor body was plain and from 1928 through December 1930 had two notches at the top of the opening where the control arm protrudes. The body is a very dark brown almost black in color. The opening in the body is 7/8” wide, which allows for a full 20 degrees of spark advance with the forged type upper plate. The later stamped upper plate arm is a little wider.

Type 2 - Beginning in December 1930 the cap was plain and the notch was reduced to approximately 5/64”. The window was increased in size to 31/32” to allow for a full 20 degrees

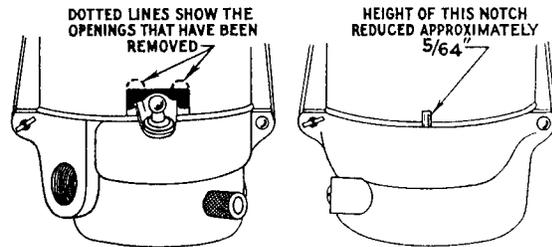
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of advance with the stamped arm of the upper plate. The window was also rectangular in shape eliminating the two openings.

See illustration:

In July 1931 a Ford script was added between the number 1 and 2 contact points. In August 1931 a U.S.A. was added below the Ford script. Original distributor bodies have only one slot in the lower skirt for the locating pin.



Type 3 – Introduced with the Model B “improved 4-cylinder engine” the cap was like type 2 but featured two locating notches so that it was interchangeable between the Model A and Model B. The Model B used a centrifugal advance and the locating pin was relocated. These housings still have the opening for the control arm, but it was reduced for the Model B and should be enlarged for the A. The body around the rectangular opening was thinner and designed for cutting out this larger opening.

Functioning

The distributor is driven by the rotation of the camshaft through the oil pump drive gear. It is connected with a lower shaft to the drive gear shaft. Ford never used a one-piece distributor shaft (long shaft). Ford used the two-piece – upper and lower shaft combination. This provides for a positive connection and allows a little flex in the driveline. One-piece shafts should be replaced with two-piece shafts. The old shaft does make a nice drift!

The camshaft rotation opens and closes the valves at the appropriate intervals and when properly timed allows the distributor to deliver the spark to the appropriate cylinder at the appropriate time (end of compression stroke).

As the upper distributor shaft rotates it turns the distributor cam. The cam opens and closes the points acting as a switch for the coil to deliver a high voltage current, held momentarily by the condenser (capacitor). This current is then “distributed” by the rotor on top of the cam through the housing to the spark plugs. All this depends on a smooth running shaft, good cam, proper points, and the other components functioning correctly.

The firing order of the Model A engine is 1, 2, 4, and 3. The spark is delivered when the piston reaches the end of its compression stroke.

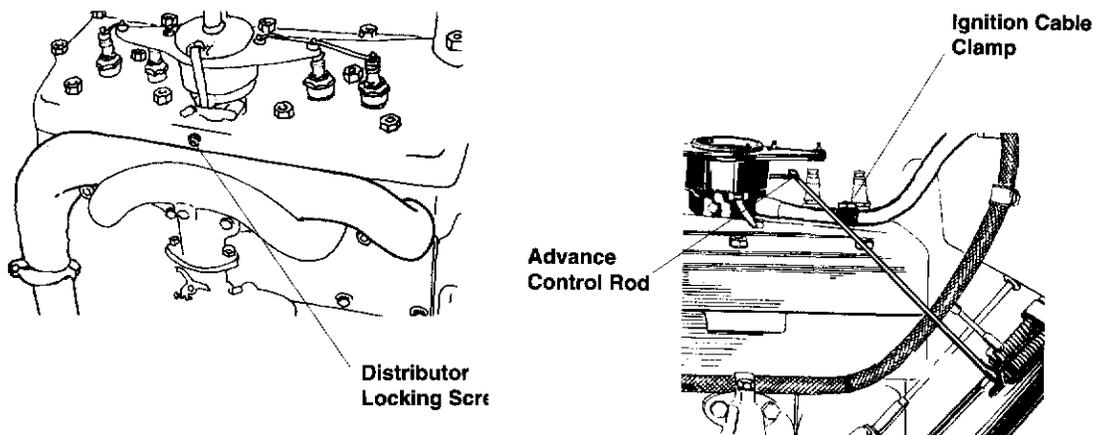
Since many of the distributor parts wear over time, it is often necessary to repair or replace them. A lack of lubrication frequently causes the wear of these items.

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Rebuilding the Stock Distributor

Remove the Distributor from the car and inspect to determine if rebuilding is necessary. Disconnect spark plug leads, advance control rod, and coil wire. Loosen the Distributor Locking Screw Nut and Screw (9/16" wrench and screwdriver). If equipped with a popout ignition cable you must disconnect the cable from the stud, remove the distributor and then unscrew the distributor from the cable. Check the following items:



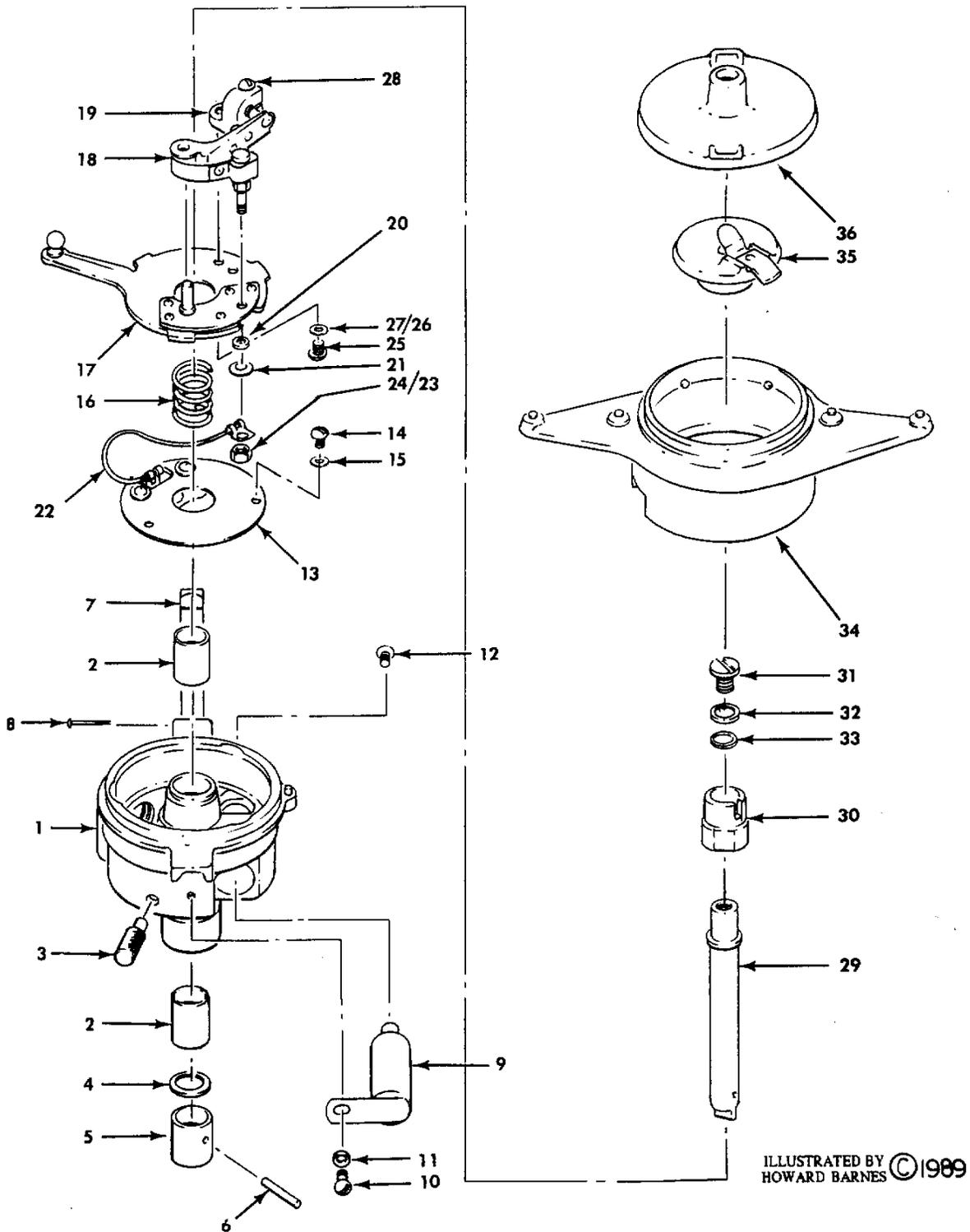
- ❑ Inspect distributor body for any cracks or corrosion build up
- ❑ Inspect rotor for clean tip and good contact with top
- ❑ Check gap between rotor and body – it should be approximately .025"
- ❑ Inspect top for carbon tip, cracks, and general condition
- ❑ Play in the shift –end pay (there should be minimal up and down movement) and side play (there should be zero side-to-side movement)
- ❑ Binding on the shaft (the shaft should turning freely though 360 degrees)
- ❑ Condition of points (they should be clean, meet flush, show no evidence of burning or corrosion build up)
- ❑ Test electrically (continuity should be present when points are closed and none when points are open)
- ❑ Visually inspect the housing for cracks (pay particular attention to the bale ears)
- ❑ Check the spring between the upper and lower plate
- ❑ Check the wire between the upper and lower plate

If you picked up a distributor at a swap meet do the same inspection. Chances are swap meet distributors will need to be rebuilt and occasionally those in running cars also need an overhaul. The distributor consists of a number of parts and many of them are small. Before starting disassembly have a place such as a small cardboard box to secure these items. Study the following diagram and parts list then follow the steps do perform disassembly.

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Model A Ford DISTRIBUTOR ASSEMBLY 1928-1931



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Model A Ford DISTRUBTOR ASSEMBLY 1928-1931

Index Number	Part Number	Nomenclature	Number Required
1	A-12130	Distributor Base Assembly	1
2	A-12132	Distributor Base Bushing	2
3	A-12135	Distributor Base Oiler	1
4	A-22331	Fiber Washer 1/2" (3/16 x 3/4)	1
5	A-12195	Shaft Sleeve	1
6	A-23670	Sleeve Pin	1
7	A-12144	Distributor Cap Clamp	2
8	A-22902	Oval Head Split Rivet (1/8 x 15/16)	2
9	A-12300	Condensor	1
10	A-20160-S7	Round Head Screw #8-32 (x 1/4)	1
11	A-22056	Lockwasher #8 (3/64 x 3/16)	1
12	A-20223-S5	Round Head Screw #10-32 (x 1/4)	1
13	A-12148	Bus Bar (Lower Plate) Support Assembly	1
14	A-20106-S7	Round Head Screw #8-32 (x 1/4)	2
15	A-22056	Lockwasher #8 (3/64 x 3/16)	2
16	A-12137	Distributor Breaker Plate Friction Spring	1
17	A-12151	Breaker Plate (Upper) & Insulator Assembly	1
18	A-12162	Point Breaker Arm Assembly	1
19	A-12160	Contact Screw Bracket	1
20	A-22072-S6	Washer (Steel Spacer)	1
21	-	Fiber Washer	1
22	-	Pigtail	1
23	A-22056	Lockwasher #8 (3/64 x 3/16)	1
24	A-21548-S7	Hex Nut #8-36 (5/32 x 5/16)	1
25	A-20116-S8	Round Head Screw (#8-32 x 5/16)	2
26	A-22071-S7	Plain Washer 11/64" (1/32 x 3/8)	2
27	A-22056	Lockwasher #8 (3/64 x 3/16)	2
28	A-20067-S7	Fillister Head Screw #6-32 (x 7/16)	1
	A-22047	Lockwasher #6 (1/32 x 17/64)	1
	-	Flat Washer 5/16"	1
29	A-12178	Cam Shaft	1
30	A-12210	Distributor Cam	1
31	A-20106-S7	Round Head Cam Screw #8-32 (x 1/4)	1
32	A-22236	Lockwasher 5/16" (1/32 x 17/32)	1
33	A-22222-S7	Plain Washer 5/16" (1/32 x 35/64)	1
34	A-12105	Distributor Body	1
35	A-12200	Distributor Rotor	1
36	A-12115	Distributor Cap	1

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Procedure

1. Remove the cap and distributor body by releasing the bail clips – set aside
2. Remove the bail clip rivets and bails – set aside
3. Secure the lower end of the distributor shaft and remove the cam screw, washer and cam – set aside
4. Release the upper plate by rotating it counter clockwise so the tabs line up with the gaps in the distributor body – it will pop up due to the spring between the plates
5. Remove the nut and washer holding the connecting wire – set top plate and nut and washer aside
6. On an original style distributor remove the condenser mounting screw and washer from the tab and the screw and fiber washer from the lower plate through the opening in the body. The condenser can then be pulled out – set aside
7. Remove the spring – set aside
8. Remove the two screws and lock washers securing the lower plate, lift out the plate – set aside
9. Remove the oiler – set aside **Note: The oiler can be removed by inserting a punch of the correct size in the oil hole and then using a screw driver carefully prying it away from the body. Do not use pliers, as they will ruin the oiler.**
10. Punch out the sleeve pin from the shaft using a small drift. It may be necessary to grind off one end of the pin as they are frequently peened over – set aside (you will not reuse the pin, but save it until you are sure the new pin is of the correct diameter and length)
11. Remove the sleeve and thrust washer – set aside
12. Gently tap the distributor shaft out from the bottom. It may be necessary to use a drift and in some case a press to remove the shaft, however it should remove easily with your fingers!
13. Using an arbor press remove the upper and lower bushings from the distributor body – set aside for comparison with the replacements

Clean all components thoroughly.

The oil hole will probably need to be cleaned out. Use a XX drill and by HAND clear the hole. Do not enlarge the hole, as the oiler needs to be reinstalled. The oil hole goes directly in from the side of the body to the center, the small hole visible looking down into the body does not meet the oil hole, this is where the lower plate attachment screw goes – do not try to drill it to make a connection. The body should be stripped of all paint – bead blasting works best!

Inspect

The upper shaft (A-12178) should be measured and if less than .498” anywhere along the shaft it should be replaced.

Carefully inspect the cleaned body, look for broken or crack ears where the bails attach and for cracks in the top where the upper bushing will be installed. Cracked housings are not suitable for rebuilding.

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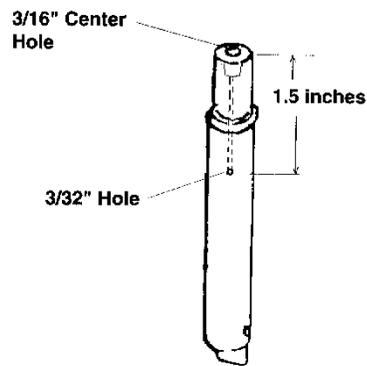
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Assembly

Body and Shaft

1. Starting with a cleaned and repainted distributor body press in two new brass bushings (A-12132) one on the top and one on the bottom. The original Ford bushings were 1" long and many of the after market ones are less. They function fine, but if you can find them 1" replacements are better since they provide more bushing surface area. Use an arbor press to press them in. [The body should be painted with two coats of gloss black enamel.]
2. Use a .500" reamer and ream both bushings at the same time to .500". The parts vendor generally sell these reamers, however many members of your local club have them and are happy to loan them to you.
3. Proper lubrication of the upper bushing was often a problem so the distributor shaft and cam screw should be drilled. You may order already drilled shafts from the part suppliers or do it yourself. Drill a 3/16" hole down the center of the shaft, 1.5" deep, and a 3/32" hole through the side. Drill a 3/16" hole through the center of the cam screw. Drilling the shaft is not difficult and the drill self centers for the 3/16" hole.
4. Insert the distributor shaft in the body and check for side play, there should be none.
5. Les Andrews recommends you remove the shaft and place a thin (.015" thick) washer (A-12180) under the collar and then reinsert the shaft. Other references do not discuss this thin washer under the collar; however it seems like a good idea mechanically to reduce friction and improve the life of the distributor.
6. Place the shaft sleeve (A-12195) on the shaft and drive the pin (A-23670) part way in. Measure the end-play. If endplay exceeds .003", remove the pin and sleeve and add a fiber washer (A-22331) above the sleeve and reinstall the sleeve. Check endplay again. It is sometimes necessary to carefully sand the fiber washer by hand against a piece of fine sandpaper (250 grit) on a flat surface to achieve the desired adjustment. With the correct endplay install the sleeve and pin. The pin provided by the parts suppliers is solid as the original and may be peened on both ends. A good roller pin of the correct length does the same job and makes subsequent removal in the future much easier.

NOTE: Sometimes when the ignition cable is screwed in too far it makes contact with the body causing a short. This problem can be eliminated by gluing a small piece of rubber in the housing opposite the opening for the cable. Insure the rubber does not interfere with the movement of the upper plate.
7. Attach the two distributor cap clamps or bails (A-12144) to the body with oval head split rivets (A-22902). The bails should be raven finished spring steel and the rivets brass. Attach the rivets with the heads facing to the front of the engine.



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Lower Plate

1. The lower plate (A-12148) was originally cadmium plated. Check the finish of the plate.
2. Check the lower plate rivets to ensure they are a tight fit. Use a multimeter to check continuity between the lower contact bracket and the plate there should be no continuity.
3. Examine the wire or pigtail and if it has become stiff or frayed or the insulation is worn replace it. The replacement should be 16 gauge-insulated wire with 60 or 80 strands and 3 ¼” long for original points or 4 ½” long for modern points. The wire should have a “flag” already soldered onto one end. Open the keeper and use a soldering iron to remove the old wire and firmly solder the new wire in place. Bend the keeper back down to secure the wire.
4. Attach the lower plate with two (2) 8-32 x ¼” cadmium plated round head screws.

Upper Plate

There are two choices for the upper plate original or modern. The original plate uses a separate point block screwed to the plate and alignment of the point contact is more difficult and miss alignment can cause poor firing. Original points have a metal contact that causes cam wear and may require frequent adjustments.

The modern plate uses 1970 Ford V8 points. These feature a nylon cam contact which results in almost no wear, a single unit points and block to provide accurate firing, and a top mounted condenser eliminating the heat failure often experienced in original condensers which are mounted lower in the distributor body. The use of a modern plate in the touring car is recommended.

Many original upper plates were adapted to modern points and condensers and you may find one of these modified plates. They work well if the modification was done expertly. I have found many of them where the points are mounted at a slight angle so the cam contact is not precise. I strongly recommend purchasing a modern plate from the parts suppliers if you elect to use modern points.

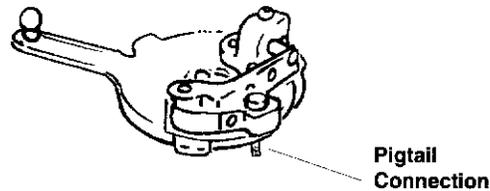
The castings had two different thicknesses in the groove that holds the upper plate. If the groove is too thick for your upper plate a Teflon washer maybe necessary.

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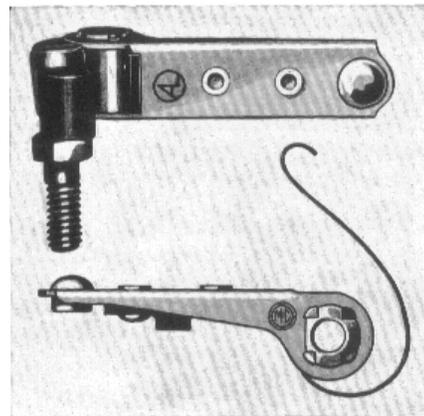
Original Points

7. The upper plate (A-12151) was also cadmium plated, check the finish and re-plate / replace as necessary. Check the rivets for tightness and again use the multimeter to check the point-mounting block for continuity with the plate. There should be no continuity.



Original Type Upper Plate

8. Install the point block or contact screw bracket (A-12160) on the plate using two (2) 8-32 x 5/16" round head screws with flat washers and lock washer from the bottom of the plate. Note that one end of the point block allows some movement before tightening; this will allow adjustments for a parallel fit with the points.
9. With a small brush apply a little lubricant to the point pin (Lubriplate, Vaseline, or silicon cam lube all work well). Install a new set of points (A-12162) by sliding them onto the pin and attaching with the metal spacer, fiber washer, lock washer and nut. Attach the pigtail from the lower plate between the fiber washer and the lock washer. Bend the flag away from the side of the plate if necessary so it will not touch the body when installed. Original points have one of the two manufacturing marks shown on the illustration.



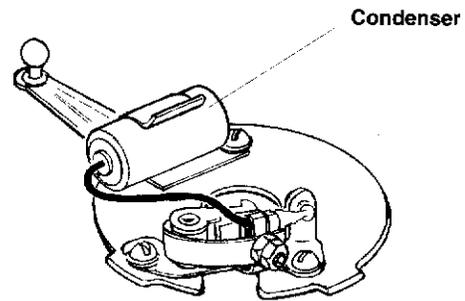
10. Place the distributor breaker plate friction spring (A-12137) over the shaft. Apply a little lubricant with a small brush to the groove in the casting where the upper plate will be fixed. Then push the upper plate down on the spring aligning the three notches in the cast body groove and turn clockwise. The plate will only go in one way so the control arm is to the rear of the engine.
11. Install the cam (A-12210) on top of the shaft and lock down with the cam screw (A-20744-S7) and washer.
12. Install a new condenser (A-12300) in the lower body opening. Secure the tab end with an 8-32 x 1/4" cadmium plated screw. The tab should make electrical contact with the body. This is usually done through the screw, but it is a good idea to clean off a little of the paint around the screw to ensure good contact. Attach the other end of the condenser to the tab on the lower plate using a 10-32 x 7/32" round head screw. The parts suppliers today furnish "burn-out proof" condensers and these are preferable. The original condenser had the tab soldered and dimpled on and was Terne finished.
13. Electrically test the distributor. With the points open and a multimeter check between the point arm and the upper plate there should be no continuity. When the points are closed there should be continuity.

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Modern Points

1. Install a set of points on the plate using two 8-32 x 1/4" screws and lock washers.
2. Install a new condenser with an 8-32 x 1/4" screw and attach the wire from the condenser to the points between the two nuts.
3. Attach the lower plate pigtail to the upper plate point stud on the topside of the plate – again between the two nuts where the condenser is attached. This is why the wire is longer for the modern plate.
4. Place the distribution breaker plate friction spring over the shaft. Apply a little lubricant with a small brush to the groove in the casting where the upper plate will be fixed. Then install the modern plate like the original by pressing down on the spring, aligning the three tabs with the three notices in the casting, and rotating clockwise.
5. Install cam and lock down with cam screw
6. The condenser is already on the plate so no condenser is needed for the body. If you want the appearance of an original distributor and old original condenser may be cut in half with a hack saw. The condenser body can be removed from the housing and each end of the housing covered with electrical tape. Then install each end with screws like the original.
7. Electrically test the distributor. With the points open and a multimeter check between the point arm and the upper plate there should be no continuity. When the points are closed there should be continuity.



Modern Upper Plate

Either Original Upper or Modern

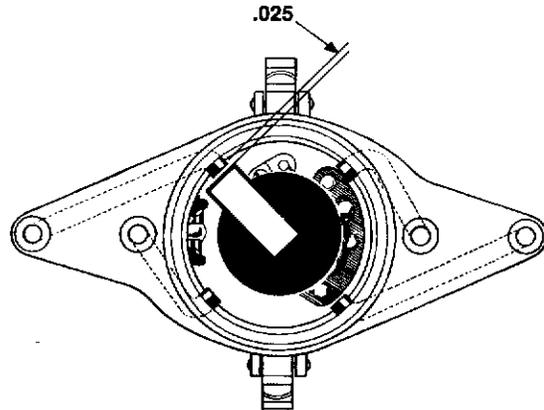
1. Attached the ignition cable to the distributor body. Screw the cable in far enough to make good contact, but not so far as to short out against the casting. Reattach the cable clamp to the stud and torque it to 55 ft. lbs for original popout ignition.
2. Install the lower distributor shaft by dropping it down the hole. Oil the shaft liberally with motor oil. Use a screwdriver in the slot and rotate it until it drops into place. The shaft can be inserted with either end down since the key and slot are offset. In both directions.
3. Place the distributor in the cylinder head with the locking pin in the hole. If the locking pin is missing it may be replaced by a press in type offered by the parts suppliers. The pin or base assembly index pin is essential for correct positioning and locking the distributed in place. The distributor must sit fully down flush against the cylinder head. Rotate the cam on the top of the shaft to ensure alignment of the shaft key and slot in the lower shaft. Occasionally, a reproduction shaft may be too long depending on

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manufacture. Grind this shaft carefully until the distributor fits flush [This rarely occurs today so make sure the shaft is too long before grinding, the problem maybe one of fit].

4. Install the distributor locking screw and lock nut.
5. Turn on the ignition switch and check for 6 volts from the point arm to the upper plate or any suitable ground.
6. Using an insulated screwdriver, open and close the points with the ignition on and look for the spark. It should be a clean blue white spark each time the points are opened and closed.
7. Attach the control rod.
8. Set the point gap to .018 with new points.
9. Install rotor and distributor body. Gap between rotor and body should be .025".
10. Adjust timing.
11. Install body cap, coil high-tension lead and spark plug straps.



Distributor Specifications	
Main Shaft	.4985" Dia.
Main Shaft Bushing	.500" I.D.
Main Shaft Side Play	.001" max.
Main Shaft End Play	.003" max.
Cam Lobe Differences	.0005" max.
Point Gap	.018"
Rotor-to-Body Terminal Gap	.025"
Spark Control Advance	20 Degrees

Lubrication

The Model A distributor should be lubricated every 500 miles along with oil changes. Use motor oil and fill the distributor base oiler. If you have drilled out the shaft and cam screw as recommended, add a few drops of oil here as well.

The cam should be lubricated with cam lube or Lubriplate sparingly. This is more important for original points than for modern points since the originals represent a metal-to-metal contact.

Some distributors have grease fittings installed rather than oilers. I have often wondered who came up with this idea. Tom Tucker from Blaine, Washington submitted a technical tip to the Restorer and it was published in Nov/Dec 1996. It suggests removing the press-in oiler and then drilling and taping the hole with a 1/8" NPS tap. Then a 90-degree Zerk grease fitting is installed. Using high temp wheel bearing grease the distributor is lubricated every few hundred miles. This will lubricate the bushing, but a few extra pumps can cause grease to enter the distributor causing failure. I recommend keeping the original oiling system.

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Service Bulletins

The Model A Service Bulletins never discussed rebuilding or refurbishing the distributor. It obviously experienced little problems during it production. They focused on setting the timing and the point gap as well as the changes made in the distributor body.

References:

Model A Ford Mechanics Handbook by Les Andrews (1997)

Ford Service Bulletins, Ford Motor Company (1928 – 1931)

Model A Shop Drawings MAFCA

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