

# SERVICE BULLETIN

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## SB651

FAA APPROVED

**SUBJECT:** CAPACITOR INFORMATION AND INSTALLATION FOR D-2000 AND D-3000 SERIES MAGNETOS.

**REASON FOR BULLETIN:** To provide information and instructions when troubleshooting difficulties associated with capacitors in the D-2000 and D-3000 Series Magnetos, and to provide revised installation instructions for these capacitors.

**WARNING**

**High resistance or discontinuity between the capacitor and the remainder of the magneto will result in destruction of the contact assembly, loss of ignition, and loss of engine power.**

**EQUIPMENT AFFECTED:** All Bendix D-2000 Series Magnetos and all Bendix and TCM D-3000 Series Magnetos.


**COMPLIANCE:** Whenever described symptoms are encountered and whenever capacitors are installed.

**GENERAL INFORMATION:**

Field reports indicate a widespread lack of understanding regarding the function of the capacitor in the operation of the D-2000 and D-3000 Series Magnetos, and regarding the remedies for symptoms associated with the capacitor circuit.

The capacitor is an integral part of the magneto which serves the electrical function of point arc suppression. The capacitor is always specified in the magneto bill-of-materials. Every spare D-3000 Series Magneto Unit supplied by Teledyne Continental Motors includes two capacitors and attaching hardware. Replacement of a D-2000 or D-3000 Series Magneto Unit is not complete without also replacing the capacitors. Apparently this relationship is occasionally overlooked because the capacitors in a D-2000 or D-3000 Series Magneto are installed in the harness cover. When a magneto is removed from an engine for replacement, its capacitors are sometimes left on the engine with the separated harness. If the reason for the original magneto's removal originated in the capacitor circuit, but the capacitors are not changed, the same symptoms can be expected to recur with the replacement magneto.

For the capacitor to function, it must be electrically connected to the magneto. Capacitor connections are made at two principal places: Through the lead wire to the flag terminal and the contact assembly, and from the capacitor case to the harness cover to the magneto housing ground. (The "P-lead" terminal connection, where the capacitor is connected to the wire to the magneto switch, is not part of this discussion.) While it is straightforward to inspect the flag terminal connection and its associated lead, the equally important ground return path for the capacitor is often overlooked. If either the ground return path or the flag terminal lead path presents high resistance, arcing will occur at the points. Arcing causes the points to overheat, which also overheats the spring to which one of the points is attached. The nylon cam follower then melts where it bears against the hot spring. The decreased height of the melted cam follower causes the point clearance to decrease and the magneto-to-engine timing to drift late. Whenever this condition is

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discovered, the magneto must be removed from the engine, and both the contact assembly and the capacitor must be replaced.

In the D-2000 and D-3000 Series Magnetos, the capacitor ground return path begins at the capacitor case. The capacitor case has a threaded area for a nut and a lockwasher to fasten the capacitor to the harness cover. The cover is then fastened to the magneto housing by four hold-down screws, allowing a ground return path through the housing-to-cover mating surfaces as well as through these screws. Original Bendix and TCM D-2000/D-3000 harness covers and all D-2000 and D-3000 Series Magneto housings are made from a magnesium alloy. Improper application of surface treatments, paints, thread locking compounds, brightening materials, gasket materials, and threaded fastener torque, singularly or in combination, can cause the capacitor to become insulated from magneto ground. Likewise, given enough time without the required preventive maintenance, the effects of moisture, heat, contamination, and a corrosive environment can serve to insulate the capacitor from magneto ground.


Teledyne Continental Motors Ignition Systems Service Bulletin 643 specifies required maintenance intervals for all TCM and Bendix aircraft magnetos and related equipment, including D-2000 and D-3000 Series Magnetos. Although these are the maximum intervals allowed, operators may choose to schedule maintenance at intervals shorter than those specified in SB643.

**DETAILED INSTRUCTIONS:**

1. Whenever magneto-to-engine timing is found to be later (closer to piston top dead center) than the limit specified by the engine manufacturer, prior to disassembling any ignition system component, use an ohmmeter capable of 0.1 milliohm resolution (such as Fluke model 8840A digital multimeter, John Fluke Manufacturing Co, P. O. Box C-9090, Everett, WA, 98206) to measure resistance between each capacitor threaded area and an unpainted area on the magneto housing. If this resistance is greater than 3 milliohms, the capacitor must be removed from the magneto system assembly and the corresponding contact assembly must be examined. If the contact assembly cam follower is found to be melted where it bears against the point spring, both the contact assembly and the capacitor must be discarded. If the cam follower is not found to be melted, the capacitor must be inspected per GENERAL OVERHAUL paragraph 7.2.5, in the D-3000 Series Maintenance Manual, Form X42003 or later revision, before it can be reinstalled as described below.

NOTE... A new cam follower has a straight edge where it bears on the point spring. If melting has occurred, the edge deforms to match the shape of the spring. Sometimes melting also causes the follower thickness to bulge and/or the material to darken at the bearing area.

2. Whenever maintenance affords access, inspect the contact assemblies. Any contact assembly found with the cam follower melted where it bears against the point spring must be removed and replaced, and its corresponding capacitor must also be removed and replaced.
3. At the 500 hour inspection as specified in SB 643, check magneto-to-engine timing in accordance with the engine manufacturer's instructions prior to removing any ignition system component from the engine. If magneto-to-engine timing is found to be later than the limit specified by the engine manufacturer, comply with paragraph 1, above.

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4. Capacitor Installation:

- a. Ensure each capacitor to be installed is the correct part number for the magneto. Despite similarities in appearance, capacitors for D-2000/D-3000 Series Magnetos have differing capacitance values and boot configurations depending on the number of cylinders the magnetos fire. Capacitor applications are as follows:

Magneto Number Of Cylinders	Capacitor Part Number
4	10-382807
6	10-382681
8	10-382681-1


- b. Ensure capacitor mounting surface inside the harness cover is clean and free of corrosion. If necessary, brighten harness cover in the inside capacitor mounting area with ONLY a clean, fresh nylon scouring pad.
- c. Using ONLY a different clean fresh nylon scouring pad, remove contamination and corrosion from capacitor case shoulder and threads as necessary. See Figure 1
- d. Form capacitor leads as shown in Figure 1.
- e. Install the two capacitors in their respective places in the harness cover. Secure each capacitor with lockwasher and nut, centering the boot nipple between the harness silicone grommets. Apply 60 to 70 inch pounds torque to each nut. NOTE... To ensure correct alignment of capacitor boot nipple, the harness cover and capacitor may be temporarily mounted onto a magneto while the capacitor securing nut is tightened.

5. Assemble Harness Cover to Magneto:

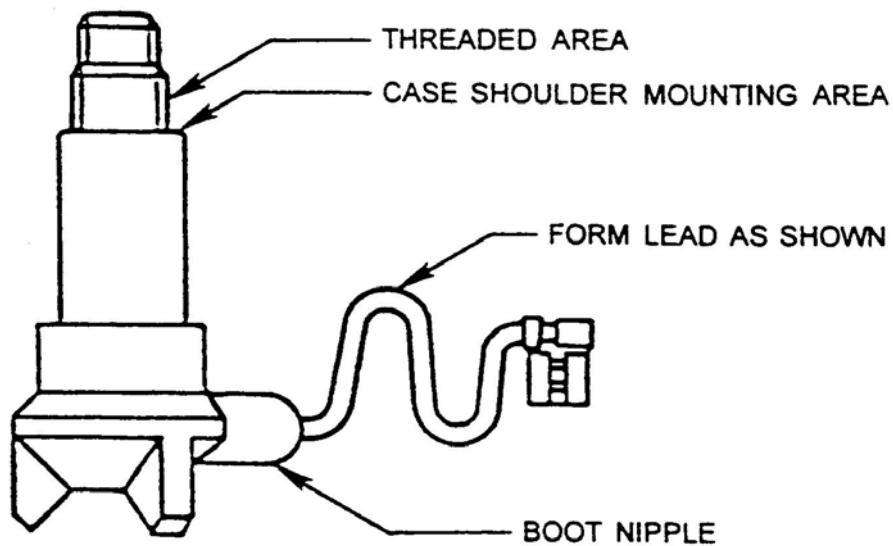
NOTE... Spray grommets with a film of MS-122N/CO2 TFE Release Agent. (Available from Miller-Stephenson Chemical Company, P. O. Box 950, Danbury, CT, 06813) Do not spray distributor block.

NOTE... Harness cover is secured to both D-2000 and D-3000 Series Magnetos with four screws and four washers. Early D-2000 Series Harness covers with eight screw holes which have not been modified in accordance with SB 605A to fill in the four center screw holes must be replaced with new covers.


- a. In order to ensure a good ground return path, ensure harness cover and housing mating surfaces are free of corrosion, paint, and gasket/sealing materials. Use ONLY a clean fresh nylon scouring pad to brighten these surfaces. Also ensure threads in housing are free of corrosion and thread locking compounds. Use a 10-32 tapered tap, followed by a nylon brush and air blast to clean the threads.
- b. For pressurized magnetos only, position gasket on magneto mating surface.
- c. Position harness cover so that witness marks align with witness marks on magneto housing. Install capacitor lead flag terminal onto the inside spade terminal of the corresponding contact assembly: Connect LEFT capacitor lead to the contact assembly farthest from the witness marks and data plate; Connect RIGHT capacitor lead to the contact assembly nearest to the witness marks and to the data plate. Fully seat flag terminals straight onto the spade terminals.

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- d. Position cover onto magneto, ensuring each grommet slides into its corresponding distributor block outlet tower.
- e. Install one screw and washer at each of the four locations on the cover. Draw screws down evenly. For pressurized magnetos, ensure gasket is positioned properly and apply 40 to 45 inch pounds torque to each screw. For unpressurized magnetos, apply 30 to 35 inch pounds torque to each screw.
- f. Using Fluke model 8840A digital multimeter or equivalent, measure the resistance between each capacitor threaded area and an unpainted area of the magneto housing. If this resistance exceeds 3 milliohms, the source of high resistance must be eliminated before the magneto can be returned to service.



**FIGURE 1**  
**TYPICAL D-2000 / D-3000 CAPACITOR**

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