DIFFICULTY RATING =

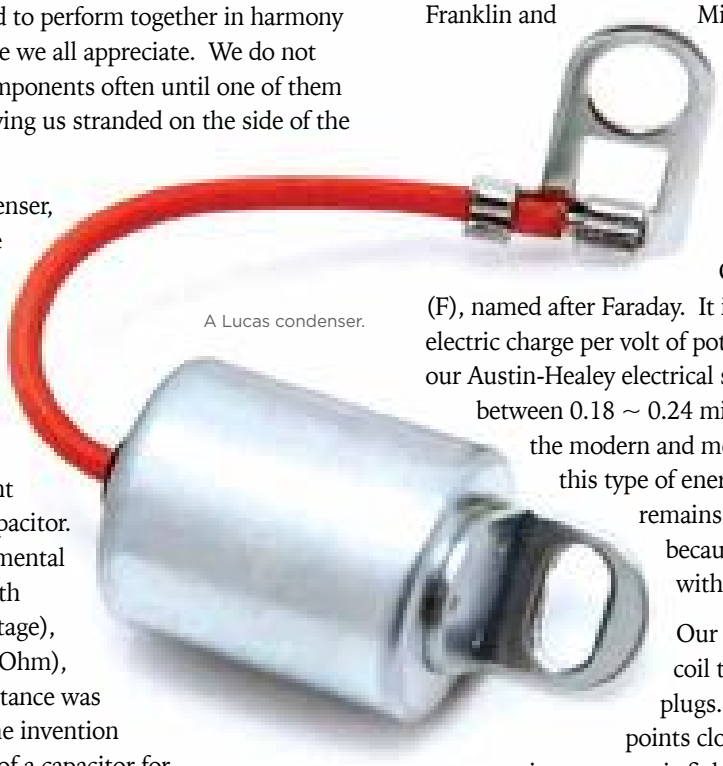
TECHNICAL SERVICE BULLETIN

Is my capacitor incapacitated?

Bill Young, Jacksonville, Florida, St. Johns Austin-Healey Club

Our Austin-Healeys were assembled from many special and unique components, all required to perform together in harmony to provide the driving experience we all appreciate. We do not think about these individual components often until one of them decides to stop functioning, leaving us stranded on the side of the road.

For example, consider the condenser, that small silver gadget with the short wire hidden deep inside the distributor. It doesn't seem to do very much, but you will see that it is a key component in the coil circuit of the electrical ignition system.

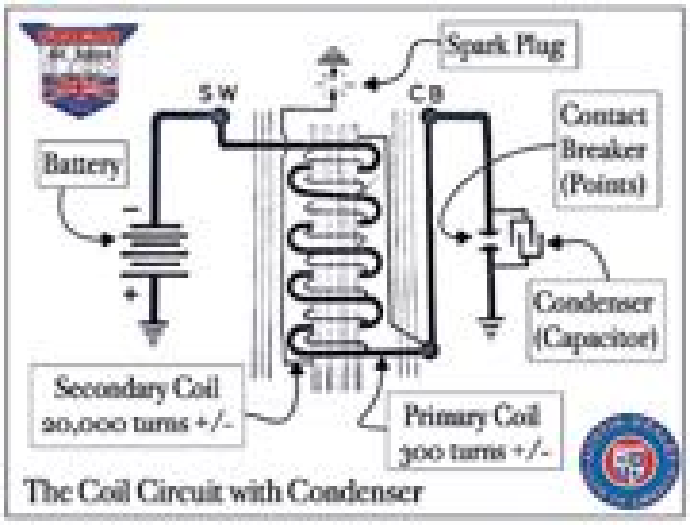


A Lucas condenser.

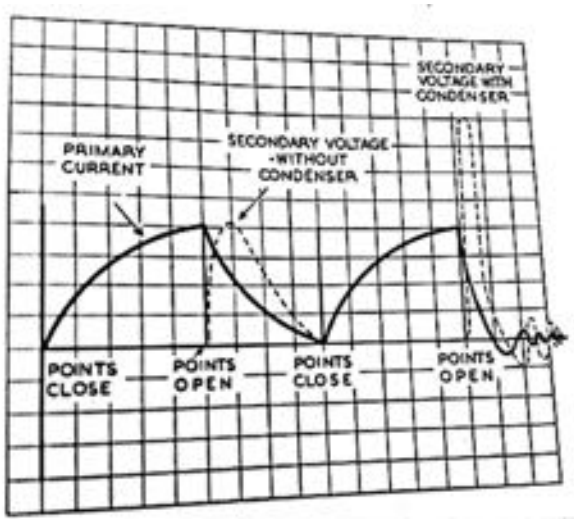
Although we call this component a "condenser," it is actually a capacitor. Capacitance is one of the fundamental principles of electricity along with Electromotive Force (EMF) (Voltage), Current (Ampere), Resistance (Ohm), and Inductance (Henry). Capacitance was discovered in the 1740's with the invention of the Leyden jar, an early form of a capacitor for storing electric charge. It was described as "condensing" the electrical charge within it, leading to the name "condenser" for devices that performed a similar function. Our friends Benjamin Franklin and Michael Faraday expanded the understanding of how to store this charge. Franklin worked with parallel flat plates for storing electricity, while Faraday developed designs using dielectric materials to increase the amount of charge.

Capacitance is measured in Farads (F), named after Faraday. It is defined as storing one coulomb of electric charge per volt of potential difference. The condenser in our Austin-Healey electrical system would have a typical rating between 0.18 ~ 0.24 microfarads. The term "capacitor" is the modern and more accurate term in use today for this type of energy storage device, yet "condenser" remains in use for older ignition systems because of the historical legacy associated with its discovery.

Our ignition system uses a two-winding coil to develp the voltage to the spark plugs. When the contact breaker (CB) points close, the primary coil is energized creating a magnetic field in the coil. When the points open, the magnetic field collapses inducing a current impulse in the secondary winding producing a high voltage sufficient to



The coil circuit with condenser.



With and without condenser.

Inside the condenser.

produce the spark at the spark plug. This collapsing magnetic field also induces a current in the primary winding that causes a high voltage across the points. Interrupting this current causes excessive arcing and sparking that can burn and pit the points contact surface. The condenser solves this problem.

The condenser is connected in parallel with the point's contacts. When the points open, a small amount of current continues to flow into the condenser until it is fully charged, allowing the points to open fully without arcing. Once current into the primary coil stops flowing, the magnetic field in the coil collapses and produces the high voltage. Now that the points are open there is little or no arcing across the points. If the condenser is failing or not working at all, and when the points open, the primary coil current flow slowly collapses as the arc is occurring across the points (see graph in this article). This time delay causes secondary coil output voltage to be reduced to the spark plugs. This would cause weak engine performance and premature failure of the points.

I cut open a condenser to see what was inside. I found it to be well made with about 60 inches of metal foil and dielectric film wrapped tightly in a coil. It was tightly sealed and showed no signs of aging or deterioration. There would be no reason to suspect it could fail, however, it would be wise to replace the condenser when you replace the points just to be sure the electrical system is in good working order. After all, this little fellow charges and discharges 12,000 times per minute at 4000 RPM. They are not expensive, so purchase the best one you can. Some folks on the forums recommend the NAPA Echlin EP29 for the big Healey engine.

Now that you know more than you wanted to know about capacitors/condensers, it may be time for a Haze Capacitor, a hazy India Pale Ale. This IPA is brewed by Against the Grain Brewery in Louisville, Kentucky. The brewer tells us that this New England-style IPA is brewed with special techniques to produce and retain tropical fruity flavor and aroma, and holds proteinaceous haze to give a smooth body. It pours with a hazy orange-yellow to gold color with a fluffy white head. With 7.5% ABV, too many of these ales might just incapacitate you for sure. HM

Haze Capacitor IPA.