SU Fuel Pump Operation
by David DuBois

"I have an old pump on my workbench, and one of these days I will try to verify why the points stop with a blocked inlet."

No need to fuss around verifying that situation, I have verified it on my test stand. Think about the action of the pump. When the pump is at rest, the points are closed. When power is applied, current goes through the points and the coil to ground, pulling the diaphragm up against the bottom of the coil and producing a vacuum in the inlet chamber of the pump. Just as the diaphragm reaches the full travel up, the carrier of the lower set of contacts toggles over and the points open, interrupting the current flowing through the coil. When this happens, there is no longer any magnetism being produced by the coil and the diaphragm is pushed back down to its rest position, and in the process pushes fuel out through the outlet of the pump (there is a set of check valves in the pump that keeps the fuel from being pushed back into the tank). If the float bowls are full and the needle valves are shut, the diaphragm may take awhile to reach the bottom rest position and during this time, the current through the coil remains off. Once the diaphragm reaches its rest position, the lower contact carrier toggles to its other position, causing the upper and lower contacts to close, again allowing current to flow through the coil and repeating the inlet cycle.

Now, consider what happens if the is a clog on the inlet side of the pump (or a vacuum is pulled in the tank due to a lack of venting). If the vacuum produced on the inlet side of the pump by either a tank not venting or a clog exceeds the vacuum produced by the rising diaphragm in the pump, the diaphragm will not be able to rise all the way to the point where the lower contact carrier can toggle over and open the points. When this situation occurs, the pump stalls with the points closed and current continues to flow through the coil. The older pumps draw somewhere around 3.5 amps (later pumps draw around 5.5 amps), but in normal operation the points are only closed for about 10% of the on/off cycle, so the average current flow during normal operation is only about 10% of full current and the pump remains relatively cool. But, if the pump stalls with the points closed, full current flows all of the time that the points are closed and with full current through the coil, heat builds up rapidly, until the internal swamping resistor (part or all of the arc suppression circuit) burns out.

In the SU pumps, unlike the after market pumps, such as the Facet pumps, there is no bypass valve (used to set output pressure), if there is a clog on the inlet side of the pump, the pump will always stall in a current on condition as described above. On the earlier pumps, like the ones in the T-series cars, MGAs and very early MGBs, the inlet and outlet valves consist of a brass disk that seat on either brass or aluminum seats and over time have a groove worn in them. The result is that they don't seal as well as when new so that even if a clog develops on the inlet side of the pump (or a vacuum is pulled in the tank), a worn pump will continue to click, but at a much slower rate than normal, the extra time between ticks being the time that the points are closed, current is flowing and the pump is heating up. On the after market pumps like the Facet, the pump will actually cycle faster when the inlet side is clogged and no damage occurs to the pump. This is why I recommend that a modern, high efficiency filter not be used on the inlet side of a SU pump. In the T-series car, there is a filter over the pickup tube inside the tank and filter inside the pump. Both of these filters are a relatively coarsely woven mesh that will pass any fine rust particles, stopping only rocks and small birds. The SU pumps and even the SU carburetors are relatively tolerant of the fine rust particles, whereas the modern filters will soon clog with these particles and cause damage to the SU pumps.