So I had the key on ACC last night pumping up the rear suspension to put blocks under the rear bogies for the winter. I noticed my JC4 brake vacuum pump was cycling, and driving my Digipanel low voltage nuts, so I thought I'd check the voltage going to it.

I followed the main power(I thought) to the battery 12V terminal and measured the voltage. There was very little change there, so I pulled the fuse... the pump continued to cycle. So I wondered if I got the Ignition and 12V wires reversed. I was under the assumption from wiring diagrams on the Net that +12V was the main power wire from the Motor, and Ign was just a sense wire. But turns out the motor power is taken from the Ignition line, hence the voltage drop going through the ignition switch wiring. I pull my Ign sense from the yellow fan wire which also supplies power in accessory.

So I dug around the Internet and found this explanation on the operation of the Vacuum Pump. Although I was searching for JC4, this article didn't explicitly say JC4, however the wiring chart below states JC4.

Supplemental Brake Assist

The Supplemental Brake Assist (SBA) unit creates vacuum for the brake booster in case of a vacuum loss or low vacuum to the brake booster. The SBA consists of

- *The sensor circuit board and pressure sensor*
- *The check valve manifold*
- *The vacuum pump*
- *The motor*

When the vehicle is keyed ON, the SBA performs a self test by toggling the Supplemental Brake Assist Signal Circuit low for one second. The instrument panel cluster (IPC) recognizes this as an indication that the SBA is functional. If the IPC does not see this signal for five consecutive ignition cycles the Service Brake Booster Message is displayed. The SBA performs diagnostics at 16 Km/h (10 mph) under normal conditions, and before 16 Km/h (10 mph) if a low vacuum condition exists. The SBA then spins the motor and runs diagnostics to determine if the pump is operating and the SBA is functional. The SERVICE BRAKE BOOSTER message will display until the next ignition cycle if the unit is unable to maintain reduced power brake levels.

The SBA unit utilizes the ignition on signal from the generator to determine the engine is running and monitors speed using an input from the vehicle speed sensor. It also has an internal pressure sensor that compares the pressure inside the booster to the ambient pressure. If the vacuum drops below 18 cm/Hg (7 in/Hg) the REDUCED BRAKE POWER message is displayed and a 5 second timer is started. If the vacuum stays below 18 cm/Hg (7 in/Hg) for 5 seconds the SBA starts the pump. If the vacuum drops below 15 cm/Hg (6 in/Hg) the pump comes on immediately. Once the vacuum level increases to 23 cm/Hg (9 in/Hg) The pump shuts off. The REDUCED BRAKE POWER message continues to be displayed until the vacuum level reaches 25 cm/Hg (10 in/Hg). If the pump runs for one minute without the vacuum reaching 23 cm/Hg (9 in/Hg) the pump shuts off and the SERVICE BRAKE BOOSTER message is displayed.

The SBA assembly operates in two modes.

• Low Vacuum Mode -- The low vacuum mode can occur with the engine ON or OFF. The SBA determines the ON/OFF status by monitoring the regulator output on the engine ON circuit. This mode involves SBA pump activation and deactivation due to changes in vacuum detected by the pressure sensor.
- Low Vacuum Engine ON Mode -- The SBA will operate in reaction to changes to brake booster vacuum as monitored by the pressure sensor. This mode is normally active on power up if a valid engine ON signal is detected and a low vacuum condition is indicated for more than 5 seconds.
- Reduced Brake Power Mode -- When the booster vacuum drops below 18 cm/Hg (7 in/Hg) the SBA will start a 5 second timer. If the vacuum exceeds 18 cm/Hg (7 in/Hg) the timer stops and resets. After 5 seconds the pump activates and the REDUCED BRAKE POWER message is displayed.
- Immediate Pump Activation Mode -- When the booster vacuum drops below 15 cm/Hg (6 in/Hg) the REDUCED BRAKE POWER message is displayed and the pump is turned on.
- Pump Deactivation Mode -- The pump will be turned off when the booster vacuum exceeds 23 cm/Hg (9 in/Hg). The SBA will continue to display REDUCED BRAKE POWER until the booster vacuum exceeds 25 cm/Hg (10 in/Hg).
- Low Vacuum Engine Off -- The SBA will monitor the vacuum when the vehicle is above 8 Km/h (5 mph) and an engine OFF condition is detected. If the vehicle is below 8 Km/h (5 mph) and an engine OFF condition is detected the SBA will monitor the vacuum for 60 seconds
• Vacuum Augment (Engine OFF) Mode -- If the engine ON state changes to OFF after reaching 8 Km/h (5 mph) the SBA activates the pump for up to 60 seconds. After 60 seconds the pump shuts off and the SERVICE BRAKE BOOSTER message is displayed. If the engine ON signal is detected or the vehicle slows to below 8 Km/h (5 mph) before the pump times out. The pump shuts off and no message is displayed

I also found this information on the JC4 wiring including the additional pins.
http://www.gmcmhphotos.com/photos/misc/p64082-jc4-vacuum-pump-wiring.html

So from that wiring information, the line we have been calling +12V is an "Engine ON" signal. I can't tell if this "Engine ON" signal is an "Engine Running" signal, or simply Key ON.

However from my reading of its operation, it would seem that:
1) the vacuum is too low at 10" for our use...
2) the unit will time-out and shut down after 60 seconds of operation. Not exactly what we want if the engine quits while going down a long hill.

My eyes were starting to glaze over so maybe I missed something.

Bruce Hislop
ON Canada
77PB, 455 Dick P. rebuilt, DynamicEFI EBL EFI & ESC.
1 ton front end
http://www.gmcmhphotos.com/photos/showphoto.php?photo=29001
My Staff says I never listen to them, or something like that