



HOLDEN VE/WM HVAC & A/C DIAGNOSTIC HINTS					TSB #:	74
					Date:	9/7/2013
Initial Once Read:						

In this technical bulletin we have listed diagnostic advice relating to the Holden VE/WM HVAC & A/C system. This information relates to known system and vehicle strategies peculiar to the Holden VE/WM. When investigating the system functionality, it is best practice to run a scan tool check for DTC's (diagnostic trouble codes) that may have been reported, particularly if the DTC is related to module communications loss from any other module in the vehicle.

Twelve (12) electronic modules make up the operating architecture and relay information to each other on a communication highway, known as the "CAN". The CAN is broken into HI & LO speeds, a bit like low "residential speed limit" and high "freeway speed limit". Like our roads, traffic congestion affects the flow of traffic, likewise CAN congestion affects the communications between vehicle modules. See the communication information being fed between modules and the HI & LO Can connection on the last page of this TSB.

ACRONYMS: **HCM** (HVAC Control Module) **ECC** (Electric Climate Control) **MCC** (Manual "Semi Auto" Operated Climate Control) **BCM** (Body Control Module) **FET** (Field Effect Transistor in HCM) **ECU** (Electronic Control Unit.) **DTC** (Diagnostic Trouble Code) **PWM** (Pulse Width Modulation)

A/C COMPRESSOR NOT OPERATING:

- ◇ **ECC Vehicle - Cold Engine Lockout.** The A/C compressor and blower motor will not operate if the ambient temperature is below 5°C and the engine coolant temperature is below 53°C. This is to avoid cold A/C air being introduced into the cabin. This is to avoid cold A/C air being introduced into the cabin. Here are some of the causes that may turn a compressor off:
 - Faulty ambient sensor reading of -40°C which could be open circuit.
 - Evaporator sensor reading of 0 °c, faulty sensor
 - Faulty coolant temperature sensor.
 - Excessive coolant temperature could prevent compressor from operating.
- ◇ **ECC / MCC Vehicle - Interruption to Pin 12 of the 14 Pin Connector Between the HCM and Vehicle.** The compressor turns off and a DTC of "B013B" (compressor control valve) is reported. The compressor may operate for 10 seconds prior to turning off. The compressor can be turned back on, but will again turn off after 10 seconds. Check the HCM harness 14 pin connector (see page 3 for diagram) for poor terminal contact and also the electronic control valve electrical connection.
- ◇ **ECC / MCC Vehicle - Voltage Drop.** A vehicle electrical system voltage drop of 2 volts detected between the alternator and battery will result in the BCM disengaging the compressor and A/C system. This could be an electrical terminal connection issue between the battery and the alternator where a loss of supply voltage is detected greater than 2 volts which results in a plausible voltage error to the BCM.
- ◇ **ECC / MCC Vehicle - Pressure Transducer Circuit.** If the A/C system has been empty of refrigerant such as when at a panel beater a DTC P0532 or P0533 could be set especially if the ignition had been turned on with no refrigerant in the A/C system. As the compressor is turned off, you will not be able to carry out the final fill through the low side of the A/C system until the DTC is removed.
- ◇ **ECC / MCC Vehicle - Physically Not Operating, Mechanical Not Electrical Issue.** With the engine running check to see if the small hexagonal shaft end in the centre of the compressor is turning with the pulley. If it is not turning the compressor is internally damaged and must be replaced. The original cause of the compressor "lock up" must be diagnosed once the new compressor has been fitted.



POOR A/C PERFORMANCE:

- ◇ **ECC / MCC Vehicle - Low Refrigerant Charge.** One of the symptoms of a low refrigerant charge is that the left side of the centre dash vent is not as cold as the right side of the centre dash vent, regardless of the vehicle being an ECC or MCC level HVAC. This is because the evaporator is a U flow design which will result in the difference in the vent temperatures. If the refrigerant level is questionable, recover the refrigerant, recharge with 580+/-20 Grams (series 1) or 480 Grams (series 2) of R134a and recheck the A/C performance.
- ◇ **ECC / MCC Vehicle - Compressor Performance Output** is controlled by the HCM via feedback signals from the evaporator temperature sensor. These feedback signals from the evaporator sensor result in the PWM from the HCM to the compressor electronic control valve increasing and decreasing according to the heat load on the evaporator. In an ECC vehicle there are also other sensors such as the cabin, solar and ambient sensors that will impact on the A/C system performance if they are faulty or reading incorrectly.
- ◇ **ECC Vehicle - Fresh Air Purge.** In extreme cases such as extended idling or very high ambient temperature, some customers may complain of poor A/C performance after driving for some time in recirculation mode. The fresh air purge mode is automatically selected by the HCM to prevent excessive build-up of CO₂ in the cabin. Regardless of the ambient temperature, the recirculation door cycles open for 10 minutes to allow fresh air to enter the cabin. After the 10 minutes have passed, the system will return the recirculation mode for another 30 minutes. The hot ambient air is introduced into the cabin via the plenum chamber which is heat soaked thus increasing the vent and cabin temperature. During this strategy the customer may perceive that the A/C compressor is not as efficient as it was as they will feel the temperature rise when the air intake door moves to fresh air and hot ambient air is introduced into the cabin. This function may be overridden by cycling the fresh and recirculated intake air button.
- ◇ **ECC / MCC Vehicle - Stuck in Recirculation Mode.** With the A/C system operating, the discharge tube is very hot and liquid tube is only warm, High side pressure is High. This indicates either a restriction in the condenser or in the sub-cooler desiccant filter. This results in lack of refrigerant at the TXV, essentially starving the evaporator.
- ◇ **ECC / MCC Vehicle - Evaporator Freezing Up.** A/C temperature very cold for a short time then increase in vent temperature with a decrease in blower fan speed. Faulty evaporator temperature sensor or sensor requires service modification to relocate the sensor tip 15mm further to pick up the temperature in a different location or low refrigerant charge, possibly frosting the suction tube.
- ◇ **ECC / MCC Vehicle - Evaporator Freezing Up.** A hydrocarbon refrigerant has been possibly used and the charge quantity not adjusted to suit the vehicle and refrigerant. Normally a hydrocarbon refrigerant charge is 30% of the original R134a charge. An indicator of possible evaporator freeze up is a frosted suction tube.

POLLUTION MODE:

- ◇ **ECC Vehicle - Air Intake Pollution Mode.** Below 15 km/h, pollution mode can be activated to reduce exhaust fumes in the vehicle cabin when in traffic conditions. To activate pollution mode press and hold the recirculation button for 4 seconds, the display will show "pollution mode activated" and automatically go to recirculation mode as long as the vehicle speed is below 15 km/h to deactivate the pollution mode push the recirculation button.



VOLTAGE:

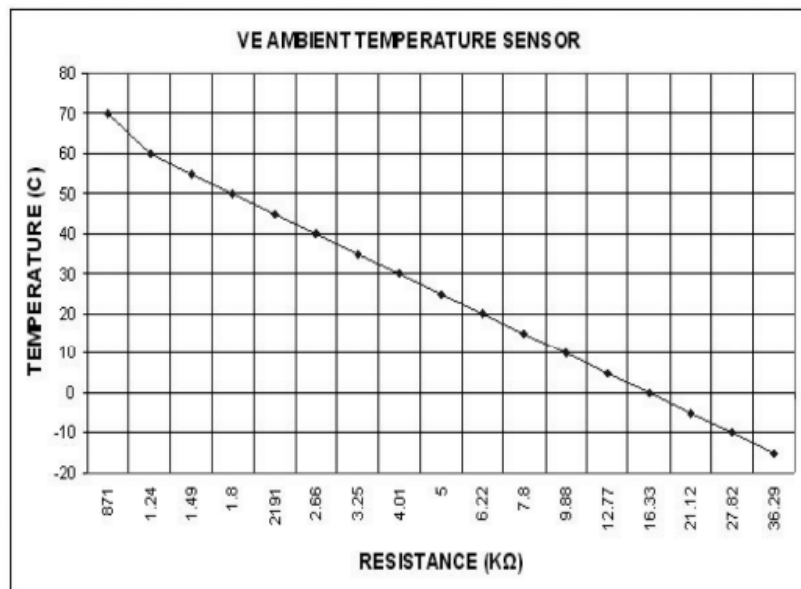
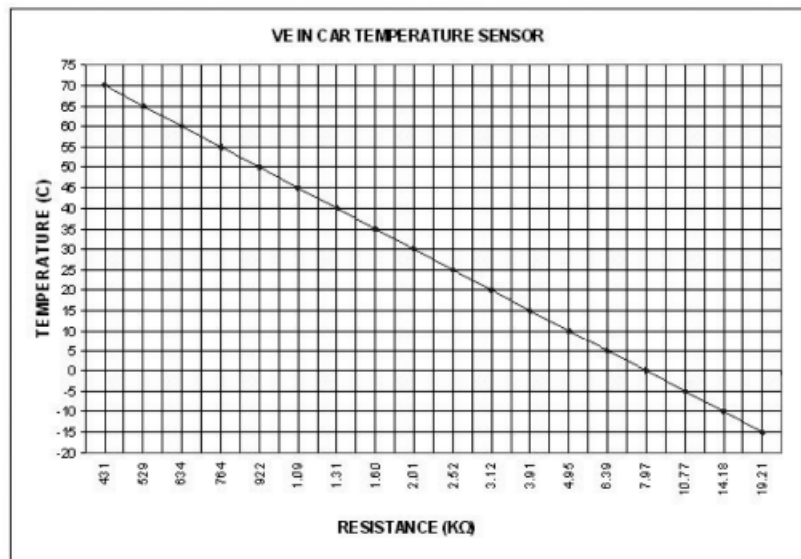
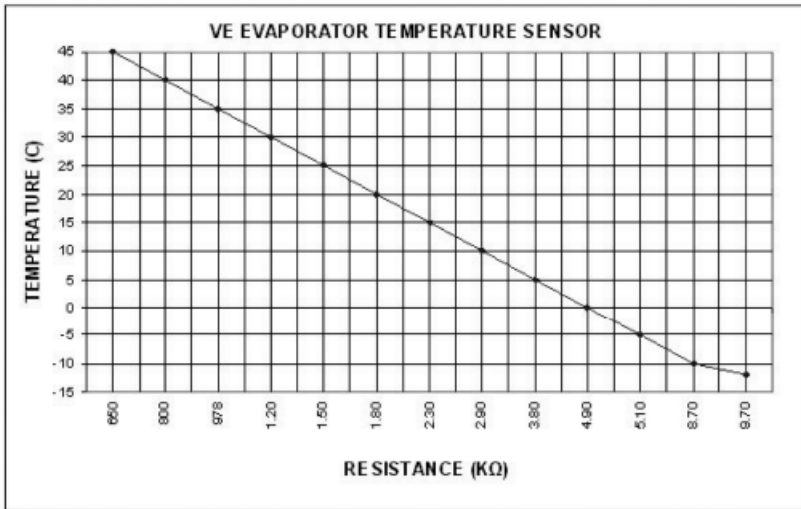
- ◇ **ECC / MCC Vehicle - HCM Low Supply Voltage.** If the HCM supply voltage drops by 2 volts the compressor will de-stroke to off. The HCM earth could be missing or loose intermittently. The indicator of this issue is that the “Service Symbol” chime is illuminated. The HCM earth is located at the rear boot latch and may not be connecting properly, particularly if the vehicle has been in a previous rear-end collision.
- ◇ **ECC / MCC Vehicle - Low Battery Voltage.** If the voltage drops below 9 volts for more than one second, even while “cranking” a DTC of “B1325” may be set. HCM will “shut down”, all HVAC functions including the compressor will stop and the drive motors will lose their minimum and maximum door position values.
- ◇ **ECC / MCC Vehicle - Blower Fan and A/C Turn Off.** Voltage lost at the main HCM connector pin 14. Poor connection, “wriggle” the connector or check to see if the pin has been bent over and creating no contact.
- ◇ **ECC / MCC Vehicle - HCM High Supply Voltage.** If the supply voltage to the HCM is 16 volts or above the HCM will “shut down”, all HVAC functions will stop and the drive motors will lose their minimum and maximum door positions. Same as if below 9 volts (low battery)

AIRMIX / MODE DOORS:

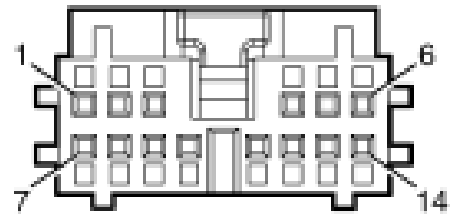
- ◇ **ECC / MCC Vehicle - Stuck in Recirculation Mode.** At a High side pressure above 2400 kPa the compressor will de-stroke to off and the air intake door move to recirculation. This is to avoid “excessive temperature loading” to the evaporator and avoid compressor damage. Once the High side pressure has reduced to below 2000 kPa, you can de-select recirculation mode.
- ◇ **ECC / MCC Vehicle - Stuck in Recirculation Mode.** Damaged or broken recirculation door pivot pin or faulty mode drive motor.
- ◇ **ECC / MCC Vehicle - Lost Door Minimum and Maximum Door Positions.** Changes to vent temperatures such as when in full cold heat is present. This can happen if a communication, voltage interruption or low voltage to the HCM has occurred. The “HCM door minimum and maximum positions require re-learning using an appropriate scan tool such as TUNI217.
- ◇ **ECC Vehicle - Noise From The HVAC When Turned Off.** It may be noticeable by some customers, especially if they have turned their HVAC and radio off that a “whirring” sound is coming from the HVAC. This is normal as the temperature air mixing motors are operating to the last known set temperature to be ready for when the HVAC system is turned back on again.

BLOWER MOTOR:

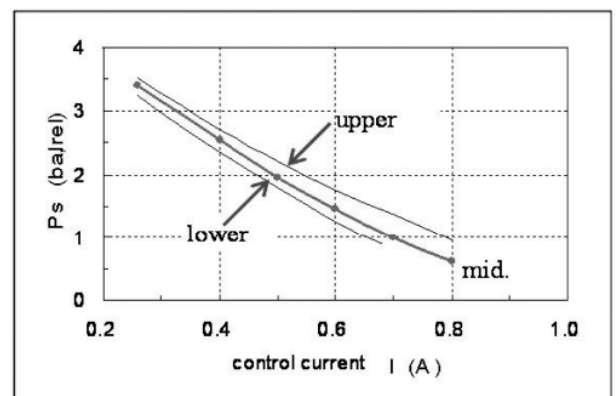
- ◇ **ECC Vehicle - Blower Fan Turns Off.** Blower speed button in radio facia panel “sticks” once activated then released.
- ◇ **ECC / MCC Vehicle - Blower Stays On with Ignition Off.** Low speed CAN issue. The fan will remain on until the battery is flat.
- ◇ **ECC / MCC Vehicle - Blower Fan Turns Off.** Battery voltage between 15-16 volts FET protection mode engages. Blower fan and A/C compressor will turn off.
- ◇ **ECC / MCC Vehicle - Intermittent Fault.** The blower motor will not operate at times. Loose electrical connection at a 2 pin connector behind the drivers side kick panel. This causes zero volts to the blower motor.
- ◇ **ECC / MCC Vehicle - Blower Motor Suddenly Stops.** Excessive current draw at the blower motor caused by a blocked cabin filter, water entry into the blower motor, excessive foliage in the blower scroll or poor voltage supply at the blower terminal.



HCM 14 Pin Connector



Pin	Wire Colour	Wire Size	Function
X2-1	BN	0.3	Low Reference
X2-2	D-GN	0.3	Inside Air Temperature Sensor Signal
X2-3	—	—	—
X2-4	L-BU/BK	0.3	LH Solar Sensor Signal
X2-5	GY	0.3	RH Solar Sensor Signal
X2-6	WH/BU	0.3	Rear Defog Relay Control
X2-7	BN	0.3	Low Reference
X2-8	L-GN/BK	0.3	Ambient Air Temperature Sensor Signal
X2-9	—	—	—
X2-10	D-GN	0.3	Low Speed GMLAN Serial Data
X2-11	—	—	—
X2-12	D-BU	0.3	AC Compressor Clutch Low Reference
X2-13	D-GN	0.3	AC Compressor Clutch Supply Voltage
X2-14	RD/WH	0.75	Battery Positive Voltage



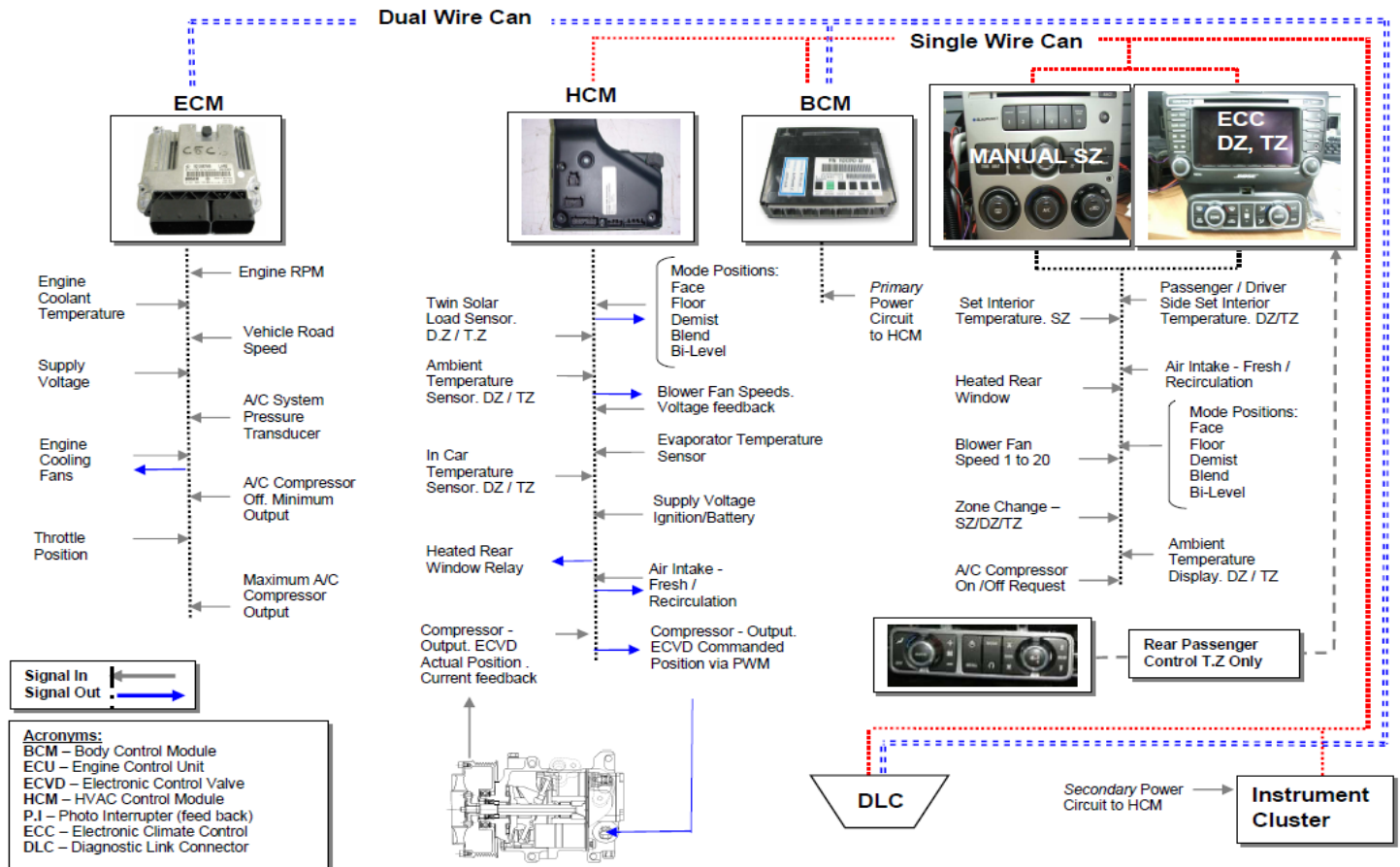
Compressor Electronic Control Valve - Current/ Suction pressure comparison.

PS = Suction (Low side) pressure



MODULE COMMUNICATIONS:

- ◇ **ECC / MCC Vehicle - HCM Shut Down or Gone into Default.** No communication at pin 10 of the HCM connector. Radio communication to BCM lost. Check electric “CAN” electrical connector above the glove box area.
- ◇ **ECC / MCC Vehicle - HCM /BCM Shutdown.** When the vehicle ignition is turned off and the doors closed (courtesy lamp switch part of door lock) the data between modules to the BCM is being relayed for approximately 2 minutes. The HCM remains awake for 15 minutes, then goes to sleep. Providing there is no communications interruption.
- ◇ **ECC / MCC Vehicle - HCM Wake Up.** When the ignition is turned off and the vehicle doors are closed and locked, the HCM will remain “awake” for 15 minutes. With the ignition off, when a door is opened then closed all modules including the HCM will wake up for 8 seconds. Opening the doors, bonnet or even a sensor response will wake up all the modules including the HCM. Normal current draw a HCM is 116 mV. Low battery charge DTC will be set in all modules not just the HCM.
- ◇ **ECC Vehicle - HCM Default Mode.** If the HCM loses communications or a voltage issue it will go into a “default” mode. The blower fan goes to 50%, mode goes to demist, set temperature changes to 23°C and auto mode is selected.



Note the CAN Bus connection between electronic modules. If an electronic module such as the BCM fails, likewise the HCM will also fail as it relies on an voltage supply interface with the BCM.

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