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2014 Jeep Grand Cherokee Service and Repair Manual

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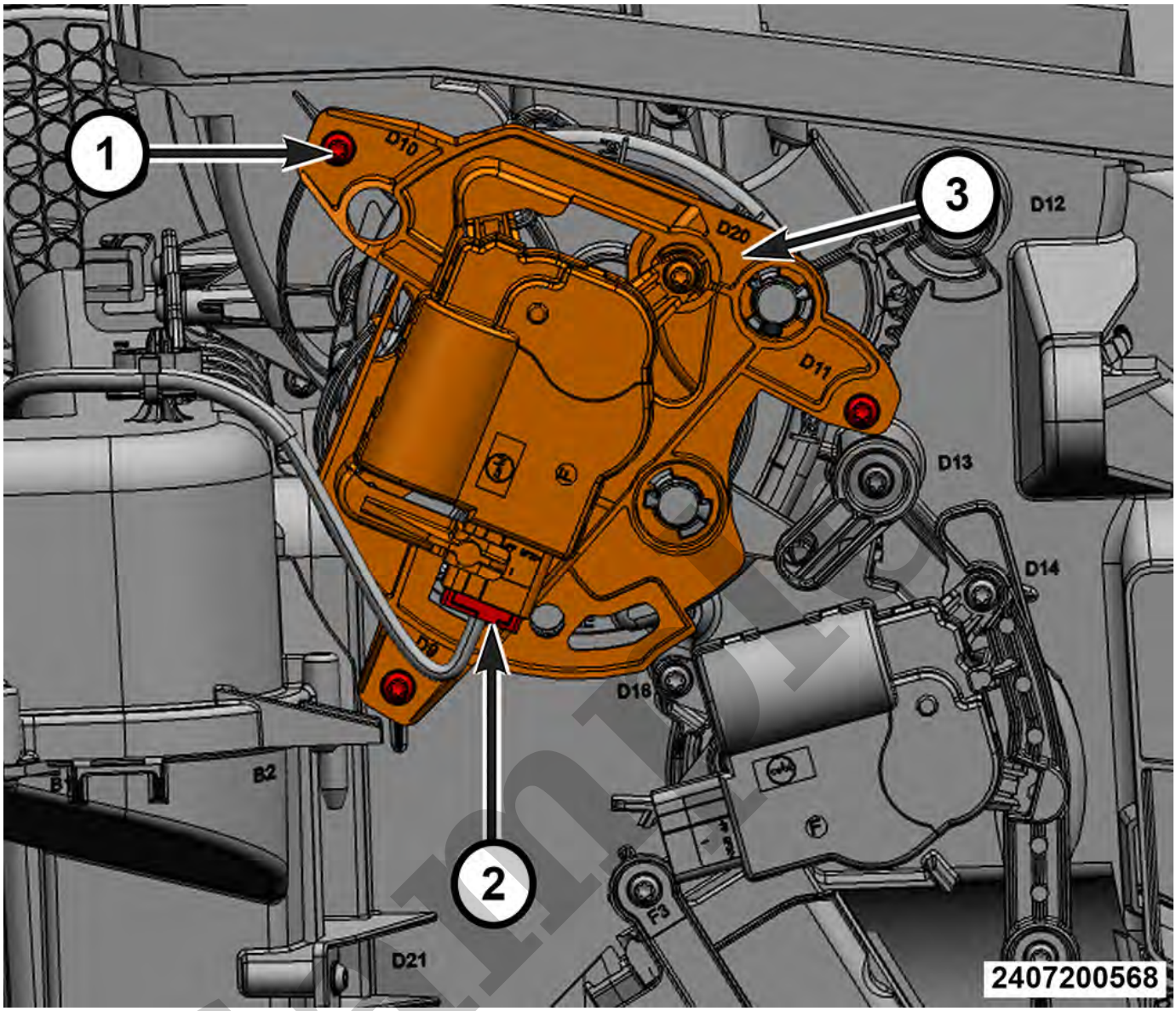
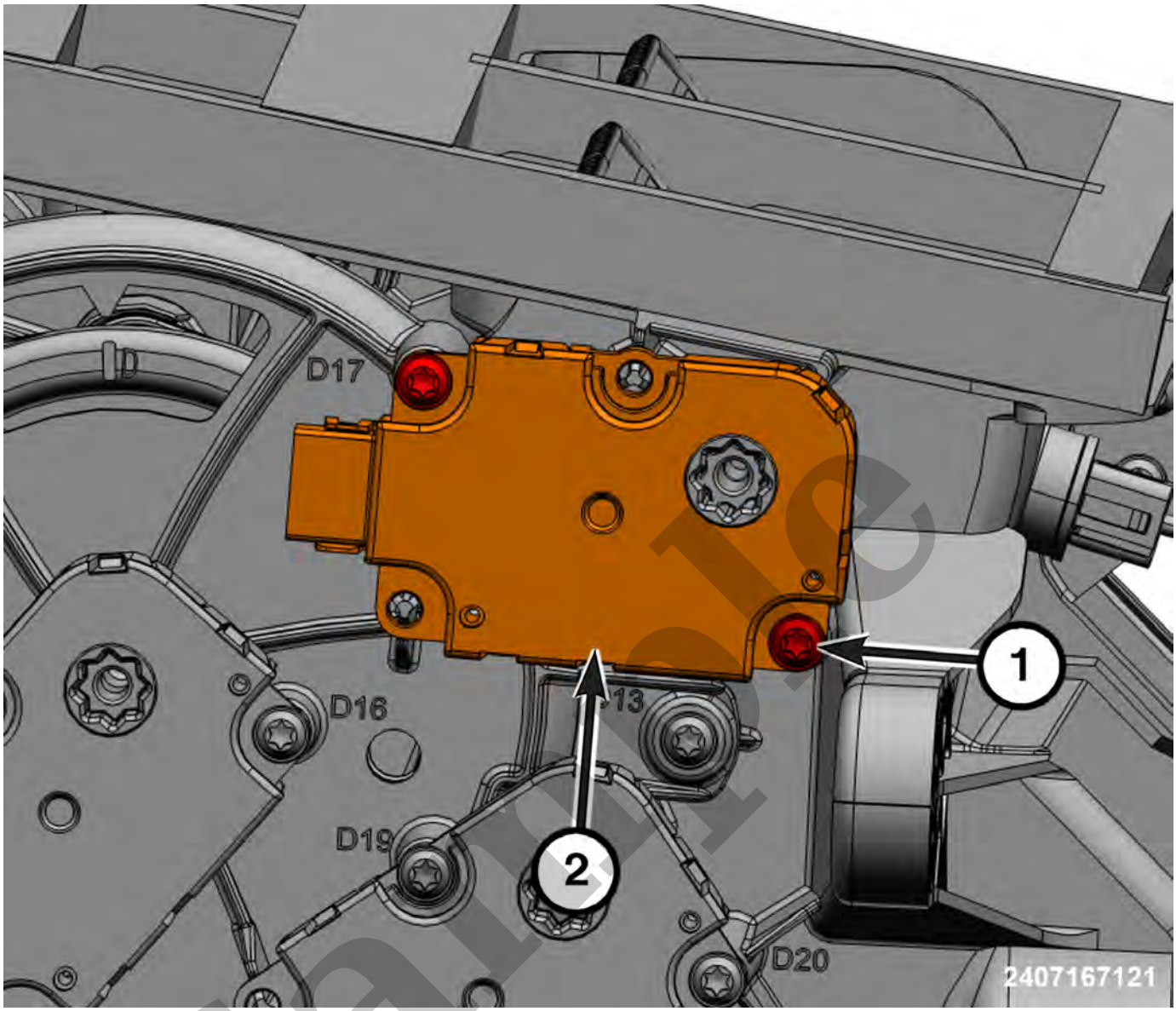


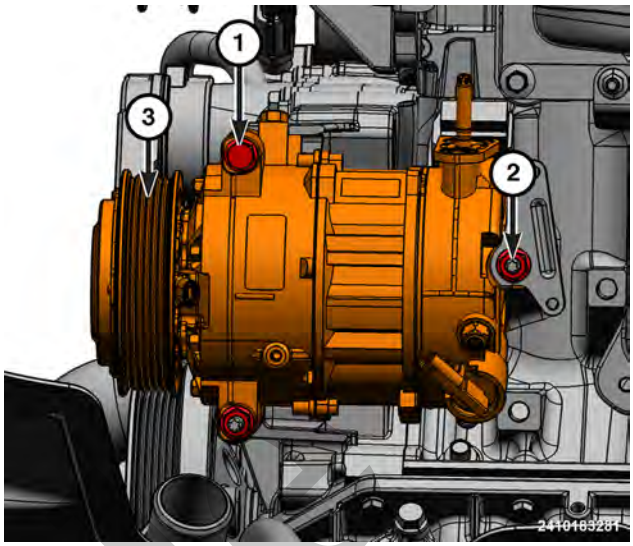
1 - Fastener
2 - Wire Harness Connector
3 - Mode Door Actuator and Cam Assembly

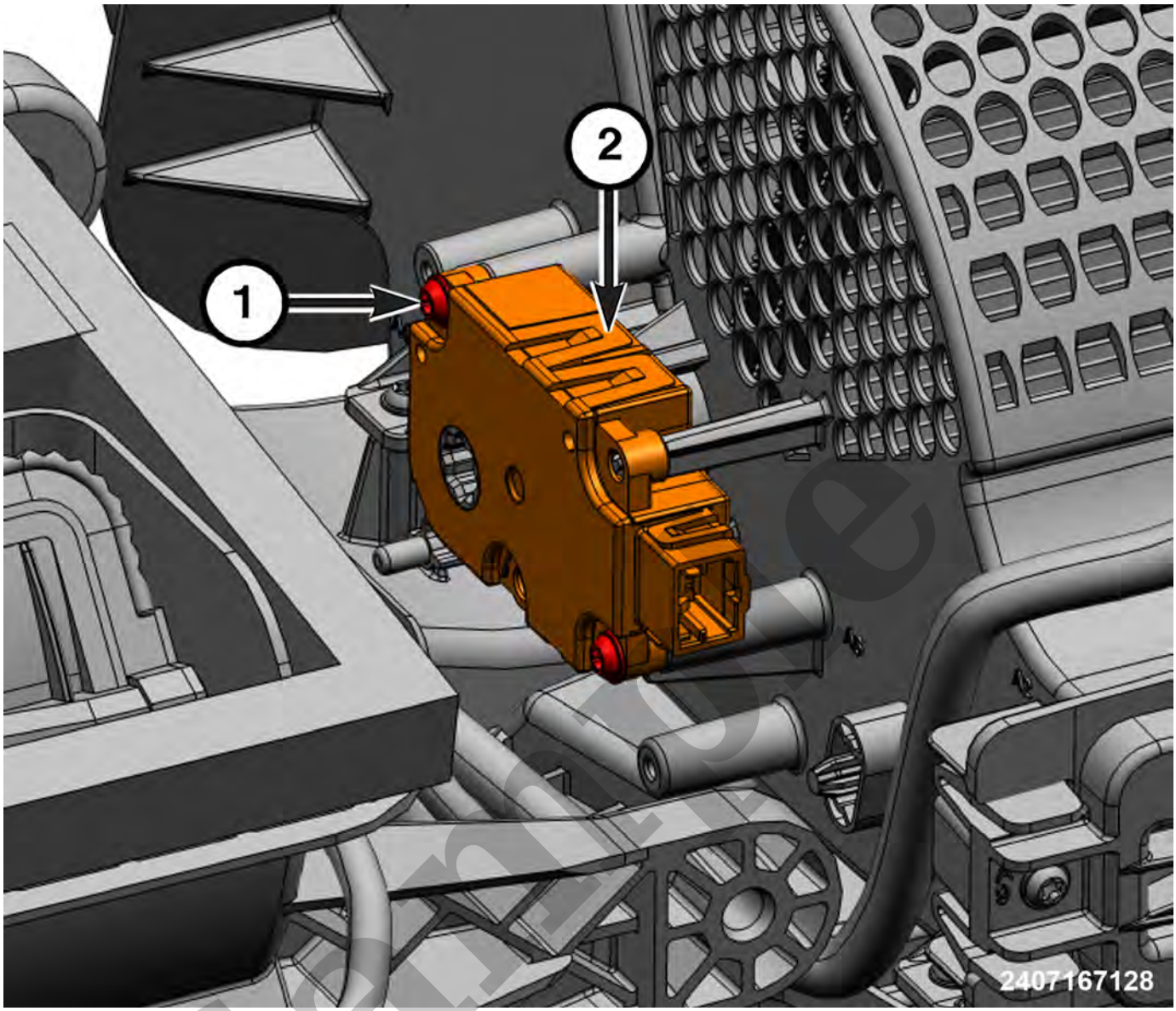
4. Disconnect the wire harness connector from the mode door actuator.
5. Remove the fasteners that secure the mode door actuator and cam assembly to the HVAC housing
6. Remove the fastener securing the mode door arm to the HVAC housing and remove the mode door actuator and cam assembly from the vehicle.
7. Remove the fastener securing the mode door actuator to the cam.
8. Disassemble the cam making reference marks to aid reassembly then remove the actuator.



1 - Fasteners
2 - Panel Mode Door Actuator

4. Remove the fasteners that secure the panel mode door actuator to the HVAC housing and remove the actuator from the vehicle.

DESCRIPTION	SPECIFICATION	COMMENT
	Lbs.) 4. **Tighten upper bolt to 28 N·m (21 ft. Lbs.)** 5. **Tighten lower nut to 28 N·m (21 ft. Lbs.)**	
A/C Compressor to Engine Mounting Studs	**10 N·m (7 Ft. Lbs.)**	–
A/C Clutch to Compressor Shaft Bolt	**14 N·m (10 Ft. Lbs.)**	–
A/C Pressure Transducer to A/C Liquid Line	**5 N·m (45 In. Lbs.)**	–
A/C Suction Liquid Line Assembly to Body Nuts	**7 N·m (62 In. Lbs.)**	–
HVAC Housing to Instrument Panel Support Bolts	**5 N·m (44 In. Lbs.)**	–
Refrigerant Lines to A/C Compressor Nut(s)	**20 N·m (15 Ft. Lbs.)**	–
Refrigerant Lines to A/C Condenser Nuts	**20 N·m (15 Ft. Lbs.)**	–
Refrigerant Lines to A/C Expansion Valve Nut	**20 N·m (15 Ft. Lbs.)**	–



1 - Fasteners
2 - Recirculation Door Actuator

3. Remove the fasteners that secure the recirculation door actuator to the left side of the HVAC air inlet housing and remove the recirculation door actuator from the air inlet housing.

INSTALLATION

Follow the removal procedure in reverse for general reassembly of the components on the vehicle. The steps listed below are calling out specific procedures that should be followed during installation.

- If necessary, rotate the actuator slightly to align the splines on the actuator output shaft with those on the recirculation door pivot shaft adapter.
- Tighten the fasteners securely.

4.	Humidity Rain Light Sensor Module (HRLSM)
5.	A/C Heater Control (Integral to the Integrated Center Stack (ICS) module)
6.	Air Outlet Temperature Sensor
7.	In-Car Temperature Sensor
8.	Actuator
9.	Evaporator Temperature Sensor
10.	Heating, Ventilation and Air Conditioning (HVAC) Module
11.	External Control Variable Displacement (ECVD) Valve
12.	Electric Clutch
13.	A/C Pressure Transducer
–	Blower Motor Power Module (Located on the bottom of and integral to the blower motor)

OPERATION

The air conditioning system is primarily controlled by the HVAC module using inputs from various sensors around the vehicle, both inside and outside the vehicle. The HVAC module directs the system based on occupant input to the A/C heater control in the Integrated Center Stack (ICS) module or the Display Screen Module (DSM). The HVAC module is located on the bottom of the HVAC housing between the HVAC distribution housing and the blower/recirculation housing, to the inboard side of the blower motor.

The exterior sensors used to control the operation of the A/C system are the ambient temperature sensor, mounted behind the right end of the middle grille opening and the A/C pressure transducer which is mounted on the discharge line on the left side of the Front End Module (FEM), just below the high side service port. The A/C pressure transducer is used directly by the PCM to control the engagement and disengagement of the compressor clutch. If the pressure in the discharge line is too high, the pressure sensor transmits that signal to the PCM which will disengage the compressor clutch until the pressure is reduced to a safe level for the system to operate. If the pressure in the discharge line is too low, the pressure transducer transmits that signal to the PCM which will prevent the compressor clutch from engaging.

Interior sensors include the in-car temperature sensor, located behind the steering column opening cover, a sun/light sensor which is integral to the HRLSM, mounted to the windshield behind the rearview mirror cover, a humidity sensor which is also integral to the HRLSM, an evaporator sensor located directly behind the

each of the four zones and each has stall detection capability. Refer to the Quad-Zone Actuator Working Parameters table for additional information on each of the actuators.

The door actuators are direct current motors controlled at 12 volts, but usually operate between 9 and 16 volts. The HVAC housing contains two front blend door actuators, four rear blend door actuators (right and left hot, right and left cold), one floor mode door actuator, one defrost mode door actuator, one vent panel/demister mode door actuator, and one recirculation door actuator. All actuators operate in the same fashion.

Actuator Specifications

Measurement	**Value**
Operating Voltage	9 to 16 V dc
Operating Temperature	-40°C to (-40°F) 85°C (185°F)
Steps per OPG Revolution	6400
Degrees per Step	0.05625°
Min. Pull in Torque (9.0 ≤ x < 9.7 V dc) Autospeed	≥ 20 N·cm (28.32 Oz. In.)
Max. Pull out Torque (-40 °C / -40°F)	≤ 110 N·cm (155.77 Oz. In.)
Potentiometer Resistance	4.7 kilohms

The actuators work in conjunction to control both the temperature of the air being distributed and the volume of the air flowing throughout the vehicle. The temperature is controlled directly using the temperature blend doors, however, the volume of air flow is achieved using the mode doors to close off the direction of the air flow, thus restricting the amount of air allowed to pass that particular door. This allows air flow from a single blower motor to be used for the entire vehicle yet gives individual control of the air volume to each front seat occupant and a rear seat occupant.

The specific feature of the potentiometer is that it operates in a linear fashion. The potentiometer receives a 12 volt power supply at terminal 4 and receives a ground at terminal 1. The LIN input to each actuator is at terminal 2 and exits to the next actuator at terminal 3 on all actuators except the last actuator in the system.

Quad-Zone Actuator Working Parameters

The Schrader-type valve in the refrigerant line fitting permits the A/C pressure transducer to be removed or installed without disturbing the refrigerant in the A/C system.

NOTE

Replacement of the O-ring seal is required when the pressure transducer is replaced. Failure to replace the O-ring seal may result in a refrigerant system leak.

The A/C pressure transducer is connected to a 5 volt supply. Utilizing sensing elements and internal electronics, it creates a voltage signal that is proportional to the pressure. This voltage is received by the PCM, where it is converted to a pressure value, and broadcasts the information from the PCM over the CAN-C bus for use by the other modules.

The PCM is programmed to respond to this and other sensor inputs to control the operation of the A/C compressor and the radiator cooling fan to optimize A/C system performance and to protect the system components from damage. The PCM will not operate the A/C compressor if there are any A/C pressure transducer circuit faults detected.

The A/C pressure transducer is factory calibrated and cannot be adjusted or repaired and must be replaced if inoperative or damaged.

Air Outlet Temperature Sensor

Component Index

Body Control Module (BCM)

Component Index

The BCM is used in the HVAC system to relay sensor and vehicle operational status to the HVAC module. The following information is used by the HVAC module to make changes and adjustments to the system when correction is needed or requested by the operator:

Inputs

- Vehicle setup
- Temperature unit setup from IPC
- Rear climate control selection status

Outputs

- Vehicle setup
- Temperature unit setup from IPC
- Rear climate control selection status
- Ignition status
- Ambient temperature data
- Interior humidity data

Electric Clutch

Component Index

The A/C compressor clutch components provide the means to engage and disengage the A/C compressor from the engine accessory drive belt. When the electromagnetic A/C clutch coil is energized, it magnetically draws the clutch plate in contact with the clutch pulley and drives the compressor shaft. When the A/C clutch coil is not energized, the pulley freewheels on the clutch hub bearing, which is part of the pulley assembly.

A/C clutch engagement is controlled by the PCM which provides a Low Side Driver to the control side of the A/C clutch relay in the Power Distribution Center (PDC). This activates the A/C clutch relay allowing fused B(+) to be supplied to the A/C compressor clutch coil. Ground for the coil is supplied continuously.

The PCM receives an A/C request message from the HVAC module over the CAN-C bus using several inputs to determine A/C compressor clutch control, including:

- Engine revolutions per minute
- Engine coolant temperature
- Throttle position
- Vehicle speed

The HVAC module regulates the ECVD valve using the following guidelines:

- Controllable 12 VDC (nominal) 400 Hz PWM signal to modulate valve
- Solenoid control valve is driven only if the clutch is engaged by the PCM, according to CAN data bus message
- Current feedback loop is required in the HVAC module
- Compressor clutch is controlled by the PCM according to HVAC module inputs

CONFIGURATION DATA/BOUNDARY CONDITION		**DENSO 7SAS18**	**HANON**
Compressor Cylinders		7	7
Maximum Displacement		183.3cc	190 cc
Coil Resistance (R @ 20°C (68°F)		10.6 Ω	10.6 Ω
Inductance		47 mH	51.4 mH @ 20°C (68°F)
Max Current vs Compressor RPM	Compressor RPM	ECV Current (mA)	ECV Current (mA)
	0	800	800
	4500	800	800
	6000 Denso / 6500 Hanon	500	500
	9000	500	500
Min Current vs Compressor RPM	Compressor RPM	ECV Current (mA)	ECV Current (mA)
	0	260	260
	4500	260	260
	6000 Denso / 6500 Hanon	260	260
	9000	260	260