

# Section 1

## HVAC

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# HVAC Systems with A/C - Manual

## Specifications

### Fastener Tightening Specifications

Application	Specification	
	Metric	English
A/C Compressor Hose Block Fitting	35 N·m	26 lb ft
A/C Condenser Tube to A/C Receiver/Dryer Fitting	15 N·m	11 lb ft
Compressor Mounting Bolts (4.3L, 5.7L, 6.5L, and 7.4L (L29))	50 N·m	37 lb ft
Compressor Mounting Bolts (7.4L (L19))	33 N·m	24 lb ft
Compressor Mounting Nut	25 N·m	18 lb ft
Compressor Shaft Nut	18 N·m	13 lb ft
Condenser Mounting Bolt (Commercial)	33 N·m	24 lb ft
Condenser Mounting Bolt (Motorhome)	6 N·m	53 lb in
Evaporator Tube to Evaporator Fitting	17 N·m	13 lb ft
Evaporator Tube to Receiver/Dryer Fitting	17 N·m	13 lb ft
Receiver/Dryer Bracket Screw	2.7 N·m	25 lb in
Refrigerant Hose Clamp Nuts	17 N·m	13 lb ft
Refrigerant Hose Fitting at A/C Condenser	23 N·m	17 lb ft
Refrigerant Hose Fitting at A/C Evaporator	32 N·m	24 lb ft

### Refrigerant Oil Distribution Specifications

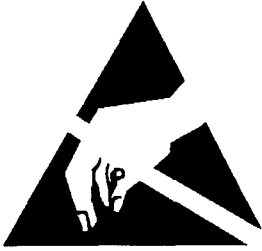
Application	Specification	
	Metric	English
All compressors: Drain the old compressor and measure the oil. If less than 30 ml (1 fl oz) is drained, add	60 ml	2 fl oz
All compressors: If more than 30 ml (1 fl oz) is drained, add	The same amount that was drained out of the old compressor	
Receiver/Dryer: Oil is added to the replacement receiver/dryer to compensate for the oil retained by the original receiver/dryer desiccant bag assemblies. The receiver dryer should only be replaced when leaking due to the following conditions: <ul style="list-style-type: none"> <li>• A perforation</li> <li>• A damaged O-ring seat</li> <li>• Damaged threads</li> </ul> When replacing the receiver dryer, add	90 ml	3 fl oz
Evaporator	90 ml	3 fl oz
Condenser	30 ml	1 fl oz

**Schematic and Routing Diagrams**

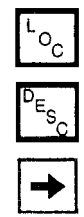
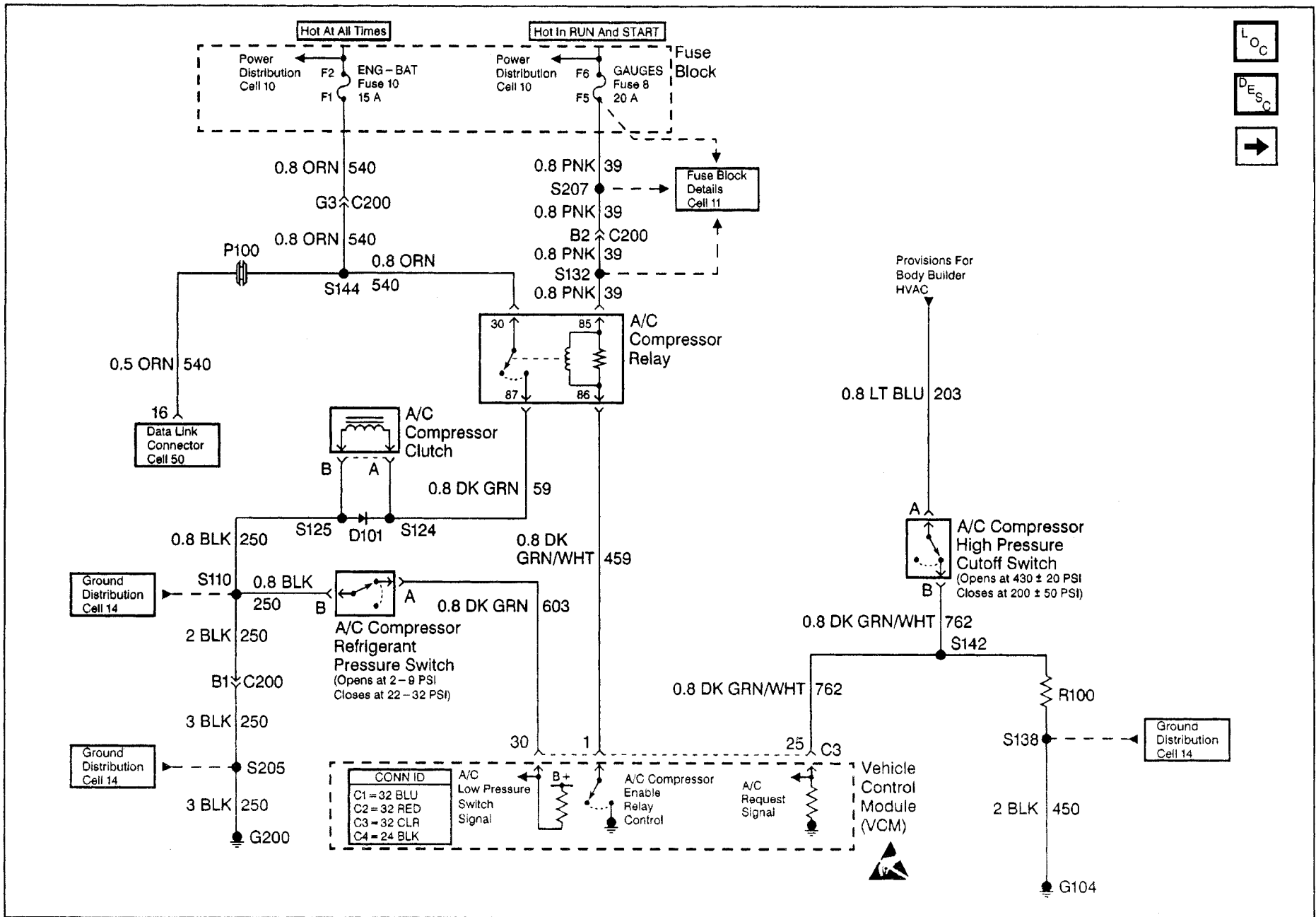
**HVAC Schematic References**

Reference on Schematic	Section Number - Subsection Name
Fuse Block Details Cell 11	8 — Wiring Systems
Ground Distribution Cell 14	8 — Wiring Systems
Power Distribution Cell 10	8 — Wiring Systems

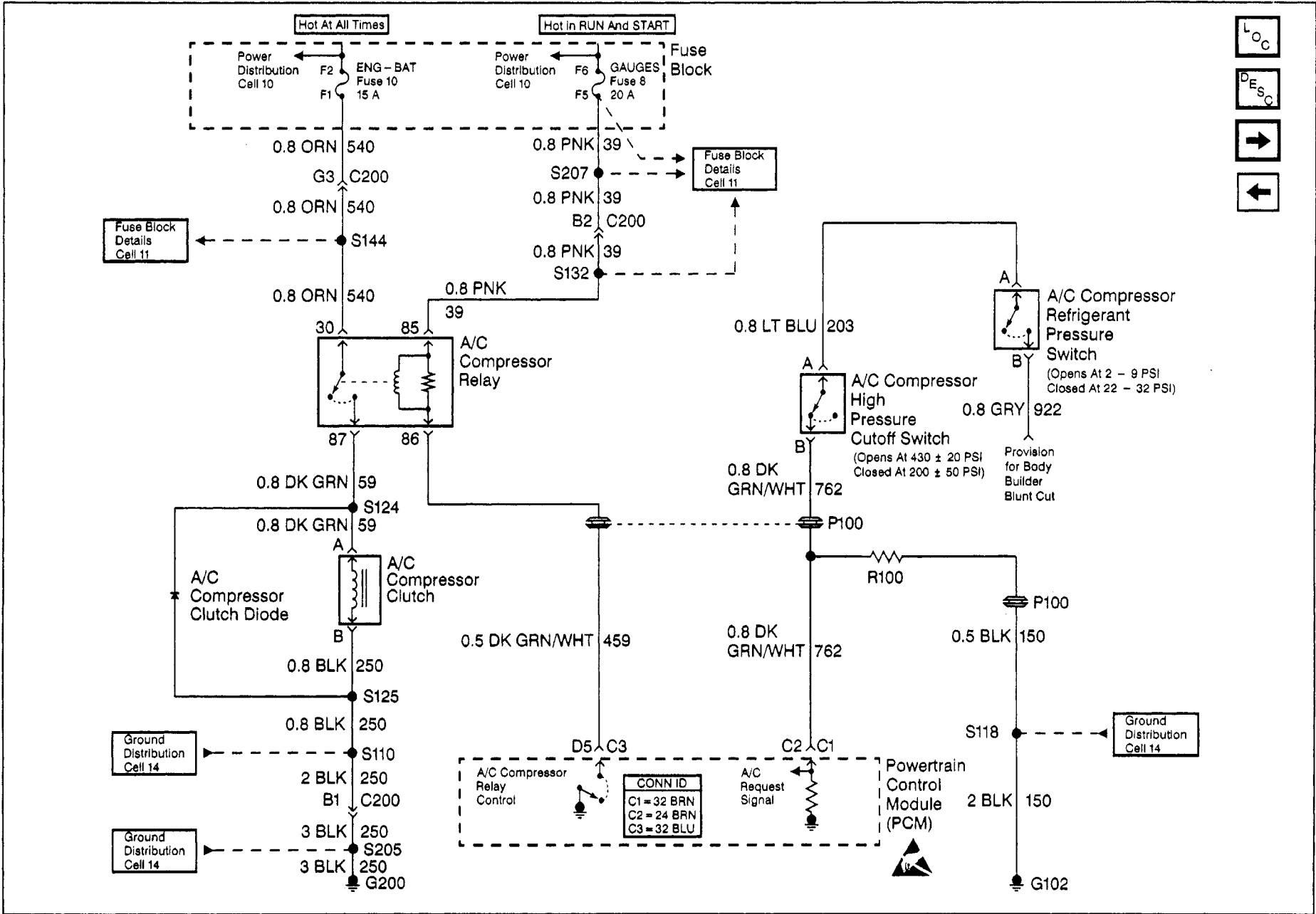
**HVAC Schematic Icons**

Icon	Icon Definition
 <p>19384</p>	<p>Refer to <i>ESD Notice</i> in Cautions and Notices.</p>

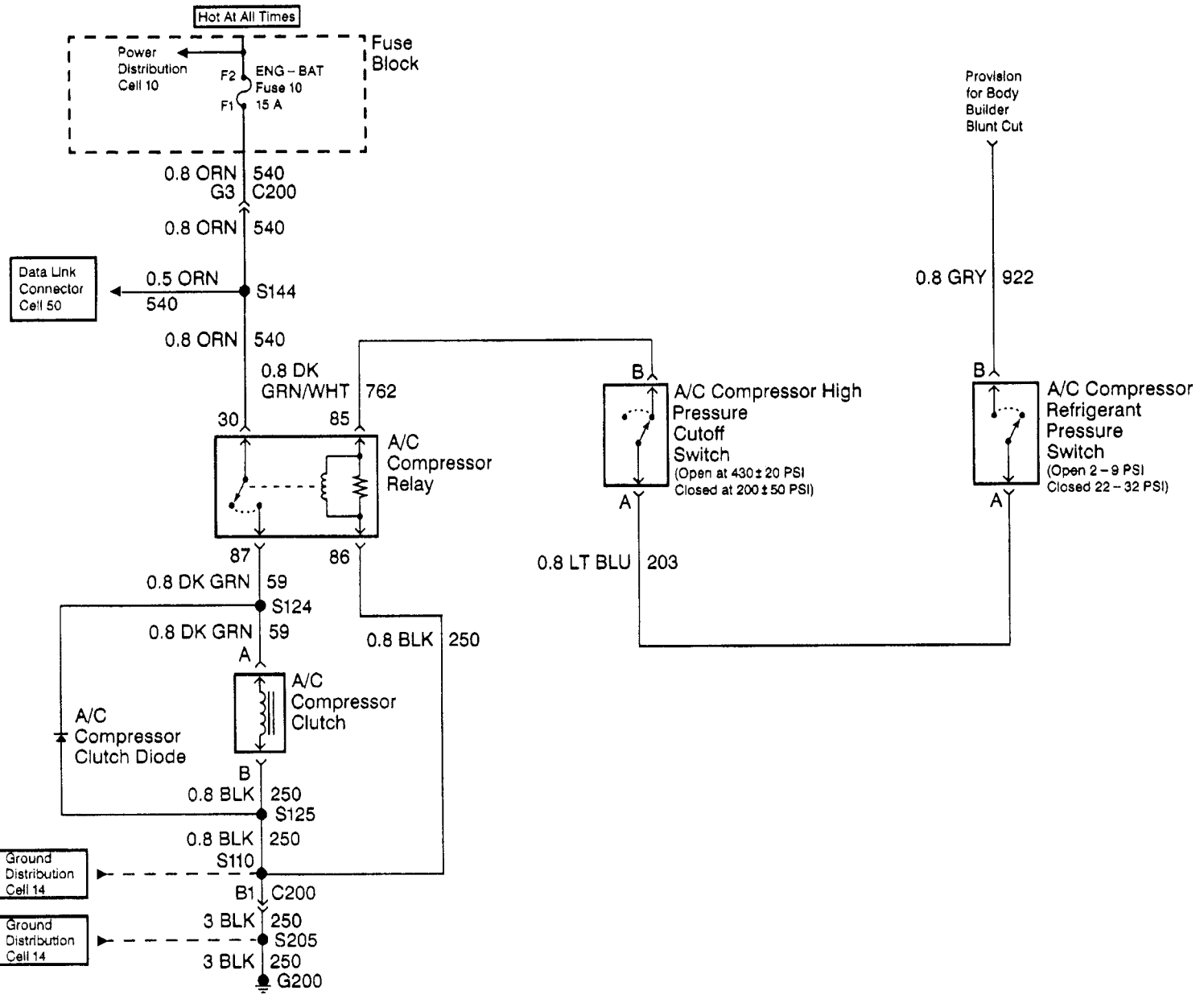
# HVAC Compressor Control Schematics (Commercial) (Cell 64: Commercial Gasoline Engines, A/C Controls)



# HVAC Compressor Control Schematics (Commercial) (Cell 64: Commercial Diesel Engine, EFI, A/C Controls)



# HVAC Compressor Control Schematics (Commercial) (Cell 64: Commercial Diesel Engine, Mech. FI, A/C Controls)

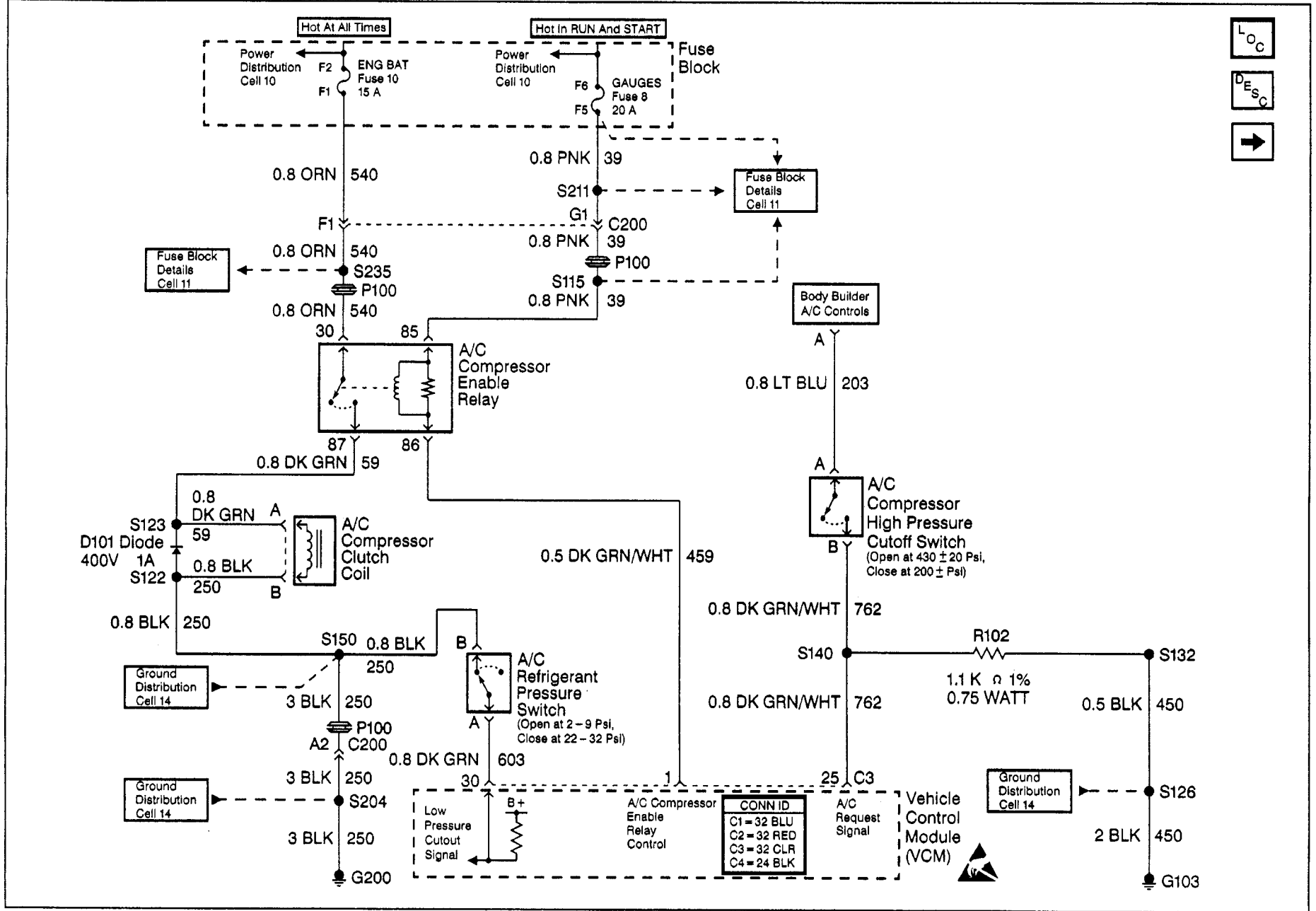


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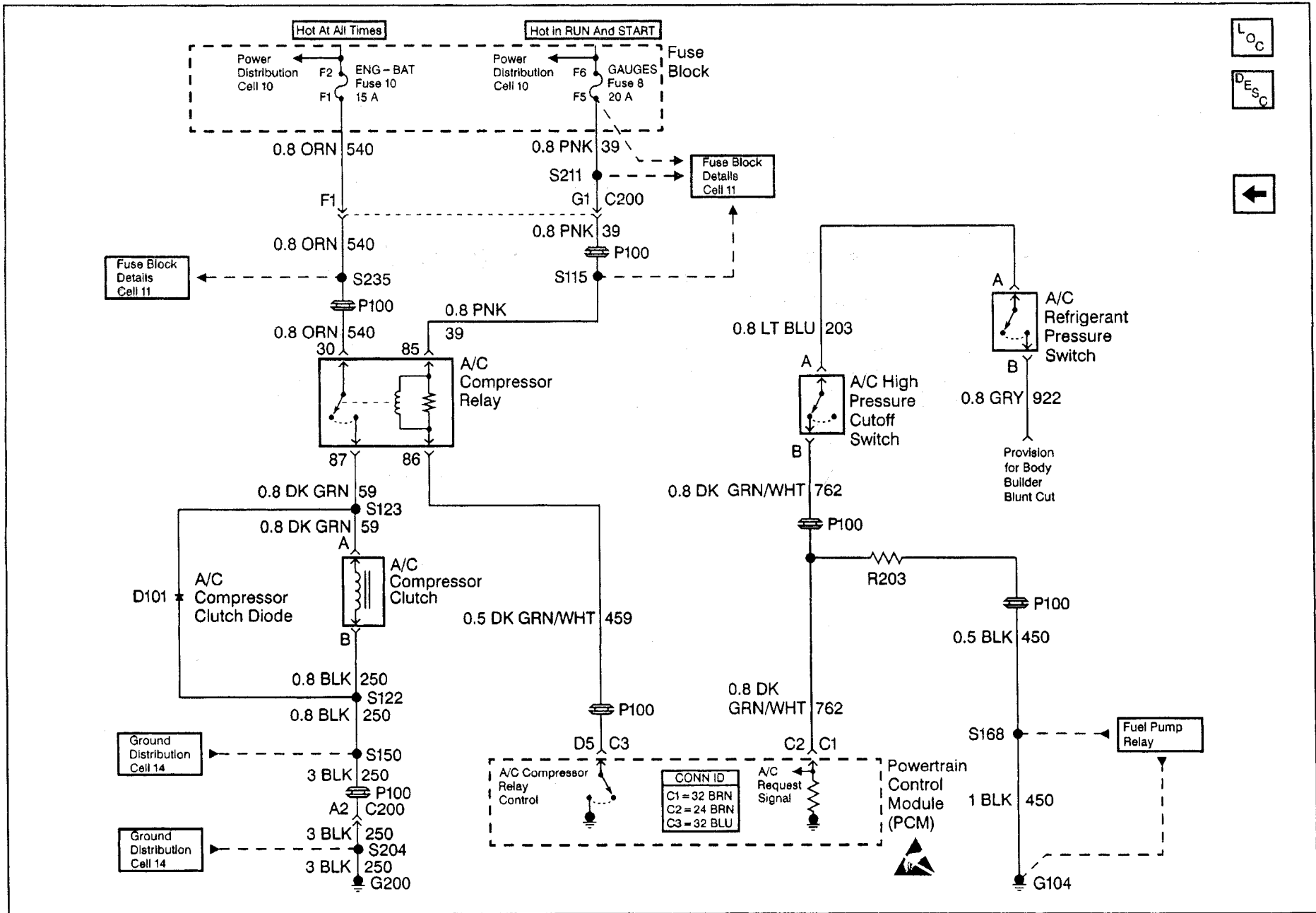
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# HVAC Compressor Control Schematics (Motorhome) (Cell 64: Motorhome Gasoline Engine, A/C Controls)



# HVAC Compressor Control Schematics (Motorhome) (Cell 64: Motorhome Diesel Engine, A/C Controls)





## Component Locator

## HVAC Components (Commercial)

Name	Location	Locator View	Connector End View
A/C Compressor Clutch	At the front LH side of the engine	<i>HVAC Component Views (Commercial)</i>	<i>HVAC Connector End Views</i>
A/C Compressor High Pressure Cut-Off Switch	At the rear of the A/C compressor	<i>HVAC Component Views (Commercial)</i>	<i>HVAC Connector End Views</i>
A/C Compressor Refrigerant Pressure Switch	Located by the body builder	—	<i>HVAC Connector End Views</i>
A/C Compressor Relay	In the engine compartment on the bulkhead under the battery junction block	<i>HVAC Component Views (Commercial)</i>	<i>HVAC Connector End Views</i>
Data Link Connector (DLC)	LH side of the passenger compartment lower bulkhead on the side of the relay bracket	<i>Data Link Communications Component Views (Commercial)</i> in Data Link Communications	<i>Data Link Communications Connector End Views</i> in Data Link Communications
IP Fuse Block	Located by the body builder	<i>Electrical Center Identification (Commercial)</i> in Wiring System	<i>Power and Grounding Connector End Views</i> in Wiring Systems
Powertrain Control Module (EFI Diesel)	At the LH side of the drivers island on the relay bracket	<i>Engine Controls Component Views</i> in Engine Controls	<i>PCM Connector End Views (EFI)</i> in Engine Controls
Vehicle Control Module (Gasoline)	At the LH side of the radiator support	<i>Engine Controls Component Views</i> in Engine Controls	<i>VCM Connector End Views</i> in Engine Controls
C200	Engine harness to the IP harness, in the bulkhead near P100	<i>Harness Routing Views (Commercial)</i> in Wiring Systems	<i>Inline Harness Connector End Views (Commercial)</i> in Wiring Systems
D101	In the engine harness, approximately 13 cm (5 in) from the breakout toward the A/C compressor high pressure cut-off switch	—	—
G102 (Diesel with Manual Trans)	At the RH front of the engine near the generator bracket	<i>Power and Grounding Component Views</i> in Wiring Systems	—
G102 (All Gasoline, Diesel with Auto Trans)	At the rear of the LH cylinder head	<i>Power and Grounding Component Views</i> in Wiring Systems	—
G104	At the rear of the LH cylinder head	<i>Power and Grounding Component Views</i> in Wiring Systems	—
G200	LH interior bulkhead near the relay bracket	—	—
P100	LH bulkhead left of the steering column	<i>Harness Routing Views (Commercial)</i> in Wiring Systems	—
R100 (Gasoline)	In the engine harness, approximately 23 cm (9 in) from the breakout to the MAF and IAT sensors	—	—
R203 (Diesel)	In the engine harness, approximately 25 cm (10 in) from the PCM connector C3	—	—
S110 (Gasoline)	In the engine harness, approximately 4 cm (2 in) from the breakout for C200 towards P100	—	—
S110 (Diesel)	In the engine harness, approximately 4 cm (2 in) from the breakout for the ABS harness connectors C110 and C111	—	—
S118 (MFI Diesel)	In the engine harness, approximately 15 cm (6 in) from the glowplug controller breakout towards the generator	—	—

## HVAC Components (Commercial) (cont'd)

Name	Location	Locator View	Connector End View
S118 (EFI Diesel)	In the engine harness, approximately 4 cm (2 in) from the starter motor breakout towards the rear chassis connector C300	—	—
S118 (Gasoline)	In the engine harness at the LH rear of engine, approximately 4 cm (2 in) from G102/G104 breakout toward the bank 1 HO2S	—	—
S124	In the engine harness on the end of D101, approximately 13 cm (5 in) from the A/C compressor high pressure cut-off switch breakout	—	—
S132 (Gasoline)	In the engine harness, approximately 19 cm (8 in) from C200 breakout towards the MAF sensor	—	—
S132 (EFI Diesel)	In the engine harness, approximately 11 cm (4 in) from the breakout for C200 toward the A/C compressor connectors	—	—
S138 (Gasoline)	In the engine harness, approximately 7 cm (3 in) from the TP sensor breakout toward C105	—	—
S142 (Gasoline)	In the engine harness, approximately 23 cm (9 in) from the breakout to the MAF sensor on R100	—	—
S144 (Gasoline)	In the engine harness, approximately 11 cm (4 in) from C200 breakout towards P100	—	—
S144 (Diesel)	In the engine harness, approximately 17 cm (7 in) from the A/C compressor clutch relay	—	—
S205	In the IP harness, approximately 4 cm (2 in) before the fuse block breakout toward C200	—	—
S207	In the IP harness, approximately 40 cm (16 in) from the fuse block toward the instrument cluster connector	—	—
S242 (Diesel)	In the engine harness, approximately 25 cm (10 in) from the PCM connector C3 on R203	—	—

## HVAC Components (Motorhome)

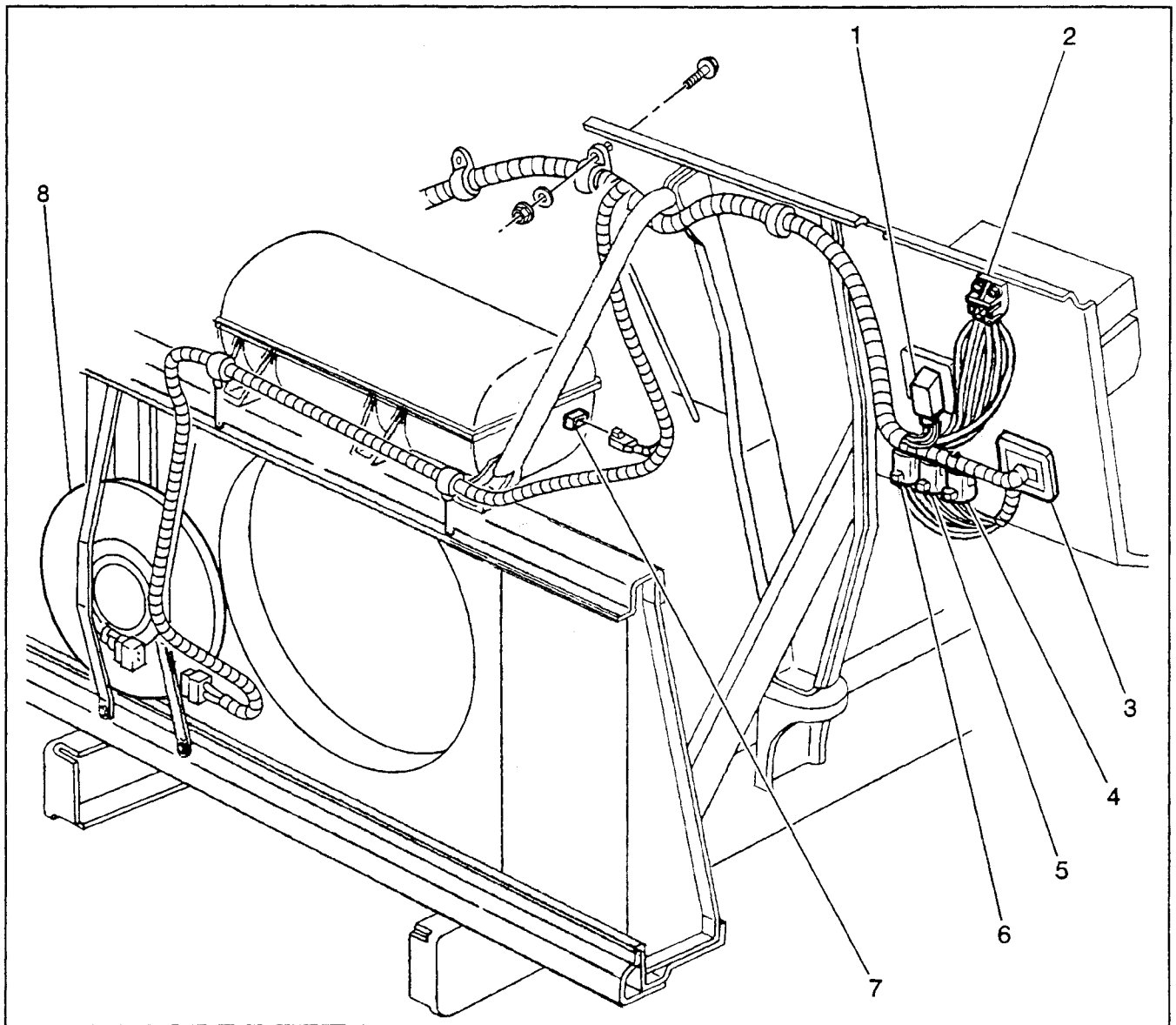
Name	Location	Locator View	Connector End View
A/C Compressor Clutch	At the front LH side of the engine	<i>HVAC Component Views (Motorhome)</i>	<i>HVAC Connector End Views</i>
A/C Compressor High Pressure Cut-Off Switch	At the rear of the A/C compressor	<i>HVAC Component Views (Motorhome)</i>	<i>HVAC Connector End Views</i>
A/C Compressor Refrigerant Pressure Switch	Located by the body builder	—	<i>HVAC Connector End Views</i>
A/C Compressor Relay	On the RH side of the driver's island	<i>HVAC Component Views (Motorhome)</i>	<i>HVAC Connector End Views</i>
IP Fuse Block	Located by the body builder	<i>Electrical Center Identification (Motorhome) in Wiring Systems</i>	<i>Power and Grounding Connector End Views in Wiring Systems</i>
Powertrain Control Module (Diesel)	On the LH side of the driver's island	<i>Engine Controls Component Views in Engine Controls</i>	<i>PCM Connector End Views in Engine Controls</i>

## HVAC Components (Motorhome) (cont'd)

Name	Location	Locator View	Connector End View
Vehicle Control Module (Gas)	Mounted on top of the radiator support	<i>Engine Controls Component Views in Engine Controls</i>	<i>VCM Connector End Views in Engine Controls</i>
C200	At the top front of the steering column support near the park brake pull button switch	<i>Harness Routing Views (Motorhome) in Wiring Systems</i>	<i>Inline Harness Connector End Views (Motorhome) in Wiring Systems</i>
D101(Gas)	In the engine harness, 25 cm (10 in) from the A/C compressor clutch connector	—	—
D101 (Diesel)	In the engine harness, 15 cm (6 in) from the breakout for the A/C compressor clutch, toward A/C compressor clutch connector	—	—
G103	At the rear of the RH cylinder head	<i>Power and Grounding Component Views in Wiring Systems</i>	—
G104	At the rear of the RH cylinder head	<i>Power and Grounding Component Views in Wiring Systems</i>	—
G200	Mounted to the top front of the steering column support plate	—	—
P100	Main wiring pass through at the bulkhead	<i>Harness Routing Views (Motorhome) in Wiring Systems</i>	—
R102 (Gas)	In the engine harness, 20 cm (8 in) from the ABS harness breakout	—	—
R102 (Diesel)	On the IP side of the engine harness, 32 cm (12 in) from P100 in the breakout for the PCM	—	—
R203 (Diesel)	Taped to the connector of the P/B booster fluid flow alarm, 20 cm (8 in) from the steering column connector breakout toward the stoplamp switch	—	—
S115	In the engine harness, 35 cm (13 in) from passthrough P100 in the engine compartment	—	—
S122/S123 (Diode Splice)	In the breakout for the A/C compressor clutch, 21 cm (9 in) from the A/C compressor clutch connector	—	—
S126 (Gas)	In the engine harness, 17 cm (7 in) from the breakout for the generator connector, toward the breakout for the VCM	—	—
S140/S132 (Resistor Splice, Gas)	In the breakout for the VCM, 20 cm (8 in) from the main engine harness	—	—
S140/S132 (R204 Resistor Splice, Diesel)	In the breakout for the PCM, 32 cm (13 in) from P100	—	—
S168 (Diesel)	In the engine harness, 4 cm (2 in) from the breakout for C100 and C207, toward the battery junction block	—	—
S204	In the IP harness, 26 cm (11 in) from the breakout for connector C200, toward the IP fuse block	—	—
S211	In the IP harness, 5 cm (2 in) from the dimmer switch and IP cluster breakout, toward the IP fuse block	—	—
S235	In the IP side of the engine harness, 24 cm (9 in) from P100 toward C200	—	—

HVAC Component Views (Commercial)

Engine Wiring Diesel - LH Front Of Bulkhead, Front View

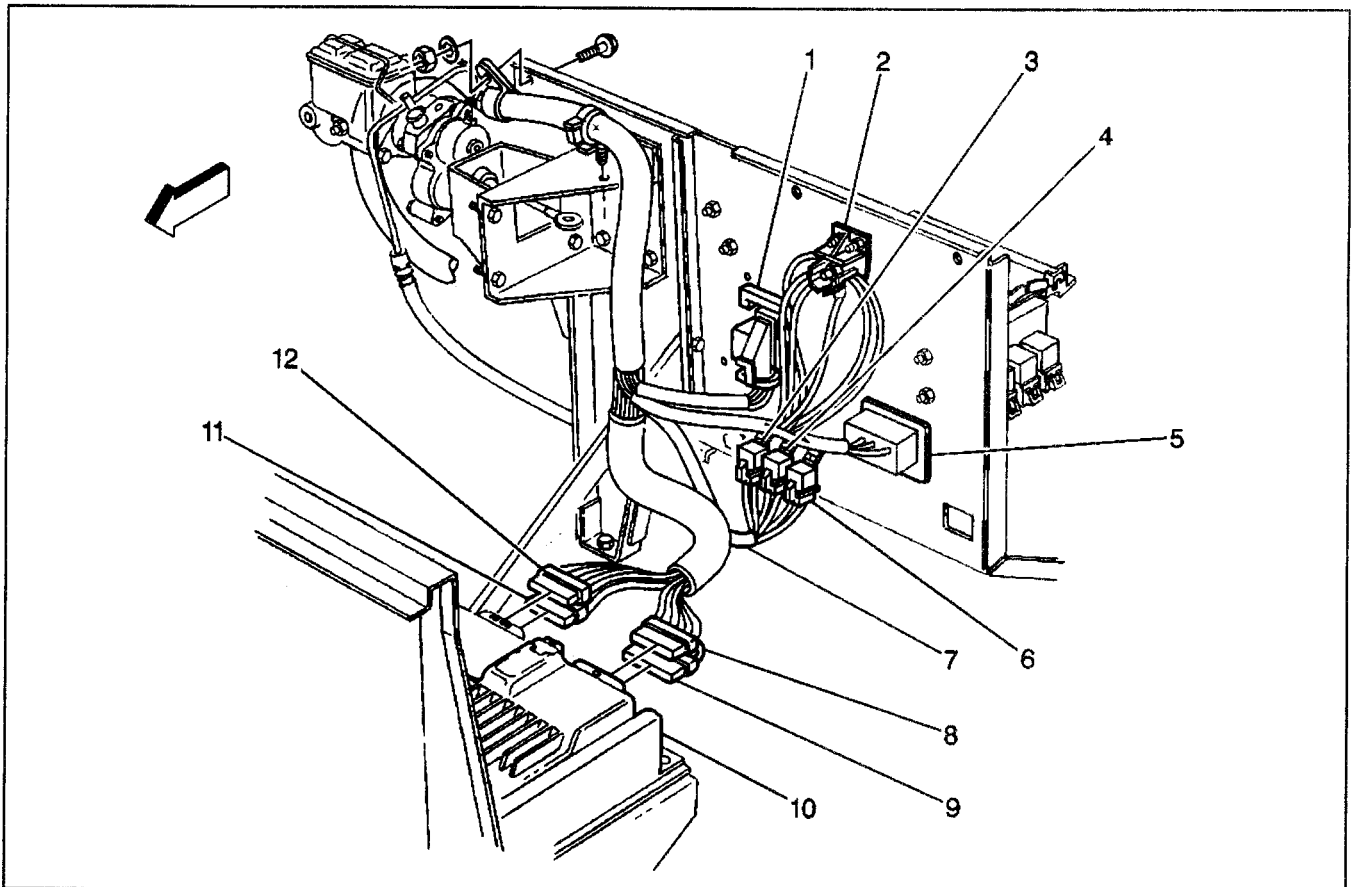


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Legend

- |                            |                                  |
|----------------------------|----------------------------------|
| (1) C200                   | (5) Fan Control Relay            |
| (2) Battery Junction Block | (6) Starter Relay                |
| (3) P100                   | (7) Engine Coolant Level Switch  |
| (4) A/C Compressor Relay   | (8) Auxiliary Engine Coolant Fan |

## Engine Wiring (Gasoline), LH Front

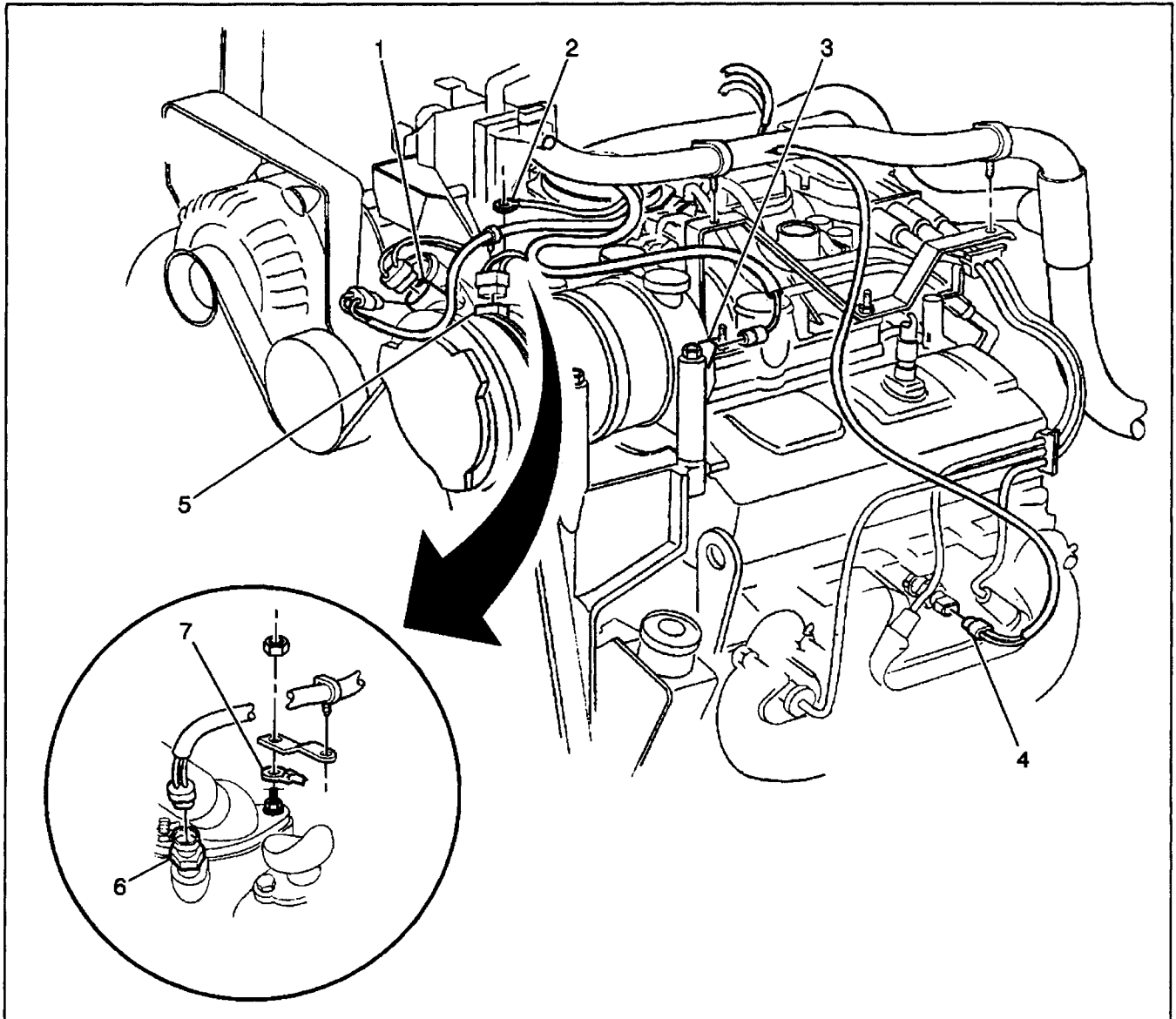


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**Legend**

- |                            |                                   |
|----------------------------|-----------------------------------|
| (1) C200, C202, C203       | (7) Fuel Pump Prime Connector     |
| (2) Battery Junction Block | (8) C4                            |
| (3) A/C Compressor Relay   | (9) C2                            |
| (4) Fuel Pump Relay        | (10) Vehicle Control Module (VCM) |
| (5) P100                   | (11) C1                           |
| (6) Starter Relay          | (12) C3                           |

Engine Wiring - 4.3L Upper LH Front View

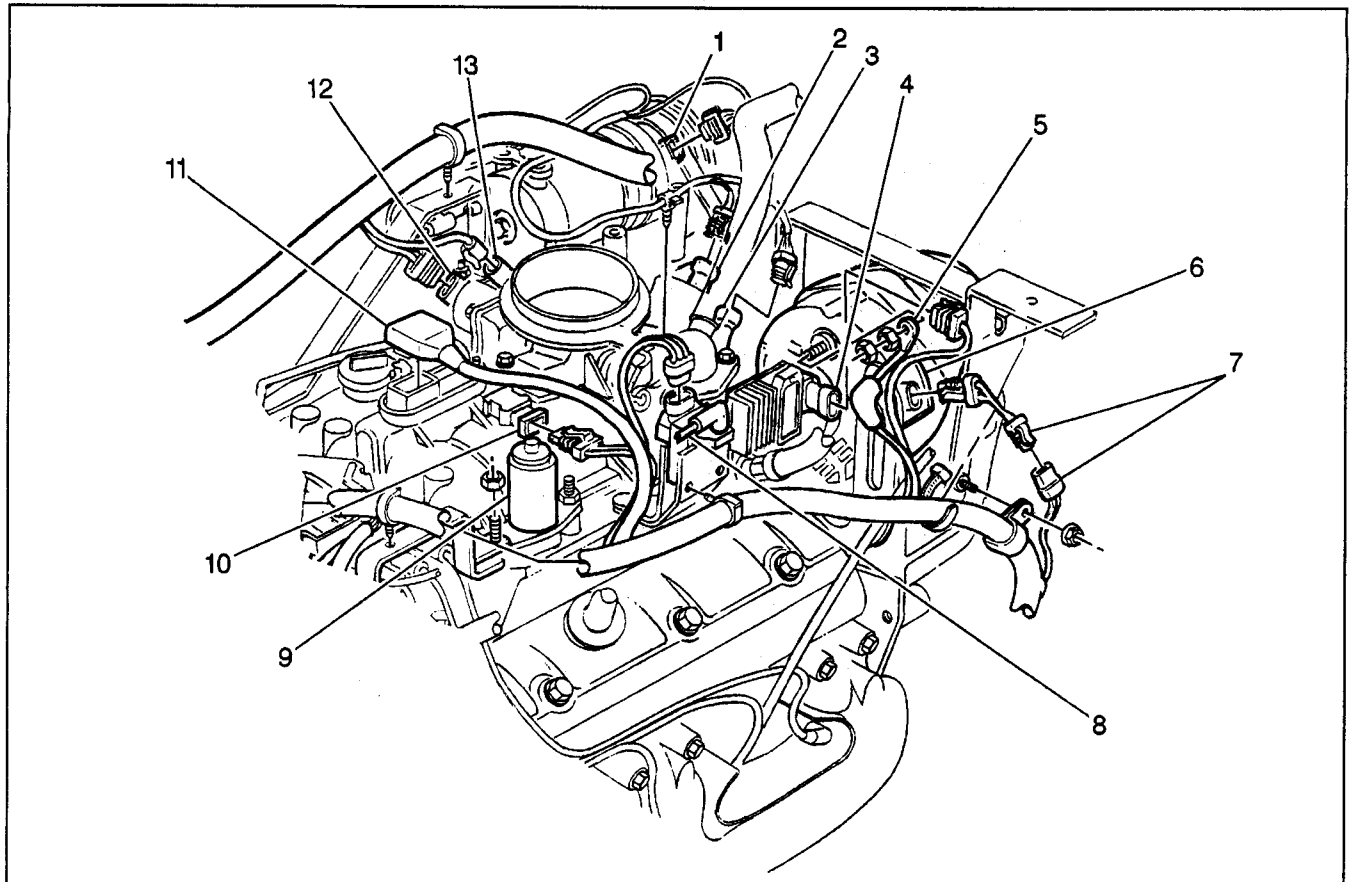


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**Legend**

- |  |   |
|--|---|
| (1) Exhaust Gas Recirculation (EGR) Valve      | (4) Engine Coolant Temperature Gauge Sensor |
| (2) G108                                       | (5) A/C Compressor Clutch                   |
| (3) A/C Compressor High Pressure Cutoff Switch | (6) Engine Coolant Temperature (ECT) Sensor |
|  | (7) G108                                    |

## Engine Wiring 4.3L, Upper RH Forward

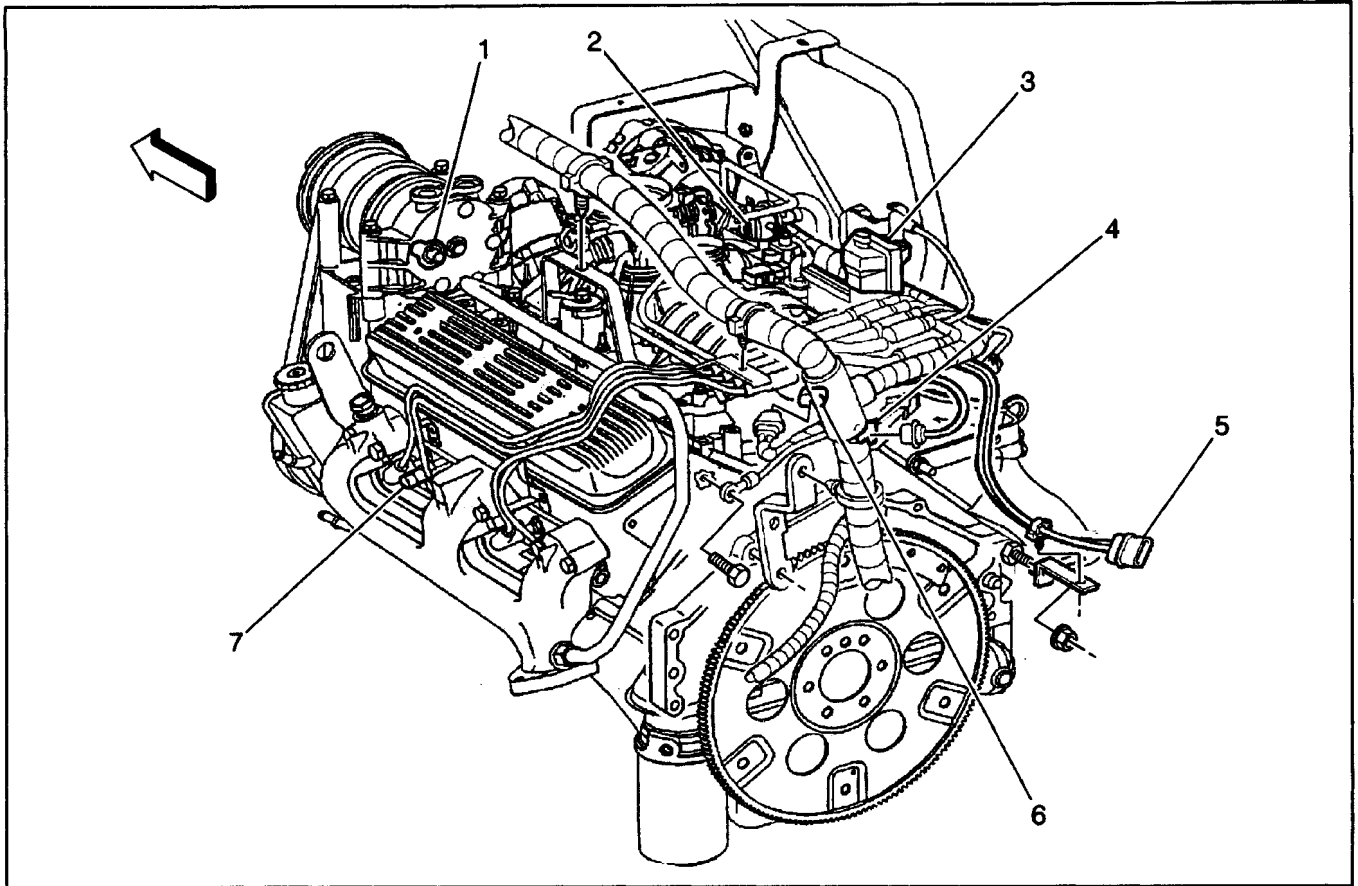


180073

**Legend**

- |   |   |
|---|---|
| (1) A/C Compressor Clutch                   | (8) Ignition Coil                                     |
| (2) Exhaust Gas Recirculation (EGR) Valve   | (9) Evaporative Emissions (EVAP) Canister Purge Valve |
| (3) Engine Coolant Temperature (ECT) Sensor | (10) Manifold Absolute Pressure (MAP) Sensor          |
| (4) Ignition Control Module (ICM)           | (11) C105   |
| (5) Battery Positive Cable                  | (12) Idle Air Control (IAC) Valve                     |
| (6) Generator                               | (13) Throttle Position (TP) Sensor                    |
| (7) C102                                    |   |

## Engine Wiring 5.7L, Upper LH Rear



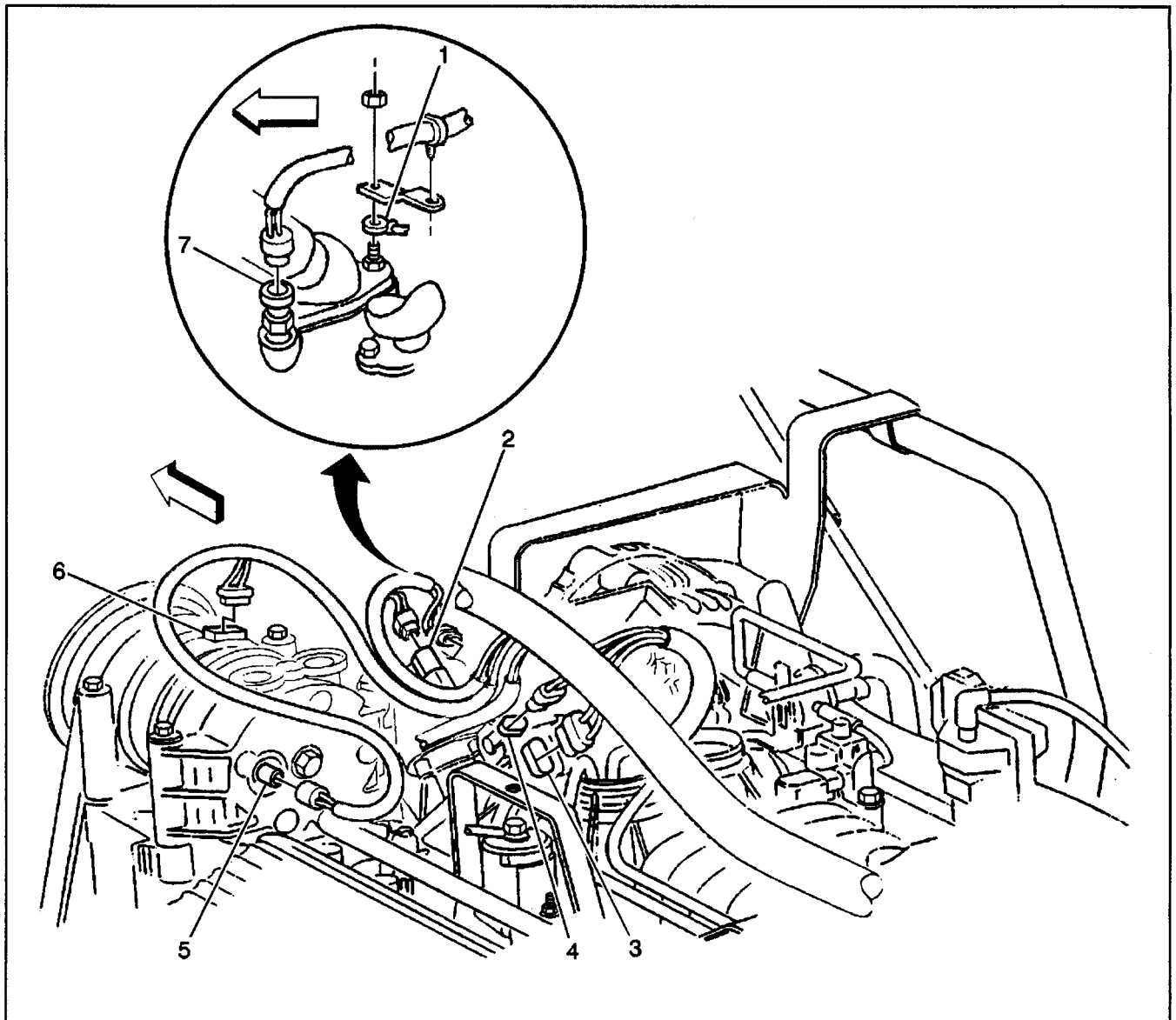
180076

**Legend**

- |   |  |
|---|--|
| (1) A/C Compressor High Pressure Cut-Off Switch | (5) Heated Oxygen Sensor (HO2S), Bank 2 Sensor 1 |
| (2) Evaporative Emissions Canister Purge Valve  | (6) Camshaft Position (CMP) Sensor               |
| (3) Ignition Coil                               | (7) Engine Coolant Temperature Gauge Sensor      |
| (4) Engine Oil Pressure Gauge Sensor            |  |



Engine Wiring - 5.7L Upper LH Forward View



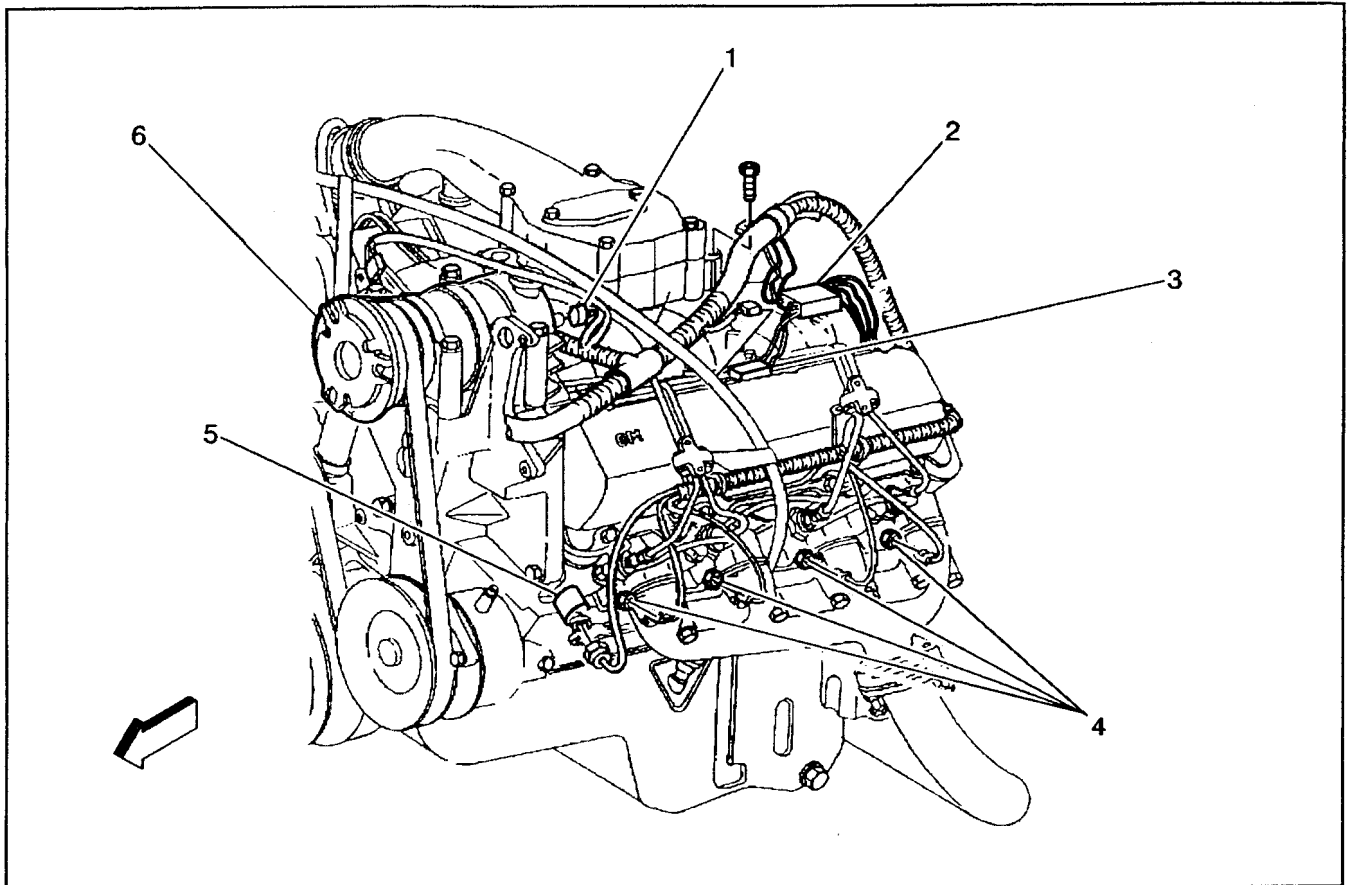
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**Legend**

- |   |   |
|---|---|
| (1) G108                                  | (5) A/C Compressor High Pressure Cut-Off Switch |
| (2) Exhaust Gas Recirculation (EGR) Valve | (6) A/C Compressor Clutch                       |
| (3) Idle Air Control (IAC) Valve          | (7) Engine Coolant Temperature (ECT) Sensor     |
| (4) Throttle Position (TP) Sensor         |   |

## HVAC Component Views (Motorhome)

## Engine Left Side (L65)

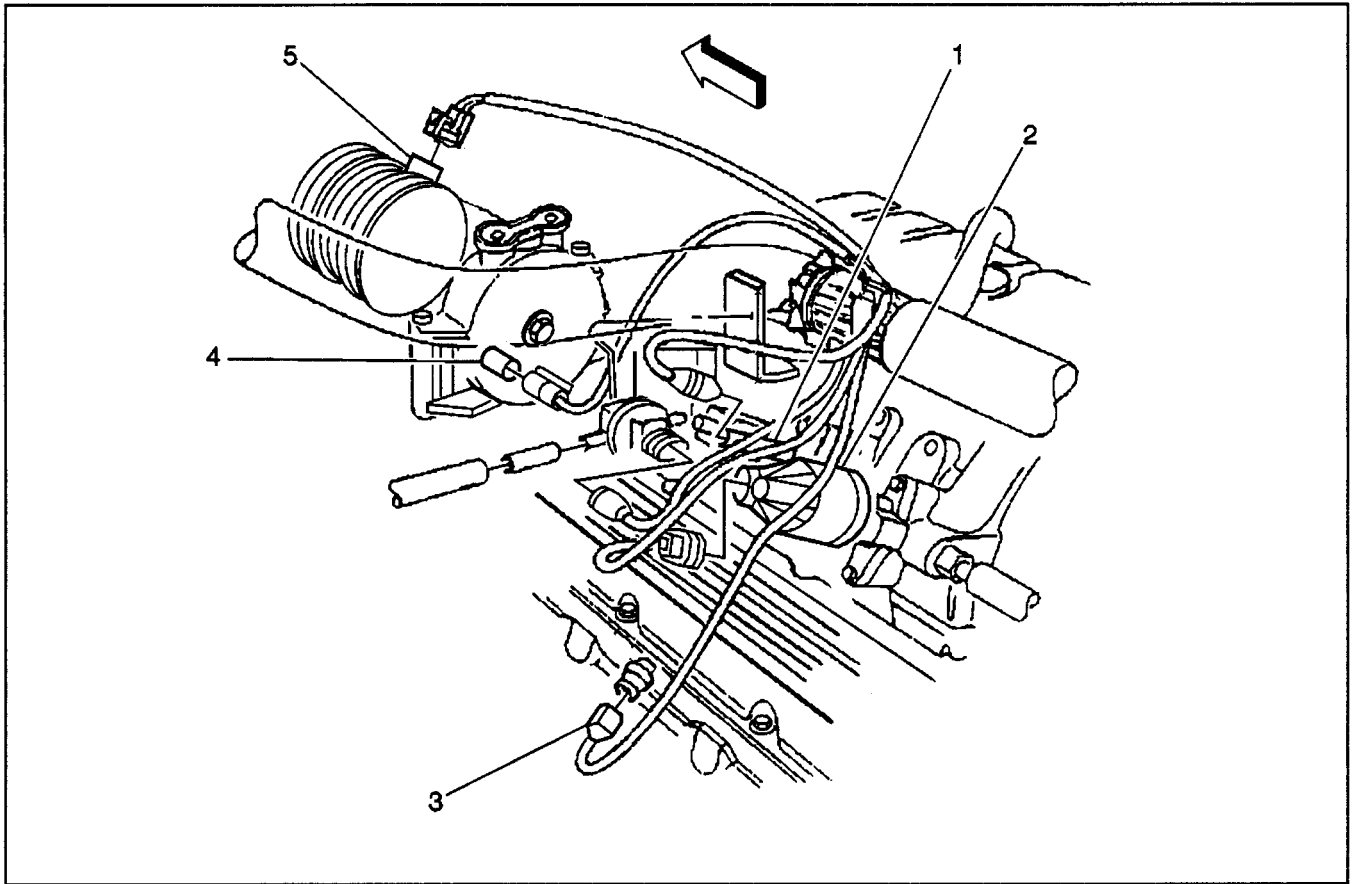


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**Legend**

- |   |   |
|---|---|
| (1) A/C Compressor High Pressure Cut-Off Switch | (4) Glow Plugs                              |
| (2) C101  | (5) Engine Coolant Temperature Gauge Sensor |
| (3) Wastegate Solenoid                          | (6) A/C Compressor Clutch                   |

## Engine Wiring Left Side (L29)

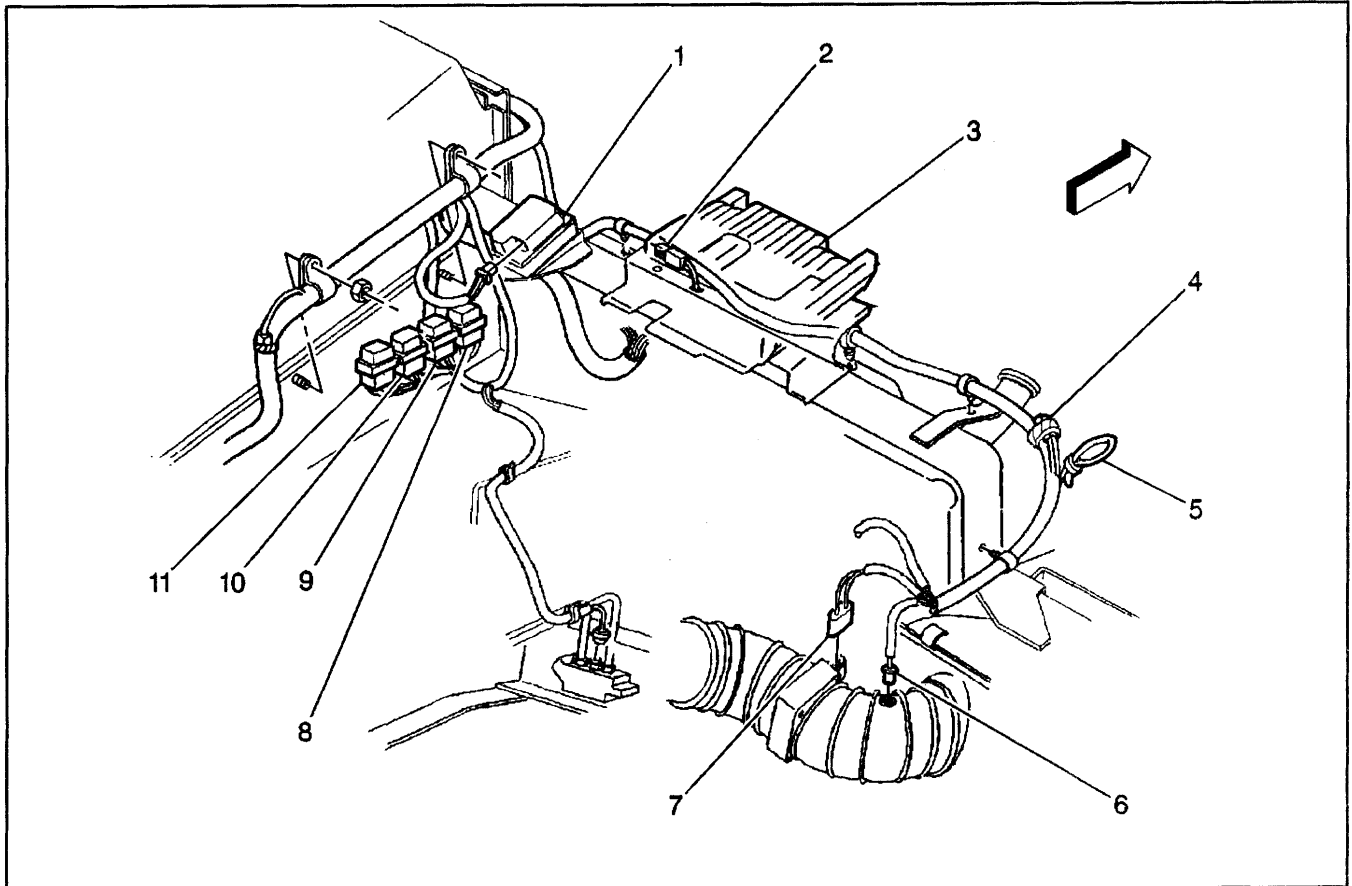


363567

**Legend**

- |   |   |
|---|---|
| (1) Evaporative Emissions (EVAP) Canister Purge Valve | (4) A/C Compressor High Pressure Cut-Off Switch |
| (2) Exhaust Gas Recirculation (EGR) Valve             | (5) A/C Compressor Clutch                       |
| (3) Engine Coolant Temperature Gauge Sensor           |   |

Radiator Support Wiring (L29)

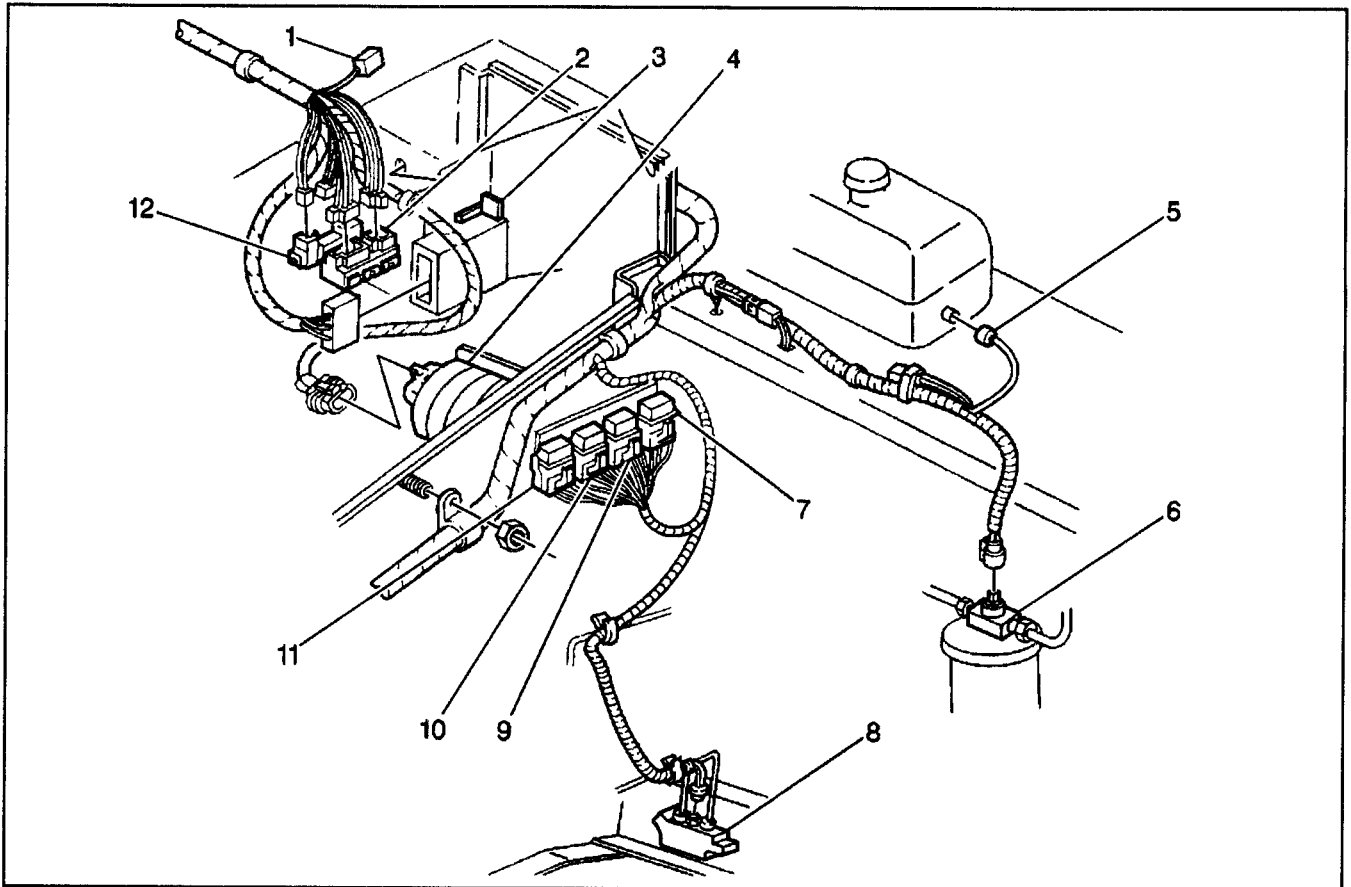


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**Legend**

- |   |   |
|---|---|
| (1) Cruise Control Module                                     | (6) Intake Air Temperature (IAT) Sensor       |
| (2) Auxiliary Engine Coolant Fan Connector                    | (7) Mass Air Flow (MAF) Sensor                |
| (3) Vehicle Control Module (VCM)                              | (8) Starter Relay                             |
| (4) EVAP Low Pressure Control Switch Connector (Body Builder) | (9) A/C Compressor Relay                      |
| (5) Thermal A/C Control (Body Builder)                        | (10) Fuel Pump Relay                          |
|   | (11) Park/Neutral Position (PNP) Switch Relay |

Radiator Support Wiring (L65)



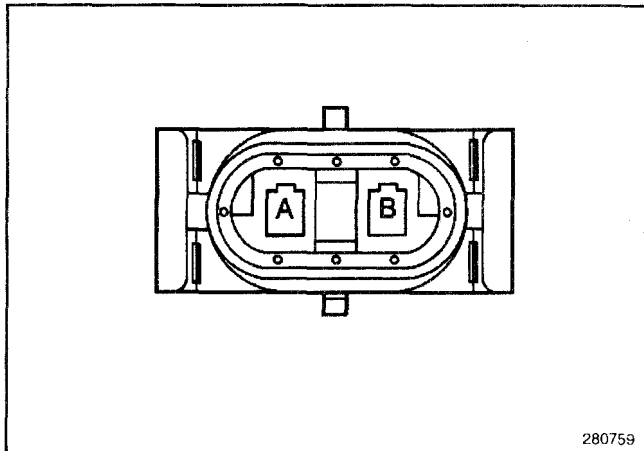
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**Legend**

- |  |  |
|--|--|
| (1) C203   | (6) Auxiliary Engine Coolant Fan A/C Pressure Switch |
| (2) Torque Converter Clutch (TCC) and Stoplamps Switch                           | (7) Starter Relay                                    |
| (3) Vehicle Speed Sensor (VSS) Calibrator  | (8) Brake Pressure Differential Switch               |
| (4) Accelerator Pedal Position Module (APP) (Part of Accelerator Pedal Assembly) | (9) A/C Compressor Relay                             |
| (5) Engine Coolant Level Switch  | (10) Fuel Pump Relay                                 |
|  | (11) Park/Neutral Position (PNP) Switch Relay        |
|  | (12) Stoplamps Switch                                |

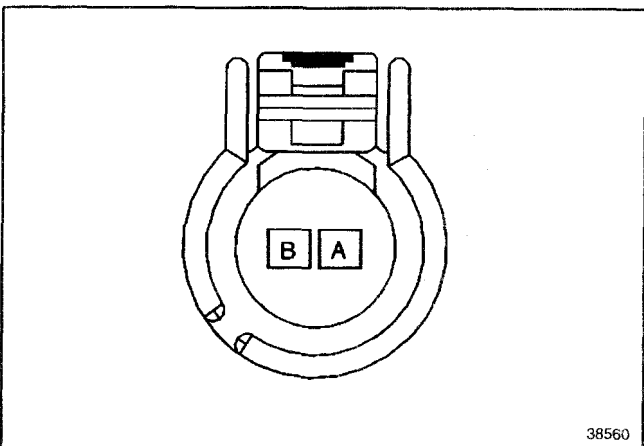
HVAC Connector End Views

A/C Compressor Clutch



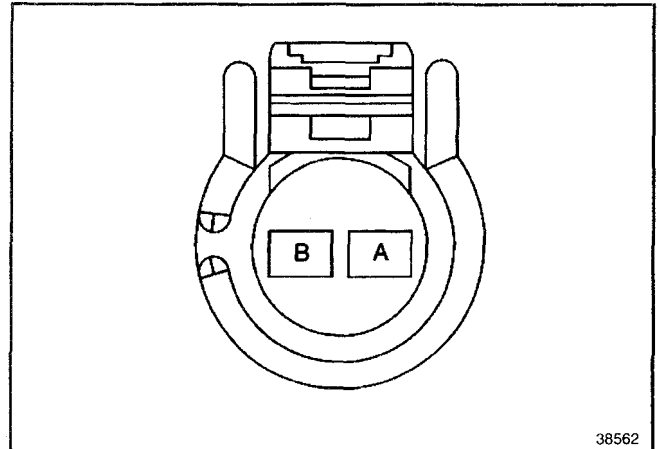
<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162017</li> <li>• 2 Way F Metri-Pack 150 Series (GRY)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	DK GRN	59	Air Conditioning Compressor Clutch Solenoid Feed
B	BLK	250	Ground

A/C Compressor High Pressure Cut-off Switch



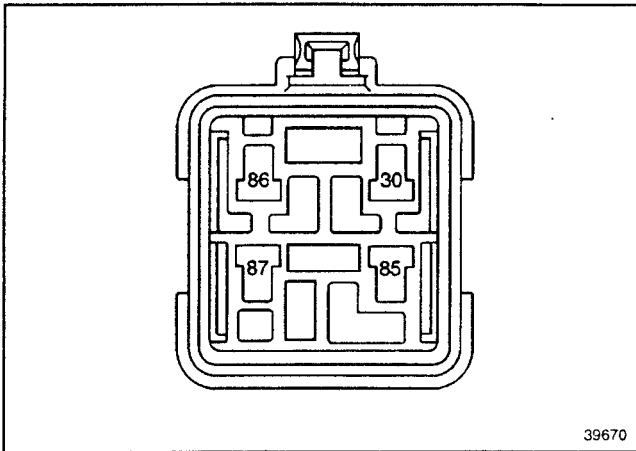
<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162438</li> <li>• 2 Way F Metri-Pack 150 Series (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	LT BLU	203	Air Conditioning Refrigerant High Pressure Cut-out Switch Feed
A (L31)	BRN	921	To Body Builder HVAC System
B	DK GRN / WHT	762	Air Conditioning Request Signal

A/C Compressor Refrigerant Pressure Switch



<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162440</li> <li>• 2 Way F Metri-Pack 150 Series (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A (Diesel)	LT BLU	203	Air Conditioning Refrigerant High Pressure Cut-out Switch Feed
A (Gas)	DK GRN	603	Air Conditioning Refrigerant Low Pressure Cut-out Switch Output
B (Diesel)	GRY	922	To Body Builder HVAC System
B (Gas)	BLK	250	Ground

**A/C Compressor Relay**



<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12129716</li> <li>• 4 Way F Metri-Pack 280 Series Flexlock (GRY)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
30	ORN	540	Fuse Output-Battery - Type III Fuse
85	PNK	39	Fuse Output-Ignition 1- Type III Fuse
86	DK GRN / WHT	459	Air Conditioning Compressor Control Relay Output-Coil
87	DK GRN	59	Air Conditioning Compressor Clutch Solenoid Feed

**Diagnostic Information and Procedures**

**HVAC Compressor Clutch Does Not Engage (Gasoline)**

**HVAC Compressor Clutch Does Not Engage - Gasoline**

- Refer to *A/C Compressor Control Circuit Diagnosis* in Engine Controls - 4.3L – L35
- Refer to *A/C Compressor Control Circuit Diagnosis* in Engine Controls - 5.7L– L31 *A/C Request Circuit Diagnosis*
- Refer to *A/C Compressor Control Circuit Diagnosis* in Engine Controls - 7.4L– L29

**HVAC Compressor Clutch Does Not Engage (Commercial Diesel MFI)**

Step	Action	Value(s)	Yes	No
1	Before using this table, confirm that the air conditioning (A/C) system has an adequate state of charge. Does the A/C system have an adequate state of charge?	—	Go to Step 2	Go to Refrigerant System Checks
2	Inspect the condition of the ENG-BAT fuse. Is the fuse open?	—	Go to Step 3	Go to Step 4
3	Locate and repair the source of the overload in CKT 540 (ORN) and replace the fuse. Is the repair complete?	—	System OK	—
4	Inspect the condition of G 200. Is it clean and tight?	—	Go to Step 6	Go to Step 5
5	Repair G 200 as necessary. Is the repair complete?	—	System OK	—

## HVAC Compressor Clutch Does Not Engage (Commercial Diesel MFI) (cont'd)

Step	Action	Value(s)	Yes	No
6	<ol style="list-style-type: none"> <li>1. Start the engine.</li> <li>2. Select A/C.</li> <li>3. Turn on the switches that engage the A/C compressor.</li> </ol> Did the compressor engage?	—	System OK	Go to Step 7
7	<ol style="list-style-type: none"> <li>1. Turn the engine OFF.</li> <li>2. Turn the ignition to the RUN position.</li> <li>3. Disconnect the A/C compressor clutch connector.</li> <li>4. Connect a test light from the A/C compressor clutch connector cavity A to ground.</li> </ol> Did the test light illuminate?	—	Go to Step 8	Go to Step 9
8	Connect a test light from the A/C compressor clutch connector cavity B to B +. Did the test light illuminate?	—	Go to Step 10	Go to Step 11
9	<ol style="list-style-type: none"> <li>1. Disconnect the A/C compressor relay.</li> <li>2. Connect a test light from the A/C compressor relay connector, cavity 30 to ground.</li> </ol> Did the test light illuminate?	—	Go to Step 12	Go to Step 13
10	Replace the A/C compressor clutch coil. Refer to <i>Compressor Clutch Coil and/or Pulley Rim</i> . Is the repair complete?	—	System OK	—
11	Repair the open in CKT 250 (BLK) between the A/C compressor clutch connector cavity B and G 200. Is the repair complete?	—	System OK	—
12	<ol style="list-style-type: none"> <li>1. Reconnect the A/C compressor clutch connector to the A/C compressor.</li> <li>2. Start the engine.</li> <li>3. Connect a fused jumper wire between cavity 30 and cavity 87 of the A/C compressor relay connector.</li> </ol> Did the compressor engage?	—	Go to Step 14	Go to Step 15
13	Repair the open in CKT 540 (ORN) between the ENG-BAT fuse cavity F1 and the A/C compressor relay connector cavity 30. Is the repair complete?	—	System OK	—
14	<ol style="list-style-type: none"> <li>1. Turn the engine OFF.</li> <li>2. Remove the fused jumper.</li> <li>3. Connect a test light from the A/C compressor relay connector, cavity 85 to ground.</li> <li>4. Turn the ignition switch to the ON position.</li> </ol> Did the test light illuminate?	—	Go to Step 16	Go to Step 17
15	<ol style="list-style-type: none"> <li>1. Turn the engine OFF.</li> <li>2. Turn the ignition switch to the RUN position.</li> <li>3. Disconnect the A/C compressor clutch connector.</li> <li>4. Connect a test light to the A/C compressor clutch connector, cavity A.</li> </ol> Did the test light illuminate?	—	Go to Step 10	Go to Step 18
16	Connect a test light from the A/C compressor relay connector, cavity 86 to B +. Did the test light illuminate?	—	Go to Step 19	Go to Step 20



## HVAC Compressor Clutch Does Not Engage (Commercial Diesel MFI) (cont'd)

Step	Action	Value(s)	Yes	No
17	1. Disconnect the A/C compressor high pressure cutoff switch. 2. Connect a test light from the A/C compressor high pressure cutoff switch connector, cavity A to ground. Did the test light illuminate?	—	Go to Step 21	Go to Step 22
18	Repair the open in CKT 59 (DK GRN) between the A/C compressor relay connector, cavity 87 and the A/C compressor clutch connector, cavity A Is the repair complete?	—	System OK	—
19	Replace the A/C compressor relay. Refer to <i>Compressor Relay Replacement</i> . Is the repair complete?	—	System OK	—
20	Repair the open in CKT 250 (BLK) between the A/C compressor relay connector, cavity 86 and G 200. Is the repair complete?	—	System OK	—
21	1. Connect a fused jumper from the A/C compressor relay connector, cavity 85 to ground. 2. Connect a test light from the A/C compressor high pressure cutoff switch connector, cavity B to B +. Did the test light illuminate?	—	Go to Step 23	Go to Step 24
22	1. Disconnect the A/C compressor refrigerant pressure switch connector. 2. Connect a test light from the A/C compressor refrigerant pressure switch connector, cavity B to ground. Did the test light illuminate?	—	Go to Step 25	Go to Step 26
23	Replace the A/C compressor high pressure cutoff switch. Is the repair complete?	—	System OK	—
24	Repair the open in CKT 762 (DK GRN/WHT) between the A/C compressor high pressure cutoff switch connector, cavity B and the A/C compressor relay connector, cavity 85. Is the repair complete?	—	System OK	—
25	Use a <i>J 39200</i> to measure the resistance from the A/C compressor refrigerant pressure switch connector, cavity A to the A/C compressor high pressure cutoff switch connector, cavity A. Is the resistance greater than the specified value?	1.0Ω	Go to Step 28	Go to Step 27
26	Repair the open in CKT 922 (GRY) between the A/C compressor refrigerant pressure switch connector, cavity B through the A/C ON/OFF switch and the ignition switch circuit. Is the repair complete?	—	System OK	—
27	Replace the A/C compressor refrigerant pressure switch. Is the repair complete?	—	System OK	—
28	Repair the open in CKT 203 (LT BLU) between the A/C compressor high pressure cutoff switch connector, cavity A and the A/C compressor refrigerant pressure switch connector, cavity A. Is the repair complete?	—	System OK	—

## HVAC Compressor Clutch Does Not Engage (Diesel EFI)

Step	Action	Value(s)	Yes	No
1	Before using this table, confirm that the air conditioning (A/C) system has an adequate state of charge. Does the A/C system have an adequate state of charge?	—	Go to Step 2	Go to <i>Refrigerant System Checks</i>
2	Inspect the condition of the HEATER fuse. Is the fuse open?	—	Go to Step 3	Go to Step 4
3	Locate and repair the source of the overload in CKT 922 and replace the fuse. Is the repair complete?	—	System OK	—
4	Inspect the condition of the ENG-BAT fuse. Is the fuse open?	—	Go to Step 5	Go to Step 6
5	Locate and repair the source of the overload in CKT 540 (ORN) and replace the fuse. Is the repair complete?	—	System OK	—
6	Inspect the condition of the GAUGES fuse. Is the fuse open?	—	Go to Step 7	Go to Step 8
7	Locate and repair the source of the overload in CKT 39 (PNK) and replace the fuse. Is the repair complete?	—	System OK	—
8	Inspect the condition of the grounds G 200 and G 104 for the Motorhome, and the grounds G 200 and G 102 for the Commercial. Are the grounds clean and tight?	—	Go to Step 10	Go to Step 9
9	Repair the grounds as necessary. Is the repair complete?	—	System OK	—
10	1. Turn the ignition switch to the RUN position. 2. Disconnect the A/C compressor clutch connector. 3. Connect a test light to the A/C compressor clutch connector, cavity A to ground. Did the test light illuminate?	—	Go to Step 11	Go to Step 12
11	Connect a test light from the A/C compressor clutch connector, cavity B to B+. Did the test light illuminate?	—	Go to Step 13	Go to Step 14
12	1. Disconnect the A/C compressor relay. 2. Connect a test light from the A/C compressor relay connector, cavity 30 to ground. Did the test light illuminate?	—	Go to Step 15	Go to Step 16
13	Replace the A/C compressor clutch coil. Refer to <i>Compressor Clutch Coil and/or Pulley Rim</i> . Is the repair complete?	—	System OK	—
14	Repair the open in CKT 250 (BLK) between the A/C compressor clutch connector, cavity B, and G 200. Is the repair complete?	—	System OK	—
15	1. Reconnect the A/C compressor clutch connector to the A/C compressor clutch. 2. Start the engine. 3. Connect a fused jumper wire between cavity 30 and cavity 87 of the A/C compressor relay connector. Refer to <i>Using Fused Jumper Wires</i> in Wiring Systems. Did the compressor engage?	—	Go to Step 17	Go to Step 20
16	Repair the open in CKT 540 (ORN) between the ENG-BAT fuse cavity F1 and the A/C compressor relay connector, cavity 30. Is the repair complete?	—	System OK	—

## HVAC Compressor Clutch Does Not Engage (Diesel EFI) (cont'd)

Step	Action	Value(s)	Yes	No
17	<ol style="list-style-type: none"> <li>1. Turn the engine OFF.</li> <li>2. Turn the ignition switch to the RUN position.</li> <li>3. Remove the fused jumper wire.</li> <li>4. Connect a test light from the A/C compressor relay connector, cavity 85 to ground.</li> </ol> Did the test light illuminate?	—	Go to Step 19	Go to Step 18
18	Repair the open in CKT 39 (PNK) between the GAUGES fuse, cavity F 5 and the A/C compressor relay connector, cavity 85. Is the repair complete?	—	System OK	—
19	<ol style="list-style-type: none"> <li>1. Connect a test light from the A/C compressor relay connector, cavity 86, to B +.</li> <li>2. Turn the ignition switch to the RUN position.</li> </ol> Did the test light illuminate?	—	Go to Step 32	Go to Step 22
20	<ol style="list-style-type: none"> <li>1. With the fused jumper wire still installed, disconnect the A/C compressor clutch connector.</li> <li>2. Connect a test light from the A/C compressor clutch connector, cavity A, to ground.</li> </ol> Did the test light illuminate?	—	Go to Step 11	Go to Step 21
21	Repair the open in CKT 59 (DK GRN) between the A/C compressor relay connector, cavity B87, to the A/C compressor clutch connector, cavity A. Is the repair complete?	—	System OK	—
22	<ol style="list-style-type: none"> <li>1. Disconnect the powertrain control module (PCM) connector C3.</li> <li>2. Use a J 39200 to measure the resistance from the PCM connector C3, cavity D5, to the A/C compressor relay connector, cavity 86.</li> </ol> Is the resistance greater than the specified value?	1.0Ω	Go to Step 23	Go to Step 24
23	Repair the open in CKT 459 (DK GRN/WHT) between the PCM connector C3, cavity D5, and the A/C compressor relay connector, cavity 86. Is the repair complete?	—	System OK	—
24	<ol style="list-style-type: none"> <li>1. Disconnect the PCM connector C1.</li> <li>2. Turn the ignition switch to the RUN position.</li> <li>3. Connect a test light from the PCM connector C1, cavity C2, to ground.</li> </ol> Did the test light illuminate?	—	Go to Step 35	Go to Step 25
25	<ol style="list-style-type: none"> <li>1. Disconnect the A/C compressor high pressure cutoff switch.</li> <li>2. Connect a test light from the A/C compressor high pressure cutoff switch connector, cavity A to ground.</li> </ol> Did the test light illuminate?	—	Go to Step 26	Go to Step 28
26	Use a J 39200 to measure the resistance between the A/C compressor high pressure cutoff switch connector, cavity B, and the PCM connector C1, cavity C2. Is the resistance greater than the specified value?	1.0Ω	Go to Step 27	Go to Step 33
27	Repair the open in CKT 762 (DK GRN/WHT) between the A/C compressor high pressure cutoff switch connector, cavity B, and the PCM connector C1, cavity C2. Is the repair complete?	—	System OK	—
28	<ol style="list-style-type: none"> <li>1. Disconnect the A/C compressor refrigerant pressure switch.</li> <li>2. Connect a test light from the A/C compressor refrigerant pressure switch connector, cavity B, to ground.</li> </ol> Did the test light illuminate?	—	Go to Step 29	Go to Step 31

**HVAC Compressor Clutch Does Not Engage (Diesel EFI) (cont'd)**

Step	Action	Value(s)	Yes	No
29	Use a <i>J 39200</i> to measure the resistance from the A/C compressor refrigerant pressure switch connector, cavity A, to the A/C compressor high pressure cutoff switch connector, cavity A. Is the resistance greater than the specified value?	1.0Ω	Go to <i>Step 30</i>	Go to <i>Step 34</i>
30	Repair the open in CKT 203 (LT BLU) between the A/C compressor refrigerant pressure switch connector, cavity A, and the A/C compressor high pressure cutoff switch connector, cavity A. Is the repair complete?	—	System OK	—
31	Repair the open in CKT 922 (GRY) between the A/C compressor refrigerant pressure switch and the heater and A/C control. Is the repair complete?	—	System OK	—
32	Replace the A/C compressor relay. Refer to <i>Compressor Relay Replacement</i> . Is the repair complete?	—	System OK	—
33	Replace the A/C compressor high pressure cutoff switch. Refer to <i>Compressor Control Switches</i> . Is the repair complete?	—	System OK	—
34	Replace the A/C compressor refrigerant pressure switch. Refer to <i>Compressor Control Switches</i> . Is the repair complete?	—	System OK	—
35	Replace the PCM. Refer to <i>PCM Replacement/Programming</i> . Is the repair complete?	—	System OK	—

**HVAC Compressor Clutch Does Not Disengage (Gasoline)**

Step	Action	Value(s)	Yes	No
1	1. Verify that the switches that engage the air conditioning (A/C) compressor are in the OFF position. 2. Start the engine. 3. Disconnect the A/C compressor relay. Did the compressor continue to run?	—	Go to <i>Step 2</i>	Go to <i>Step 3</i>
2	Repair the short to B+ in CKT 59 (DK GRN). Is the repair complete?	—	System OK	—
3	Connect a test light from the A/C compressor relay connector, cavity 86 to B+. Did the test light illuminate?	—	Go to <i>Step 4</i>	Go to <i>Step 5</i>
4	1. Turn the engine OFF. 2. Disconnect the vehicle control module (VCM) connector C3. 3. Connect a test light from the A/C compressor clutch relay connector, cavity 86 to B+. Did the test light illuminate?	—	Go to <i>Step 6</i>	Go to <i>Step 7</i>
5	Replace the A/C compressor relay. Refer to <i>Compressor Relay Replacement</i> . Is the repair complete?	—	System OK	—
6	Repair the short to ground in CKT 459 (DK GRN/WHT) between the A/C compressor relay connector, cavity 86, and the VCM connector C3, cavity 1. Is the repair complete?	—	System OK	—
7	Connect a test light from the VCM connector C3, cavity 25 to ground. Did the test light illuminate?	—	Go to <i>Step 8</i>	Go to <i>Step 9</i>

**HVAC Compressor Clutch Does Not Disengage (Gasoline) (cont'd)**

Step	Action	Value(s)	Yes	No
8	Disconnect the A/C compressor high pressure cut-off switch connector with the test light still connected. Did the test light remain on?	—	Go to Step 10	Go to Step 11
9	Replace the VCM. Refer to <i>VCM Replacement/Programming</i> in Engine Controls. Is the repair complete?	—	System OK	—
10	Repair the short to B + in CKT 762 (DK GRN/WHT) between the VCM connector C3, cavity 25 and the A/C compressor high pressure cut-off switch connector, cavity B. Is the repair complete?	—	System OK	—
11	Repair the short to B + in CKT 203 (LT BLU) between the A/C compressor high pressure cutoff switch connector, cavity A and the heater and A/C control. Is the repair complete?	—	System OK	—

**HVAC Compressor Clutch Does Not Disengage (Commercial Diesel MFI)**

Step	Action	Value(s)	Yes	No
1	1. Verify that the switches that engage the air conditioning (A/C) compressor are in the OFF position. 2. Start the engine. 3. Disconnect the A/C compressor relay. Did the compressor continue to run?	—	Go to Step 2	Go to Step 3
2	Repair the short to B+ in CKT 59 (DK GRN) between the A/C compressor relay connector, cavity 87 and the A/C compressor clutch connector, cavity A. Is the repair complete?	—	System OK	—
3	Connect a test light from the A/C compressor relay connector cavity 85 to ground. Did the test light illuminate?	—	Go to Step 5	Go to Step 4
4	Replace the A/C compressor relay. Refer to <i>Compressor Relay Replacement</i> . Is the repair complete?	—	System OK	—
5	With the test light still connected, disconnect the A/C compressor high pressure cutoff switch. Does the test light still illuminate?	—	Go to Step 6	Go to Step 7
6	Repair the short to B + in CKT 762 (DK GRN/WHT) between the A/C compressor high pressure cutoff switch connector, cavity B, to the A/C compressor relay connector, cavity 85. Is the repair complete?	—	System OK	—
7	1. Reconnect the A/C compressor high pressure cutoff switch. 2. With the test light still connected, disconnect the A/C compressor refrigerant pressure switch connector. Does the test lamp still illuminate?	—	Go to Step 8	Go to Step 9
8	Repair the short to B + in CKT 203 (LT BLU) between the A/C compressor high pressure cutoff switch connector, cavity A, and the A/C compressor refrigerant pressure switch connector, cavity A. Is the repair complete?	—	System OK	—
9	Repair the short to B + in CKT 922 (GRY) between the A/C compressor refrigerant pressure switch connector, cavity B and the heater and A/C control. Is the repair complete?	—	System OK	—

## HVAC Compressor Clutch Does Not Disengage (Diesel EFI)

Step	Action	Value(s)	Yes	No
1	1. Verify that the switches that engage the air conditioning (A/C) compressor are in the OFF position. 2. Start the engine. 3. Disconnect the A/C compressor relay. Did the compressor continue to run?	—	Go to Step 2	Go to Step 3
2	Repair the short to B + in CKT 59 (DK GRN) between the A/C compressor relay connector, cavity 87, and the A/C compressor clutch connector, cavity A. Is the repair complete?	—	System OK	—
3	Connect a test light from the A/C compressor relay connector, cavity 86 to B +. Did the test light illuminate?	—	Go to Step 4	Go to Step 5
4	1. Turn the engine OFF. 2. Disconnect the powertrain control module (PCM) connector C3. 3. Connect a test light from the A/C compressor relay connector, cavity 86 to B +. Did the test light illuminate?	—	Go to Step 6	Go to Step 7
5	Replace the A/C compressor relay. Refer to <i>Compressor Relay Replacement</i> . Is the repair complete?	—	System OK	—
6	Repair the short to ground in CKT 459 (DK GRN/WHT) between the A/C compressor relay connector, cavity 86 and the PCM connector C3, cavity D5. Is the repair complete?	—	System OK	—
7	1. Disconnect the PCM connector C1. 2. Turn the ignition switch to the RUN position. 3. Connect a test light from the PCM connector C1, cavity C2 to ground. Did the test light illuminate?	—	Go to Step 8	Go to Step 15
8	With the test light still connected, disconnect the A/C high pressure cutoff switch. Does the test light still illuminate?	—	Go to Step 9	Go to Step 10
9	Repair the short to B + in CKT 762 (DK GRN/WHT) between the A/C compressor high pressure cutoff switch connector, cavity B and the PCM connector C1, cavity C2. Is the repair complete?	—	System OK	—
10	1. Disconnect the A/C compressor refrigerant pressure switch. 2. Connect a test light from the A/C compressor high pressure cutoff switch connector, cavity A to ground. Did the test light illuminate?	—	Go to Step 11	Go to Step 12
11	Repair the short to B + in CKT 203 (LT BLU) between the A/C compressor refrigerant pressure switch connector, cavity A, and the A/C compressor high pressure cutoff switch connector, cavity A. Is the repair complete?	—	System OK	—
12	1. Disconnect the heater and A/C control. 2. Connect a test light from the A/C compressor refrigerant pressure switch connector, cavity B to ground. Did the test light illuminate?	—	Go to Step 13	Go to Step 14
13	Repair the short to B + in CKT 922 (GRY) between the A/C compressor refrigerant pressure switch connector, cavity B and the heater and A/C control. Is the repair complete?	—	System OK	—
14	Replace the heater and A/C control. Is the repair complete?	—	System OK	—
15	Replace the PCM. Refer to <i>PCM Replacement/Programming</i> in Engine Controls. Is the repair complete?	—	System OK	—

## Refrigerant System Checks

### Functional Test

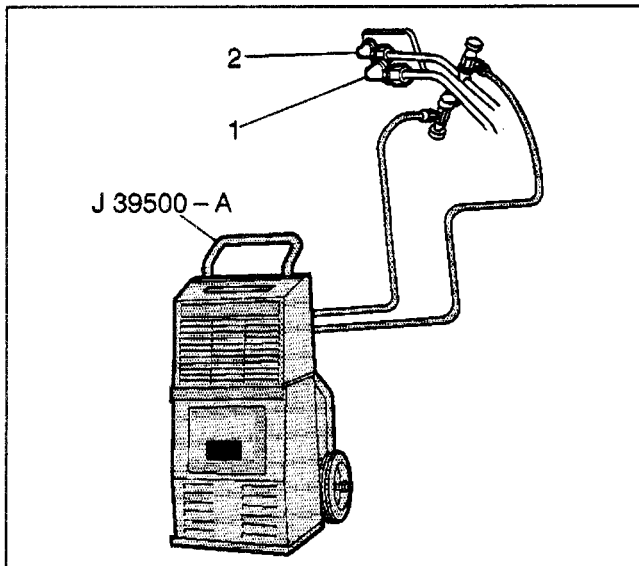
- The operation of the air conditioning (A/C) blower at all speeds in any position except the OFF position and the engagement of the A/C compressor clutch will indicate that the electrical circuits are functioning properly.
- The same "hand-felt" temperature of the A/C evaporator inlet pipe and the A/C receiver/dryer or the dehydrator surface of an operating system will indicate a properly charged system.
- The operation of the A/C control head in order to distribute the air from the designed outlets will indicate proper functioning.

### Performance Test

#### Tools Required

J 39500 A/C Refrigerant, Recovery, Recycling and Recharging Station

1. Park the vehicle inside or in a shaded area.
2. Place the transmission in the PARK or the NEUTRAL position.
3. Open the hood.
4. Secure the hood.
5. Remove the low pressure hose cap.
6. Remove the high pressure hose cap.



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7. Connect the low pressure hose (2).  
Connect the high pressure hose (1).
8. Start the engine.
9. Stabilize the engine to the normal idling condition.
10. Press the A/C button to the ON position.
11. Press the MAX/REC/RC button to the ON position.
12. Adjust the blower speed to the HI position.
13. Adjust the temperature control to full cold.
14. Carefully follow the manufacturer's instructions.

The normal temperature guideline for the pressures reading is approximately 25–30°C (77–86°F).

The normal pressure guideline at the ambient for the low pressure side is approximately 127–265 kPa (18.5–38.4 psi).

The normal pressure guideline at the ambient for the high pressure side is approximately 1373–1765 kPa (199–255.9 psi).

### HFC-134a Pressure-Temperature Relationship

Pressure		Temperature	
(kPa)	(psi)	(°C)	(°F)
36	5.3	-20	-4.4
67	9.7	-15	5
104	15	-10	14
147	21	-5	23
196	28	0	32
255	37	5	41
314	45	10	50
392	57	15	59
471	68	20	68
569	82	25	77
677	98	30	86
785	114	35	95
912	132	40	104
1059	154	45	113
1216	176	50	122

### Leak Testing

#### Tools Required

J 39400-A Electronic Leak Detector

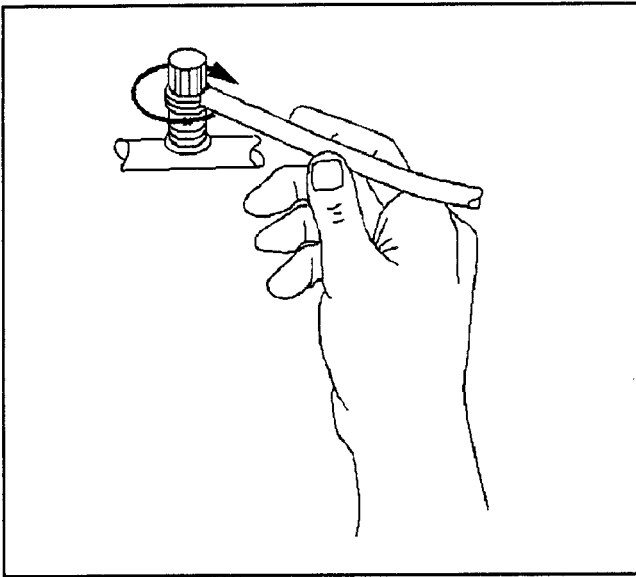
**Caution:** Do not operate the detector in a combustible atmosphere since its sensor operates at high temperatures or personal injury and/or damage to the equipment may result.

**Important:** Halogen leak detectors are sensitive to windshield washing solutions, many solvents, cleaners, and some adhesives used in the vehicle. Ensure that the surfaces are clean and dry in order to prevent a false warning. The ingestion of liquids will damage the detector.

Perform a refrigerant leak test when the following conditions exist:

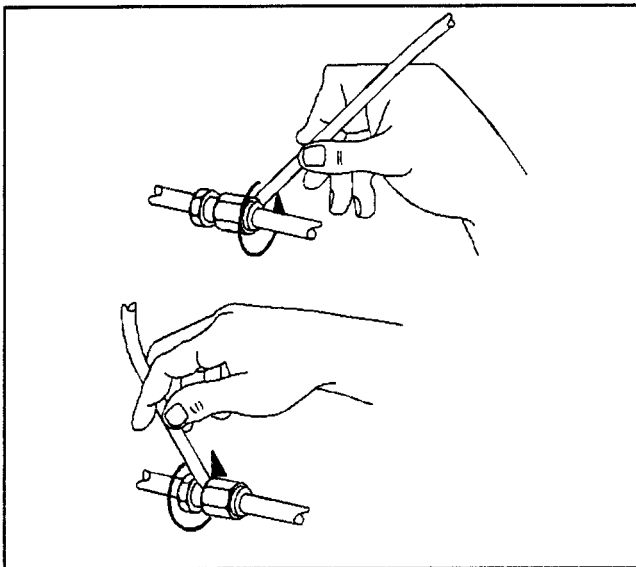
- A leak is suspected
- After performing a service operation which disturbs the following items:
  - The components
  - The connections
  - The lines

Many methods and special tools are available for use in order to perform the refrigerant leak test. No matter which tool is used, care and diligence are the biggest keys to success.



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The electronic leak detector has been found to be the most useful tool in locating refrigerant leaks. The J 39400-A Electronic Leak Detector is a small unit which operates on a 12V DC and produces an audible signal which increases in frequency as R-134a is detected. Ensure that the instrument is properly calibrated according to the instructions. Ensure the detector is in the proper setting for the type of refrigerant being tested. Place the detector GAS switch in the R-134a setting prior to use.



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The most common leaks are found at the refrigerant fittings or the connections. The following conditions may cause the leaks:

- Improper torque
- Damaged O-rings seals
- Lack of lubricant on the O-ring seals
- Dirt or debris across the O-ring seals

Even the smallest piece of lint from cotton gloves or shop cloths can create a leak path across an O-ring seal.

The successful use of this and any other electronic detector depends greatly upon the scan rate. Carefully follow the manufacturer's instructions regarding the following items:

- The calibration
- The operation
- The maintenance

**Important:** Always follow the refrigerant system around in a continuous path so that any areas of potential leaks are not missed. Always test all areas in order to ensure that the entire system is leak free, even when one leak is already found.

Circle each joint completely by moving at 25-51 mm (1-2 in) per second with the tip of the probe as close to the surface as possible. Circle the joint no more than 6 mm (0.25 in) away. Do not block the air intake. The audible tone will go from a steady 1-2 clicks per second to a solid alarm to indicate a leak. Frequently adjust the balance knob in order to maintain the 1-2 clicks per second rate.

Use this procedure in order to test the following components:

- The air conditioning (A/C) evaporator inlet
- The A/C evaporator outlet
- The A/C accumulator inlet
- The A/C accumulator outlet
- The A/C condenser inlet
- The A/C condenser outlet
- All brazed areas
- All welded areas
- Any area that shows signs of damage
- The hose couplings
- The A/C compressor rear head
- The housing joints

### Service Ports/Access Valves

The primary seal for the service ports is the sealing cap. The cap contains a specially designed O-ring seal or gasket which provide a leak-free seal. A loss of refrigerant charge will result if the following conditions exist:

- The cap is loose
- The cap is missing
- The wrong cap is used

### Air Conditioning (A/C) Evaporator Core

One of the most difficult leaks to find is in the air conditioning (A/C) evaporator core. Use the following procedure in order to leak test the core:

1. Turn the blower fan on high for 15 or more seconds.
2. Turn the blower fan off.
3. Wait for 10 minutes.
4. Remove the blower motor resistor.
5. Insert the leak detector probe as close to the A/C evaporator as possible. A leak is detected if the detector goes to a solid alarm.
6. If possible, visually inspect the core face with a flashlight for evidence of refrigerant oil.



**Air Conditioning (A/C) Compressor Block Fitting and Shaft Seal**

1. Blow shop air behind and in front of the air conditioning (A/C) compressor clutch/pulley for at least 15 seconds.
2. Wait for 1-2 minutes.
3. Probe the area in front of the pulley.  
A leak is detected if the detector goes to a solid alarm.

**When Leak Cannot Be Found**

**Tools Required**

- J 41447 R-134a Florescent Dye
- J 41459 Dye Injector
- J 39400-A Leak Detector
- J 39500 R-134a A/C Refrigerant Recovery, Recycling, and Recharging Station (ACR4)

The following diagnostic procedure should be used when an air conditioning (A/C) refrigerant leak cannot be found when using a leak detector, J 39400-A.

1. Make a copy of Attachment 1 (Service Information Form).
2. Using an J 39500, record the necessary information.

3. Recover the existing R-134a refrigerant and record the refrigerant weight.
4. Add J 41447 or P/N 12346303, using the J 41459.
5. Re-charge the system following the procedures in Section 1B of the Service Manual.
6. Check the system for leaks using a high intensity black light or P/N 12377979.

**Important:** R-134a florescent dye will remain in the lubricant for the life of the vehicle as long as the vehicle's A/C system has not been flushed. If no leaks can be found, return the vehicle to the customer and advise them of the dye in the system and that it may need to be rechecked at a later date. Attach the Service Information Form to the Warranty Repair Order when completed.

**Odor Diagnosis**

**Important:** Under certain climate and operating conditions a must odor develops from mold growth in the evaporator core face. The odor is generally temporary. As climate conditions change, the odor will disappear and repair. If the odor persists it will become necessary to remove the evaporator core and clean the face of the evaporator core with the appropriate cleaner.

**Musty Smell**

Problem	Action
DEFINITION: There is a musty smell in the air conditioning (A/C) system. <b>Important:</b> Under certain climate and operating conditions a must odor develops from mold growth in the evaporator core face. The odor is generally temporary. As climate conditions change, the odor will disappear and repair. If the odor persists it will become necessary to remove the evaporator core and clean the face of the evaporator core with the appropriate cleaner.	
There are water leaks in the body.	Seal the body.
The evaporator drains.	Clean the drain.
The evaporator has mold or mildew.	Clean the evaporator.

**Coolant Smell**

Problem	Action
DEFINITION: The air conditioning (A/C) has a coolant smell.	
Anti-freeze.	<ul style="list-style-type: none"> <li>• Heater core</li> <li>• Heater pipe/hoses</li> </ul>

**Refrigerant Leak**

Problem	Action
DEFINITION: The air conditioning (A/C) has a refrigerant leak.	
Refrigerant oil.	Clean the evaporator core.

## Repair Instructions

### Odor Correction

#### Tools Required

*J 36645* Air Conditioning Cleaning Gun

In hot, humid climate the air conditioning (A/C) system may emit odors. The following conditions may cause the odors:

- Debris in the heater/A/C evaporator case
- The growth of mold on the A/C evaporator core

In order to correct the odor problem, use the following procedure:

**Important:** If disinfectant gets into the eyes, hold the eyelids open and flush the eyes with a steady, gentle stream of water for 15 minutes. Obtain medical attention if the irritation persists.

1. Put on rubber gloves and safety glasses.
  2. Pour a small bottle of the two-part Air Conditioning System Disinfectant P/N 25533404 or the equivalent into the large bottle. Seal and invert the large container once or twice to mix the contents.
  3. Inspect underneath the vehicle in order to verify that the drain outlet is not plugged.
  4. Connect the battery charger in order to avoid draining the battery during the cleaning procedure.
  5. Remove the blower motor resistor. Leave the wiring connectors attached.
  6. Inspect the heater/A/C evaporator module for debris. Remove any debris that is present through the blower resistor opening. If the debris is imbedded into the A/C evaporator core face and cannot be removed, remove the core from the vehicle and clean the core. If a large amount of debris is present in the heater/A/C evaporator case, the air inlet screen will require sealing around the air intake in the cowl area.
  7. Turn the ignition to the ON position. Do not start the vehicle.
  8. Set the mode selector to the following positions:
    - Max/Rec/Rc
    - The blower speed to 1
    - The temperature to full cold
  9. Open all of the windows and the doors.
  10. Exit the vehicle.
  11. Place a drain pan with at least a 2 quart capacity below the heater/A/C evaporator drain hole in order to collect the disinfectant and the rinse water runoff. If necessary, install an additional hose onto the drain so that all of the fluid goes into the drain pan.
  12. Turn the pedestal fan on 4 in order to provide cross ventilation during the cleaning procedure.
- Important:** Do not allow the disinfectant to come into contact with hot engine components such as the exhaust manifold.
13. Use the *J 36645* Air Conditioning Cleaning Gun, or an equivalent spray gun while performing the following procedure:
    - 13.1. Insert the nozzle of the spray gun through the blower resistor opening.
    - 13.2. Insert the siphon hose into the container of the disinfectant.
    - 13.3. Take extra care to ensure the adequate coverage of the corner and the edges.
    - 13.4. Spray directly toward the A/C evaporator face.
    - 13.5. Completely saturate the core. Use the entire container of the solution.
  14. Turn the ignition to the OFF position. Allow the core to soak for 5 minutes.
  15. Verify the proper drain operation underneath the vehicle. If necessary, unclog and increase the drain plug slits with a razor blade or sharp knife.
  16. Turn the ignition to the ON position. Do not start the vehicle.
  17. Thoroughly rinse the A/C evaporator core with clean water using the spray gun in order to remove all of the disinfectant residue. A 2 quart rinse is recommended.
  18. Turn the ignition to the OFF position.
  19. Reinstall the blower resistor.
  20. Properly dispose of the disinfectant and the rinse water runoff that was collected in the drain pan in an approved manner.

## Refrigerant Recovery and Recharging

### Tools Required

- J 39500 A/C Refrigerant Recovery, Recycling and Recharging (ACR4) System
- J 41810 PureGuard 2
- J-41810-100A Active Flow Control Valve

**Caution:** Avoid breathing the A/C Refrigerant 134a (R-134a) and the lubricant vapor or the mist. Exposure may irritate the eyes, nose, and throat. Work in a well ventilated area. In order to remove R-134a from the A/C system, use service equipment that is certified to meet the requirements of SAE J 2210 (R-134a recycling equipment). If an accidental system discharge occurs, ventilate the work area before continuing service. Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

**Caution:** For personal protection, goggles and gloves should be worn and a clean cloth wrapped around fittings, valves, and connections when doing work that includes opening the refrigerant system. If R-134a comes in contact with any part of the body severe frostbite and personal injury can result. The exposed area should be flushed immediately with cold water and prompt medical help should be obtained.

**Notice:** R-134a is the only approved refrigerant for use in this vehicle. The use of any other refrigerant may result in poor system performance or component failure.

**Notice:** To avoid system damage use only R-134a dedicated tools when servicing the A/C system.

**Notice:** Use only Polyalkylene Glycol Synthetic Refrigerant Oil (PAG) for internal circulation through the R-134a A/C system and only 525 viscosity mineral oil on fitting threads and O-rings. If lubricants other than those specified are used, compressor failure and/or fitting seizure may result.

**Notice:** R-12 refrigerant and R-134a refrigerant must never be mixed, even in the smallest of amounts, as they are incompatible with each other. If the refrigerants are mixed, compressor failure is likely to occur. Refer to the manufacturer instructions included with the service equipment before servicing.

The J 39500 removes the Refrigerant-134a from the vehicle's A/C system. The recovery procedure uses one filtering cycle. The evacuation procedure uses an automatic multiple pass filtering cycle. These filtering cycles ensure a constant supply of clean, dry refrigerant for A/C system charging.

The Initial Set-Up Instruction Manual, provided with the J 39500, contains specific procedures for proper recovery, evacuation and recharging. For ACR4 technical assistance in the U.S., call 1-800-345-2233.

## Compressor Replacement (4.3L and 5.7L)

### Removal Procedure

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the negative battery cable.
2. Discharge and recover the refrigerant from the system. Refer to *Refrigerant Recovery and Recharging*.
3. Remove the drive belt. Refer to *Drive Belt Replacement* in Engine Mechanical 4.3L or *Drive Belt Replacement* in Engine Mechanical 5.7L.
4. Remove the electrical connectors from the air conditioning (A/C) compressor.

**Important:** When removing the sealing washers, prevent dirt and foreign material from getting on the following sealing surfaces:

- The washers
- The block fitting
- The A/C compressor ports

Use a lint-free cloth to clean all of the sealing surfaces.

5. Remove the A/C compressor hose bolt and clamp.
6. Remove and discard the A/C compressor sealing washers.
7. Remove the bolts and the compressor from the bracket.

### Installation Procedure

1. Fill the A/C compressor. If the A/C compressor is being replaced, refer to *Refrigerant Oil Distribution Specifications*.

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

2. Install the compressor and bolts to the bracket.

#### Tighten

Tighten the A/C compressor bracket bolts to 50 N·m (37 lb ft).

**Important:** When installing the sealing washers, prevent dirt and foreign material from getting onto the sealed surfaces of the following components:

- The washers
- The block fitting
- The A/C compressor ports

Clean all of the sealing surfaces with a lint-free cloth.

Do not oil the sealing washers prior to assembly.

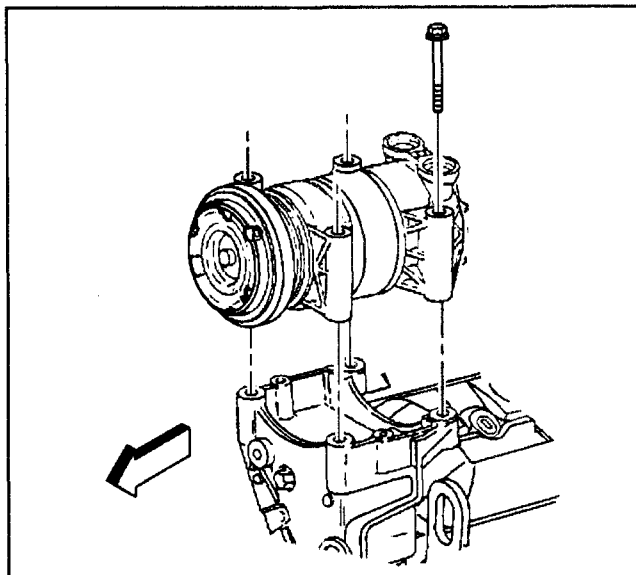
Do not reuse the sealing washers.

3. Install the new sealing washers onto the pilots of the hose fitting. Ensure that the washers bottom against the surface of the hose fitting.
4. Install the refrigerant hoses on the A/C compressor.
5. Secure the refrigerant hoses with the A/C compressor hose clamp bolt.

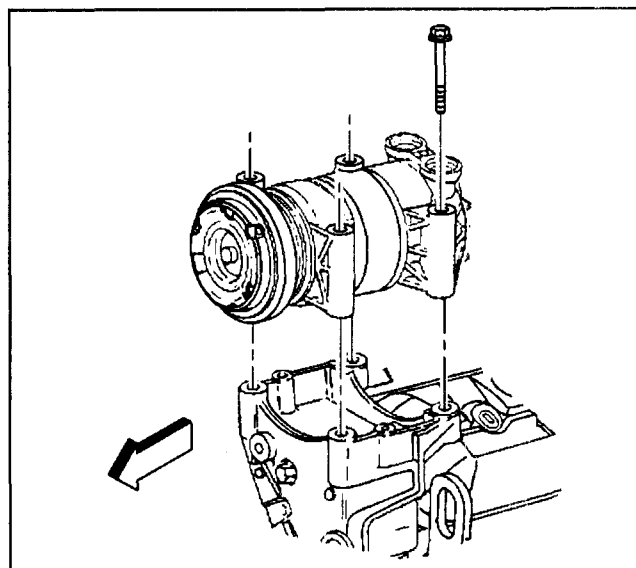
**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

#### Tighten

Tighten the A/C compressor hose clamp bolt to 35 N·m (26 lb ft).



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6. Install the electrical connectors to the A/C compressor.
7. Install the drive belt. Refer to *Drive Belt Replacement* in Engine Mechanical 4.3L or *Drive Belt Replacement* in Engine Mechanical 5.7L..
8. Connect the negative battery cables.
9. Add refrigerant to the system. Refer to *Refrigerant Recovery and Recharging*.
10. Inspect the system for leaks. Refer to *Leak Testing*.

## Compressor Replacement (6.5L)

### Removal Procedure

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the negative battery cable.
2. Discharge and recover the refrigerant from the system. Refer to *Refrigerant Recovery and Recharging*.
3. Remove the drive belt. Refer to *Drive Belt Replacement* in Engine Mechanical 6.5L.
4. Remove the electrical connectors from the air conditioning (A/C) compressor.

**Important:** When removing the sealing washers, prevent dirt and foreign material from getting on the following sealing surfaces:

- The washers
- The block fitting
- The A/C compressor ports

Use a lint-free cloth in order to clean all of the sealing surfaces.

5. Remove the A/C compressor hose bolt and clamp.
6. Remove and discard the A/C compressor sealing washers.
7. Remove the bolts (2) and the compressor (1) from the bracket (3).

### Installation Procedure

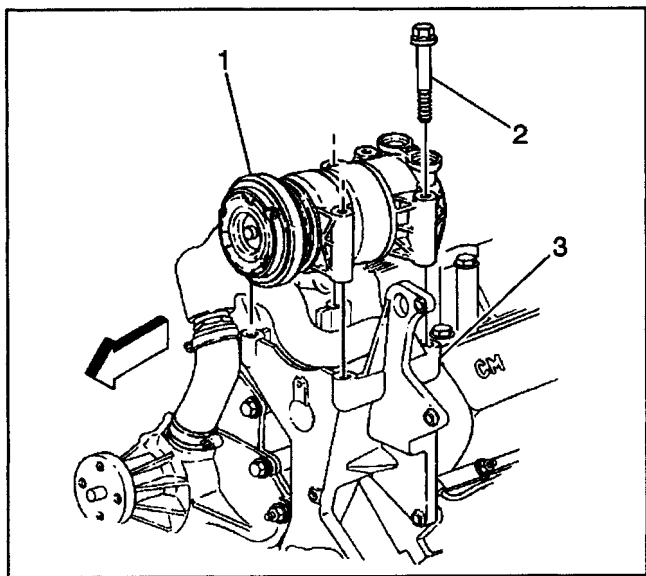
1. Fill the A/C compressor. If the A/C compressor is being replaced, refer to *Refrigerant Oil Distribution Specifications*

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

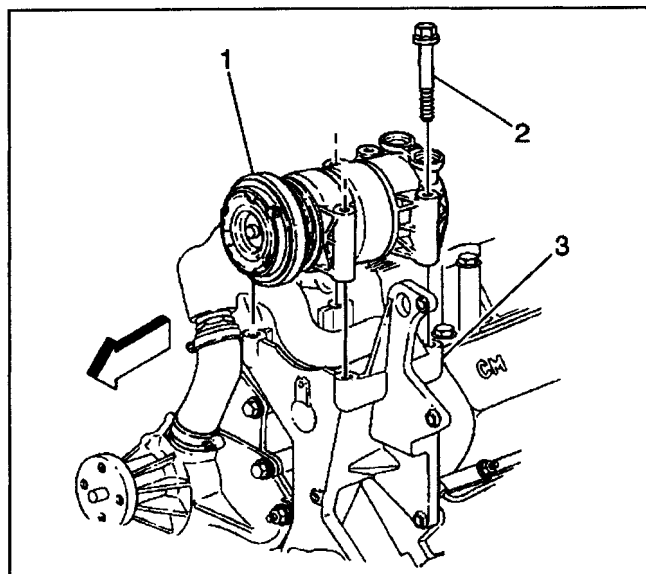
2. Install the compressor (1) and bolts (2) to the bracket (3).

### Tighten

Tighten the A/C compressor bracket bolts (2) to 50 N·m (37 lb ft).



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**Important:** When installing the sealing washers, prevent dirt and foreign material from getting onto the sealed surfaces of the following components:

- The washers
- The block fitting
- The A/C compressor ports

Clean all of the sealing surfaces with a lint-free cloth.

Do not oil the sealing washers prior to assembly.

Do not reuse the sealing washers.

3. Install the new sealing washers onto the pilots of the hose fitting. Ensure that the washers bottom against the surface of the hose fitting.
4. Install the refrigerant hoses on the A/C compressor.

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

5. Secure the refrigerant hoses with the A/C compressor hose clamp bolt.

#### **Tighten**

Tighten the A/C compressor hose clamp bolt to 35 N·m (26 lb ft).

6. Install the electrical connectors to the A/C compressor.
7. Install the drive belt. Refer to *Drive Belt Replacement* in Engine Mechanical 6.5L.
8. Connect the negative battery cables.
9. Add refrigerant to the system. Refer to *Refrigerant Recovery and Recharging*.
10. Inspect the system for leaks. Refer to *Leak Testing*.

## **Compressor Replacement (7.4L)**

### **Removal Procedure**

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

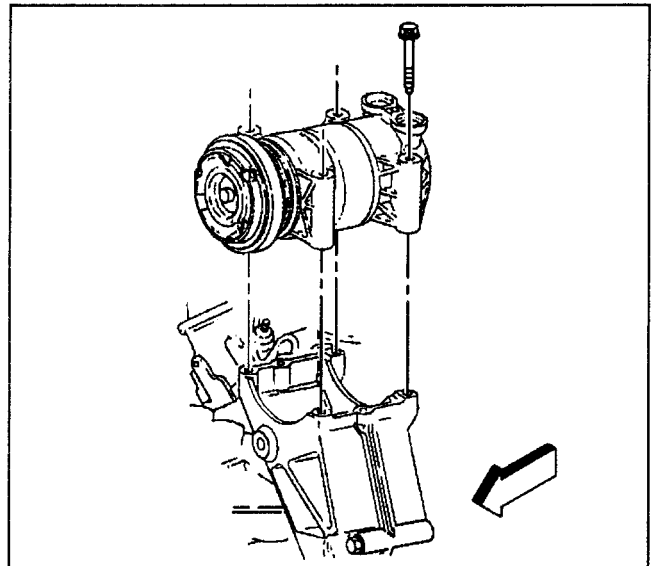
1. Disconnect the negative battery cable.
2. Discharge and recover the refrigerant from the system. Refer to *Refrigerant Recovery and Recharging*.
3. Remove the drive belt. Refer to *Drive Belt Replacement* in Engine Mechanical 7.4L.
4. Remove the electrical connectors from the air conditioning (A/C) compressor.

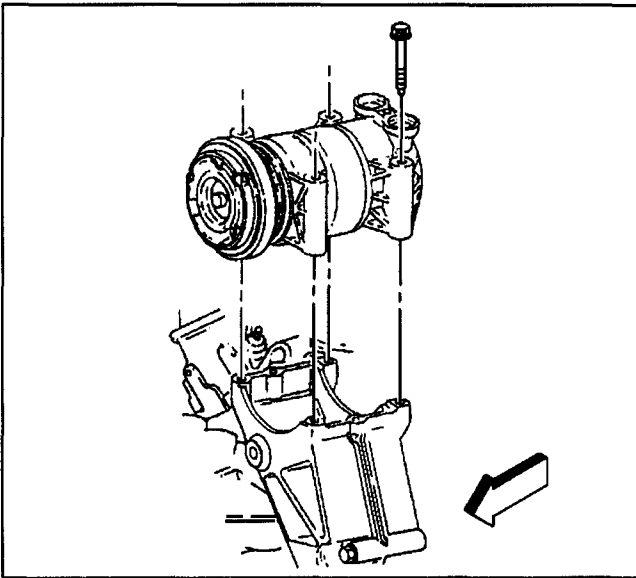
**Important:** When removing the sealing washers, prevent dirt and foreign material from getting on the following sealing surfaces:

- The washers
- The block fitting
- The A/C compressor ports

Use a lint-free cloth in order to clean all of the sealing surfaces.

5. Remove the A/C compressor hose bolt and clamp.
6. Remove and discard the A/C compressor sealing washers.
7. Remove the bolts and the compressor from the bracket.





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### Installation Procedure

1. Fill the A/C compressor. If the A/C compressor is being replaced, refer to *Refrigerant Oil Distribution Specifications*.

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

2. Install the compressor and bolts to the bracket.

#### Tighten

Tighten the A/C compressor bracket bolts to 50 N·m (37 lb ft).

**Important:** When installing the sealing washers, prevent dirt and foreign material from getting onto the sealed surfaces of the following components:

- The washers
- The block fitting
- The A/C compressor ports

Clean all of the sealing surfaces with a lint-free cloth.

Do not oil the sealing washers prior to assembly.

Do not reuse the sealing washers.

3. Install the new sealing washers onto the pilots of the hose fitting. Ensure that the washers bottom against the surface of the hose fitting.
4. Install the refrigerant hoses on the A/C compressor.

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

5. Secure the refrigerant hoses with the A/C compressor hose clamp bolt.

#### Tighten

Tighten the A/C compressor hose clamp bolt to 35 N·m (26 lb ft).

6. Install the electrical connectors to the A/C compressor.
7. Install the drive belt. Refer to *Drive Belt Replacement* in Engine Mechanical 7.4L.
8. Connect the negative battery cables.
9. Add refrigerant to the system. Refer to *Refrigerant Recovery and Recharging*.
10. Inspect the system for leaks. Refer to *Leak Testing*.

## Compressor Leak Testing

### Bench-Check Procedure

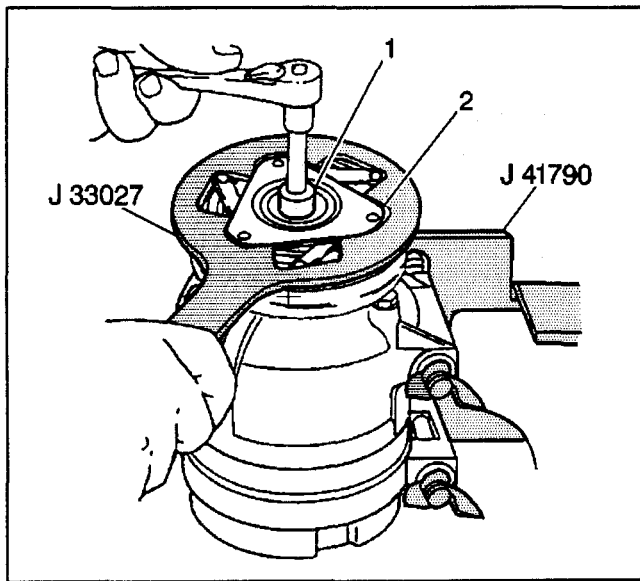
#### Tools Required

- *J 34992* Compressor Holding Fixture
- *J 39400-A* Leak Detector
- *J 39893* Pressure Testing Connector
- *J 39500* R-134a A/C Refrigerant Recovery, Recycling and Recharging System (ACR4)

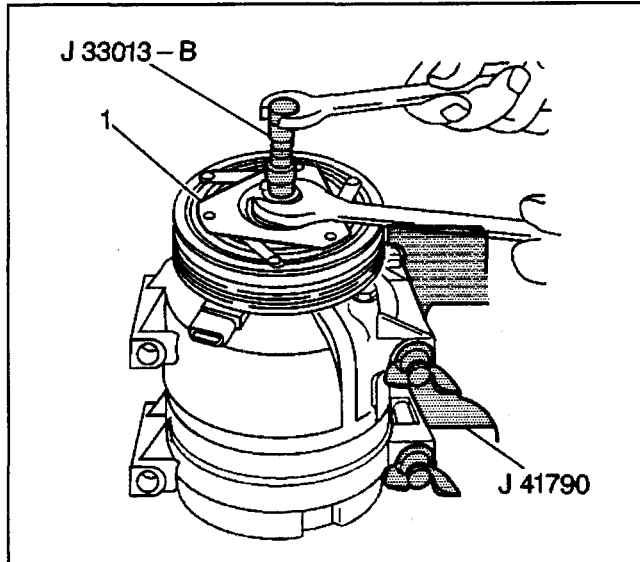
1. Install the *J 39893* on the rear head of the compressor.
2. Using the *J 39500*, attach the center hose of the manifold gauge set on the charging station to a refrigerant drum that is standing in an upright drum.
3. Connect the charging station high and low pressure lines to the corresponding fittings on the *J 39893*.  
The suction port (low-side) of the compressor has a large internal opening. The discharge port (high-side) has a smaller internal opening into the compressor. The discharge port (high-side) also has a deeper recess.
4. Open the following controls on the charging station in order to allow refrigerant vapor to flow into the compressor:
  - The low pressure control
  - The high pressure control
  - The refrigerant control
5. Use the *J 39400-A* to check for leaks at the following locations:
  - The pressure relief valve
  - The rear head switch location
  - The compressor front head seal
  - The compressor rear head seal
  - The center cylinder seal
  - The through bolt head gaskets
  - The compressor shaft seal
6. Turn the low-pressure control and the high-pressure control on the charging station off.
7. Perform the following steps if an external leak exists:
  - 7.1. Perform the necessary corrective measures.
  - 7.2. Inspect the components for leaks again in order to verify that the leak is corrected.
8. Recover the refrigerant.
9. Disconnect both hoses from the *J 39893*.
10. Add 90 ml (3 fl oz) of new PAG lubricant to the compressor assembly.
11. Slowly rotate the complete compressor assembly (excluding the crankshaft and the drive plate hub) several turns in order to distribute the oil to all of the cylinder and the piston areas.
12. Install a M9 x 1.25 threaded nut on the compressor crankshaft if the drive plate and clutch assembly are not installed.

13. Use a box-end wrench or socket and handle in order to rotate the compressor crankshaft or clutch drive plate on the crankshaft several turns. Performing the above action will ensure piston assembly to cylinder wall lubrication.
14. Using the *J 39500*, connect the *J 39893* to the test plate high-side connector.
15. Using the *J 39500*, connect the charging station low-pressure line to the low-pressure port of the *J 39893*.  
Oil will drain out of the compressor suction port if the compressor is positioned with the suction port downward.
16. Attach the compressor to the *J 34992*.
17. Mount the compressor in a vise in order to place the compressor in a horizontal position.
18. Use a wrench to rotate the compressor crankshaft or the drive plate hub ten complete revolutions at the speed of approximately one-revolution per second.  
Turning the compressor at less than one-revolution per second can result in a lower pump-up pressure. Low pump-up pressure may disqualify a good pumping compressor.
19. Observe the reading on the high-pressure gauge at the completion of the tenth revolution of the compressor.  
The pressure reading for a good pumping compressor should measure 690 kPa (100 psi) or above. A pressure reading less than 620 kPa (90 psi) indicates one or more of the suction and/or discharge valves have an internal leak or an inoperative valve.  
Perform the following procedure if one of the valves are leaking or inoperative:
  - 19.1. Recover the refrigerant.
  - 19.2. Disassemble the compressor.
  - 19.3. Inspect the compressor for the cause of the leak.
  - 19.4. Repair the compressor as necessary.
  - 19.5. Reassemble the compressor.
  - 19.6. Repeat the pump-up test.
  - 19.7. Test for external leaks
20. Recover the refrigerant from the high-side.
21. Remove the *J 39893*.
22. Tilt the compressor with the compressor suction port and the discharge port positioned downward.
23. Drain the PAG lubricant from the compressor. Allow the compressor to drain for 10 minutes.
24. Refill the compressor with the proper amount of PAG lubricant.  
Pour the PAG lubricant into the suction port.
25. If further assembly or processing is necessary, install a shipping plate or the *J 39893*. The shipping plate or the *J 39893* prevents the following materials from entering the compressor until the compressor is installed:
  - Air
  - Dirt
  - Moisture

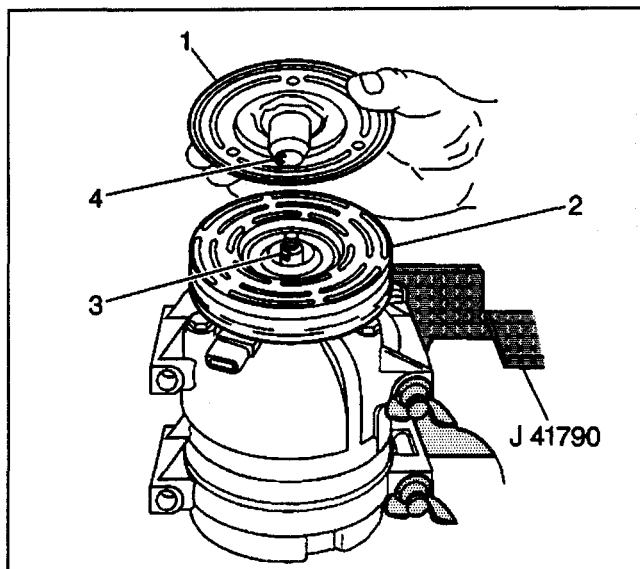




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## Compressor Clutch Plate and Hub Assembly

### Removal Procedure

#### Tools Required

- J 33027-A Clutch Hub Holding Tool
- J 33013-B Hub and Drive Plate Installer
- J 41790 Compressor Holding Fixture

1. Remove the compressor from the vehicle. Refer to *Compressor Replacement (4.3L and 5.7L)*, *Compressor Replacement (6.5L)*, or *Compressor Replacement (7.4L)*.
2. Clamp the J 41790 in a vise and attach the compressor to the holding fixture.
3. Hold the clutch hub and drive plate assembly (2) in place using the J 33027-A.
4. Remove the compressor shaft nut with a 13 mm socket (1).
5. Thread the clutch plate and hub remover and installer tool hub and drive plate installer into the hub.
6. Remove the hub and drive plate assembly (1) by turning the center screw into the body of the hub and drive plate installer and against the compressor shaft.
7. Remove the shaft key and retain for reassembly.

### Installation Procedure

#### Tools Required

- J 33013-B Hub and Drive Plate Installer
- J 33027-A Clutch Hub Holding Tool
- J 33017 Pulley and Bearing Assembly Installer

1. Install the shaft key into the hub key groove (4) approximately 3.2 mm (1/8 in) out of the keyway. The shaft key is curved slightly to provide an interference fit in the hub key groove.
2. Clean the surfaces of the clutch plate (1) and the clutch rotor (2) before installing the clutch plate and hub assembly.
3. Align the shaft key with the shaft keyway in the clutch plate and the hub assembly and place onto the compressor shaft (3).

4. Remove the *J 33013-B* :
  - 4.1. Remove the center screw from the body of the hub and drive plate installer.
  - 4.2. Install the center screw into the opposite end of the hub and drive plate installer.
5. Install the *J 33013-B* and the bearing tools (1) onto the clutch plate (3) and the hub assembly (2):
  - 5.1. Back the body of the hub and drive plate installer tool off enough to allow the center screw to be threaded onto the end of the compressor shaft.
  - 5.2. Thread the center screw several turns onto the end of the compressor shaft.  
Do not tighten the center screw on the compressor shaft.
6. Hold the center screw with a wrench:
  - 6.1. Tighten the hex portion of the hub and drive plate installer body several turns.
  - 6.2. Remove the hub and drive plate installer from the clutch plate and hub.
  - 6.3. Make sure the shaft key is still in place in the keyway.
7. Reinstall the *J 33013-B*.
8. Place a feeler gage between the clutch plate and the clutch rotor.
9. Tighten the hex portion of the hub and drive plate installer until the air gap between the clutch plate and clutch rotor is 0.40 mm (0.015 in).  
Make sure that the air gap is even all around the clutch plate and hub assembly.
10. Remove the *J 33013-B*.
11. Hold the clutch plate and hub assembly (2) with the *J 33027-A*.

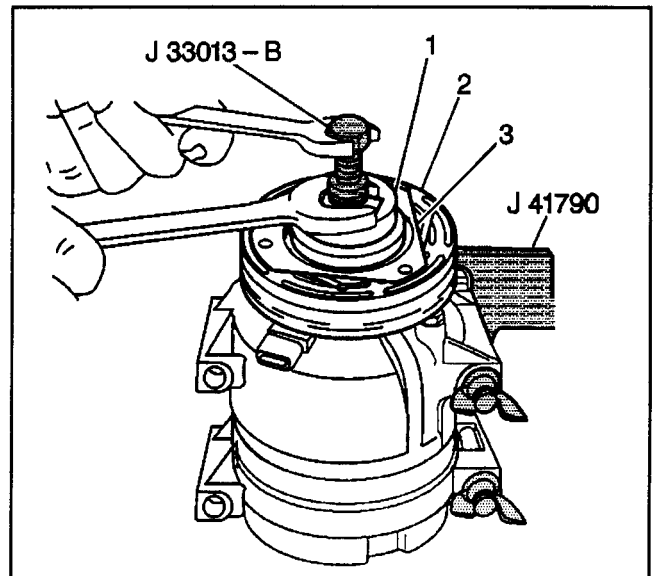
**Notice:** Refer to *Fastener Notice* in *Cautions and Notices*.

12. Install the compressor shaft nut.

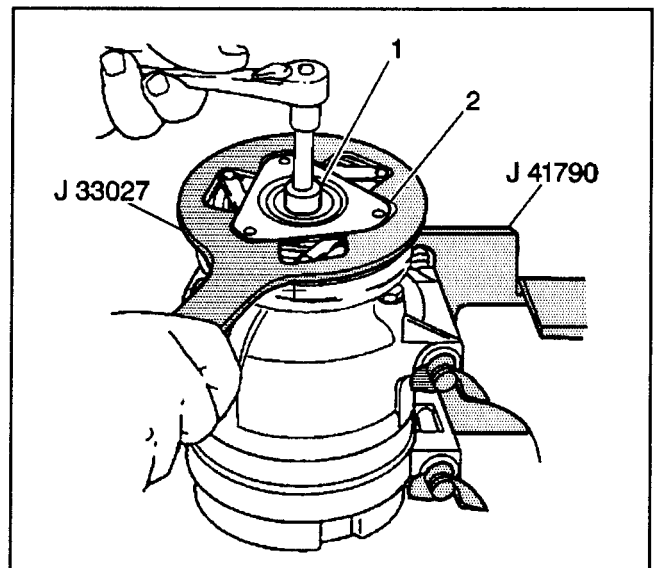
**Tighten**

Tighten the compressor shaft nut to 18 N·m (13 lb ft).

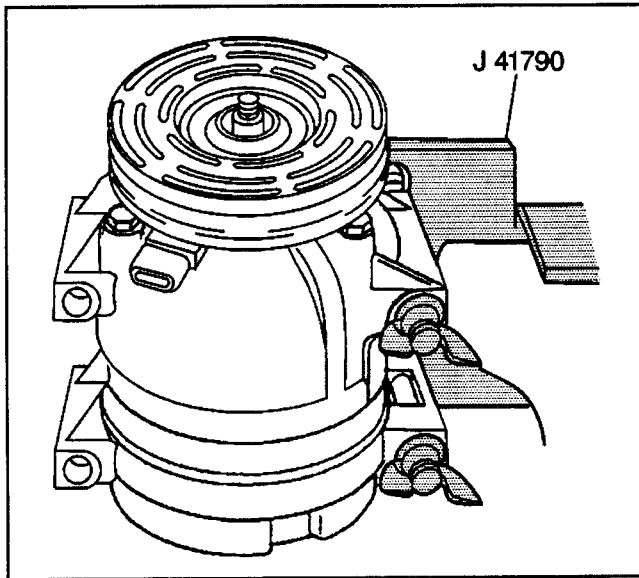
13. Spin the pulley rotor by hand to make sure the rotor is not rubbing against the clutch drive plate.
14. Remove the compressor from the *J 41790*.
15. Install the compressor into the vehicle. Refer to *Compressor Replacement (4.3L and 5.7L)*, *Compressor Replacement (6.5L)*, or *Compressor Replacement (7.4L)*.



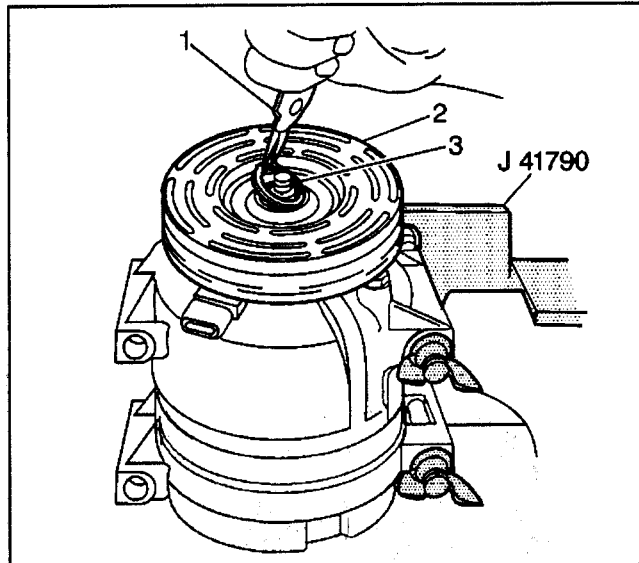
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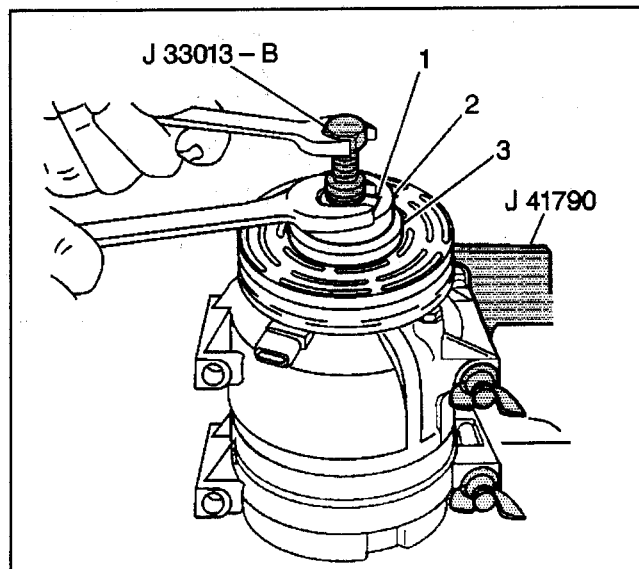
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## Clutch Rotor and/or Bearing

### Removal Procedure

#### Tools Required

- J 41790 Compressor Holding Fixture
- J 41552 Compressor Pulley Puller
- J 33023-A Puller Pilot

1. Remove the compressor from the vehicle. Refer to *Compressor Replacement (4.3L and 5.7L)*, *Compressor Replacement (6.5L)*, or *Compressor Replacement (7.4L)*.
2. Install the compressor onto the J 41790.

3. Remove the clutch plate and hub assembly (2). Refer to *Compressor Clutch Plate and Hub Assembly*.
4. Remove the clutch rotor and bearing assembly retaining ring (3), using external snap ring pliers (1).
5. Place the J 33023-A on the clutch rotor.
6. Install the J 41552 down into the inner circle of slots in the rotor.
7. Turn the compressor pulley puller clockwise in the slots to engage the puller tangs with the rotor.
8. Hold the compressor pulley puller in place and use a wrench to turn the center forcing screw against the puller pilot to remove the clutch rotor and bearing assembly.

### Installation Procedure

#### Tools Required

- J 33013-B Hub and Drive Plate Installer
- J 33017 Puller and Bearing Assembly Installer
- J 41790 Compressor Holding Fixture

1. Position the clutch rotor and bearing assembly (2) onto the compressor.
2. Position the J 33017 and bearing (1) from the J 33013-B directly over the inner race of the bearing.
3. Place the washer (3) from the J 42126 tool kit onto the body of the J 33013-B.
4. Remove the center screw from the body of the J 33013-B.
5. Install the center screw into the opposite end of the J 33013-B.

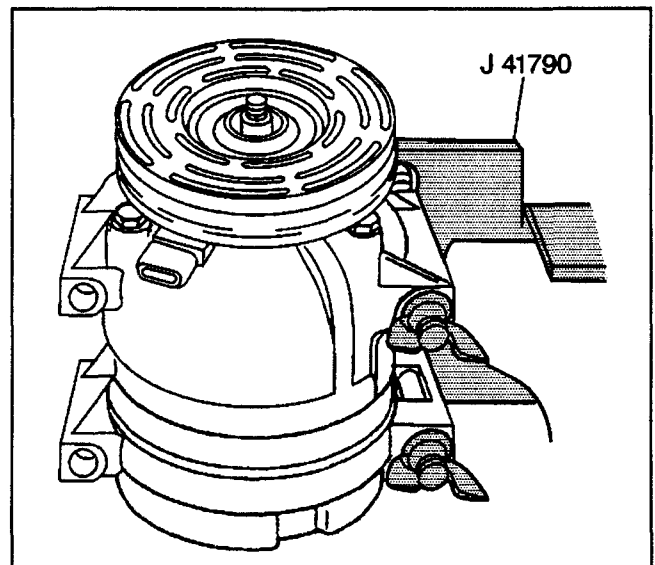
6. Back the body of the *J 33013-B* off enough in order to allow the center screw to be threaded onto the end of the compressor shaft.
7. Thread the center screw several turns onto the end of the compressor shaft.  
Do not tighten the center screw on the compressor shaft.
8. Hold the center screw with a wrench.
9. Tighten the hex portion of the *J 33013-B* body several turns.
10. Remove the *J 33013-B* from the clutch rotor and bearing assembly.
11. Make sure that the clutch rotor and bearing (2) is pressed onto the nose of the compressor far enough in order to clear the groove for the retaining ring.  
If the clutch rotor and bearing does not clear the groove, repeat steps 7, 8, and 9.
12. Install the clutch rotor and bearing retaining ring (3) using external snap ring pliers (1).  
Make sure that the camphor side of the retaining ring is facing up when the retaining ring is being installed.
13. Install the clutch plate and hub assembly. Refer to *Compressor Clutch Plate and Hub Assembly*.
14. Remove the compressor from the *J 41790*.
15. Install the compressor into the vehicle. Refer to *Compressor Replacement (4.3L and 5.7L)*, *Compressor Replacement (6.5L)*, or *Compressor Replacement (7.4L)*.

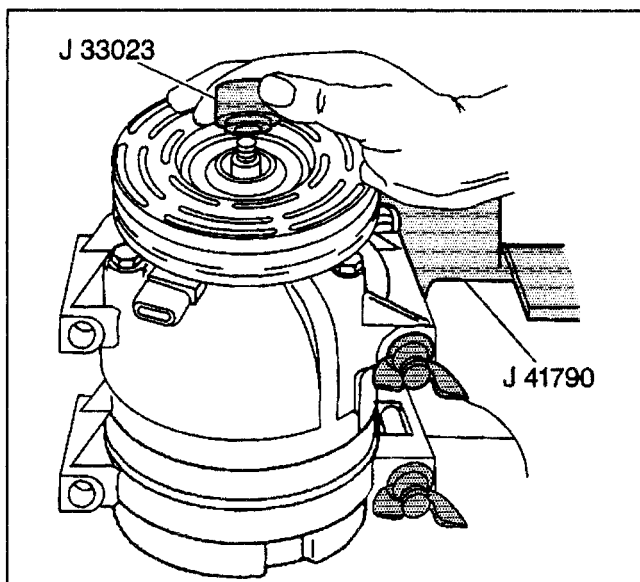
## Compressor Clutch Coil and/or Pulley Rim

### Removal Procedure

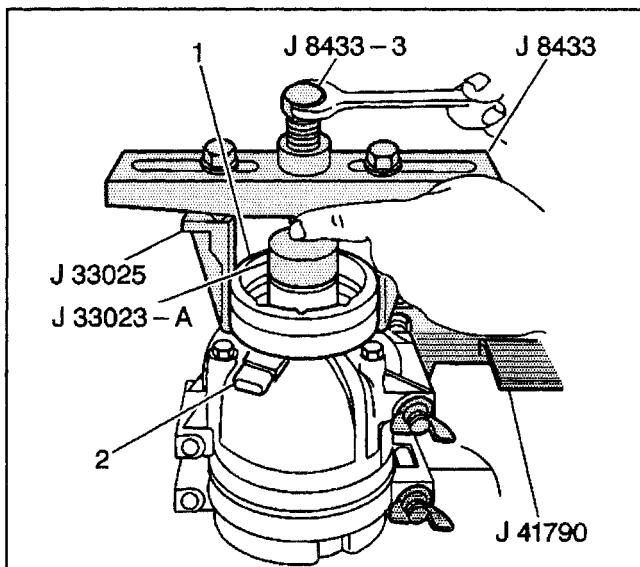
#### Tools Required

- *J 41790* Compressor Holding Fixture
  - *J 8433-1* Compressor Pulley Puller
  - *J 8433-3* Forcing Screw
  - *J 33025* Clutch Coil Puller Legs
  - *J 33023-A* Puller Pilot
1. Remove the compressor from the vehicle. Refer to *Compressor Replacement (4.3L and 5.7L)*, *Compressor Replacement (6.5L)*, or *Compressor Replacement (7.4L)*.
  2. Install the compressor onto the *J 41790*.

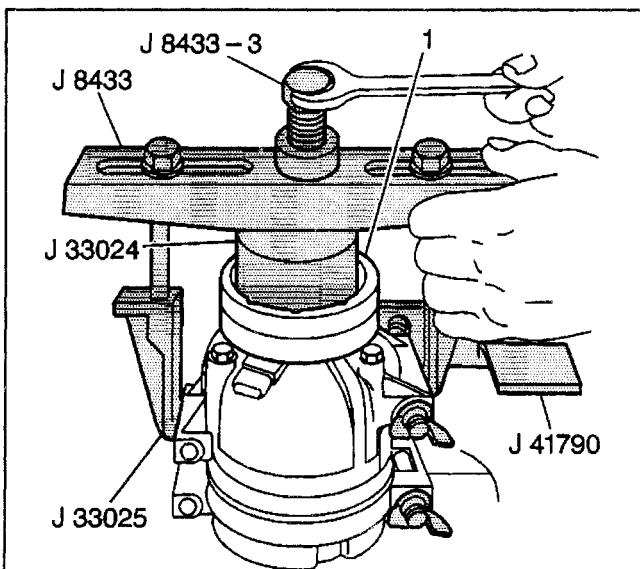




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3. Install the *J 33023-A* onto the front head of the compressor.
4. Remove the compressor clutch plate and hub assembly. Refer to *Compressor Clutch Plate and Hub Assembly*.
5. Remove the compressor rotor and bearing assembly. Refer to *Clutch Rotor and/or Bearing*.

6. Mark the clutch coil terminal location (2) on the compressor front head.
7. Install the *J 33025* onto the *J 8433-1*.
8. Install the *J 8433-1* onto the compressor clutch coil (1) and tighten the puller leg bolts.
9. Tighten the center forcing screw *J 8433-3* of the compressor pulley puller *J 8433-1* against the puller pilot to remove the compressor clutch coil from the compressor.

### Installation Procedure

#### Tools Required

- *J 41790* Compressor Holding Fixture
  - *J 33024* Clutch Coil Installer Adaptor
  - *J 33025* Clutch Coil Puller Legs
  - *J 8433-1* Compressor Pulley Puller
  - *J 8433-3* Forcing Screw
1. Place the clutch coil assembly (1) on the front head with the clutch coil terminal at the positioned at the mark made during disassembly.
  2. Place the *J 33024* over the internal opening of the clutch coil housing and align installer with the compressor front head.
  3. Install the *J 8433-3* into the *J 8433-1* and center the screw in the countersunk center hole of the *J 33024*.

4. Install the 4 inch through bolts and washers from the J 42136 tool kit into the J 33025 and attach them to the compressor mounting bosses.
5. Turn the center forcing screw of the J 8433-3 to press the clutch coil onto the front head until the clutch coil is fully seated.  
Make sure the clutch coil and the J 33024 stay in line with each other while pressing the clutch coil onto the compressor.
6. Install the compressor clutch rotor and bearing assembly. Refer to *Clutch Rotor and/or Bearing*.
7. Install the compressor clutch plate and hub assembly. Refer to *Compressor Clutch Plate and Hub Assembly*.
8. Remove the compressor from the J 41790.
9. Install the compressor into the vehicle. Refer to *Compressor Replacement (4.3L and 5.7L)*, *Compressor Replacement (6.5L)*, or *Compressor Replacement (7.4L)*.

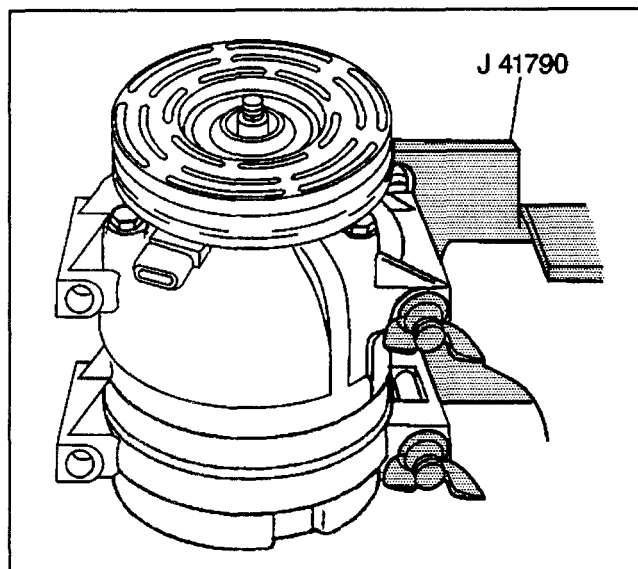
## Compressor Shaft Seal

### Removal Procedure

#### Tools Required

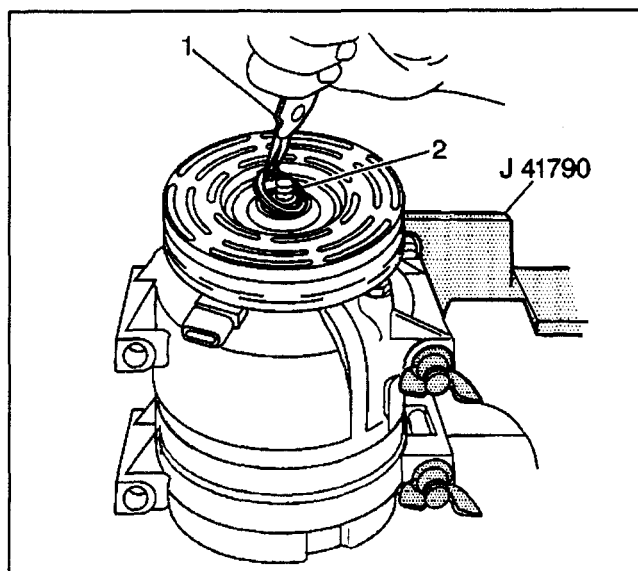
- J 41790 Compressor Holding Tool
- J 42136 A/C Lip Seal Remover

1. Remove the compressor from the vehicle. Refer to *Compressor Replacement (4.3L and 5.7L)*, *Compressor Replacement (6.5L)*, or *Compressor Replacement (7.4L)*.
2. Place the compressor on the J 41790.

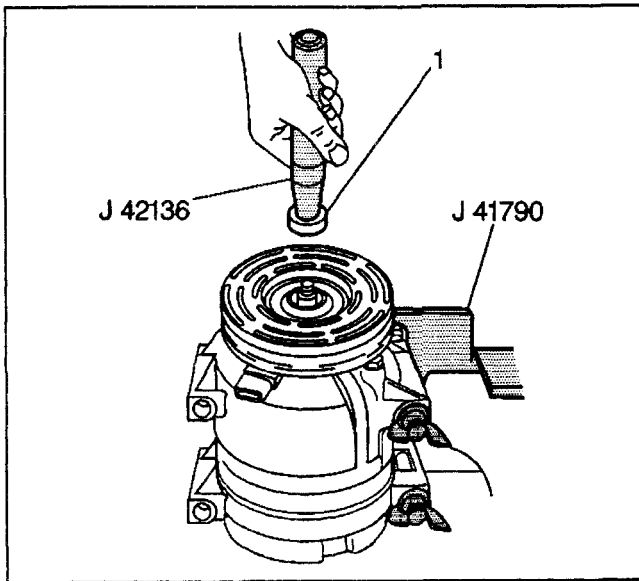


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3. Remove the compressor clutch plate and hub assembly. Refer to *Compressor Clutch Plate and Hub Assembly*.
4. Remove the compressor shaft seal retainer ring (2), using internal snap ring pliers (1).
5. To prevent any dirt or foreign material from getting into the compressor, thoroughly clean the following components:
  - The inside of the compressor neck area surrounding the shaft
  - The exposed portion of the compressor shaft seal
  - The compressor shaft
  - The O-ring groove

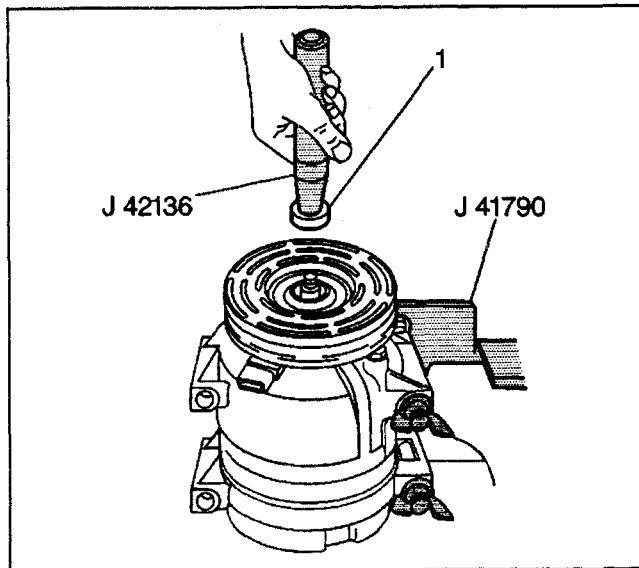


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6. Fully engage the lip of the *J 42136* into the recessed portion of the seal (1) the turning the handle clockwise.
7. Remove the compressor shaft seal from the compressor with a rotary pulling motion.
8. Recheck the shaft and the inside of the compressor neck for dirt or foreign material and make sure these areas are perfectly clean before installing the new compressor shaft seal.



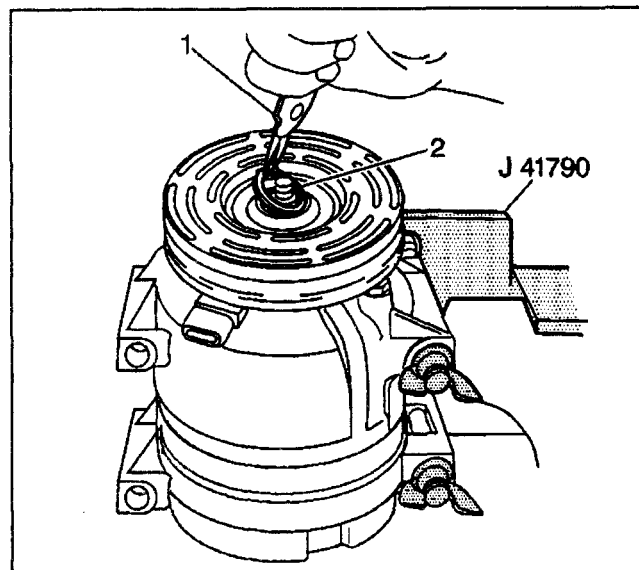
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**Installation Procedure**

**Tools Required**

- *J 9625-A* Leak Test Adaptor
- *J 42136* A/C Lip Seal Remover
- *J 34614* Shaft Seal Protector
- *J 41790* Compressor Holding Tool

1. Dip the new compressor shaft seal (1) in clean 525 viscosity refrigerant oil. Assemble the seal onto the *J 42136* by turning the handle clockwise.
2. Install the *J 34614* onto the compressor shaft.
3. Using a rotary motion, slide the new compressor shaft seal onto the compressor shaft until the seal is fully seated.
4. Remove the *J 34614* by turning the handle counter clockwise.



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5. Install a new compressor shaft seal retaining ring (2), using internal snap ring pliers (1). Make sure that the chamfer side of the retaining ring is facing up and that the retaining ring snaps into the groove.
6. Leak test the compressor, using the *J 9625-A*.
  - 6.1. Install the *J 9625-A* onto the compressor and pressurize the suction and high-side of the compressor with R-134a.
  - 6.2. Temporarily install the shaft nut.
  - 6.3. With the compressor in a horizontal position, rotate the compressor shaft in the normal direction of rotation, several turns by hand.
  - 6.4. Leak test the seal area and repair if necessary.
  - 6.5. Remove the shaft nut.

7. Recover the refrigerant. Refer to *Refrigerant Recovery and Recharging*.
8. Remove and clean any excess oil resulting from installing the new seal parts from the shaft and inside the compressor neck.
9. Install the compressor clutch plate and hub assembly. Refer to *Compressor Clutch Plate and Hub Assembly*.
10. Remove the compressor from the J 41790.
11. Install the compressor into the vehicle. Refer to *Compressor Replacement (4.3L and 5.7L)*, *Compressor Replacement (6.5L)*, or *Compressor Replacement (7.4L)*.

## Compressor Pressure Relief Valve

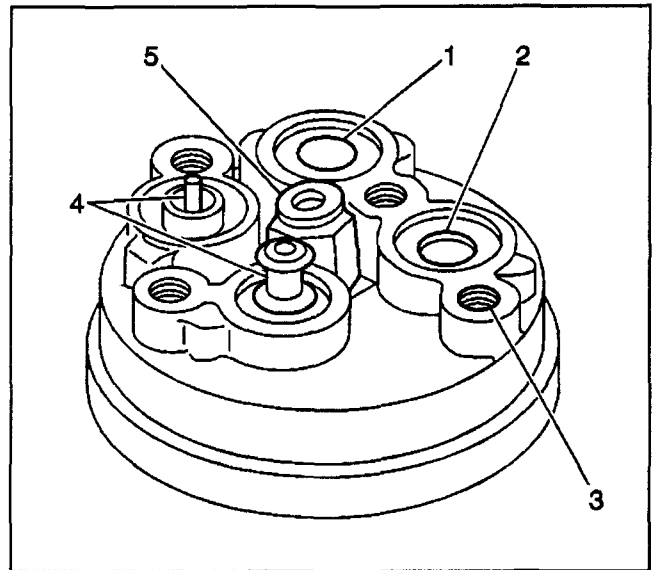
### Removal Procedure

#### Tools Required

J 39500 R-134a A/C Refrigerant Recovery, Recycling and Recharging System (ACR4)

**Caution:** Refer to *SIR Handling Caution in Cautions and Notices*.

1. Use the J 39500 to recover the refrigerant.
2. Remove the old pressure relief valve (5).



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### Installation Procedure

#### Tools Required

J 39500 R-134a A/C Refrigerant Recovery, Recycling and Recharging System (ACR4)

1. Clean the valve seat area on the rear head.
2. Lubricate the O-ring of the new pressure relief valve (5) and the O-ring assembly using new 525 viscosity refrigerant oil.

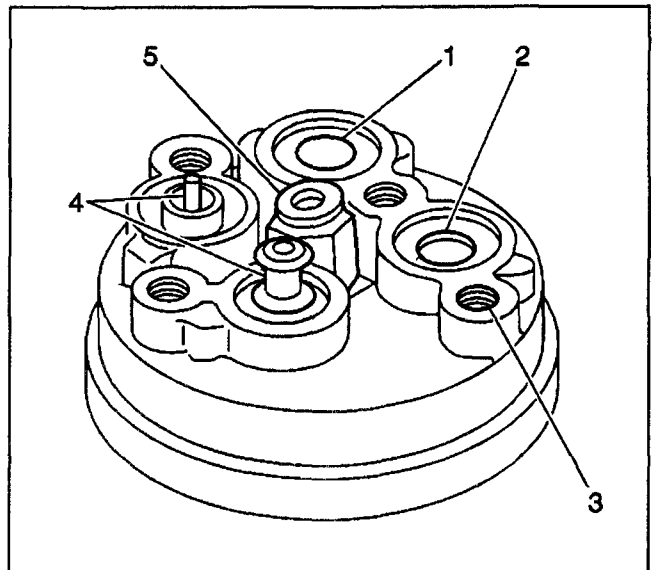
**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

3. Install the new pressure relief valve (5).

#### Tighten

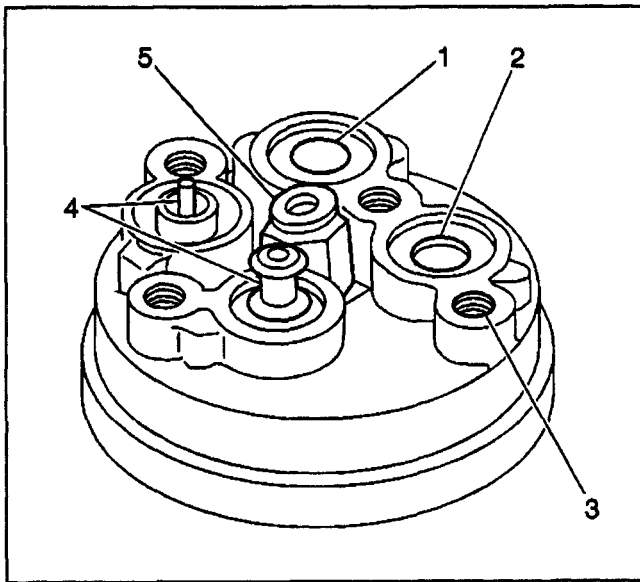
Tighten the new valve to 9.0 N·m (6.1 lb ft).

4. Evacuate and recharge the system. Use the J 39500.
5. Leak test the system.

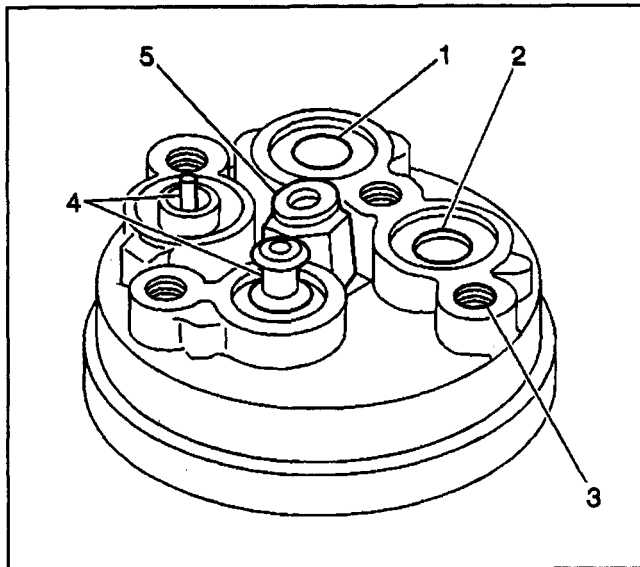


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## Compressor Control Switches

### Removal Procedure

#### Tools Required

- J 9553-01 O-Ring Remover
- J 5403 Snap Ring Pliers

**Caution:** Refer to *SIR Handling Caution in Cautions and Notices*.

1. Recover the refrigerant.
2. Disconnect the electrical connector from the switch (4) in the rear head of the compressor.
3. Remove the switch retaining ring using the J 5403.
4. Remove the switch (4) from the compressor.
5. Remove the old O-ring seal from the switch cavity using the J 9553-01.

### Installation Procedure

#### Tools Required

J 5403 Snap Ring Pliers

1. If you are reinstalling an existing control switch in the compressor, use a new O-ring and a new retainer ring. An O-ring and a retainer ring is included in a new switch kit.
2. Inspect the switch cavity and the O-ring groove in the rear head or dirt of foreign material.
3. Clean as necessary.
4. Lubricate the new O-ring using clean refrigerant oil.
5. Install the new O-ring into the groove in the switch cavity.
6. Lubricate the control switch housing using clean refrigerant oil.
7. Install the switch (4) into the switch cavity until the switch bottoms in the cavity.
8. Using the J 5403, install the switch retaining ring. Ensure that the high point of the curved sides is adjacent to the switch housing.
9. Ensure that the retaining ring is properly seated in the switch cavity retaining groove.
10. Leak test according to bench test procedure.

## Compressor Sealing Washers Replacement

### Removal Procedure

**Important:** Keep dirt and foreign material from getting on the sealing surfaces of the following components when removing the sealing washers:

- The washers
- The block fitting
- The air conditioning (A/C) compressor ports

Clean all sealing surfaces with a lint-free rag.

**Caution: Refer to Battery Disconnect Caution in Cautions and Notices.**

1. Disconnect the negative battery cables.
2. Discharge and recover the refrigerant from the system.  
Refer to *Refrigerant Recovery and Recharging*.
3. Remove the following items from the A/C compressor:
  - The A/C compressor hose block fitting bolt
  - The A/C compressor sealing washers
  - The A/C compressor hoses
4. Discard the A/C compressor sealing washers.

### Installation Procedure

#### Important:

- Keep dirt and foreign material from getting on the following sealing surfaces when installing the sealing washers:
  - The washers
  - The block fitting
  - The A/C compressor ports

Clean all sealing surfaces with a lint-free rag.

- Do not reuse the sealing washers.
  - Do not oil the sealing washers prior to the assembly.
1. Install the new sealing washers onto the pilots of the block fitting. Bottom the washers against the surface of the block fitting.
  2. Install the A/C compressor hoses on the A/C compressor with the A/C compressor hose block fitting bolt.

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

**Important:** Verify that there is a 1.2 mm (0.047 in) space between the block fitting and the A/C compressor rear head.

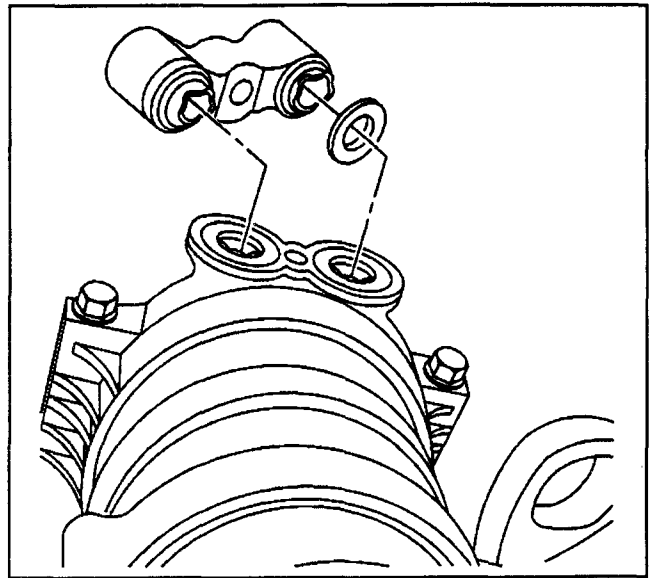
3. Hold the block in place. Hand tighten the A/C compressor block fitting bolt.

#### Tighten

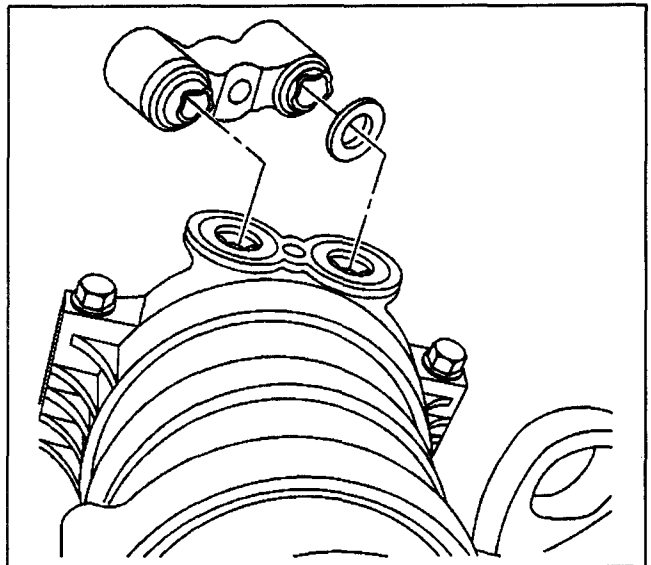
Tighten the A/C compressor hose block fitting bolt to 35 N·m (26 lb ft).

**Caution: Refer to Battery Disconnect Caution in Cautions and Notices.**

4. Connect the negative battery cables.
5. Install the refrigerant to the system. Refer to *Refrigerant Recovery and Recharging*.
6. Inspect the system for leaks. Refer to *Leak Testing*.



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## Compressor Hose Assembly Replacement

### Removal Procedure

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the negative battery cable.
2. Discharge and recover the refrigerant from the system. Refer to *Refrigerant Recovery and Recharging*.
3. Remove the nut.
4. Remove the bolt and the washer.
5. Remove the hose assembly from the rear of the compressor.
6. Remove the sealing washers. Refer to *Compressor Sealing Washers Replacement* in HVAC.
7. Remove the hose assembly from the receiver/dryer.
8. Remove the O-ring seal.
9. Remove the hose assembly from the condenser.
10. Remove the O-ring seal.

### Installation Procedure

1. Install the new O-ring seal.  
Coat the O-ring seal with 525 viscosity refrigerant.

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

2. Install the hose assembly to the condenser.

#### Tighten

Tighten the hose assembly to 24 N·m (18 lb ft).

3. Install the new O-ring seal.  
Coat the O-ring seal with 525 viscosity refrigerant oil.
4. Install the hose assembly to the receiver/dryer.

#### Tighten

Tighten the hose assembly to 41 N·m (30 lb ft).

5. Install the sealing washers. Refer to *Compressor Sealing Washers Replacement* in HVAC.
6. Install the hose assembly to the rear of the compressor.
7. Install the washer.
8. Install the bolt.

#### Tighten

Tighten the bolt to 35 N·m (26 lb ft).

9. Install the nut.

#### Tighten

Tighten the nut to 25 N·m (18 lb ft).

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

10. Connect the negative battery cable.
11. Add the refrigerant to the system. Refer to *Refrigerant Recovery and Recharging*.
12. Inspect the system for leaks. Refer to *Leak Testing* in HVAC.

## Evaporator Tube Replacement

### Removal Procedure

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the negative battery cable.
2. Discharge and recover the refrigerant from the system. Refer to *Refrigerant Recovery and Recharging*.
3. Remove the evaporator tube from the evaporator.
4. Remove the O-ring seal.
5. Remove the evaporator tube from the receiver/dryer.
6. Remove the O-ring seal.

### Installation Procedure

1. Install the new O-ring seal.  
Coat the O-ring seal with 525 viscosity refrigerant oil.
2. Install the evaporator tube to the evaporator.
3. Install the new O-ring seal.  
Coat the O-ring seal with 525 viscosity refrigerant oil.

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

4. Install the evaporator tube to the receiver/dryer.

#### Tighten

- Tighten the receiver/dryer connection to 17 N·m (13 lb ft).
- Tighten the evaporator connection to 17 N·m (13 lb ft).

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

5. Connect the negative battery cable.
6. Add the refrigerant to the system. Refer to *Refrigerant Recovery and Recharging*.
7. Inspect the system for leaks. Refer to *Leak Testing* in HVAC.

## Receiver Dehydrator and Evaporator Hose Assembly

### Removal Procedure

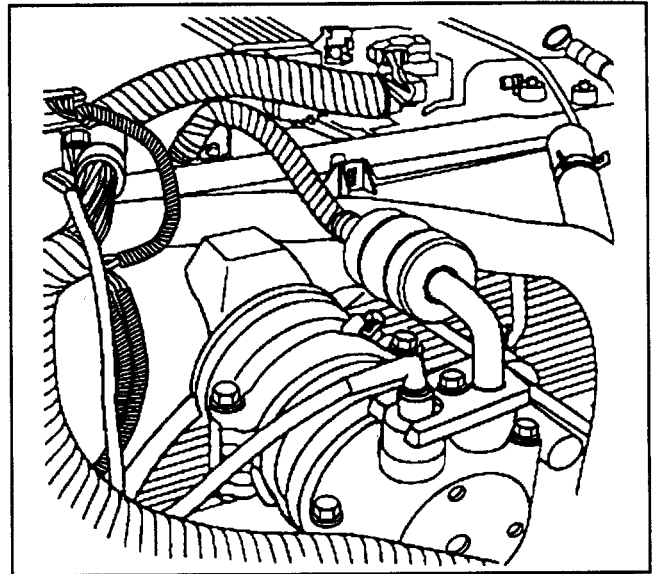
**Important:** Keep dirt and foreign material from getting on the sealing surfaces of the following components when removing the sealing washers:

- The washers
- The block fitting
- The air conditioning (A/C) compressor ports

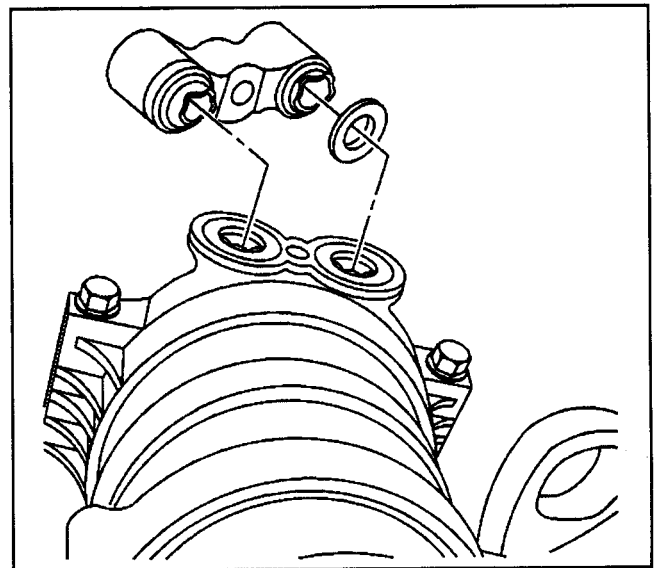
Clean all sealing surfaces with a lint-free rag.

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

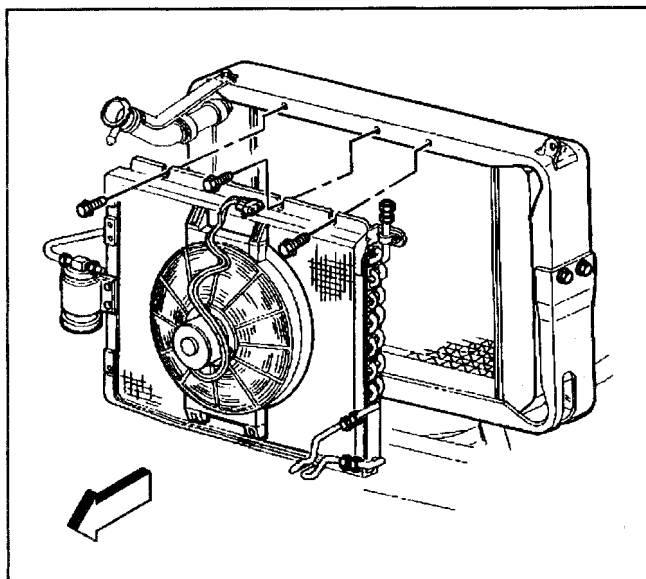
1. Disconnect the negative battery cables.
2. Discharge and recover the refrigerant from the system. Refer to *Refrigerant Recovery and Recharging*.
3. Remove the following components from the A/C compressor:
  - The A/C compressor hose block fitting bolt
  - The A/C compressor sealing washers
  - The refrigerant hoses
 Discard the A/C compressor sealing washers.
4. Remove the refrigerant hose from the A/C condenser.
5. Remove the O-ring seal.  
Discard the O-ring seal.



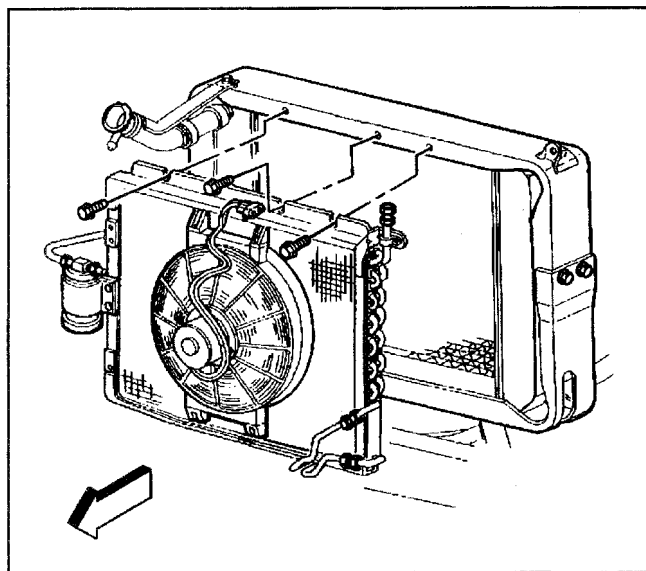
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6. Remove the refrigerant hose from the A/C evaporator.
7. Remove the O-ring seal.  
Discard the O-ring seal.
8. Remove the following items from the hose attachment points:
  - The hose clamp nuts
  - The washers
  - The bolts
  - The hose clamps

### Installation Procedure

#### Important:

- Keep dirt and foreign material from getting on the following sealing surfaces when installing the sealing washers:
  - The washers
  - The block fitting
  - The A/C compressor ports
 Clean all sealing surfaces with a lint-free rag.
- Do not reuse the sealing washers.
- Do not oil the sealing washers prior to the assembly.

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

1. Install the hose clamps to the refrigerant hoses and the hose attachment points with the following items:
  - The bolts
  - The washers
  - The nuts

#### Tighten

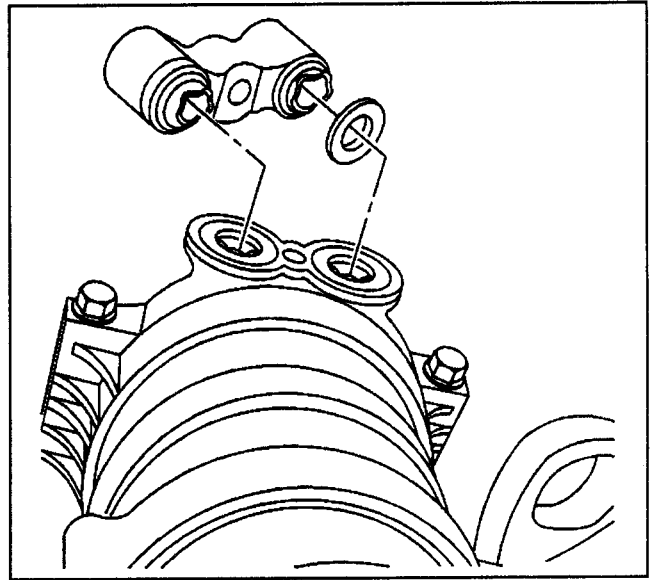
Tighten the refrigerant hose clamp nuts to 17 N·m (13 lb ft).

2. Coat the new O-ring seal with 525 viscosity refrigerant oil.
3. Install the new O-ring seal in the A/C evaporator end of the refrigerant hose.
4. Install the refrigerant hose to the A/C evaporator.

#### Tighten

Tighten the refrigerant hose fitting at the A/C evaporator to 32 N·m (24 lb ft).

5. Coat the new O-ring seal with 525 viscosity refrigerant oil.
6. Install the new O-ring seal in the A/C condenser end of the refrigerant hose.



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7. Install the refrigerant hose to the A/C condenser.

**Tighten**

Tighten the refrigerant hose fitting at the A/C condenser to 23 N·m (17 lb ft).

8. Fill the refrigerant hoses. Refer to *Refrigerant Oil Distribution Specifications* in HVAC.
9. Install the new sealing washers onto the pilots of the block fitting.  
Bottom the washers against the surface of the block fitting.
10. Install the refrigerant hoses on the A/C compressor with the A/C compressor hose block fitting bolt.

**Important:** There should be a 1.2 mm (0.047 in) space between the block fitting and the A/C compressor rear head.

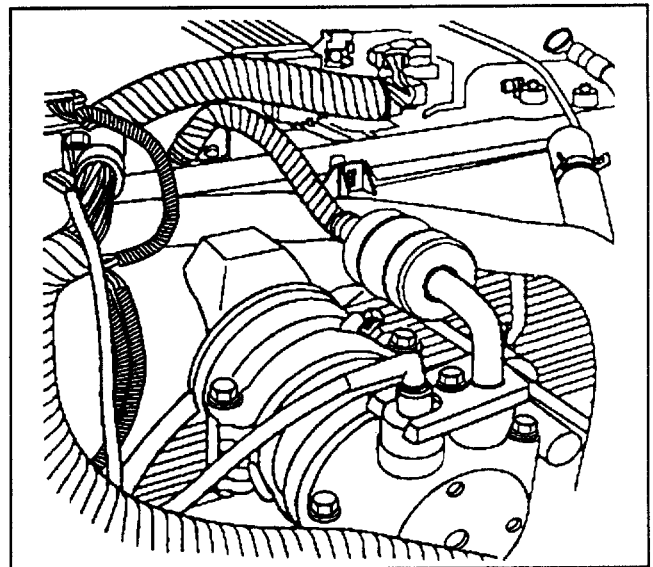
11. Hold the block in place.  
Hand tighten the A/C compressor block fitting bolt.

**Tighten**

Tighten the A/C compressor hose block fitting bolt to 35 N·m (26 lb ft).

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

12. Connect the negative battery cables.
13. Add the refrigerant to the system. Refer to *Refrigerant Recovery and Recharging* in HVAC.
14. Inspect the system for leaks. Refer to *Leak Testing* in HVAC.
15. Lower the cab.



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## Receiver Dehydrator Replacement

### Removal Procedure

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the negative battery cables.
2. Discharge and recover the refrigerant from the system. Refer to *Refrigerant Recovery and Recharging*.
3. If equipped, remove the air conditioning (A/C) receiver/dryer electrical connector from the A/C receiver/dryer pressure switch.  
If equipped, remove the dehydrator electrical connector from the dehydrator pressure switch.
4. If equipped, remove the A/C condenser tube and the O-ring seal from the A/C receiver/dryer.  
If equipped, remove the A/C condenser tube and the O-ring seal from the dehydrator.  
Discard the O-ring seal.
5. Remove the A/C evaporator hose and the O-ring seal from the A/C condenser.  
Discard the O-ring seal.
6. If equipped, remove the A/C receiver/dryer clamp bolt.  
If equipped, remove the dehydrator clamp bolt.
7. If equipped, remove the A/C receiver/dryer from the A/C receiver/dryer clamp.  
If equipped, remove the dehydrator from the dehydrator clamp.

### Installation Procedure

1. If equipped, install the A/C receiver/dryer in the A/C receiver/dryer clamp.  
If equipped, install the dehydrator in the dehydrator clamp.
2. Coat the new O-ring seal with 525 viscosity refrigerant oil.
3. Install the new O-ring seal.

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

4. If equipped, connect the A/C condenser tube to the A/C receiver/dryer.  
If equipped, connect the A/C condenser tube to the dehydrator.

#### Tighten

Tighten the A/C condenser tube to the A/C receiver/dryer or the dehydrator fitting to 15 N·m (11 lb ft).

5. Coat the new O-ring seal with 525 viscosity refrigerant.
6. Install the new O-ring seal.

7. Connect the A/C evaporator hose to the A/C condenser.
8. If equipped, install the A/C receiver/dryer clamp bolt.  
If equipped, install the dehydrator clamp bolt.
9. If equipped, install the A/C receiver/dryer electrical connector to the A/C receiver dryer pressure switch.  
If equipped, install the dehydrator electrical connector to the dehydrator pressure switch.

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

10. Connect the negative battery cabled.
11. Add the refrigerant to the system. Refer to *Refrigerant Recovery and Recharging*.
12. Inspect the system for leaks. Refer to *Leak Testing* in HVAC.

## Compressor Relay Replacement

### Removal Procedure

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the negative battery cable.
2. Remove the relay from the fuse block.

### Installation Procedure

1. Install the relay.

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

2. Connect the negative battery cable.
3. Inspect the circuit operation.

## Condenser Fan Replacement

### Removal Procedure

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

1. Disconnect the negative battery cables.
2. Remove the air conditioning (A/C) condenser fan electrical connector from the A/C condenser fan.
3. Remove the 4 bolts and the A/C condenser fan from the A/C condenser.

### Installation Procedure

1. Install the A/C condenser fan to the A/C condenser with the 4 bolts.
2. Install the A/C condenser fan electrical connector to the A/C condenser fan.

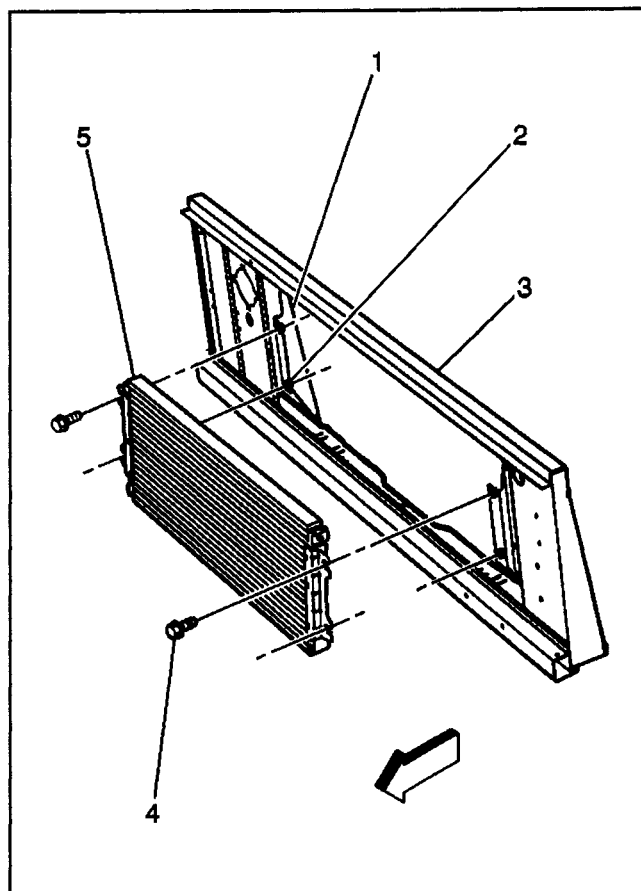
**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices*.

3. Connect the negative battery cables.

## Condenser Replacement (Commercial)

### Removal Procedure

1. Remove the bolts (4).
2. Remove the condenser (5).



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### Installation Procedure

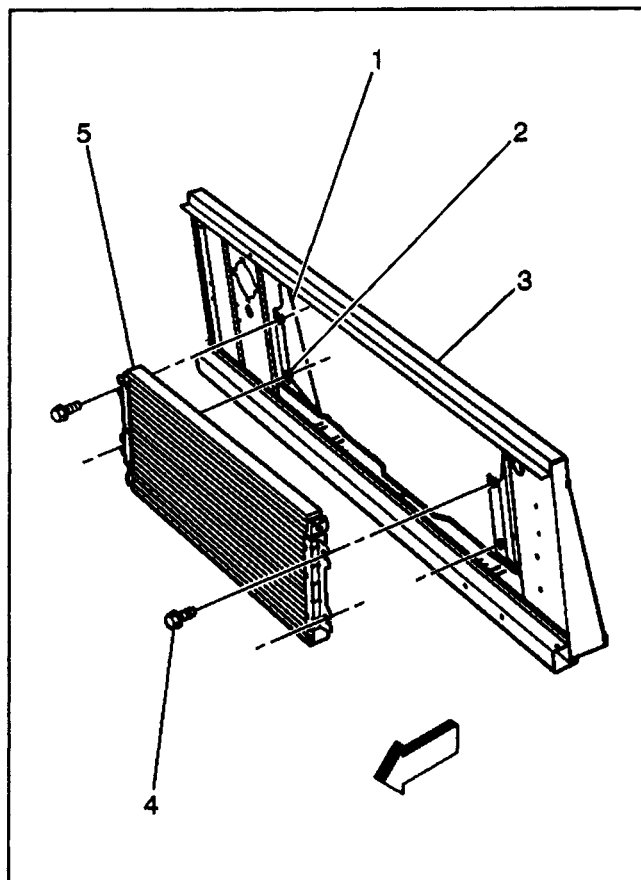
1. Install the condenser (5).

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

2. Install the bolts (4).

#### Tighten

Tighten the bolts to 33 N·m (24 lb ft).



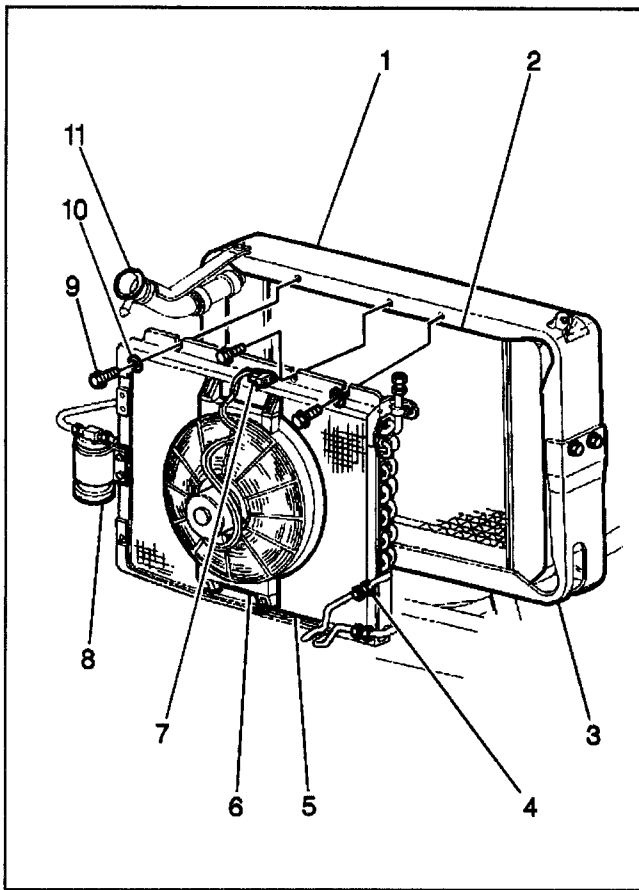
301135



## Condenser Replacement (Motorhome)

### Removal Procedure

1. Remove the bolts (9).
2. Remove the washers (10).
3. Remove the condenser (5).



301131

### Installation Procedure

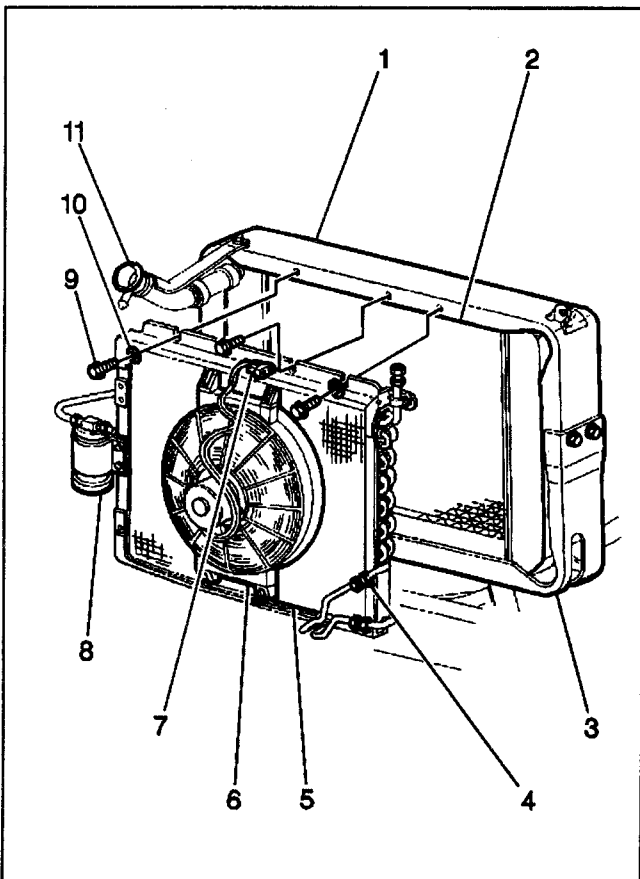
1. Install the condenser (5).
2. Install the washers (10).

**Notice:** Refer to *Fastener Notice* in Cautions and Notices.

3. Install the bolts (9).

#### Tighten

Tighten the bolts to 6 N·m (53 lb in).

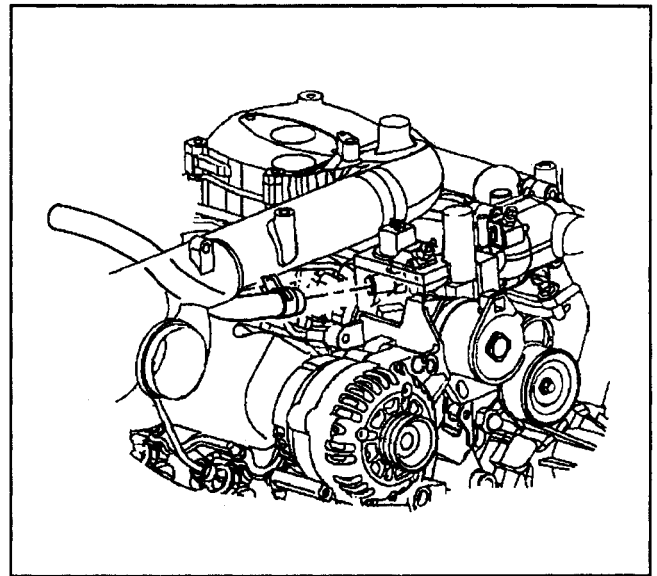


301131

## Heater Hoses Replacement

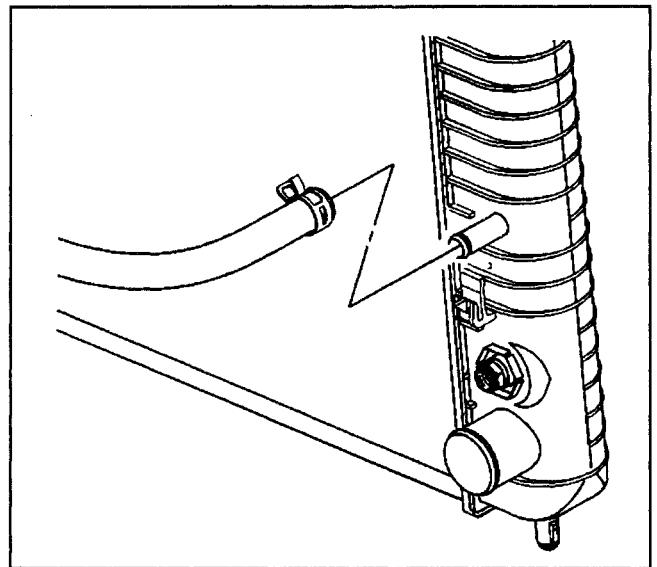
### Removal Procedure

1. Drain the cooling system. Refer to *Draining and Filling Cooling System*.
2. Remove the air intake tube.
3. Remove the heater hoses from the mounting clip.
4. Disconnect the heater hoses from the heater core inlet and the outlet.
5. Remove the inlet heater hose from the engine.



363240

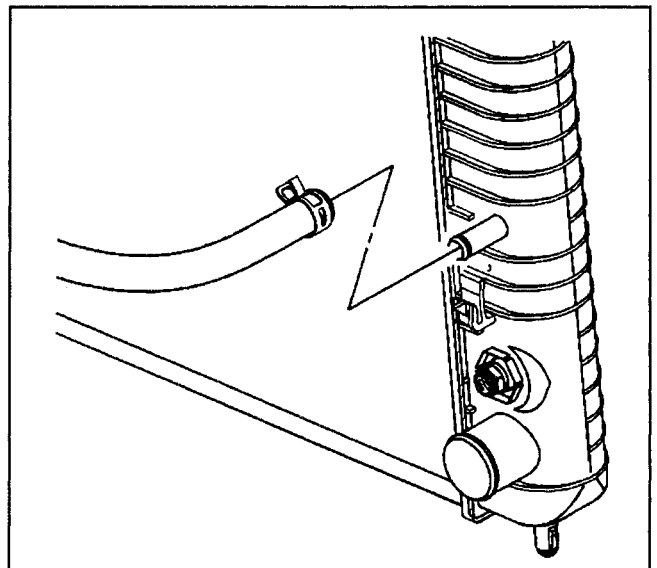
6. Remove the outlet heater hose from the radiator.
7. Remove the heater hoses.



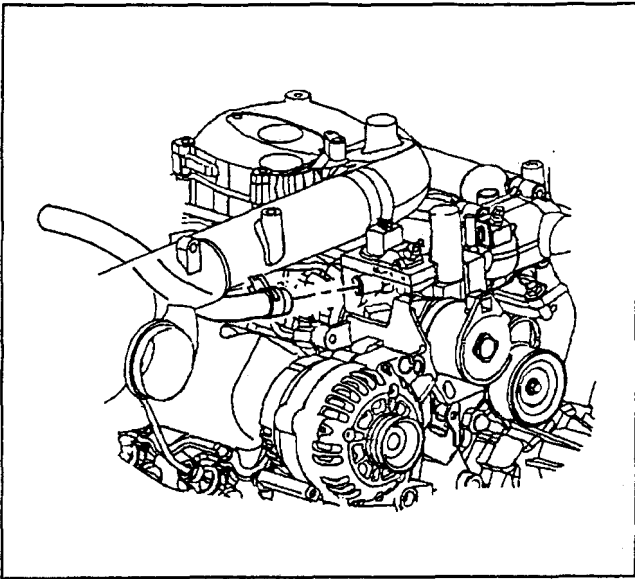
363242

### Installation Procedure

1. Install the heater hoses.
2. Install the outlet heater hose to the radiator.



363242



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3. Install the heater hose to the engine
4. Connect the heater hoses to the heater core.
5. Install the heater hoses to the mounting clip.
6. Install the air intake tube.
7. Fill the cooling system. Refer to *Draining and Filling Cooling System*
8. Inspect the cooling system for leaks.

## Description and Operation

### A/C System Description

The Motorhome/Commercial chassis may be equipped with an optional factory air conditioning system. This system is an expansion valve type of system. Most of the air conditioning components on the vehicles are common between the two vehicles. However, the manufacturer of the body installs some of the components. The service manual only provides information on those components that were installed on the vehicle at the Workhorse Custom Chassis assembly plant. For service information for components installed by the body manufacturer, contact the manufacturer of the body. The following components are installed by the body manufacturer:

- The air conditioning (A/C) evaporator
- The A/C expansion valve
- The air distributor duct
- The blower motor
- The blower motor resistor
- The control assembly and blower switch
- The heater core
- The heater hoses
- The heater module
- The mode actuator
- The recirculating/fresh air actuator
- The temperature control actuator

### Air Distribution System Description

Within the HVAC module are a series of air doors. These doors are hinged parts that direct the airflow through various sections of the HVAC module. The doors provide the proper airflow for the selected operating mode. Each air door is controlled by an actuator.

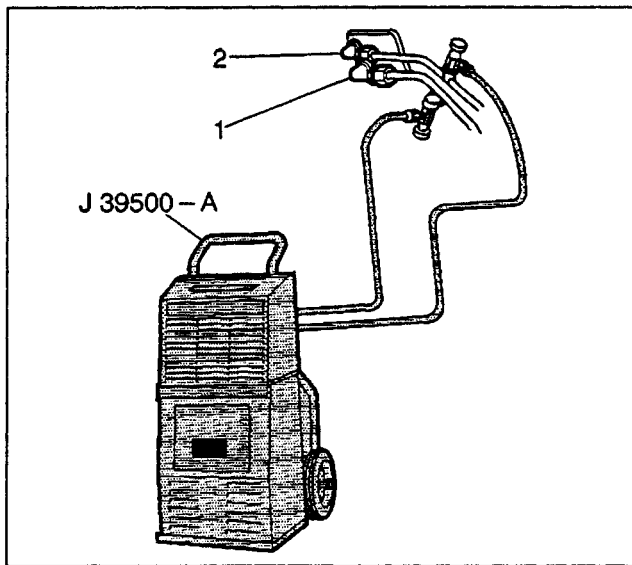
A system of ducts and outlets directs air to the passenger compartment. In cases of poor air output, check the defroster, heater, air conditioning, and vent ducts for obstructions such as leaves, dirt, or objects that may have fallen into the ducts from the passenger compartment.

### Refrigeration System Description

The system contains a gas/liquid refrigerant, depending on the temperature and the pressure, as a heat exchange medium.

The liquid Refrigerant 134a (R-134a) requires heat in order to change to a gas or a vapor.

The cooling of the vehicle occurs when R-134a changes from a liquid to a gas in the air conditioning (A/C) evaporator. Air passing through the A/C evaporator gives up heat to the R-134a. R-134a then absorbs the heat while changing to a gas. The blower motor circulates the cool air in the cab.



302193

The refrigerant cycle starts at the A/C compressor where the refrigerant enters as a low pressure (2), low temperature vapor. The refrigerant compresses to a high pressure (1), high temperature vapor. The high pressure, high temperature vapor gives up heat to the cooler air passing through the A/C condenser cooling fins as the vapor flows through the A/C condenser tubes. The refrigerant changes to a high pressure liquid when the refrigerant vapor gives up the heat. The high pressure liquid passes through the A/C receiver/dryer or the dehydrator. The refrigerant filters through a screen. The refrigerant uses a desiccant in order to dry the moisture. The A/C receiver/dryer or the dehydrator also acts as a storage tank for the refrigerant.

The liquid refrigerant flows through the A/C expansion valve. The liquid refrigerant changes to a low pressure, low temperature liquid in the A/C evaporator. Warm inside air flows through the cooler A/C evaporator core or fins. The warm inside air gives up heat to the low pressure, low temperature liquid in the A/C evaporator. The low pressure vapor returns to the A/C compressor and the cycle restarts.

### Heater System Description

Some air conditioning (A/C) systems operate on the reheat principle. Reheating means that all of the air passing through the system is first chilled to an almost freezing temperature. The air is then reheated to a more comfortable temperature before being discharged into the passenger compartment.

Dehumidified air is reheated passing through the heater core in the air conditioning module. The heater is warmed by engine coolant passing through the tubes of the heater core. The hot engine coolant transfers heat to the heater core fins. The fins then heat the air that flows past them. The relative position of the air temperature valve in the air conditioning module determines how much of the total airflow passes through the heater. The amount of reheated air determines the warmth of the total airflow discharged into the passenger compartment.

### Odor Description

The air conditioning (A/C) system emits odors primarily at startup in hot, humid climates. This odor may result from the following conditions:

- Debris in the heater/evaporator case
- Mold growth on the evaporator core

In order to address this condition, a service kit is available through the Service Parts Group.

A single application of the deodorizer, P/N 12370470, removes odor from the A/C system. However, installation of a delayed blower control module is recommended in order to prevent the odor from returning. Refer to the supplied installation instructions.

### Refrigerant R-134a

The refrigerant functions like the coolant in the engine cooling system. The refrigerant is the substance in the air conditioning (A/C) system that absorbs, carries, and then releases heat. Although various substances can be used as refrigerants in other types of refrigeration systems, some truck and automotive A/C systems use a type of refrigerant called Refrigerant-12 (R-12).

These vehicles, however, use Refrigerant-134a (R-134a) which has the following properties:

- Non-toxic
- Non-flammable
- Clear
- Colorless
- Liquified gas

While the R-134a A/C system is very similar to the R-12 system, the differences in the refrigerant, the lubricants, and the service equipment are important.

**Notice:** R-12 refrigerant and R-134a refrigerant must never be mixed, even in the smallest of amounts, as they are incompatible with each other. If the refrigerants are mixed, compressor failure is likely to occur. Refer to the manufacturer instructions included with the service equipment before servicing.

**Important:** Polyalkaline glycol (PAG) refrigerant oil distributed by General Motors is manufactured with blue coloring. If the color of PAG oil changes to any color other than blue during storage, replace it. PAG oil that is no longer blue has absorbed moisture and cannot be used.

R-134A carries a special lubricant called polyalkaline glycol (PAG) refrigerant oil. P/N 12345923 PAG refrigerant oil will have a slight blue tint. The oil is hygroscopic, which means it absorbs water from the atmosphere. Store the PAG refrigerant oil in closed containers.

### Handling Refrigerant R-134a

**Notice:** R-12 refrigerant and R-134a refrigerant must never be mixed, even in the smallest of amounts, as they are incompatible with each other. If the refrigerants are mixed, compressor failure is likely to occur. Refer to the manufacturer instructions included with the service equipment before servicing.

- Do not mix R-12 and R-134a, even in the smallest amounts. The refrigerants are incompatible with each other. Air conditioning (A/C) compressor failure is likely to occur if the refrigerants are mixed.
- Use only the specified lubricant (PAG) for the R-134a A/C system and the R-134a components. A/C compressor failure is likely to occur if you lubricants other than those specified are used. Coat all fittings and O-ring seals with clean 525 viscosity refrigerant oil in order to provide a leak-proof seal and to aid in the assembly and disassembly.
- Do not store or heat the refrigerant containers above 52°C (125°F).
- Do not heat a refrigerant container with an open flame. Place the bottom of the container in a pail of warm water, if warming is necessary.
- Do not intentionally drop, puncture or incinerate the refrigerant containers.
- Refrigerant will displace oxygen, therefore, be certain to work in well-ventilated areas in order to prevent suffocation.
- Do not introduce compressed air into any refrigerant container or refrigerant component. Compressed air will cause contamination.
- Do not carry a R-134a container in the passenger compartment of a vehicle.

All R-134a disposable (blue) containers are shipped with a metal screw cap in order to protect the valve and the safety plug of the container from damage. Replace the cap after each use to follow safety measures.

### Handling Compressor Oil

Unlike engine oil, no cleaning agent is added to compressor oil. Even if the compressor runs for a very long time, the oil never becomes cloudy or dirty looking as long as there is nothing wrong with the compressor or its method of use. Inspect the extracted oil for the following conditions:

- Moisture, dust, metal shavings, etc.
- Change to a varnish color

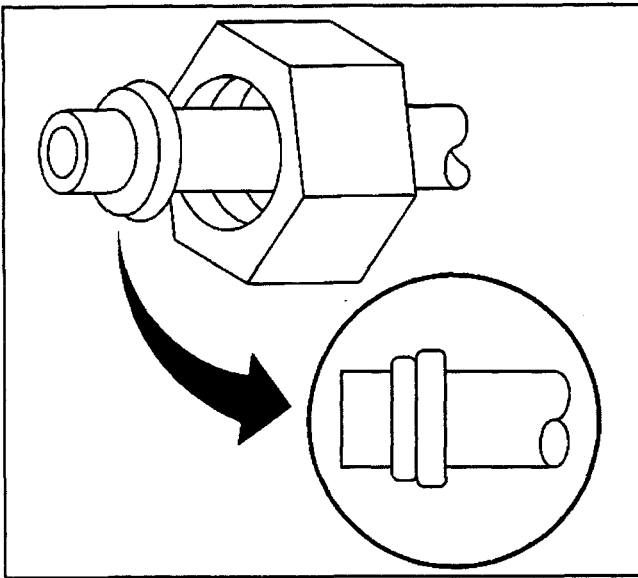
### Handling of Refrigerant Lines and Fittings

**Important:** Before opening the refrigeration system, ensure that the work area is well ventilated. Do not conduct welding or steam-cleaning operations on or near the following areas:

- The refrigeration system lines.
- Other air conditioning (A/C) parts on the vehicle.
- Ensure that all of the metal tubing lines are free of dents or kinks that may cause line restriction. Line restriction may cause the loss of system capacity.
- Do not bend the flexible hose lines to a radius of less than 4 times the diameter of the hose.
- Do not allow the flexible hose lines to come within 6.5 mm (2.5 in) of the exhaust manifold.
- Regularly inspect the flexible hose lines for leaks or brittleness. Replace the lines with new lines if deterioration or leaking is found.
- When disconnecting any fitting in the refrigerant system, recover the system of all R-134a using the following procedure:
  1. Proceed very cautiously regardless of the gage readings.
  2. Open the fitting very slowly.
  3. Keep hands and face away from the fitting in order to prevent injury.
  4. If pressure is noticed when a fitting is loosened, allow the pressure to bleed off slowly.

**Notice:** Never use alcohol to remove moisture from the refrigeration system. Damage to the system components could occur.

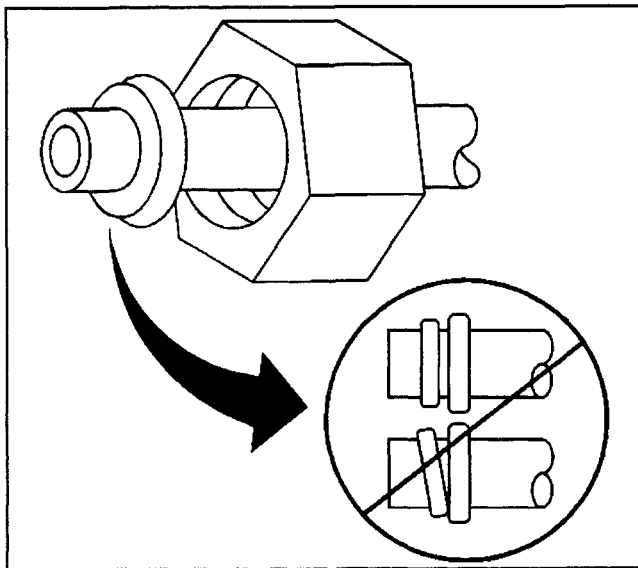
- Immediately cap refrigerant lines that are opened to the atmosphere. This action prevents the entrance of moisture and dirt which can cause internal A/C compressor wear or plugged lines in the following areas:
  - The A/C condenser
  - The A/C evaporator core
  - The A/C expansion (orifice) tubes
  - The A/C compressor inlet screens
- Remove the sealing caps from subassemblies just before making the connections for final assembly. Apply a small amount of clean 525 viscosity refrigerant oil on all of the tube and hose joints.



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Use new O-ring seals dipped in 525 viscosity oil when assembling joints. The oil aids in assembly and helps provide a leakproof joint. The O-ring seals and seats must be in perfect condition because a burr or a piece of dirt can cause a refrigerant leak.

- Use the proper wrenches in order to make connections on the O-ring seal fittings.



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**Notice:** Using improper wrenches may damage the connection. Use a wrench to back up the opposing fitting in order to prevent distortion of the connecting lines or the components.

- Use three different wrenches in order to simultaneously hold the following parts when connecting the flexible hose connections:
  - The swagged fitting
  - The flare nut
  - The coupling that is attached to the flare nut
 This action prevents turning in the fitting and damage to the seat.

- Tighten tubing connections to the specified torque. Refer to *Fastener Tightening Specifications* in HVAC.

### Maintaining Chemical Stability

The efficient operation and life of the air conditioning (A/C) system depends on the chemical stability of the refrigeration system. Contamination with dirt, air, or moisture lead to chemical instability, resulting in the following conditions:

- Unstable pressure-temperature relationships
- Reduced efficiency
- Interior corrosion
- Premature component wear
- Premature component failure

Observe the following general practices in order to ensure the chemical stability of the system:

- Before breaking a refrigerant connection, wipe away any dirt or oil. This will reduce the risk of contamination. Immediately cap, plug, or tape both sides of the connection.
- Keep all tools clean and dry, including the manifold gauge set and any replacement parts.
- When adding polyalkaline glycol (PAG) refrigerant oil, ensure that the transfer device and the container are clean and dry. Refrigerant oil must be as moisture-free as possible.
- Set up all necessary tools, cleaners, etc., before opening the A/C system. Do not leave the A/C system open any longer than is absolutely necessary.
- Evacuate the A/C system after opening and before recharging.

### Thermal Expansion Valve Description

The thermal expansion valve is a variable orifice valve located on the inlet pipe of the air conditioning (A/C) evaporator. The thermal expansion valve controls the rate at which refrigerant flows into the A/C evaporator, the speed of evaporation, and the A/C evaporator temperature.

A sealed metal bulb and tube are connected to one side of a diaphragm that moves the control valve. This bulb is held against the A/C evaporator outlet pipe and senses the outlet temperature. As the outlet temperature rises, the gas expands in the bulb and the tube. The expanding gas then causes the A/C expansion valve to open, allowing more refrigerant to enter the A/C evaporator. The increased flow of refrigerant in the evaporator lowers the evaporator temperature. When the evaporator temperature is just above freezing, the thermal expansion valve partially closes, and the evaporator temperature rises again, due to decreased refrigerant flow and evaporation. A balance tube that is connected to the A/C evaporator outlet pipe senses outlet pressure on the opposite side of the diaphragm from the metal bulb and tube.

## Evaporator Description

The air conditioning (A/C) evaporator:

- cools the air that enters the passenger compartment.
- dries the air.
- clears the air of pollen and pollutants.

Refrigerant enters the A/C evaporator as a low pressure liquid. The low pressure causes the liquid refrigerant to turn to gas (vaporize). This gas is able to absorb heat from the warm outside air that passes through the A/C evaporator fins. The cooled air is then directed into the passenger compartment. As heat is transferred to the A/C evaporator, moisture in the air condenses on the evaporator surface and is drained off carrying dust and pollen. A water drain port is located at the bottom of the evaporator housing. The temperature of the A/C evaporator must be high enough so that the surface condensation does not freeze and block off any air passages. The temperature of the A/C evaporator is regulated by both the A/C expansion valve and the thermostat. The A/C evaporator is located in the heater module under and behind the instrument panel.

## Condenser Description

The condenser assembly is in front of the radiator. The condenser assembly consists of the following components:

- coils that carry the refrigerant.
- cooling fins that provide the rapid transfer of heat.

Air passing through the condenser assembly cools the high-pressure refrigerant vapor, causing the air to condense into a liquid.

## Heater Core Description

In any air conditioning (A/C) mode, the heater cores heat the cool, dehumidified air in order to achieve the desired temperature. The position of the control assembly temperature selector determines how much heat is added to the incoming air.

## Receiver Dehydrator Description

The air conditioning (A/C) receiver/dryer acts as a refrigerant storage reservoir. This reservoir ensures that a full column of liquid refrigerant is fed to the thermal expansion valve under all operating conditions. The receiver/dryer also has a built-in filter and a desiccant that absorbs moisture.

## Compressor Description

The air conditioning (A/C) compressor can be identified by a label attached to the body giving the part and model number and the manufacturer's name. The Harrison HR6-HE and the Seltec TM-16HD compressors are belt driven from the engine crankshaft, using an integral clutch through the compressor clutch pulley. The compressor pulley rotates freely, without turning the compressor shaft, until an electromagnetic clutch coil is energized. When voltage is applied to the clutch coil, a clutch plate and hub assembly is drawn rearward toward the pulley. The magnetic force locks the clutch plate and pulley together as one unit in order to drive the compressor shaft.

## Control Assembly Description

The air conditioning (A/C) button on the control assembly must be in the ON position for the A/C to work. The temperature selector and the fan control switch on the control assembly function to maintain comfort in the passenger compartment.

## Relays and Sensors Description

### Auxiliary Engine Coolant Fan A/C Pressure Switch (Commercial Diesels and all Motorhomes)

The air conditioning (A/C) fan pressure switch is located on top of the receiver/dryer. The switch is normally open, but closes as a result of rising pressure. When the switch closes, the fan relay is energized. The switch requires 1620.3 kPa (235 psi) +/- 206.8 kPa (30 psi) to close.

### A/C Compressor High Pressure Cutoff Switch

The high pressure cut-off switch is located on the rear cover of the compressor. This switch is normally closed, but opens at pressures of 2827-3103 kPa (410-450 psi) to interrupt the voltage to the air conditioning (A/C) clutch circuit. When the high pressure switch opens, the compressor stops cycling and the pressure relief valve is prevented from discharging refrigerant and oil.

### A/C Compressor Refrigerant Pressure Switch

The evaporator (low) pressure switch is located on the suction line near the evaporator. The switch is normally open, but will close at 185 kPa (27 psi) +/- 35 kPa (5 psi). At pressures below 38 kPa (5.5 psi) +/- 24 kPa (3.5 psi), the switch opens and interrupts the air conditioning (A/C) clutch circuit.

### A/C Compressor Relay

This relay is controlled by the VCM (Gas), PCM (Diesel, electronic fuel injection) or by the pressure switches (Diesel, mechanical fuel injection). It controls power to the A/C Compressor Clutch.

Special Tools and Equipment


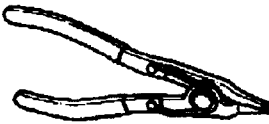
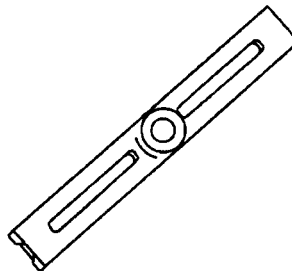

Illustration	Tool Number/ Description
 <p>10767</p>	<p>J 5403 Snap Ring Pliers</p>
 <p>6183</p>	<p>J 6083 Snap Ring Pliers</p>
 <p>210221</p>	<p>J 8433-1 Puller Bar</p>
 <p>7029</p>	<p>J 8433-3 Forcing Screw</p>

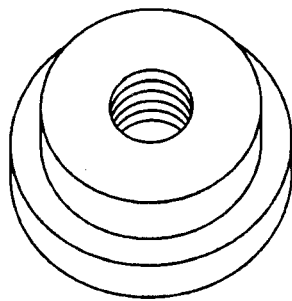
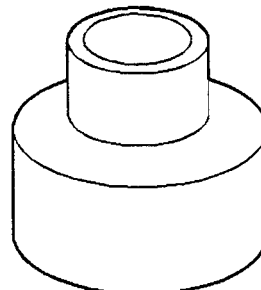
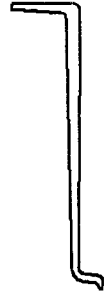
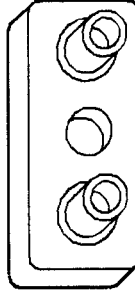
Illustration	Tool Number/ Description
 <p>258360</p>	<p>J 9398-A Bearing Remover</p>
 <p>210053</p>	<p>J 9481-A Bearing Installer</p>
 <p>6190</p>	<p>J 9553-01 O-Ring Remover</p>
 <p>6191</p>	<p>J 9625-A Leak Test Adapter</p>



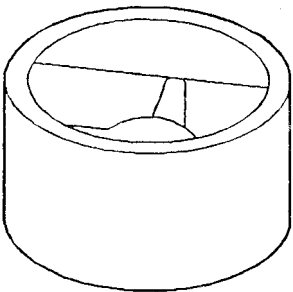
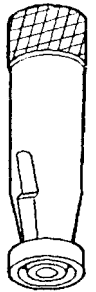

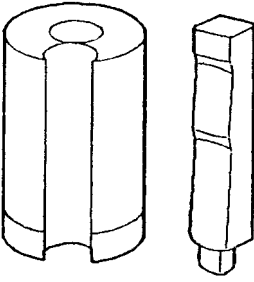
Illustration	Tool Number/ Description
 <p data-bbox="384 507 423 528">6192</p>	<p data-bbox="517 321 674 393">J 21352-A Support Block</p>
 <p data-bbox="384 849 423 870">6193</p>	<p data-bbox="462 663 721 756">J 23128-A Seal Seat Remover and Installer</p>
 <p data-bbox="384 1201 423 1222">6184</p>	<p data-bbox="517 1025 666 1087">J 29886 Driver Handle</p>
 <p data-bbox="384 1543 423 1564">6207</p>	<p data-bbox="509 1377 682 1440">J 33011 O-Ring Installer</p>

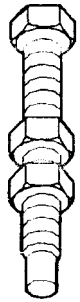
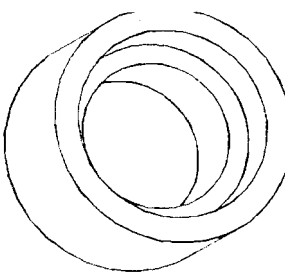
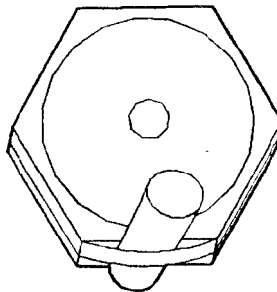
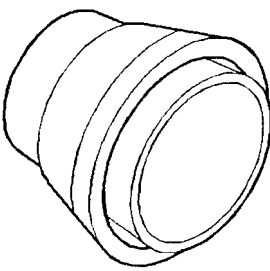
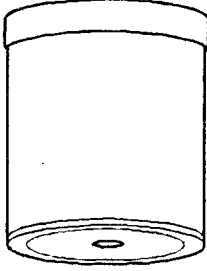
Illustration	Tool Number/ Description
 <p data-bbox="1081 507 1121 528">6187</p>	<p data-bbox="1176 310 1411 404">J 33013 Hub and Drive Plate Remover and Installer</p>
 <p data-bbox="1081 859 1121 880">7032</p>	<p data-bbox="1191 673 1395 756">J 33017 Pulley and Bearing Assembly Installer</p>
 <p data-bbox="1081 1201 1121 1222">6200</p>	<p data-bbox="1176 1025 1403 1098">J 33019 Bearing Staking Tool</p>
 <p data-bbox="1081 1554 1121 1574">7035</p>	<p data-bbox="1230 1377 1356 1440">J 33023-A Puller Pilot</p>
 <p data-bbox="1081 1906 1121 1926">7036</p>	<p data-bbox="1144 1730 1442 1792">J 33024 Clutch Coil Installer Adapter</p>

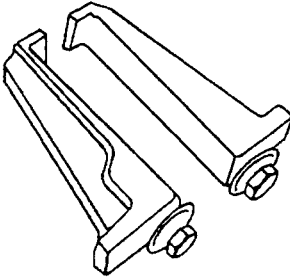

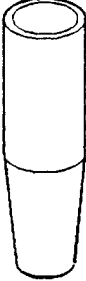
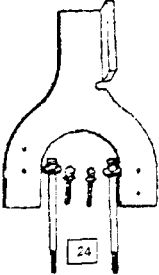

Illustration	Tool Number/ Description
 <p data-bbox="393 505 429 520">7037</p>	<p data-bbox="482 323 718 385">J 33025 Clutch Coil Puller Legs</p>
 <p data-bbox="393 855 429 870">7039</p>	<p data-bbox="471 679 730 741">J 33027-A Clutch Hub Holding Tool</p>
 <p data-bbox="393 1203 429 1218">6206</p>	<p data-bbox="495 1027 707 1089">J 34614 Shaft Seal Protector</p>
 <p data-bbox="393 1551 429 1566">7038</p>	<p data-bbox="451 1375 746 1437">J 34992 Compressor Holding Fixture</p>
 <p data-bbox="393 1900 429 1914">3550</p>	<p data-bbox="464 1723 733 1786">J 36645 Evaporator Cleaning Gun</p>

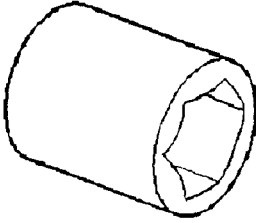
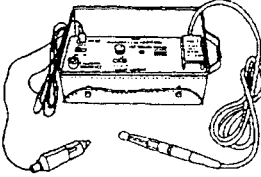
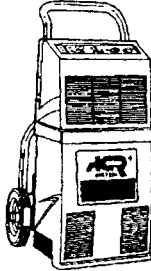

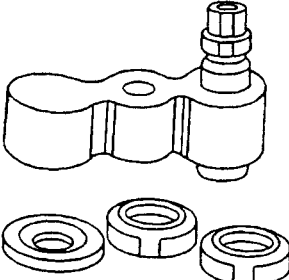
Illustration	Tool Number/ Description
 <p data-bbox="1091 505 1127 520">3549</p>	<p data-bbox="1172 312 1428 395">J 39037 High-Side Charge Valve Socket</p>
 <p data-bbox="1083 855 1119 870">82132</p>	<p data-bbox="1224 679 1373 741">J-39400-A Leak Detector</p>
 <p data-bbox="1083 1203 1119 1218">82133</p>	<p data-bbox="1154 1006 1444 1110">J 39500 R-134a A/C Refrigerant Recovery, Recycling and Recharging System (ACR4)</p>
 <p data-bbox="1083 1551 1119 1566">82128</p>	<p data-bbox="1165 1375 1428 1437">J 39500-50 Refillable Recovery Tank</p>
 <p data-bbox="1067 1900 1103 1914">210224</p>	<p data-bbox="1149 1723 1444 1786">J 39893 Pressure Testing Connector</p>

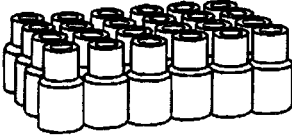
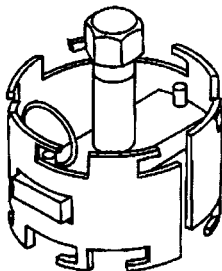

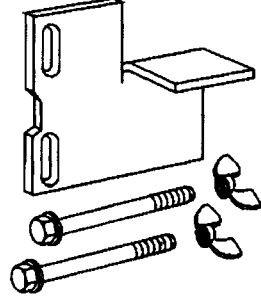
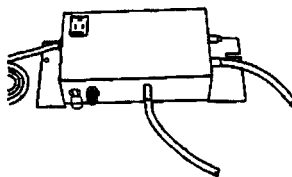
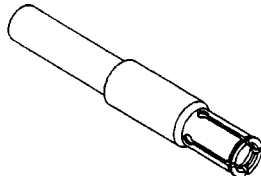
Illustration	Tool Number/ Description
 <p data-bbox="368 507 423 528">363384</p>	<p data-bbox="470 321 713 393">J 41447 R-134a Florescent Dye</p>
 <p data-bbox="368 859 423 880">157245</p>	<p data-bbox="525 673 666 745">J 41552 Pulley Puller</p>
 <p data-bbox="368 1212 423 1232">363386</p>	<p data-bbox="525 1025 666 1098">J 41459 Dye Injector</p>

Illustration	Tool Number/ Description
 <p data-bbox="1066 507 1121 528">157244</p>	<p data-bbox="1144 321 1442 393">J 41790 Compressor Holding Fixture</p>
 <p data-bbox="1066 859 1121 880">347269</p>	<p data-bbox="1152 673 1434 745">J 41810-100A Active Flow Control (AFC)</p>
 <p data-bbox="1066 1212 1121 1232">208026</p>	<p data-bbox="1176 1015 1411 1108">J 42136 Compressor Lip Seal Remover</p>

## Section 1

# HVAC

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**BLANK**

# HVAC Systems


## Specifications

### Fastener Tightening Specifications

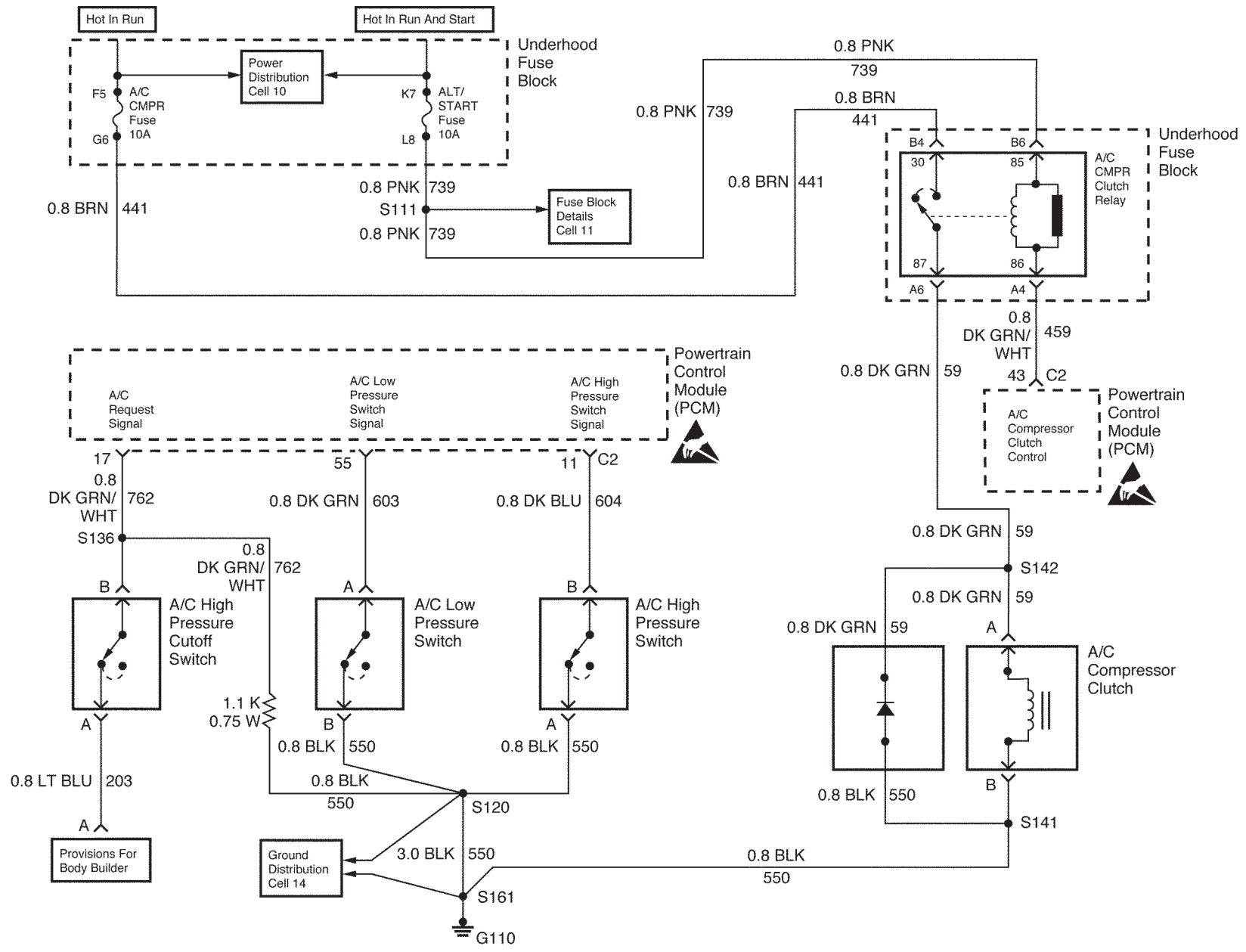
Application	Specification	
	Metric	English
Auxiliary Oil Cooler Bolts	35 N·m	26 lb ft
Condenser and Engine Oil Cooler Bolts	5.9 N·m	52 lb in

Schematic and Routing Diagrams

HVAC Schematic Icons

Icon	Icon Definition
	Refer to <i>ESD Notice</i> in Cautions and Notices in the WCC Service Manual.

# HVAC Compressor Control Schematics (P22 Motorhome) (Cell 64: 8.1L Gasoline Engine)

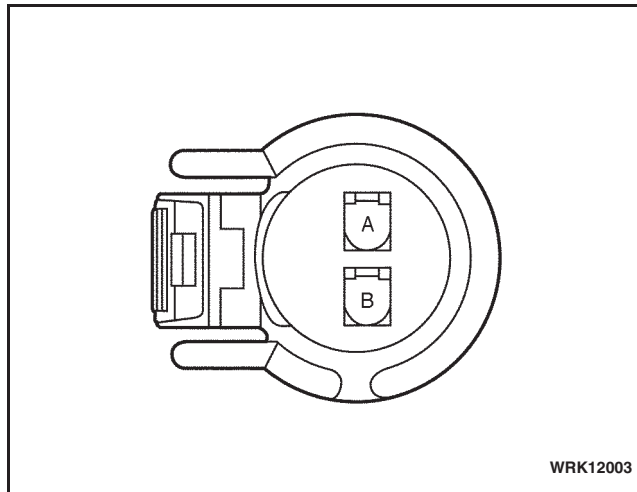




### Component Locator

#### HVAC Connector End Views

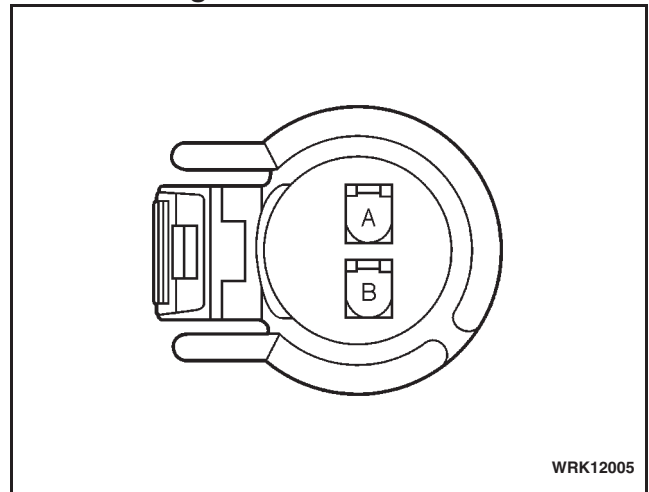
**A/C Low Pressure Switch**



WRK12003

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162440</li> <li>• 2-Way F 150 Series, Sealed P2S (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	DK GRN	603	Cycling Switch Signal
B	BLK	550	Cycling Switch Ground

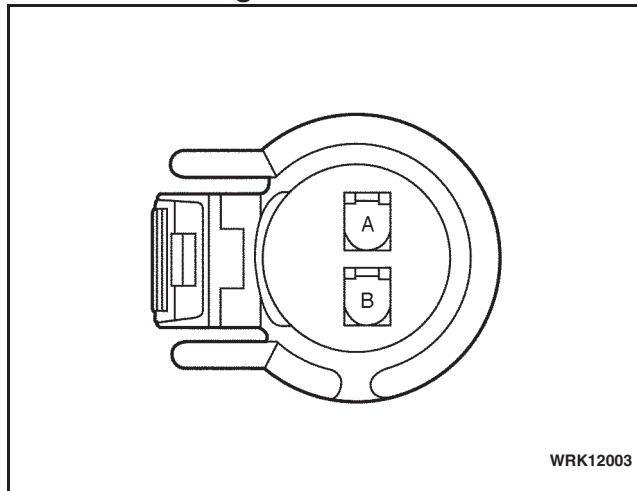
**A/C High Pressure Cutoff Switch**



WRK12005

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162438</li> <li>• 2-Way F 150 Series, Sealed (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	LT BLU	203	Body Builder / A/C Request
B	DK GRN/ WHT	762	A/C Signal (Cutoff)

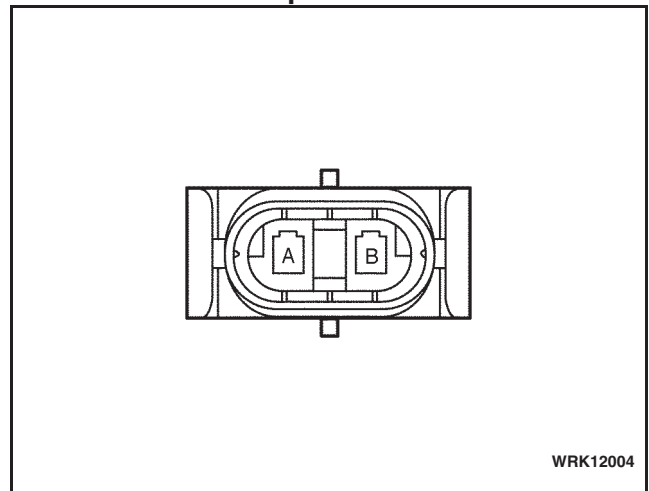
**A/C High Pressure Switch**



WRK12003

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162440</li> <li>• 2-Way F 150 Series, Sealed P2S (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	BLK	550	Switch Ground
B	DK BLU	604	Switch Signal

**A/C Compressor Clutch**



WRK12004

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162017</li> <li>• 2-Way F Metri-Pack 150 Series, Sealed (GRY)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	DK GRN	59	A/C Clutch Feed
B	BLK	550	A/C Clutch Ground

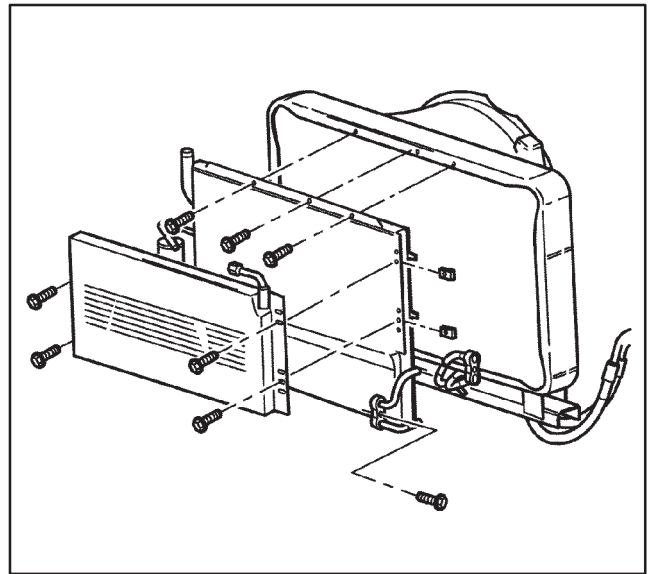
## Repair Instructions

### Condenser Replacement

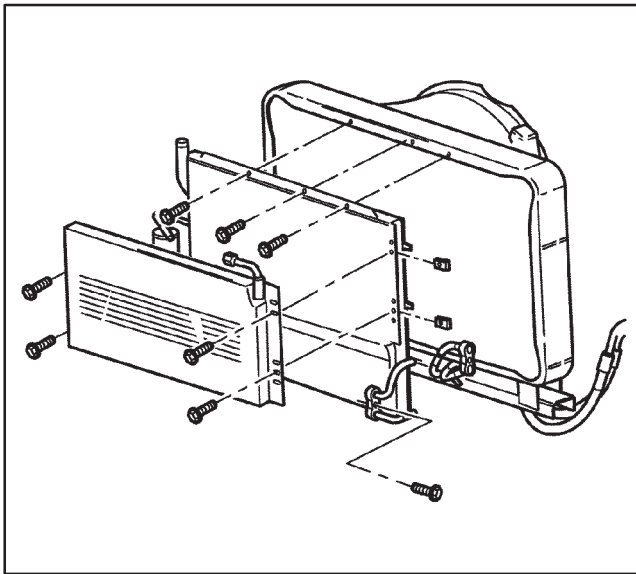
#### Removal Procedure

**Caution:** Refer to *Battery Disconnect Caution in Cautions and Notices in the WCC Service Manual.*

1. Disconnect negative battery cable.
2. Discharge and recover the refrigerant from the system. Refer to *Refrigerant Recovery and Recharging* in the WCC Service Manual.
3. Remove the air inlet duct from the air filter housing. Refer to *Outside Air Duct Replacement* in this supplement.
4. Remove the cooling fans from the auxiliary oil cooler. Refer to *Auxiliary Cooling Fan Replacement (8.1L)* in this supplement.
5. Remove the transmission oil cooler lines from the auxiliary oil cooler. Refer to *Oil Cooler Line Replacement* in this supplement.
6. Remove the bolts from the auxiliary oil cooler.
7. Remove the auxiliary oil cooler from the vehicle.
8. Remove the condenser and engine oil cooler from the upper radiator bracket.



WRK12001



WRK12001

### Installation Procedure

**Notice:** Refer to *Fastener Notice* in Cautions and Notices in the WCC Service Manual.

1. Install the condenser and engine oil cooler to the upper radiator bracket.

#### Tighten

Tighten the condenser and engine oil cooler bolts to 5.9 N·m (52 lb in).

2. Install the auxiliary oil cooler to the vehicle.
3. Install the bolts to the auxiliary oil cooler.

#### Tighten

Tighten auxiliary oil cooler bolts to 35 N·m (26 lb ft).

4. Install the transmission oil cooler lines to the auxiliary oil cooler. Refer to *Oil Cooler Line Replacement* in this supplement.
5. Install the cooling fans to the auxiliary oil cooler. Refer to *Auxiliary Cooling Fan Replacement (8.1L)* in this supplement.
6. Install the air inlet duct to the air filter housing. Refer to *Outside Air Duct Replacement* in this supplement.

**Notice:** Use only clean and approved transmission fluid.

7. Refill the transmission with DEXRON® III Automatic Transmission Fluid. Refer to *Fluid Capacity Specifications* in this supplement.
8. Check the transmission fluid. Refer to *Transmission Fluid Checking Procedure* in this supplement.
9. Connect the negative battery cable.
10. Add refrigerant to the system. Refer to *Refrigerant Recovery and Recharging* in the WCC Service Manual.

### Compressor Replacement

Refer to *Compressor Replacement (7.4L)* in the WCC Service Manual.

## Section 1

# HVAC

## Sub-Section 1.1 – HVAC Systems


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HVAC Compressor Control Schematics (P32 Motorhome) (Cell 64: 8.1L Gasoline Engine) (L18) .....	(S2) 1.1-4	HVAC Connector End Views (3.9L Diesel) (LB4) .....	(S2) 1.1-9
HVAC Compressor Control Schematics (P32 Motorhome) (Cell 64: 5.7L Gasoline Engine) (L31) .....	(S2) 1.1-5	HVAC Connector End Views (P32 Motorhome) (L18) .....	(S2) 1.1-10
HVAC Compressor Control Schematics (P42 Commercial) (Cell 64: 3.9L Diesel Engine) (L4B) .....	(S2) 1.1-6		

**BLANK**

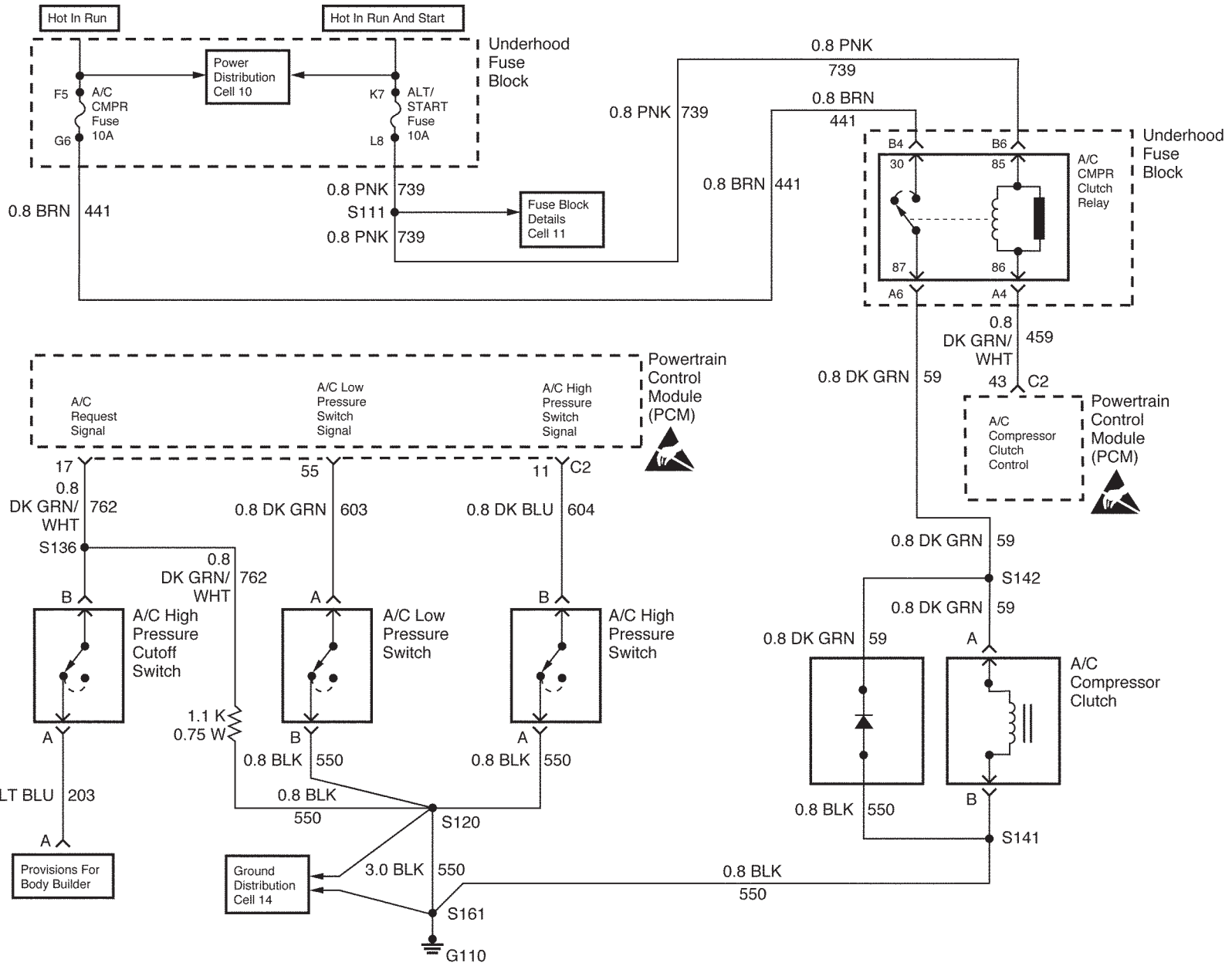
# HVAC Systems

## Schematic and Routing Diagrams

### HVAC Systems Schematic Icons

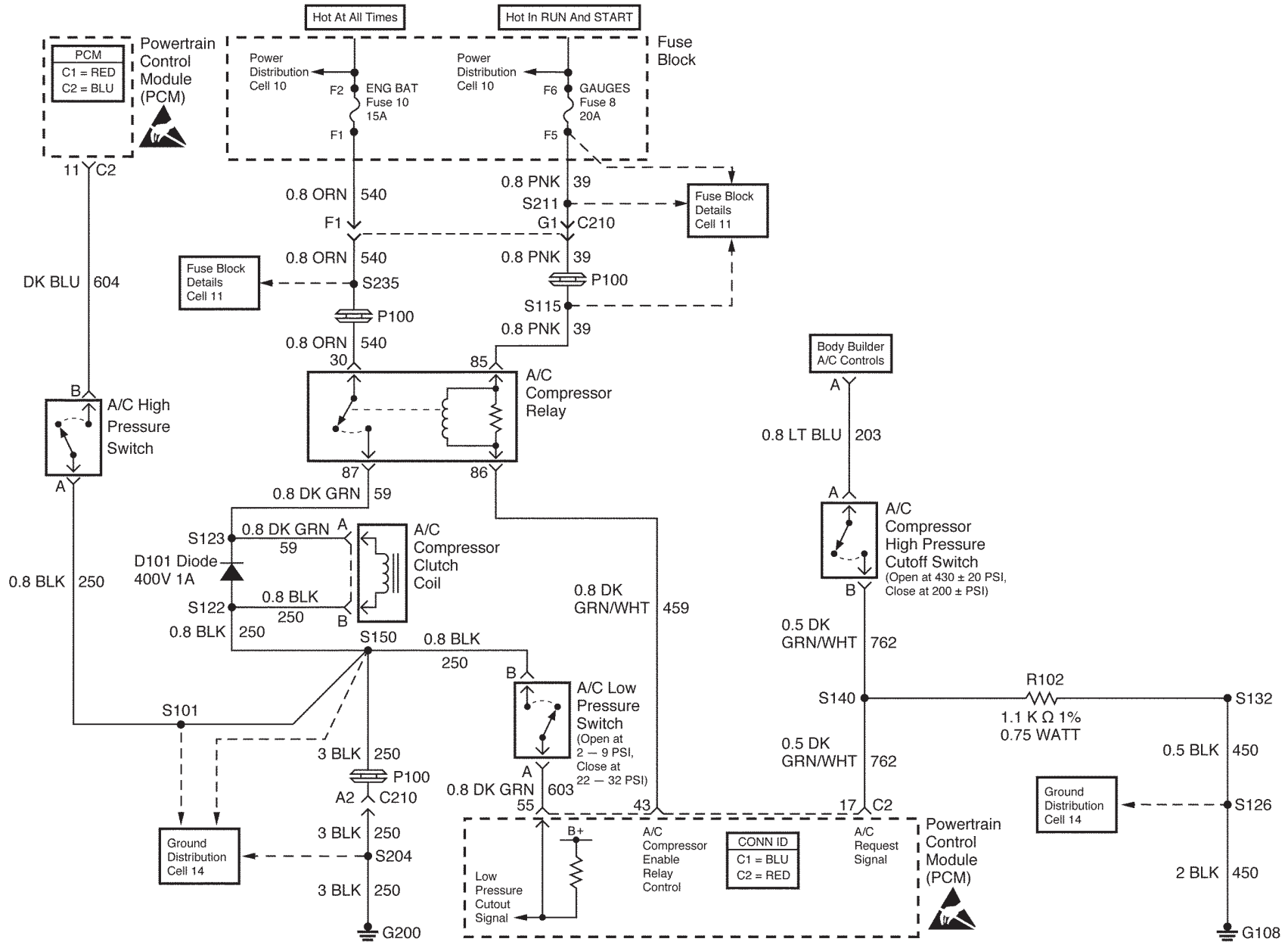
Icon	Icon Definition
	Refer to <i>ESD Notice</i> in Cautions and Notices in the WCC Service Manual.

# HVAC Compressor Control Schematics (P32 Motorhome) (Cell 64: 8.1L Gasoline Engine) (L18)



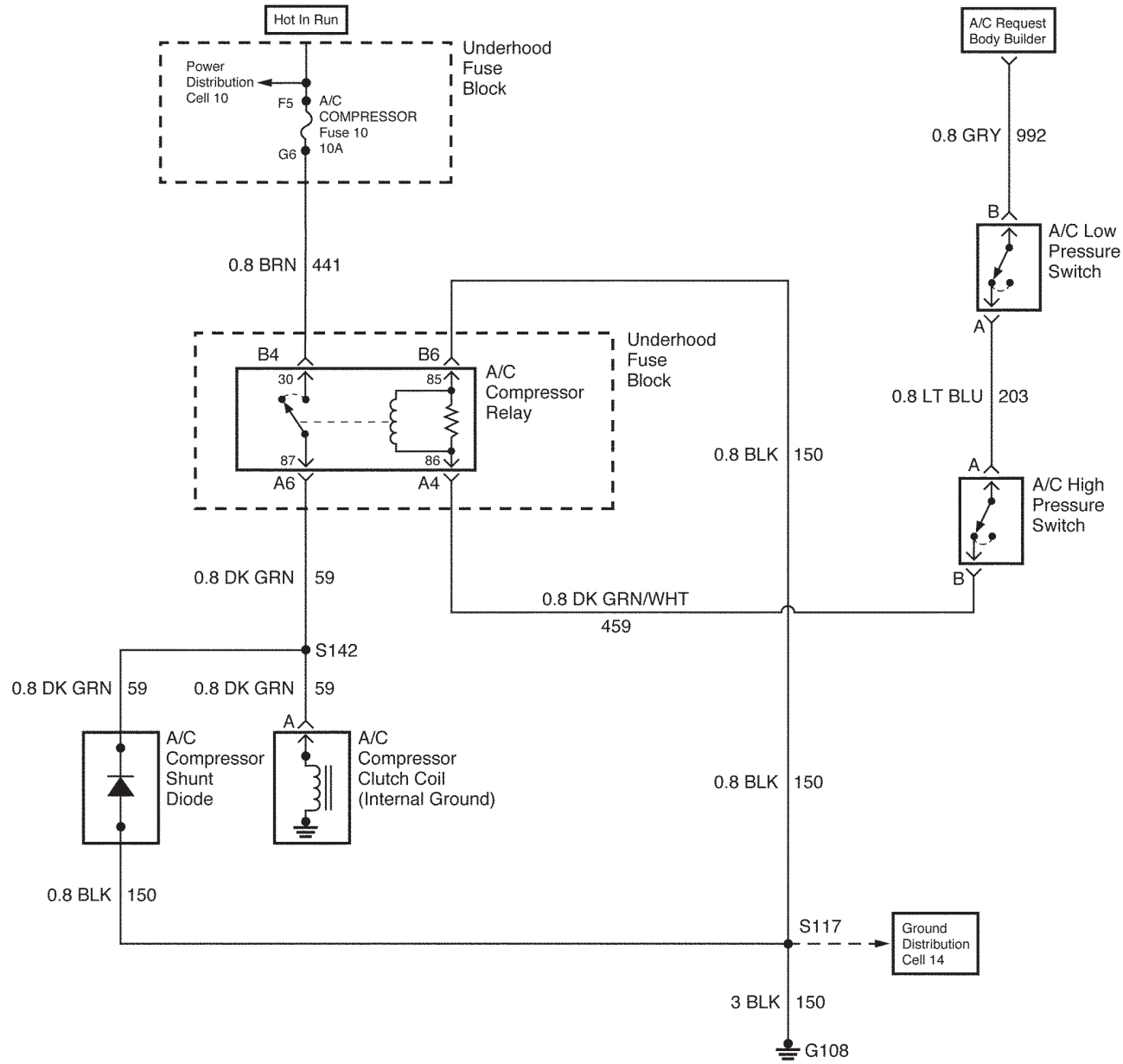
WRK12002

# HVAC Compressor Control Schematics (P32 Motorhome) (Cell 64: 5.7L Gasoline Engine) (L31)

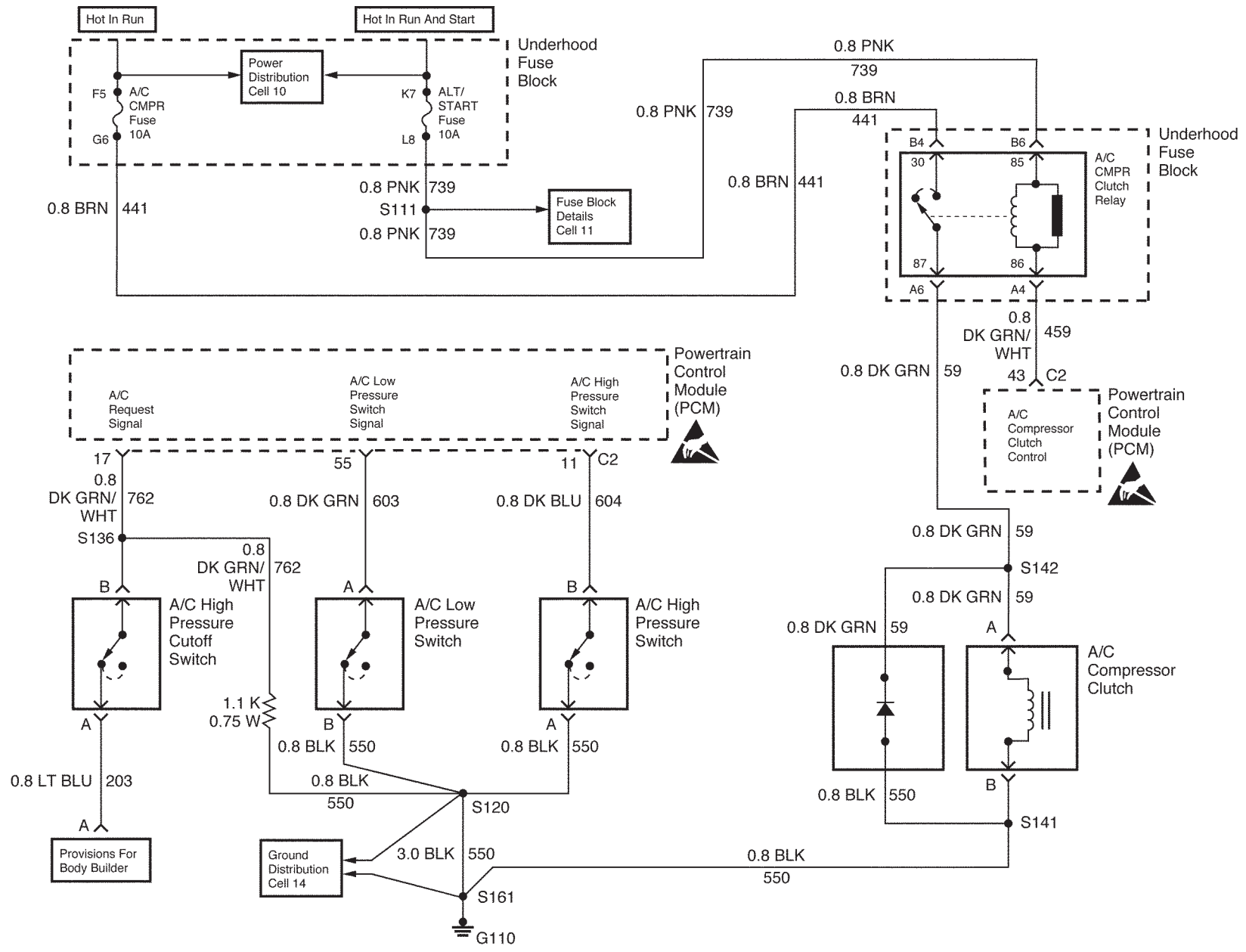




# HVAC Compressor Control Schematics (P42 Commercial) (Cell 64: 3.9L Diesel Engine) (L4B)



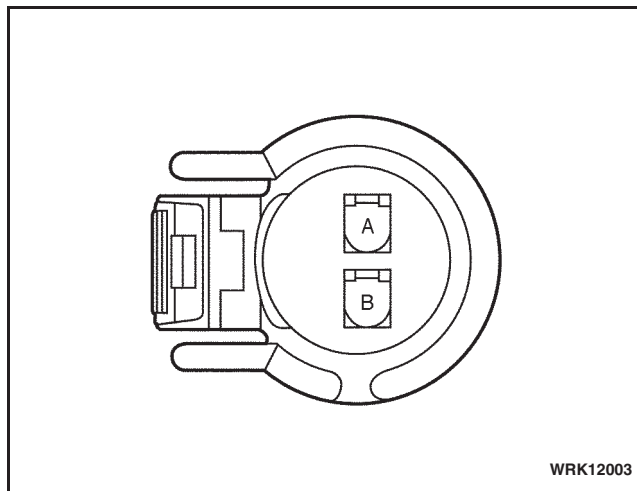
# HVAC Compressor Control Schematics (P52 Commercial) (Cell 64: 8.1L Gasoline Engine) (L18)



**Visual Identification**

**HVAC Connector End Views (Gasoline Engine) (L18 and L31)**

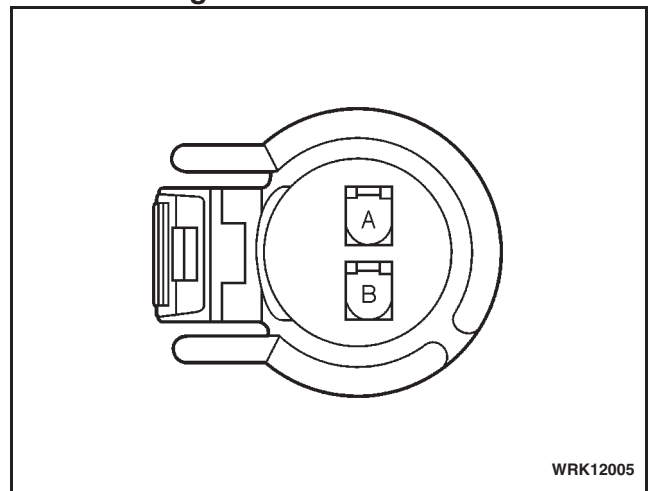
**A/C Low Pressure Switch**



WRK12003

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162440</li> <li>• 2-Way F 150 Series, Sealed P2S (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	DK GRN	603	Cycling Switch Signal
B	BLK	550	Cycling Switch Ground

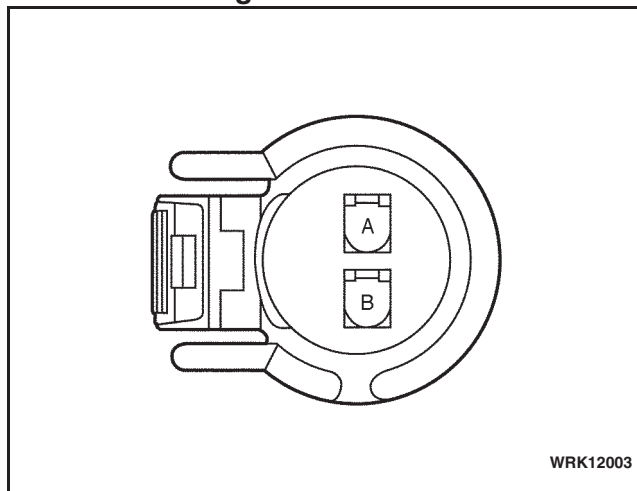
**A/C High Pressure Cutoff Switch**



WRK12005

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162438</li> <li>• 2-Way F 150 Series, Sealed (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	LT BLU	203	Body Builder / A/C Request
B	DK GRN/ WHT	762	A/C Signal (Cutoff)

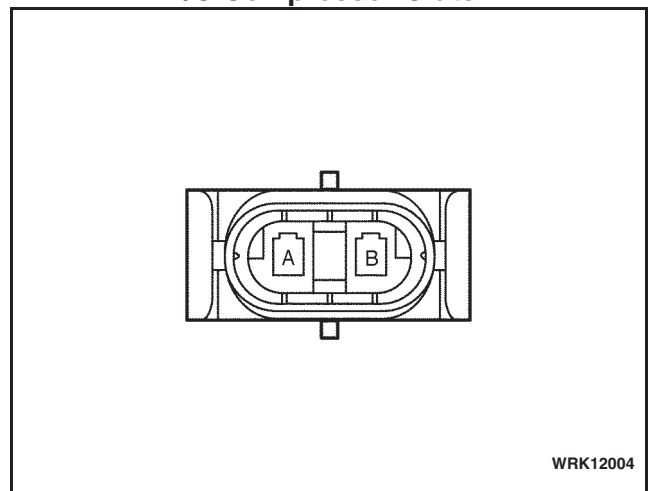
**A/C High Pressure Switch**



WRK12003

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162440</li> <li>• 2-Way F 150 Series, Sealed P2S (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	BLK	550	Switch Ground
B	DK BLU	604	Switch Signal

**A/C Compressor Clutch**

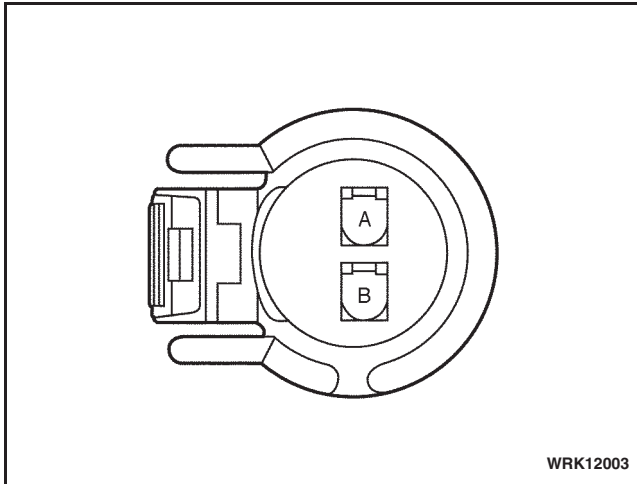


WRK12004

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>• 12162017</li> <li>• 2-Way F Metri-Pack 150 Series, Sealed (GRY)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	DK GRN	59	A/C Clutch Feed
B	BLK	550	A/C Clutch Ground

HVAC Connector End Views (3.9L Diesel) (LB4)

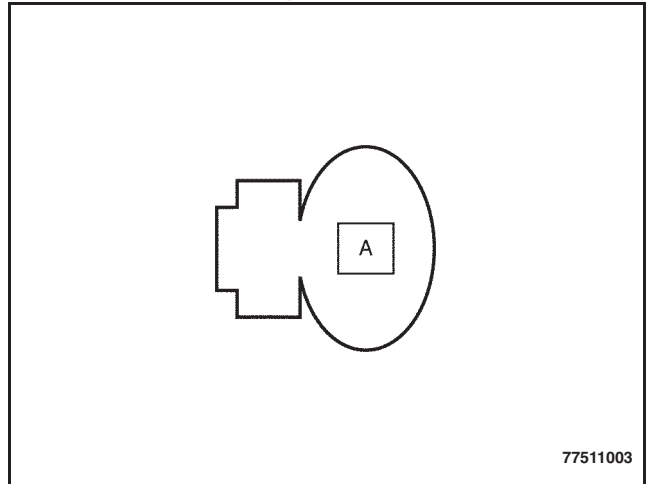
A/C Low Pressure Switch



WRK12003

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>● 12162440</li> <li>● 2-Way F 150 Series, Sealed P2S (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	LT BLU	203	A/C Refrigerant Low Pressure Switch Feed
B	GRY	992	To Body Builder HVAC System

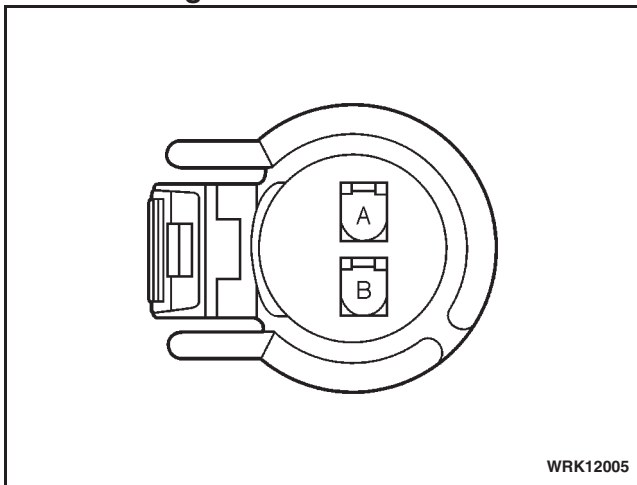
A/C Compressor Clutch



77511003

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>● 12065172</li> <li>● 2-Way F Metri-Pack 280 Series, Sealed (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	DK GRN	59	A/C Clutch Feed
*Clutch is Grounded Internally.			

A/C High Pressure Cutoff Switch

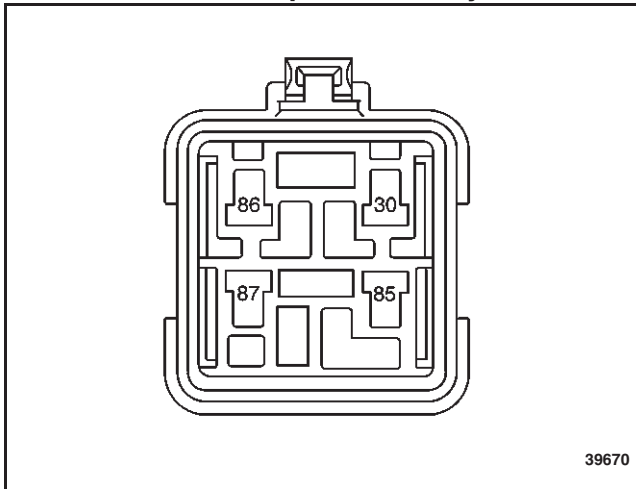


WRK12005

<b>Connector Part Information</b>		<ul style="list-style-type: none"> <li>● 12162438</li> <li>● 2-Way F 150 Series, Sealed (BLK)</li> </ul>	
Pin	Wire Color	Circuit No.	Function
A	LT BLU	203	A/C Refrigerant High Pressure Output Signal
B	DK GRN/ WHT	459	A/C Request

HVAC Connector End Views  
(P32 Motorhome) (L31)

A/C Compressor Relay



<b>Connector Part Information</b>		<ul style="list-style-type: none"><li>• 12129716</li><li>• 4-Way F Metri-Pack 280 Series, Flexlock (GRY)</li></ul>	
Pin	Wire Color	Circuit No.	Function
30	ORN	540	Fuse Output – Battery – Type III Fuse
85	PNK	39	Fuse Output – Ignition 1 – Type III Fuse
86	DK GRN/ WHT	459	A/C Compressor Control Relay Output – Coil
87	DK GRN	59	A/C Compressor Clutch Solenoid Feed