## DIAGNOSIS AND TESTING (Continued)

### EATC System Functional Test

- The EATC system functional test is designed to catch those system failures that the Self Test is unable to test.
- Ensure the engine is cold.
- The in-vehicle temperature should be greater than 10°C (50°F) for proper evaluation of system response.
- Refer to the following charts for testing instructions.

**EATC SYSTEM FUNCTIONAL TEST**

| TEST STEP | RESULT ▶ | ACTION TO TAKE |
|---|---|---|
| **1**<br>● Turn ignition switch to the RUN position.<br>● Press the AUTOMATIC button.<br>● Set control at 90°F setting.<br>● **Does control display 90°F Auto?** | Yes ▶<br>No ▶ | GO to **2.**<br>REFER to Diagnosis When Self-Test And Functional Test Indicate No Errors Found. |
| **2**<br>● Verify that the blower does not come on. (Engine coolant temp. is less than 120°F).<br>● **Does blower operate?** | Yes ▶<br>No ▶ | REFER to CELO Inoperative.<br>GO to **3.** |
| **3**<br>● Ensure that engine is warm (coolant temp. is greater than 120°F).<br>● Set control at 75 setting.<br>● **Does blower operate?** | Yes ▶<br>No ▶ | GO to **4.**<br>REFER to Blower Speed Controller Diagnosis-No Blower. |
| **4**<br>● Rotate blower thumbwheel fully down.<br>● **Does blower go to low blower speed?** | Yes ▶<br>No ▶ | GO to **5.**<br>REFER to Blower Speed Controller Diagnosis. |
| **5**<br>● Rotate blower thumbwheel fully up.<br>● **Does blower go to high blower speed?** | Yes ▶<br>No ▶ | GO to **6.**<br>REFER to Blower Speed Controller Diagnosis. |
| **6**<br>● Press the DEFROST button.<br>● Verify that air is discharged from defroster nozzle with small bleed through the side window demistors.<br>● Verify that the outside recirc door is in the outside air position.<br>● **Are these conditions met?** | Yes ▶<br>No ▶ | GO to **7.**<br>REFER to Vacuum System Diagnosis. |
| **7**<br>● Press the FLOOR button.<br>● Verify that the air is discharged through the floor ducts.<br>● **Is this condition met?** | Yes ▶<br>No ▶ | GO to **8.**<br>REFER to Vacuum System Diagnosis. |
| **8**<br>● Press the VENT button.<br>● Verify that the air is discharged through the panel registers.<br>● **Is this condition met?** | Yes ▶<br>No ▶ | GO to **9.**<br>REFER to Vacuum System Diagnosis. |
| **9**<br>● Make sure that the ambient temperature is greater than 40°F.<br>● Press the MAX A/C button.<br>● Verify that the outside recirc door is in the recirc position.<br>● **Is this condition met?** | Yes ▶<br>No ▶ | GO to **10.**<br>REFER to Vacuum System Diagnosis. |

## DIAGNOSIS AND TESTING (Continued)

**EATC SYSTEM FUNCTIONAL TEST (Continued)**

| TEST STEP | RESULT | ACTION TO TAKE |
|---|---|---|
| 10 | | |
| • Press the VENT button.<br>• Verify that the VENT display is lit.<br>• Verify that the clutch is off.<br>• **Are these conditions met?** | Yes ▶<br>No ▶ | GO to 11.<br>REFER to Clutch Does Not Disengage When In OFF Diagnosis. |
| 11 | | |
| • Press the MAX A/C button again.<br>• Verify that the MAX A/C display is lit and that the clutch is on.<br>• **Are these conditions met?** | Yes ▶<br>No ▶ | GO to 12.<br>REFER to No Clutch Operation Diagnosis. |
| 12 | | |
| • Press the AUTOMATIC button. | Verify that the AUTO or function and fan VFDs are lit. ▶ | REFER to Diagnosis When Self-Test And Functional Test Indicate No Errors Found. |

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### Diagnosis When EATC Self Diagnostics Test Indicates No Errors Found

Refer to the chart below for symptoms, their possible causes and the test or service procedures required.

**DIAGNOSIS WHEN SELF-TEST INDICATES NO ERRORS FOUND**

| CONDITION | POSSIBLE SOURCE | ACTION |
|---|---|---|
| • Cool Discharge Air When System is Set to AUTOMATIC and 90°F | • Heater system malfunction.<br>• Blend door not in max. heat. | • Check coolant level.<br>• Refer to heater system operating principles in appropriate Section (check engine thermostat).<br>• Check position of blend door.<br>• Check blend door shaft attachment.<br>• Test per Blend Door Actuator Diagnosis (assume 2 was displayed in the Self-Test). |
| • Warm Discharge Air in Auto/60°F | • Clutch circuit malfunction.<br>• Check refrigerant.<br>• Blend door not in MAX. A/C position.<br>• Outside/Recirc door not in recirc. | • Test clutch circuit per "No Clutch Operation" Diagnosis.<br>• Check Refrigerant System Pressures.<br>• Check position of blend door.<br>• Check blend door shaft attachment.<br>• Test per "Blend Door Actuator" Diagnosis (assume 2 was displayed in the Self-Test).<br>• Test per "Vacuum Leak" Diagnosis. |
| • Cool Air in 85°F Max. Heat in 90°F | • Sensor shorted. | • TROUBLESHOOT according to Sensor Diagnosis. |
| • Heat in 65°F Max. Cool in 60°F | • Sensor open. | • TROUBLESHOOT according to Sensor Diagnosis. |

## DIAGNOSIS AND TESTING (Continued)

**DIAGNOSIS WHEN SELF-TEST INDICATES NO ERRORS FOUND (Continued)**

| CONDITION | POSSIBLE SOURCE | ACTION |
|---|---|---|
| • No Blower | • Damaged CELO switch / wiring.<br>• Damaged blower speed controller.<br>• Damage HI blower relay.<br>• Damaged control assembly.<br>• Damaged blower motor.<br>• Damaged wiring. | • Test per "No Blower" Section of Blower Speed Controller. |
| • High Blower Only | • Damaged control assembly.<br>• Damaged blower controller.<br>• Damaged wiring. | • Test per "High Blower Only" Section of Blower Speed Controller. |
| • Clutch is Engaged When System is Off | • Damaged control assembly.<br>• Damaged wiring or interface components. | • Test according to "Clutch Does Not Disengage When in OFF". A/C Compressor Clutch Circuit Diagnosis. |
| • Control Assembly Digits and VFD Do Not Light Up, Blower Off | • Fuse.<br>• Ignition Circuit 298 open.<br>• Ignition Circuit 797 open.<br>• Ground Circuit 57A open.<br>• Damaged control assembly. | • Replace fuse.<br>• Check Circuit 298.<br>• Check Circuit 797.<br>• Check Circuit 57A.<br>• Replace control assembly. |
| • Cold Air is Delivered During Heating When Engine is Cold | • Damaged wiring.<br>• Damaged or inoperative engine temperature switch. | • Place system at 90°F / Auto. With ignition off, ignition must be off when grounding Circuit 244 (for valid results) ground Circuit 244 at engine temp. switch. Start engine. If blower is off, replace cold engine lockout (CELO). If blower is on, check wiring. If OK, replace control assembly.<br>• Replace engine temperature switch. |
| • Control Assembly Temperature Display Will Not Switch From Fahrenheit To Celsius grade When the E/M Trip Computer Button is Pushed | • Damaged or inoperative wiring tripminder or control assembly. | **CAUTION: Accidental shorting of the wrong pin could destroy the control assembly.**<br>• Short Pin 20 of connector VA (Circuit 506) to ground. Turn on ignition. If the display does not switch from F to C, Circuit 506 is open at the control assembly and the control assembly is damaged. Otherwise check the wiring and the tripminder. |
| • System Does Not Control Temperature | • Sensor hose not connected to aspirator or sensor.<br>• Aspirator not secured to evaporator case.<br>• Sensor seal(s) missing or not installed properly.<br>• Aspirator or sensor hose blocked with foreign material or kinked.<br>• Damaged aspirator hose. | • Inspect and service.<br>• Inspect and service.<br>• Inspect and service.<br>• Inspect and service.<br>• Inspect and service. |
| • EATC Control Assembly Turns On and Off Erratically. No Control of System | • Damaged charging system. EATC will not function with too low or too high battery voltage. | • Check battery voltage. If battery voltage is less than 10 volts or greater than 16 volts, refer to charging system diagnosis, Section 14-00. Do not replace EATC control assembly. |

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## DIAGNOSIS AND TESTING (Continued)

### Sensor Diagnosis

Refer to the following charts for sensor diagnosis.

**EATC—IN-VEHICLE TEMPERATURE SENSOR DIAGNOSIS**

| CONDITION | POSSIBLE SOURCE | ACTION |
|---|---|---|
| • Diagnostic-Test Error Code 03 (Warm air discharge at 65°F or cool air discharge at 85°F). | 1. Sensor open or shorted. | • Disconnect wire harness connector at sensor. Measure resistance across sensor terminals and compare with Sensor Resistance Table below.<br>• If resistance is out of specifications shown in the table, replace the sensor. If sensor is OK, GO to Step 2. |
| | 2. Wire harness open or shorted. | • Disconnect battery cables. Disconnect wire harness connector from sensor and disconnect both connectors from control assembly.<br>• Check for continuity and for possible shorting between the two wires (Pin 2 and Pin 17 of control assembly connector). Service if necessary. Reconnect wire harness and battery cables. |

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**SENSOR RESISTANCE TABLE**

| APPROXIMATE TEMPERATURE | SENSOR RESISTANCE ACCEPTABLE RANGE |
|---|---|
| 10°C to 20°C (50°F to 68°F) | 37K to 58K ohms |
| 20°C to 30°C (68°F to 86°F) | 24K to 37K ohms |
| 30°C to 40°C (86°F to 104°F) | 16K to 24K ohms |

TL6396B

**EATC—AMBIENT TEMPERATURE SENSOR DIAGNOSIS**

| CONDITION | POSSIBLE SOURCE | ACTION |
|---|---|---|
| • Self-Diagnostics Error Code 04 and Outside Temperature Display is Reading—40°F or 140°F (Warm Air Discharge when set at 65°F or Cool Air Discharge when set at 85°F) | 1. Sensor open or shorted. | • Disconnect battery cables (this is necessary to reset outside temperature display memory). Disconnect the wire harness connector ar sensor. Measure resistance across sensor terminal and compare with Sensor Resistance Table in In-Vehicle Temperature Sensor Diagnosis Chart.<br>• If resistance is out of specifications shown in Sensor Resistance Table, replace sensor. If sensor is OK, GO to Step 2. Reconnect battery cables.<br>NOTE: Install sensor and electrical connections before battery is reconnected. |

## DIAGNOSIS AND TESTING (Continued)

**EATC—AMBIENT TEMPERATURE SENSOR DIAGNOSIS (Continued)**

| CONDITION | POSSIBLE SOURCE | ACTION |
|---|---|---|
| • Intermittent Heating and Cooling. Outside Temperature Display Sometimes Inaccurate | 2. Sensor wire harness open or shorted. | • Disconnect battery cables. Disconnect wire harness connector from sensor and disconnect both connectors from the control assembly.<br>• Inspect for crimped terminals.<br>• Check for continuity and for possible shorting between the two wire (Pins 1 and 2). Service if necessary. Reconnect wire harness and battery cables. |

TL6397C

**EATC—SUNLOAD SENSOR DIAGNOSIS**

| CONDITION | POSSIBLE SOURCE | ACTION |
|---|---|---|
| • Self-Diagnostics Error Code 05 | 1. Sensor shorted. | • Disconnect battery cables. Disconnect wire harness connector at sensor and disconnect both connectors from control assembly.<br><br>NOTE: Check the sensor for a short using an ohmmeter. Since the sensor is a Photodiode, there should be some unspecified resistance across the terminals dependent upon the available light in the area. The only test that should be made is for a short circuit (zero resistance). If resistance is zero ohms, replace the sensor.<br><br>Check for continuity and for possible shorting between the two wires (Pin 3 and Pin 16). Repeat if necessary. Reconnect battery cables. |

TL6398B

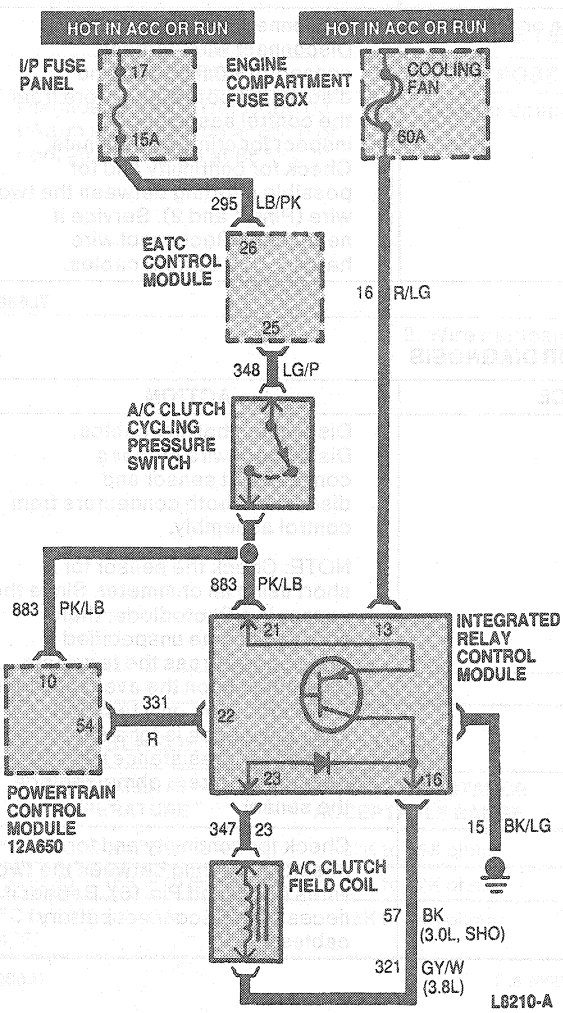
### Compressor Clutch Circuit

Operation of the A/C compressor clutch is dependent on the ambient temperature and signals from the engine computer. The engine computer will interrupt A/C compressor operation when certain conditions exist. The A/C compressor clutch can be shut off (or kept off) for several seconds at engine start-up, at high engine speeds, during acceleration, when the engine coolant temperature exceeds a predetermined temperature and during low engine idle conditions. Refer to the following diagnostic procedures and, if necessary, the Powertrain Control/Emissions Diagnosis Manual[2] to correct an inoperative compressor clutch condition. The ambient temperature must also be above approximately 10°C (50°F) for the A/C compressor to operate.

2 Can be purchased as a separate item.

## DIAGNOSIS AND TESTING (Continued)

### Circuit Diagrams
### 3.0L, 3.8L SHO




### PINPOINT TEST A
### A/C COMPRESSOR CLUTCH CIRCUIT DIAGNOSIS

| TEST STEP | | RESULT | ACTION TO TAKE |
|---|---|---|---|
| A1 | CHECK SYSTEM OPERATION | | |
| | • Start engine.<br>• Set the A/C control to MAX A/C.<br>• Check battery voltage (if not 12.5 volts or more, refer to Section 14-00).<br>• **Does clutch engage?** | Yes ▶<br>No ▶ | Circuit functioning properly.<br>GO to **A2.** |
| A2 | BY-PASS PRESSURE SWITCH | | |
| | • Disconnect electrical connector from pressure switch on accumulator.<br>• Jumper harness connector pins.<br>• Engine must be running and system set at MAX A/C.<br>• **Does clutch engage?** | Yes ▶<br>No ▶ | GO to **A3.**<br>GO to **A4.** |

## DIAGNOSIS AND TESTING (Continued)

**PINPOINT TEST A**
**A/C COMPRESSOR CLUTCH CIRCUIT DIAGNOSIS (Continued)**

| TEST STEP | | RESULT | ACTION TO TAKE |
|---|---|---|---|
| A3 | CHECK REFRIGERANT SYSTEM PRESSURES | | |
| | • Connect gauge set to service ports and observe pressure. Reading should be above 50 psi.<br>• **Is pressure above 50 psi?** | Yes | REPLACE clutch cycling pressure switch. GO to **A1.** |
| | | No | CHECK refrigerant system for leaks. SERVICE as necessary. GO to **A1.** |
| A4 | CHECK VOLTAGE AT PRESSURE SWITCH | | |
| | • Check for battery voltage at pressure switch electrical connector Circuit 348 (LG/P).<br>• **Is there voltage?** | Yes | GO to **A8.** |
| | | No | GO to **A5.** |
| A5 | CHECK EATC CONTROL ASSEMBLY OUTPUT VOLTAGE | | |
| | • Check battery voltage at:<br>— EATC Control Assembly Pin 25 (clutch signal output).<br>— Circuit 348 (LG/P) of A/C Control Assembly.<br>• **Is there voltage?** | Yes | CHECK circuit between control assembly and pressure switch for open. SERVICE as necessary. GO to **A1.** |
| | | No | GO to **A6.** |
| A6 | CHECK CONTROL ASSEMBLY INPUT VOLTAGE | | |
| | • Check for battery voltage at:<br>— Pin 26 of EATC Control Assembly (clutch signal).<br>— Circuit 295 (LB/PK) at A/C Control Assembly.<br>• **Is there voltage?** | Yes | REPLACE control assembly. |
| | | No | GO to **A7.** |
| A7 | CHECK FUSE | | |
| | • Check for voltage at fuse panel Circuit 295 (LB/PK).<br>• Ignition switch must be in the ACC or RUN position. | Battery voltage present | SERVICE wiring to control assembly. GO to **A1.** |
| | | Voltage less than 10 volts | CHECK charging system operation and for high resistance in circuit. |
| | | No voltage | CHECK fuse. SERVICE circuit as required. CHECK diode in CCRM for short (Pins 16 and 23). GO to **A1.** |
| A8 | CHECK CLUTCH CIRCUITS | | |
| | • Check for voltage across harness connector at clutch field coil.<br>• **Is there at least 10 volts?** | Yes | GO to **A9.** |
| | | No | GO to **A11.** |
| A9 | JUMP FIELD COIL | | |
| | • Disconnect field coil and jump battery voltage and ground to clutch field coil.<br>• **Does clutch engage?** | Yes | CLEAN coil electrical terminals and RETEST. |
| | | No | GO to **A10.** |
| A10 | CHECK CLUTCH AIR GAP | | |
| | • Check air gap between clutch hub and pulley.<br>• **Is air gap within specifications?** | Yes | REPLACE clutch field coil. |
| | | No | RESET air gap (REFER to applicable Compressor and Clutch Section). GO to **A9.** |
| A11 | CHECK CCRM OUTPUT VOLTAGE | | |
| | • Check for voltage between Pins 16 and 23 of the CCRM.<br>• **Is there at least 10 volts?** | Yes | CHECK clutch coil wiring harness for open circuit. SERVICE as necessary. GO to **A1.** |
| | | No | GO to **A12.** |

## DIAGNOSIS AND TESTING (Continued)

**PINPOINT TEST A**
**A/C COMPRESSOR CLUTCH CIRCUIT DIAGNOSIS (Continued)**

| TEST STEP | | RESULT | ACTION TO TAKE |
|---|---|---|---|
| A12 | CHECK CLUTCH SIGNAL AT CCRM | | |
| | • Check for a minimum of 11 volts at Pin 21 of the CCRM (clutch input signal).<br>• **Is there at least 11 volts?** | Yes<br>No | GO to **A13.**<br>CHECK circuit between pressure switch and Pin 21 of CCRM for open. SERVICE as necessary. |
| A13 | CHECK A/C CUT-OUT SIGNAL | | |
| | • Remove red Wire from Pin 22 of CCRM harness connector. Then, start engine and set system at MAX A/C.<br>• **Does clutch energize?** | No<br>Yes | REPLACE CCRM.<br>GO to **A14.** |
| A14 | CHECK POWERTRAIN CONTROL MODULE (PCM) INPUT SIGNAL | | |
| | • Check for a minimum of 11 volts at Pin 10 of Powertrain Control Module.<br>• **Is there at least 11 volts?** | | Engine coolant temperature sensor sending hot coolant signal to Powertrain Control Module, or Throttle Position Sensor sending cutout signal to Powertrain Control Module. DISCONNECT electrical connector from each sensor. Clutch will engage if sensor is sending incorrect signal. REFER to Powertrain Control/Emissions Diagnosis Manual[3]. A/C sense circuit to Powertrain Control Module open. SERVICE circuit as required. |

TL8256A

### Self Test

Refer to the following charts for Self-Test instructions involving clutch operation.

### Self Test—Blower Speed Controller (BSC)

**Tools Required:**

- Rotunda Digital Volt-Ohmmeter 007-00001

Testing requires a Rotunda Digital Volt Ohmmeter 007-00001 or equivalent. Refer to the EATC System Wiring Diagram for terminal pin locations. Use the following charts for self-test procedures.

**Condition No. 1**

No blower, ignition in RUN position, engine warm, AUTOMATIC, 32°C (90°F) setting.

**CELO TEST**

| TEST STEP | | RESULT | ACTION TO TAKE |
|---|---|---|---|
| 1 | | | |
| | • Change temp. setting to 60° Auto.<br>• **Is blower on?** | Yes<br>No | GO to **2.**<br>GO to **3.** |
| 2 | | | |
| | • Disconnect cold engine lockout (CELO) switch and change temp. to 90° setting Auto.<br>• **Is blower on?** | Yes<br>No | Faulty CELO switch.<br>CELO wire grounded. |

3 Can be purchased at a separate item.

## DIAGNOSIS AND TESTING (Continued)

**CELO TEST (Continued)**

| TEST STEP | RESULT ▶ | ACTION TO TAKE |
|---|---|---|
| **3** | | |
| ● Connect voltmeter between BSC ignition Pin 3 and ground Pin 4.<br>● **Is voltage greater than 10 volts?** | No ▶<br>Yes ▶ | CHECK V ignition circuit fuse, continuity in wiring. (thru HBR)<br>GO to **4.** |
| **4** | | |
| ● Connect voltmeter between BSC input Pin 2 and ground Pin 4.<br>● **Is voltage greater than 3 volts?** | No ▶<br>Yes ▶ | GO to **5.**<br>GO to **6.** |
| **5** | | |
| ● Connect voltmeter between BSC output Pin 1 and ground Pin 4.<br>● **Is voltage greater than 1 volt?** | No ▶<br>Yes ▶ | Damaged motor, B+ feed to motor.<br>REPLACE BSC. |
| **6** | | |
| ● Connect voltmeter between control assembly Pin 23 and Pin 24.<br>● **Is voltage greater than 3 volts?** | Yes ▶<br>No ▶ | REPLACE control assembly.<br>CHECK circuit continuity. |

TL5667D

### Condition No. 2

High blower only: no low blower speed, AUTOMATIC, thumbwheel turned to LO.

**VOLTMETER CONNECTIONS**

| TEST STEP | RESULT ▶ | ACTION TO TAKE |
|---|---|---|
| **1** | | |
| ● Disconnect BSC electronic connections.<br>● **Is blower on?** | Yes ▶<br>No ▶ | Faulty blower motor or blower wire circuit.<br>GO to **2.** |
| **2** | | |
| ● Reconnect BSC and connect voltmeter between BSC input Pin 2 and ground Pin 4 (auto function). Rotate blower thumbwheel from high to low blower.<br>● **Is voltage greater than 7 volts?** | No ▶<br>Yes ▶ | REPLACE control assembly.<br>REPLACE BSC. |

TL5668D

### Condition No. 3

Blower operates but does not vary with thumbwheel movement.

**VOLTMETER CONNECTION**

| TEST STEP | RESULT ▶ | ACTION TO TAKE |
|---|---|---|
| **1** | | |
| ● Connect voltmeter between BSC input Pin 2 and ground Pin 4 (AUTOMATIC position). Rotate blower thumbwheel from min. to max. then back to min.<br>● **Does voltage fluctuate?** | Yes ▶<br>No ▶ | GO to **2.**<br>Replace control assembly. |

## DIAGNOSIS AND TESTING (Continued)

**VOLTMETER CONNECTION (Continued)**

| TEST STEP | RESULT | ACTION TO TAKE |
|---|---|---|
| 2 | | |
| • Connect voltmeter between BSC output Pin 1 and ground Pin 4 (AUTOMATIC position). Rotate blower thumbwheel from min. to max.<br>• **Does voltage fluctuate?** | Yes<br>No | Faulty blower motor, or B+ feed to motor.<br>Replace BSC. |

TL5084B

### Condition No. 4

Cold Engine Lockout (CELO) inoperative: blower turns on immediately in AUTOMATIC, 32°C (90°F) setting, with cold engine.

| TEST STEP | RESULT | ACTION TO TAKE |
|---|---|---|
| 1 | | |
| • Cold engine (engine coolant temp. below 120°) control set at AUTOMATIC 90°.<br>• **Is blower on?** | Yes<br>No | CHECK coolant and retest. If blower turns on again with a cold engine, REPLACE CELO. Check for short in circuit.<br>CELO OK. |

TL5085E

### EATC Control Assembly Connector and Blend Door Actuator Self Test

Refer to the following chart for control assembly connector and blend door Self-Test procedures. To test the control assembly vacuum valve, apply 50 kPa (15 in-Hg) of vacuum to the number five terminal.

**BLEND DOOR ACTUATOR DIAGNOSIS**

| TEST STEP | RESULT | ACTION TO TAKE |
|---|---|---|
| 1 | | |
| NOTE: Letters in parentheses indicate (wire color, circuit no.). Refer to the EATC System Wiring Diagram for wiring schematic and connector pin diagrams.<br>• Check error code during EATC functional test.<br>• **Does code "02" display?** | Yes<br>No | GO to 2.<br>REVIEW error code key. |
| 2 | | |
| • Disconnect both connectors from EATC control assembly and drive actuator in both directions using any 9-12 volt battery.<br>• The following pins can be jumped to use the vehicle battery. Insure the ignition is in the RUN position.<br>• All pins are located on the LEFT connector (E6DB-14489-VA).<br>• Trial 1: Pin 24 (BK, 57) to Pin 22 (DB/LG, 249)<br>• Trial 2: Pin 24 (BK, 57) to Pin 21 (O,250)<br>• **Does actuator drive in both directions?** | Yes<br>No | GO to 3.<br>GO to 6. |
| 3 | | |
| • Reconnect control assembly and test according to EATC functional test.<br>• **Is test successful?** | Yes<br>No | Done.<br>GO to 4. |

## DIAGNOSIS AND TESTING (Continued)

**BLEND DOOR ACTUATOR DIAGNOSIS (Continued)**

| TEST STEP | RESULT | ACTION TO TAKE |
|---|---|---|
| **4** | | |
| • Disconnect both connectors from EATC control assembly. Measure resistance as shown below at the control assembly connector with the connector disconnected.<br>• All pins are located on the RIGHT connector (E6DB-14489-UA).<br>• Pin 15 (LG/O, 243) to Pin 6 (O/BK, 776) 5000-7000 ohms<br>• Pin 5 (O/W, 351) to Pin 6 (O/BK, 776) 300-7300 ohms<br>• Pin 5 (O/W, 351) to Pin 15 (LG/O, 243) 300-7300 ohms<br>• **Are all resistances OK?** | Yes ▶<br>No ▶ | GO to 5.<br>GO to 6. |
| **5** | | |
| • Change control assembly and test according to EATC functional test.<br>• **Is test successful?** | Yes ▶<br>No ▶ | Done<br>GO to 1. |
| **6** | | |
| • Check vehicle wiring harness and connector continuity as shown below. Disconnect connectors from both control assembly and blend door actuator. Blend door actuator connector is accessible through glove compartment. | No ▶<br>Yes ▶ | GO to 8.<br>GO to 7. |

| Control Assembly Connector | | Blend Door Actuator Connector |
|---|---|---|
| **RH Side** | | |
| Pin 5 (O/W, 351) | to | Pin 7 (O/W) |
| Pin 6 (O/BK, 776) | to | Pin 8 (O/BK) |
| Pin 15 (LG/O, 243) | to | Pin 6 (LG/O) |
| **LH Side** | | |
| Pin 21 (O/W, 351) | to | Pin 1 (O) |
| Pin 22 (DB/LG, 249) | to | Pin 2 (DB/LG) |
| Pin 24 (BK, 57) | to | Pin 3 (BK) |

| | | |
|---|---|---|
| • Reconnect all three connectors at end of this test.<br>• **Is there continuity?** | | |
| **7** | | |
| • Change blend door actuator and test according to EATC functional test.<br>• **Is test successful?** | Yes ▶<br>No ▶ | Done.<br>GO to 1. |
| **8** | | |
| • Service/replace wiring harness, connect and test according to EATC functional test.<br>• **Is test successful?** | Yes ▶<br>No ▶ | Done.<br>GO to 1. |

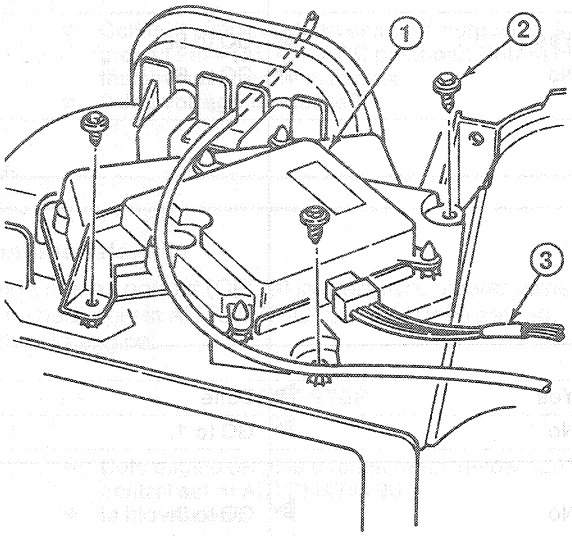
TL5669D

### Manual A/C Heater Blend Door Actuator and Temperature Adjustment Potentiometer Diagnosis

Taurus/Sable vehicles with manual A/C heater systems have an electric temperature blend door actuator and temperature adjustment potentiometer.

## DIAGNOSIS AND TESTING (Continued)

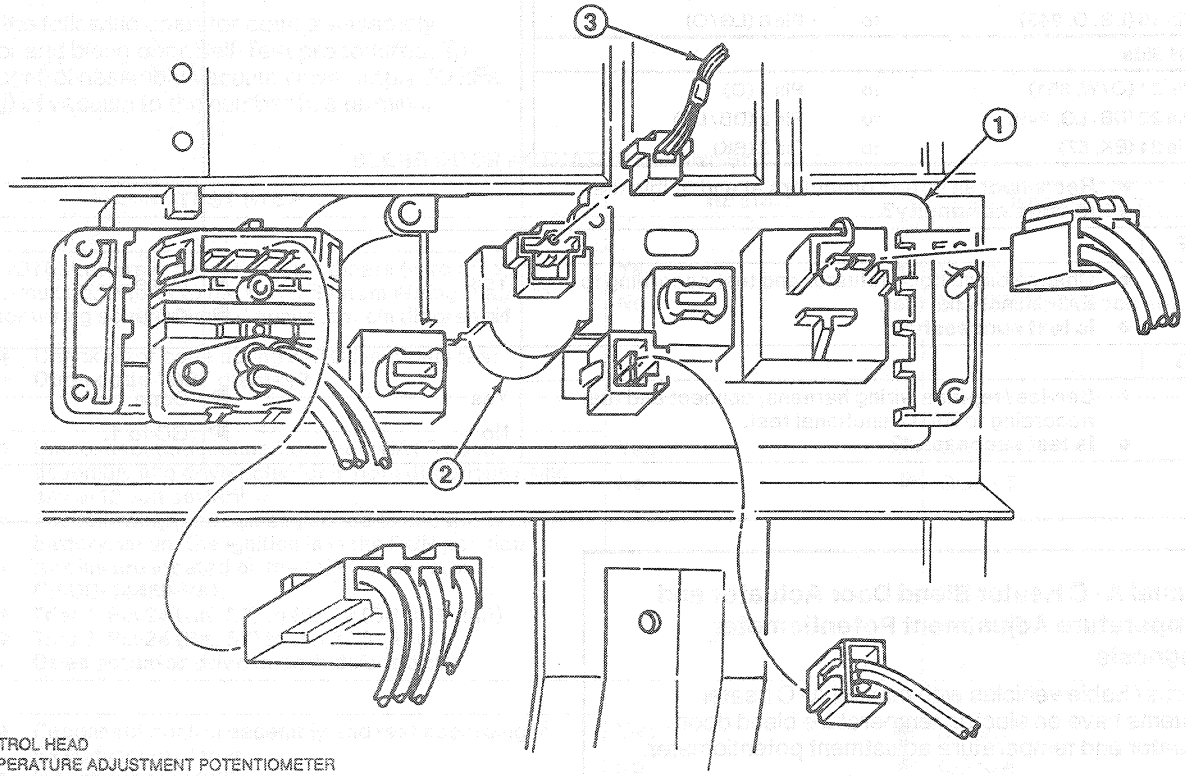
### Electric Blend Door Actuator




1. BLEND DOOR ACTUATOR
2. ACTUATOR TO EVAPORATOR CASE MOUNTING SCREWS
3. JUMPER HARNESS FROM 14401 WIRING

CCL 3732-A

### Temperature Adjustment Potentiometer



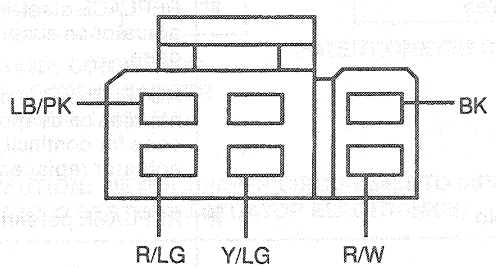

1. CONTROL HEAD
2. TEMPERATURE ADJUSTMENT POTENTIOMETER
3. FROM 14401 WIRING HARNESS

CCL 3733-A

## DIAGNOSIS AND TESTING (Continued)

**HEATER AND A/C BLEND DOOR ACTUATOR DIAGNOSIS**

| TEST STEP | | RESULT | ACTION TO TAKE |
|---|---|---|---|
| 1 | CHECK MANUAL A/C ELECTRIC BLEND DOOR ACTUATOR SYSTEM | | |
| | • Start vehicle and run engine until it reaches normal operating temperature.<br>• Turn on MAX A/C mode.<br>• Turn temperature adjust knob to full COOL (CCW) and check for cool discharge air.<br>• Turn temperature adjust knob to full WARM (CW) and check for warm discharge air.<br>• Vary temperature adjust knob from full WARM to full COOL.<br>• **Does air temperature change?** | Yes ▶<br>No ▶ | System is fully functional.<br>GO to **2.** |
| 2 | CHECK MANUAL A/C ELECTRIC BLEND DOOR ACTUATOR SYSTEM FUSE | | |
| | • Check fuse No. 17 at fuse panel.<br>• **Is fuse good?** | Yes ▶<br>No ▶ | GO to **3.**<br>REPLACE fuse, and GO to **1.**<br>NOTE: If fuse blows again, check for shorts to ground in LB/PK wire (see **3.**) and service as needed. |
| 3 | CHECK MANUAL A/C ELECTRIC BLEND DOOR ACTUATOR SUPPLY VOLTAGE | | |
| | • Disconnect blue 6-way connector located on the evaporator case and accessed through the glove compartment opening.<br>• **Is there battery positive voltage (B+) between LB/PK and BK?** | Yes ▶<br>No ▶ | GO to **4.**<br>CHECK wiring.<br>NOTE: A quick check for the actuator can be done by connecting a replacement actuator and jumper harness to the connector then operate system and look for actuator operation. |

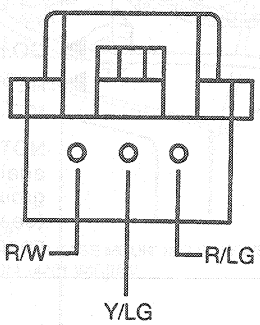
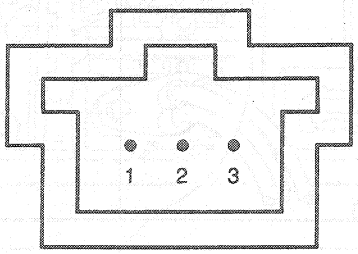



**14401 BLUE 6-WAY CONNECTOR TO ACTUATOR JUMPER HARNESS LOCATED ON EVAPORATOR CASE**

**L8135-A**

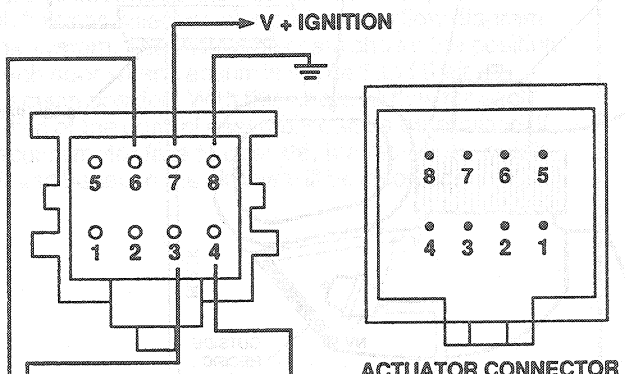
## DIAGNOSIS AND TESTING (Continued)

**HEATER AND A/C BLEND DOOR ACTUATOR DIAGNOSIS (Continued)**

| TEST STEP | RESULT | ACTION TO TAKE |
|---|---|---|
| **4** CHECK CONTROL HEAD POTENTIOMETER SUPPLY VOLTAGE | | |
| • Connect blue 6-way connector at evaporator case.<br>• Disconnect white 3-way connector from back of potentiometer at the control head.<br>• **Is there reference voltage (approximately 1-2 volts less than battery voltage) between wires R/LG and R/W?**<br>**CAUTION: Never short across wires R/LG and R/W or destructive damage could occur.** | Yes ▶<br>No ▶ | GO to **5.**<br>SERVICE as necessary.<br>NOTE: If wiring to potentiometer is good, then replace electric actuator assembly. |
|  <br>**14401 CONNECTOR TO POTENTIOMETER**<br>**L8136-A** | | |
| **5** CHECK CONTROL HEAD POTENTIOMETER | | |
| • Disconnect and remove control head potentiometer.<br>• Check resistance between terminals No. 2 and No. 3.<br>— With potentiometer @ full CCW resistance should equal 5000 OHMS.<br>— With potentiometer @ full CW resistance should equal 300 OHMS.<br>• **Is resistance linearly variable in between?** | Yes ▶<br>No ▶ | REPLACE electric actuator on evaporator case.<br>NOTE: Check jumper harness on evaporator case for continuity during actuator replacement.<br>REPLACE potentiometer. |
|  <br>**POTENTIOMETER BUILT — IN CONNECTOR**<br>**L8137-B** | | |

## DIAGNOSIS AND TESTING (Continued)

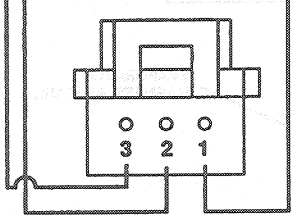
**TAURUS/SABLE (DN5) MANUAL A/C ONLY**
**BLEND DOOR ACTUATOR/POTENTIOMETER SYSTEM CONNECTIONS**

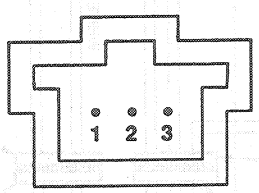






| PIN # | CIRCUIT # | COLOR | DESCRIPTION |
|---|---|---|---|
| 1 | --- | --- | N.C. |
| 2 | --- | --- | N.C. |
| 3 | 437 | Y-LG | Control Pot Wiper |
| 4 | 438 | R-W | Control Pot Vs |
| 5 | --- | --- | N.C. |
| 6 | 436 | R-LG | Control Pot GND |
| 7 | 295 | LB-PK | Actuator V+ |
| 8 | 57 | BK | Actuator GND |




| PIN # | CIRCUIT # | COLOR | DESCRIPTION |
|---|---|---|---|
| 1 | 436 | R-LG | Control Pot Vs |
| 2 | 437 | Y-LG | Control Pot Wiper |
| 3 | 438 | R-W | Control Pot GND |

**CAUTION: NEVER JUMPER CIRCUIT #436 TO CIRCUIT #438 (COULD DESTROY ACTUATOR ELECTRONICS)**

**NOTE: THE ABOVE CONNECTIONS ARE FOR THE BUEHLER MANUAL A/C ACTUATOR ONLY. (DIFFERS FOR THE EATON MANUAL & EATC ACTUATORS)**

CCL 3739-B

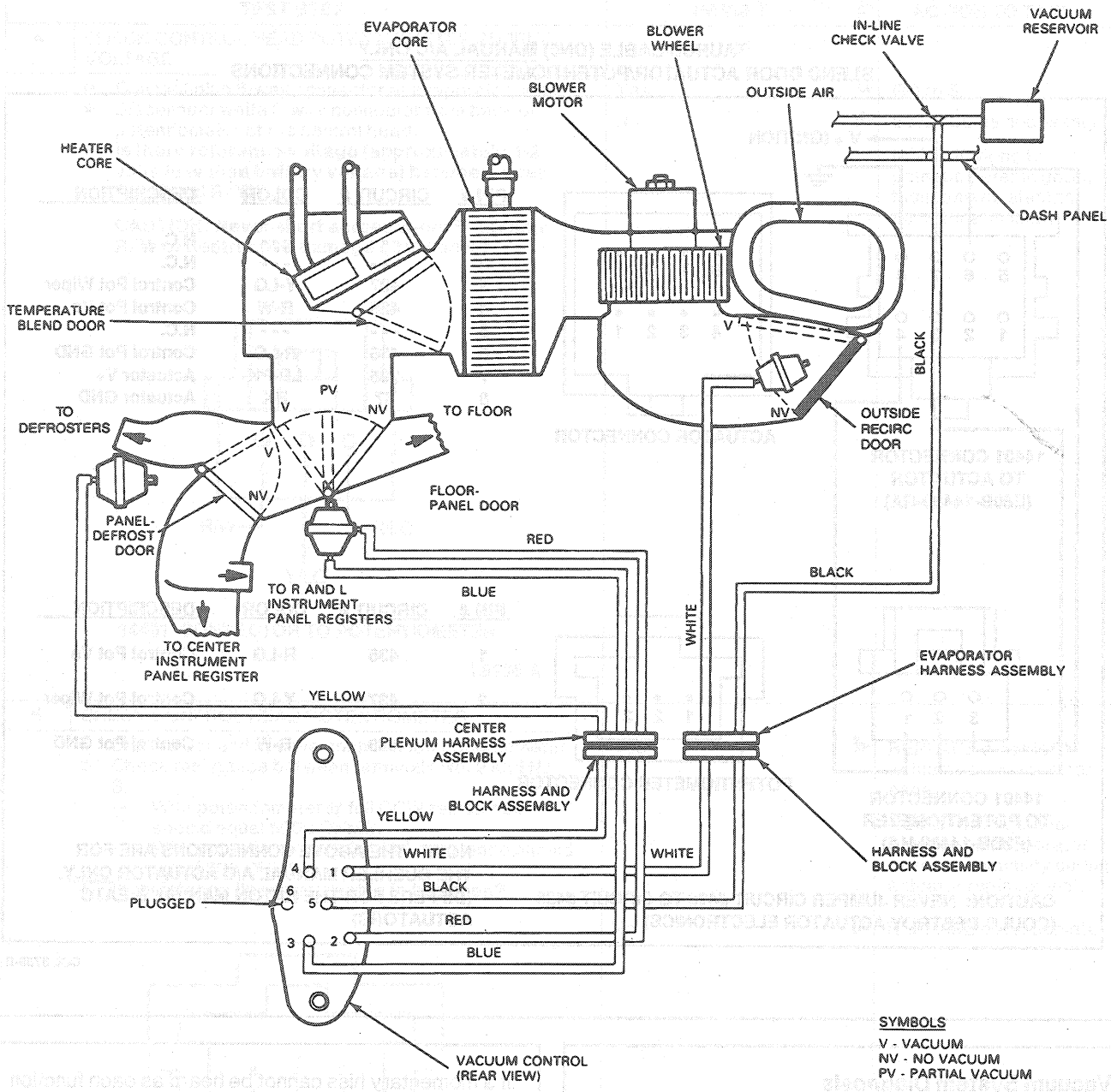
### Vacuum System Diagnosis

To test the EATC vacuum system, start the engine and depress the function buttons slowly. A momentary hiss should be heard as each button is depressed from one position to another, indicating that vacuum is available at the control assembly. A continuous hiss at the control assembly indicates a major leak somewhere in the system. It does not necessarily indicate that the leak is at the control assembly.

If a momentary hiss cannot be heard as each function button is depressed from one position to another, check for a kinked, pinched, or disconnected vacuum supply hose. Also, inspect the check valve between the intake manifold and the vacuum reservoir to ensure it is working properly.

## DIAGNOSIS AND TESTING (Continued)

### EATC System Vacuum Schematic and Selector Test

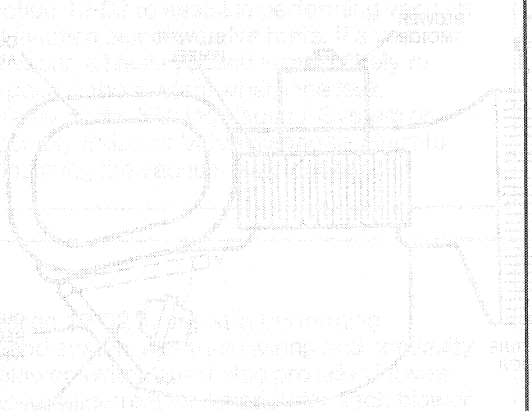


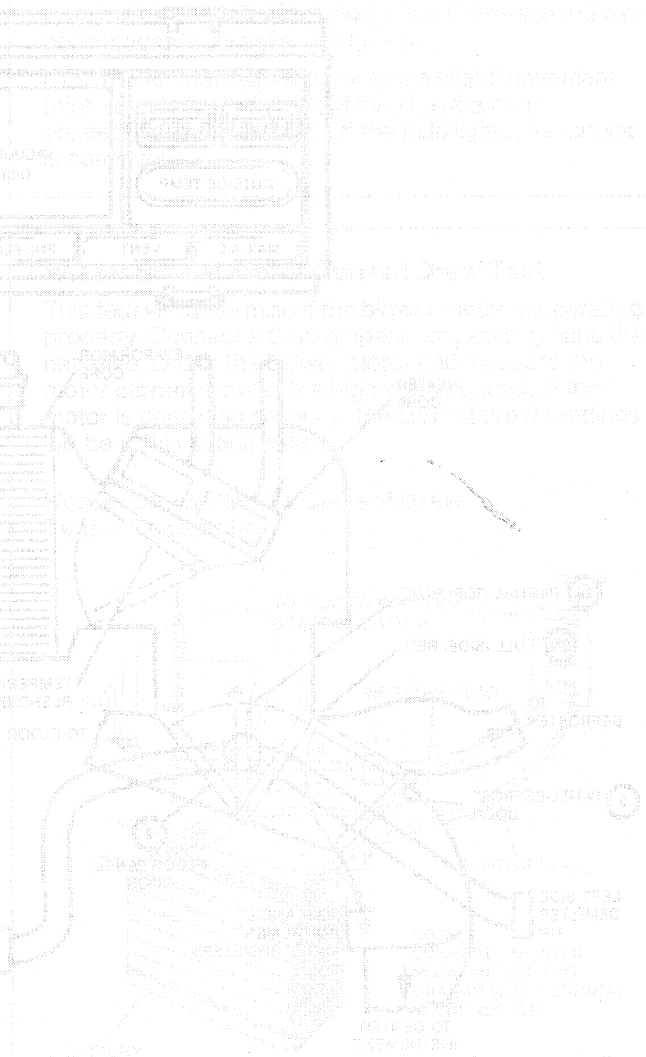

| VACUUM PORT | FUNCTION | SELECTION | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | OFF | DEFROST | FLOOR — PANEL (MIX) | FLOOR | FLOOR — PANEL (HI-LO) | PANEL | RECIRC. |
| 1 | Outside — Recirc | V | NV | NV | NV | NV | NV | V |
| 2 | Full Floor | NV | NV | NV | V | NV | NV | NV |
| 3 | Floor — Panel (Partial) | NV | NV | V | V | V | NV | NA |
| 4 | Panel — Defrost | NV | NV | NV | NV | V | V | V |
| 5 | Source | V | V | V | V | V | V | V |
| 6 | Plugged | — | — | — | — | — | — | — |

CCL 2650-B

## DIAGNOSIS AND TESTING (Continued)

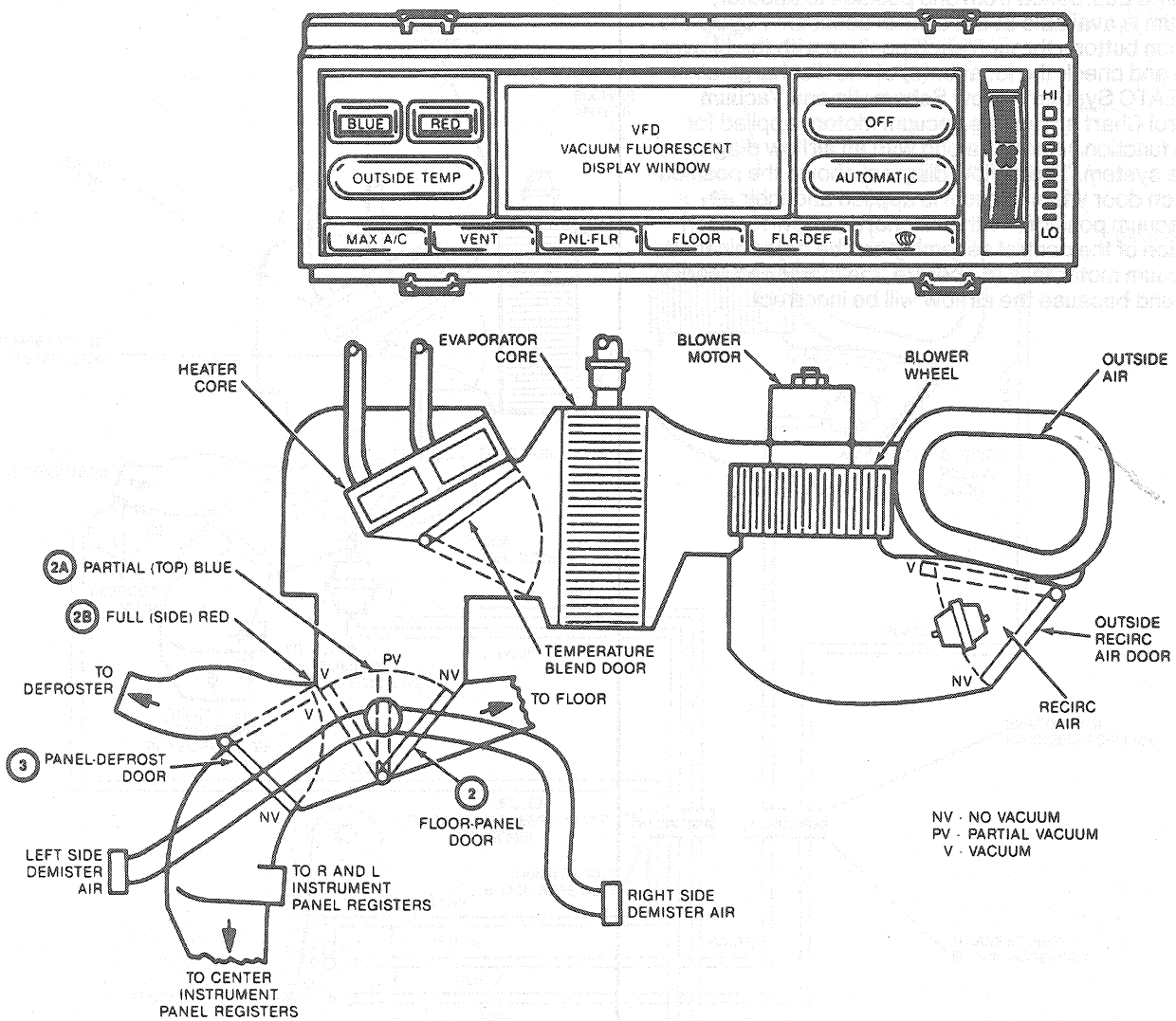
If a momentary hiss can be heard as each function button is depressed from one position to another, vacuum is available at the control assembly. Cycle the function buttons through each position with the blower on HI and check the location(s) of the discharge air. The EATC System Airflow Schematic and Vacuum Control Chart shows the vacuum motors applied for each function selection along with an airflow diagram of the system. The airflow diagram shows the position of each door when vacuum is applied and their no-vacuum position. With this chart, airflow for each position of the control assembly can be determined. If a vacuum motor fails to operate, the motor can readily be found because the airflow will be incorrect.





## DIAGNOSIS AND TESTING (Continued)

### EATC System Airflow Schematic and Vacuum Control Chart




**EATC SYSTEM VACUUM MOTOR TEST CHART**

| FUNCTION | VACUUM MOTORS APPLIED WITH VACUUM | | | |
|---|---|---|---|---|
| | OUTSIDE-RECIRC AIR DOOR | FLOOR-PANEL DOOR | | PANEL-DEFROST DOOR |
| | | PARTIAL | FULL | |
| OFF | 1 | — | — | — |
| DEFROST | — | — | — | — |
| FLOOR/DEFROST (MIX) | — | 2A | — | — |
| FLOOR | — | 2A | 2B | — |
| FLOOR/PANEL (HI-LO) | — | 2A | — | 3 |
| PANEL | — | — | — | 3 |
| PANEL/RECIRC. | 1 | — | — | 3 |

— NO VACUUM (ATMOSPHERE)

CCL 2649-C

If a vacuum motor is inoperative, check the operation of the motor with Rotunda Vacuum Tester 021-00014 or equivalent. If the vacuum motor operates properly, the vacuum hose is probably pinched, kinked, disconnected or has a leak (See EATC System Vacuum Schematic and Selector Test).

If the system functions normally at idle, but goes to defrost during acceleration, a leak exists in the system. The leak can best be located by shutting off the engine and using a gauge to check for vacuum loss while selectively blocking off vacuum hoses.

## DIAGNOSIS AND TESTING (Continued)

To check electrical system operation between the control assembly connector and the blend door actuator, refer to Diagnostic procedures.

### Airflow

Refer to Section 12-03A to assist in performing airflow function and vacuum motor application tests.

### Vacuum

Refer to Section 12-02 to assist in performing vacuum system and function selector valve tests. If a vacuum leak should occur, a hissing sound is most likely to exist at the point in the system where the leak originates. Refer to the Hissing Vacuum System or Control Assembly Selector Valve diagnosis chart to assist in pinpointing the vacuum leak location.

### Electrical

Refer to Section 12-02 to assist in performing component and system electrical wiring and continuity tests. The blower switch chart also provides blower motor voltage and current information for each blower switch position.

### Heater Testing

The following tests may be made on the heater: burned out fuses, loose wire connections, damaged wires or collapsed hoses. Loose defroster ducts and air leaks in the body may be determined by visual inspection of the parts.

### Blower Switch Continuity Test

Refer to the appropriate electrical schematic. Check for continuity between connected terminals as shown in the schematic. Check terminal continuity at every lever position. The lamp should go on for each connected pair of terminals.

There should be no continuity between the battery terminal and the switch case.

### Open Circuit Test

On all electrical circuits, continuity must exist from the source of power battery positive voltage (+) to the unit where the power is used and back up to the source of power battery ground (-) terminal. A check at each connection in a circuit, starting at the battery, will locate an open circuit or will show that the circuit is complete.

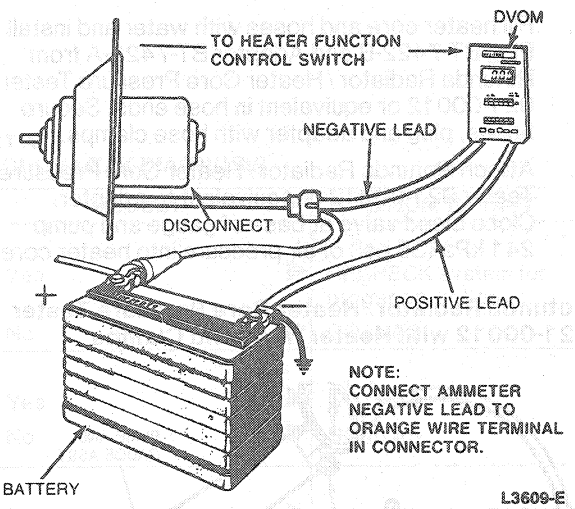
An ohmmeter or self-powered test lamp connected at any two points of a circuit, with the power removed from the circuit, will show if the circuit between the two connections is open or continuous.

If the meter does not move or has a slight movement (high resistance), the circuit may have a poor connection or broken wire. If the bulb lights, the circuit is continuous.

### Heater Blower Motor Current Draw Test

This test will determine if the blower motor is operating properly. Connect a 0-30 ampere ammeter, ground the negative lead of the blower motor and measure the motor current draw at the high-speed setting. If the motor is operating properly, the current draw readings will be within specification.

**Heater Blower Motor Current Draw Test—Schematic**




### Plugged Heater Core Test

Ensure the engine coolant is at the proper level, then start the engine and feel the heater outlet hose to see if it is hot. If it is not warm, flow through the heater core is restricted.

### Heater Core Leak Test

**Tools Required:**

- Rotunda Radiator / Heater Core Pressure Tester 021-00012

**Inspection**

1. Inspect for visible evidence of coolant leakage at hose-to-heater core attachments. A coolant leak at hose could follow heater core tube to core and appear as a leak in heater core.

## DIAGNOSIS AND TESTING (Continued)

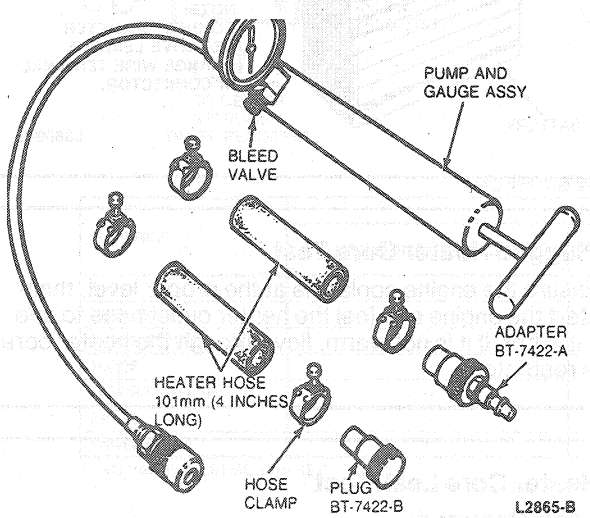
2. Check system for loose heater hose clamps. Clamps should be tightened to 1.81-2.49 N·m (17-22 lb-in).
3. If leakage is found and hose clamps are tight, check heater core tubes for distortion. Distorted heater core tubes are usually caused by over-tightening the hose clamps. Service tubes if distorted. Severe distortion of tubes could cause leakage at hose connections.

### Pressure Test

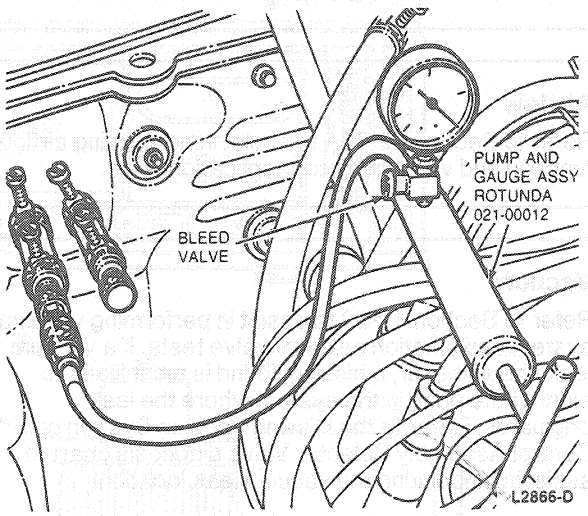
NOTE: Due to space limitations in the engine compartment, a bench test is recommended for heater core pressure testing.

1. Drain coolant from cooling system.
2. Disconnect heater hoses from heater core tubes.
3. Install a short piece of heater hose (approximately 101mm (4 inches) long) on each heater core tube.
4. Fill heater core and hoses with water and install Plug BT-7422-B and Adapter BT-7422-A from Rotunda Radiator / Heater Core Pressure Tester 021-00012 or equivalent in hose ends. Secure hoses, plug and adapter with hose clamps.
5. Attach Rotunda Radiator / Heater Core Pressure Tester 021-00012 or equivalent to adapter. Close bleed valve at base of gauge and pump 241 kPa (35 psi) of air pressure into heater core.

**Rotunda Radiator / Heater Core Pressure Tester 021-00012 with Heater Hose and Clamps**




**Rotunda Radiator / Heater Core Pressure Tester 021-00012 Installed for Pressure Test**



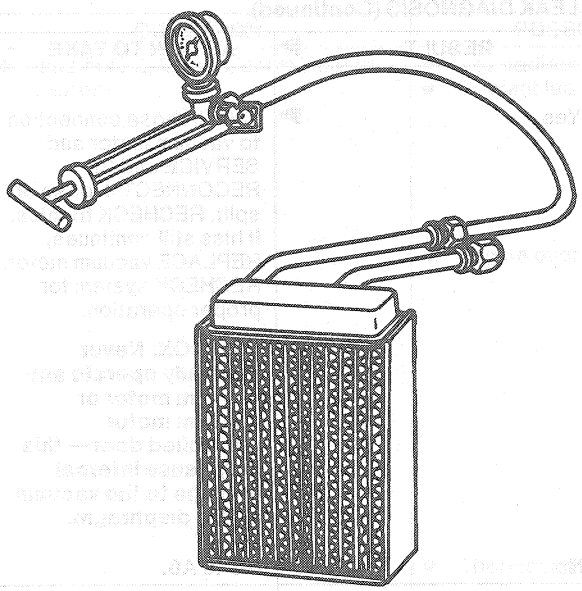

6. Observe pressure gauge for a minimum of three minutes. The pressure should not drop.
7. If pressure does not drop, no leaks are indicated.
8. If pressure drops, check hose connections to core tubes for leaks. If hoses do not leak, remove heater core from vehicle and test core as outlined.

### Bench Test

1. Remove heater core from heater case.
2. Drain all coolant from heater core.
3. Connect 101mm (4 inch) test hoses with plug and adapter to core tubes. Then, connect air pump and gauge assembly to adapter.

## DIAGNOSIS AND TESTING (Continued)

### Heater Core Bench Test



CCL 3540-A

4. Apply 241 kPa (35 psi) of air pressure to heater core with Rotunda Radiator / Heater Core Pressure Tester and submerge core in water.
5. If a leak is observed, service or replace heater core, as necessary.

**PINPOINT TEST A:**
**MANUAL A / C-HEATER SYSTEM VACUUM LEAK DIAGNOSIS**

| TEST STEP | | RESULT | ACTION TO TAKE |
|---|---|---|---|
| A1 | CHECK CONNECTORS | | |
| | • Check in-line and control assembly multiple connectors for proper connection.<br>• **Does hiss stop?** | Yes ▶ | RECHECK system for proper operation. |
| | | No ▶ | GO to **A2.** |
| A2 | DETERMINE LEAKING VALVE | | |
| | • Rotate function knob to determine what selector switch positions are leaking.<br>• **Do all positions leak?** | Yes ▶ | GO to **A3.** |
| | | No ▶ | GO to **A5.** |
| A3 | CHECK SOURCE TUBE | | |
| | • Check vacuum source tube (black) from reservoir to control assembly for cut or disconnection.<br>• **Does hiss stop?** | Yes ▶ | SERVICE tube. RECHECK system for proper operation. |
| | | No ▶ | GO to **A4.** |
| A4 | PINCH OFF SOURCE TUBE | | |
| | • Pinch off source tube (black) at control assembly.<br>• **Does hiss stop?** | Yes ▶ | REPLACE function selector switch valve. RECHECK system for proper operation. |
| | | No ▶ | RECHECK source tube (black), connections, reservoir and check valve. SERVICE or REPLACE as required. |

## DIAGNOSIS AND TESTING (Continued)

**PINPOINT TEST A:**
**MANUAL A/C-HEATER SYSTEM VACUUM LEAK DIAGNOSIS (Continued)**

| TEST STEP | | RESULT | ACTION TO TAKE |
|---|---|---|---|
| A5 | DETERMINE LEAKING HOSE(S) | | |
| | • Determine what color hose(s) are used in leaking function selector switch position(s). (Refer to airflow schematic and vacuum control chart).<br>• Pinch off suspect hose(s), one at a time, near each respective vacuum motor.<br>• **Does hiss stop?** | Yes ▶ | CHECK hose connection to vacuum motor and SERVICE and/or RECONNECT if loose or split. RECHECK for hiss. If hiss still continues, REPLACE vacuum motor. RECHECK system for proper operation.<br>**CAUTION: Never manually operate any vacuum motor or vacuum motor controlled door—this may cause internal damage to the vacuum motor diaphragm.** |
| | | No ▶ | GO to **A6.** |
| A6 | PINCH OFF SUSPECT HOSE(S) | | |
| | • Pinch off suspect hose(s), one at a time, near control assembly and/or in-line connector.<br>• **Does hiss stop?** | Yes ▶ | CHECK hose for cut or damage. SERVICE as required. RECHECK system for proper operation. |
| | | No ▶ | REPLACE function selector switch. |

TL8216A

## DIAGNOSIS AND TESTING (Continued)

### HEATER AND DEFROSTER DIAGNOSIS

| CONDITION | POSSIBLE SOURCE | ACTION |
|---|---|---|
| • Insufficient, Erratic, or No Heat or Defrost | • Low radiator coolant due to:<br>• Coolant leaks. | • Check radiator cap pressure. Replace if below minimum pressure.<br>• Fill to level. Pressure test for engine cooling system and heater system leaks. Service as required. |
| | • Engine overheating. | • Remove bugs, leaves, etc. from radiator or condenser fins.<br>• Check for:<br>Inoperative electro-drive fan<br>Sticking thermostat<br>Incorrect ignition timing<br>Water pump impeller damage<br>Restricted cooling system<br>• Leaks in cooling system.<br>• Service as required. |
| | • Thermostat. | • Feel heater hoses. If too hot to handle, thermostat is OK. |
| | • Plugged or partially plugged heater core. | • Clean and backflush engine cooling system and heater core. |
| | • Loose or improperly adjusted control cables. | • Adjust to specifications. |
| | • Vacuum hoses crossed, collapsed, or linked (if applicable). | • Check to see if door vacuum motors respond properly to movements of the function selector lever. Visually check vacuum hoses, and service as required. |
| | • Airflow control doors sticking in binding. | • Check to see if door vacuum motors respond properly to movements of the function selector knob. If hesitation in movement is noticed, disconnect vacuum motor arm from door crank arm, and move crank arm by hand. Service sticking or binding door as required. |
| | • Vacuum motor or hose leaks (if applicable). | • Disconnect multiple vacuum connector from back of control assembly, and check each connector opening with hand operated vacuum pump. If one line leaks vacuum, test motor by itself before replacing (Be careful of vacuum hoses that operate two motors at same time). Service vacuum hose(s), or replace vacuum motor as required. |
| • Air Comes Out of Defroster Outlet In Any Function Selector Lever Position | • Vacuum system (indicates a very bad leak). | • Listen for vacuum system leak. Look for disconnected vacuum hose connector. Use hand-operated vacuum pump, and check vacuum motors for diaphragm leak. Also check for leaking function selector switch on control assembly, check valve, and leaking vacuum reservoir tank. Service hoses, or replace components as required. |

## DIAGNOSIS AND TESTING (Continued)

**HEATER AND DEFROSTER DIAGNOSIS (Continued)**

| CONDITION | POSSIBLE SOURCE | ACTION |
|---|---|---|
| • Blower Does Not Operate Properly. | • Blower motor | • Run a No. 10 gauge jumper wire directly from the (grounded) negative battery terminal to the negative lead (black wire) of the blower motor. If the motor runs the problem must be external to the motor. If the motor will not run, check the ground connection for good electrical contact. If this connection is good, the motor is inoperative and should be replaced. |
| | • Blower resistor. | • Check continuity of resistors for opens or check thermal limiter for continuity, if so equipped. (A blown thermal limiter will allow motor operation on Hi blower only). Service or replace as required. |
| | • Blower wire harness. | • Check for proper installation of harness connector terminal connectors.<br>• Check wire-to-terminal continuity.<br>• Check continuity of wires in harness for shorts (a short to ground will cause motor to operate with no control over the motor), opens, abrasion, etc.<br>• Service as required. |
| | • Blower switch(es). | • Check blower switch(es) for proper contact. Replace switch(es) as required. |
| | • Vacuum selector valve. | • Check vacuum selector valve for proper contacts. Replace if required. |
| • Airflow Changes Direction When Vehicle is Accelerated | • Vacuum system leak (if applicable). | • Check vacuum system with hand vacuum pump from control assembly connector. Service tubing, or replace damaged components as required. |

## REFRIGERANT SYSTEM SERVICE

### Refrigerant-12 (R-12) System

Most Taurus / Sable vehicles use A / C systems that require the use of R-12 as a refrigerant. This type of system is very similar to the fixed orifice tube systems used previously. If there are no special R-134a identifying tags on the A / C system components and refrigerant lines, the system requires the use of R-12 refrigerant.

### Refrigerant-134a (R-134a) Systems

NOTE: R-12 refrigerant and refrigerant oil is not compatible with R-134a and R-134a refrigerant oil.

**CAUTION: Never mix the two refrigerants or the oils.**

In an effort to avoid the use of CFC refrigerants that may harm the ozone layer of the atmosphere, Ford Motor Company has introduced a new refrigerant system on some 3.0L Taurus vehicles that requires the use of a Non-CFC based refrigerant known as R-134a. This new type of refrigerant has many of the same properties as R-12 and is similar in form and function. However, R-134a is a hydrofluorocarbon (HFC) based refrigerant while R-12 is a chlorofluorocarbon (CFC) based refrigerant. Because of the absence of chlorine in its molecular structure, the use of R-134a refrigerant will not have any harmful effects on the ozone layer of the atmosphere.

## REFRIGERANT SYSTEM SERVICE (Continued)

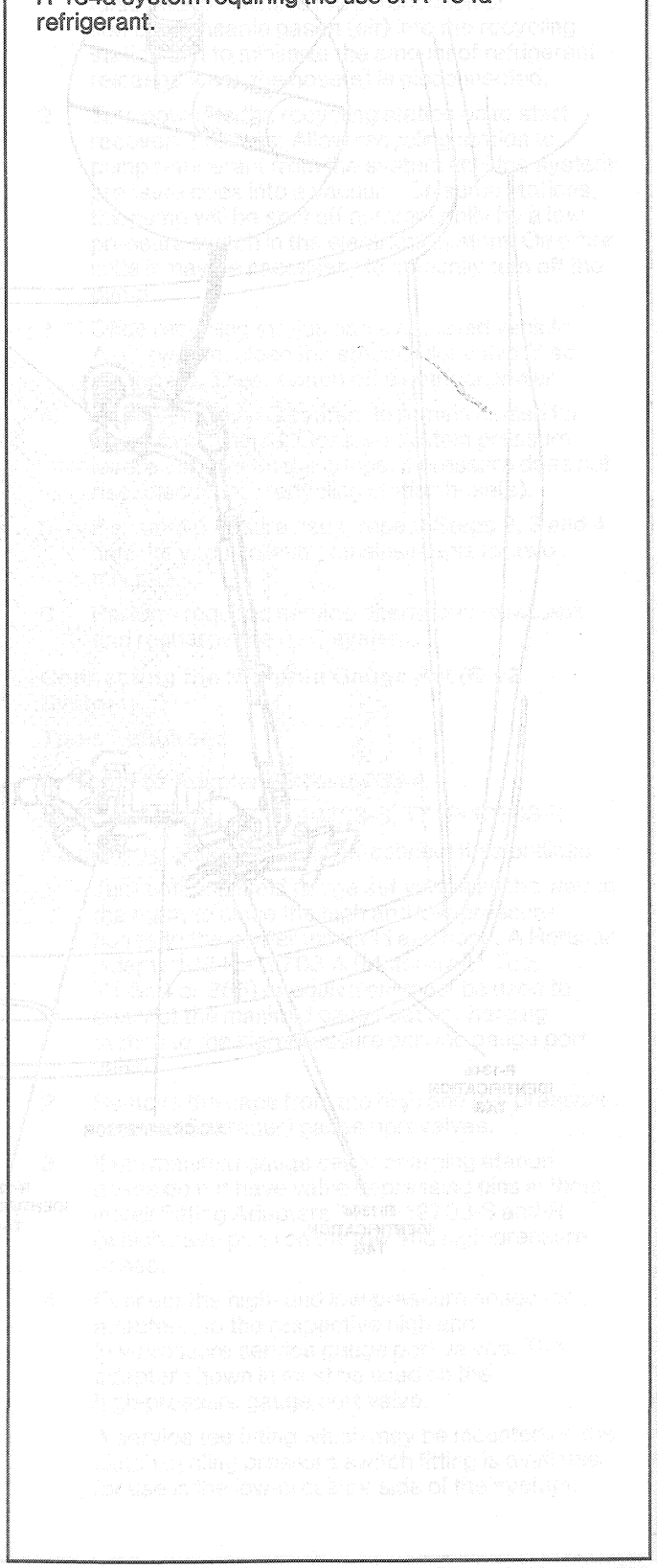
Ford Motor Company has begun producing some 3.0L Taurus vehicles that have new A/C systems requiring the use of R-134a refrigerant. R-134a A/C systems have special service requirements that will be outlined later. The main thing to keep in mind about R-12 and R-134a systems is that they are different systems. R-12 refrigerant and components can only be used in R-12 systems while R-134a refrigerant and components can only be used in R-134a systems.

**Identifying R-134a and R-12 Systems**

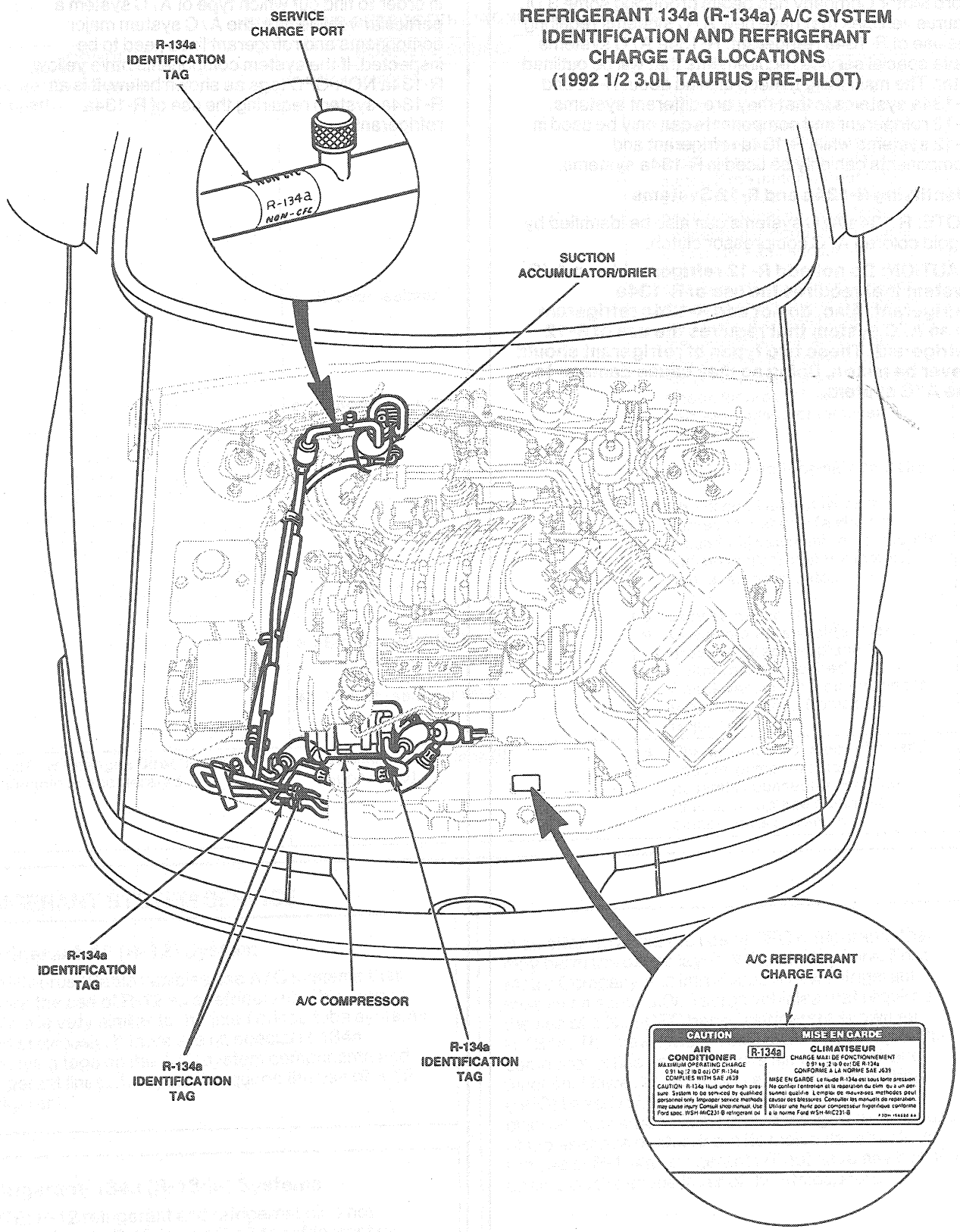
NOTE: R-134a A/C systems can also be identified by a gold colored A/C compressor clutch.

**CAUTION: Do not add R-12 refrigerant to an A/C system that requires the use of R-134a refrigerant. Also, do not add R-134a refrigerant to an A/C system that requires the use of R-12 refrigerant. These two types of refrigerant should never be mixed. Doing so may cause damage to the A/C system.**

In order to find out which type of A/C system a particular vehicle has, the A/C system major components and refrigerant lines need to be inspected. If the system components have yellow R-134a NON-CFC tags as shown below, it is an R-134a system requiring the use of R-134a refrigerant.



## REFRIGERANT SYSTEM SERVICE (Continued)



## REFRIGERANT SYSTEM SERVICE (Continued)

If the A/C system has any of the R-134a identifying characteristics previously explained, R-134a refrigerant is the only type of refrigerant that can be used in the A/C system. If the A/C system is not identified as an R-134a system as previously explained, it is an R-12 system requiring the use of R-12 refrigerant.

**R-134a Special Servicing Equipment**

**CAUTION: Do not use R-12 Special Tools and Equipment when servicing an R-134a system. Also, do not use R-134a Special Tools and Equipment when servicing an R-12 system. Doing so may cause damage to the A/C system. Refer to the Rotunda Equipment Catalog for more information on R-134a Special Servicing Equipment.**

R-134a systems require the use of special servicing equipment designed specially for R-134a systems. R-12 servicing equipment cannot be used when servicing R-134a A/C systems. R-134a special servicing equipment includes:

- R-134a Manifold gauge set
- R-134a Charging station
- R-134a Reclamation system
- R-134a Leak detector

For more information on R-134a special tools and equipment, refer to the Rotunda Equipment Catalog.

Test equipment must be connected to the refrigerant system in order to make system tests. If a charging station is used, follow the instructions of the station manufacturer.

**Refrigerant Recovery**

**Tools Required:**

- Rotunda A/C Refrigerant Reclaim System 078-00800

**CAUTION: Use extreme care and observe all safety and service procedures related to the use of refrigerants.**

Refrigerant recovery systems and recycling stations are in use in most automotive A/C service facilities. The use of such equipment makes possible the recovery and reuse of A/C system refrigerant after contaminants and moisture have been removed.

If a refrigerant recovery or recycling station is used, the following general procedures should be observed, in addition to the operating instructions provided by the equipment manufacturer.

1. Connect refrigerant recycling station hose(s) to vehicle A/C service ports and recovery station inlet fitting.

   NOTE: Hoses should have shut off devices or check valves within 25.4cm (12 inches) of the hose end to minimize the introduction of non-condensable gases (air) into the recycling station and to minimize the amount of refrigerant released when the hose(s) is disconnected.
2. Turn power to the recycling station on to start recovery process. Allow recycling station to pump refrigerant from the system until the system pressure goes into a vacuum. On some stations, the pump will be shut off automatically by a low pressure switch in the electrical system. On other units it may be necessary to manually turn off the pump.
3. Once recycling station has evacuated vehicle A/C system, close the station inlet valve (if so equipped). Then, switch off electrical power.
4. Allow vehicle A/C system to remain closed for about two minutes. Observe system pressure level as shown on the gauge. If pressure does not rise, disconnect recycling station hose(s).
5. If system pressure rises, repeat Steps 2, 3 and 4 until the vacuum level remains stable for two minutes.
6. Perform required service operations, evacuate and recharge the A/C system.

**Connecting the Manifold Gauge Set (R-12 System)**

**Tools Required:**

- High Side Adapter D81L-19703-A
- Fitting Adapter T71P-19703-S, T71P-19703-R

If a manifold gauge set is used, connect it as outlined.

1. Turn both manifold gauge set valves all the way to the right, to close the high and low-pressure hoses to the center manifold and hose. A Rotunda Adapter D81L-19703-A (Motorcraft® Tool YT-354 or 355) or equivalent must be used to connect the manifold gauge set or charging station to the high-pressure service gauge port valve.
2. Remove the caps from the high and low pressure service (Schrader) gauge port valves.
3. If the manifold gauge set or charging station hoses do not have valve depressing pins in them, install Fitting Adapters T71P-19703-S and-R (which have pins) on the low and high-pressure hoses.
4. Connect the high- and low-pressure hoses, or adapters, to the respective high and low-pressure service gauge port valves. The adapter shown in must be used on the high-pressure gauge port valve.

   A service tee fitting which may be mounted on the clutch cycling pressure switch fitting is available for use in the low-pressure side of the system.

## REFRIGERANT SYSTEM SERVICE (Continued)

**System Discharging**

**Tools Required:**

- Rotunda A/C Reclaim System 078-00800

In order to minimize the discharge of ozone depleting chlorofluorocarbons into the atmosphere, the Ford Motor Company supports the efficient usage, recovery and recycling of the R-12 used in passenger cars, compact trucks and light truck air conditioners. Ford Motor Company recommends the use of a U.L.-approved recovery/recycling device such as Rotunda Model Number 078-00800 or equivalent, (which meets SAE Standard J 1991), during any A/C system repair and recharge procedure which requires that the system be discharged.

**System Evacuating**

1. Connect manifold gauge set as outlined, if not yet connected.
2. Leak test the system as outlined.
3. Remove the refrigerant from the system as outlined.
4. Ensure both manifold gauge valves are turned all the way to the right (closed).
5. Ensure the center hose connection at the manifold gauge is tight.
6. Connect manifold gauge set center hose to a vacuum pump.
7. Open manifold gauge set valves and start the vacuum pump.
8. Evacuate the system with the vacuum pump until low-pressure gauge reads at least 99.4 kPa (29.5 in-Hg) (vacuum) and as close to 101.1 kPa (30 in-Hg) as possible. Continue to operate the vacuum pump for 30 minutes.
9. When evacuation of system is complete, close the manifold gauge set valves and turn the vacuum pump off.
10. Observe low-pressure gauge for five minutes to ensure system vacuum is held. If vacuum is held, charge the system. If vacuum is not held for five minutes, leak test the system, service the leaks, and evacuate the system again.

**System Charging Set Up:**

Ford Motor Company recommends using a charging station to perform evacuation and charging of the refrigerant system. Follow the instructions provided with the charging station.

If a charging station is not available, system charging may be accomplished using a separate vacuum pump, charging cylinder and manifold gauge set. The use of small cans of R-12 is NOT recommended.

If the charging cylinder method is used, the center port of the manifold gauge set should have two refrigerant hoses with integral shut-off valves built into the gauge set manifold. If the gauge set is the type that does not have shut-off valves and two hoses at the center port, a tee fitting and two hoses should be installed at the center port. In addition, the hoses attached to the center port should have shut-off valves at the other ends of the two center hoses to prevent air from entering the hoses when not connected to the vacuum pump and charging cylinder.

Charging with a Charging Cylinder:

1. If the vehicle suction (low) side service part is located on the accumulator, connect the gauge set center hose to the liquid port of the charging cylinder. If the suction (low) side service port is NOT on the accumulator (located on the suction hose), connect the center hose to the GAS port of the charging cylinder.

   **WARNING: LIQUID CHARGE INTO THE VEHICLE SUCTION ACCUMULATOR ONLY. TO PREVENT COMPRESSOR SLUGGING, DO NOT LIQUID CHARGE INTO A REFRIGERANT HOSE WHILE THE ENGINE IS OPERATING.**
2. When evacuating the system with the vacuum pump, the gauge set second center hose should be connected to the charging cylinder and opened to the gauge set so that the hose will be evacuated with the system.
3. When evacuation of the system is completed, close the center hose valve to the vacuum pump and turn the pump off.
4. Open the charging cylinder valve and the gauge set low side valve to allow refrigerant to enter the system.
5. When no more refrigerant is being drawn into the system, start the engine and select an A/C function on the control assembly. Then, move the blower speed controller to high to allow the remaining refrigerant to be drawn into the system. Continue to add refrigerant into the system until the specified weight of R-12 has been added. Then, close the charging cylinder valve and allow the system to pull any remaining refrigerant from the hose. When the suction pressure drops to approximately 30 psi, close the gauge set center hose valve.
6. Operate the system until the pressures stabilize to verify normal operation and system pressures.
7. In high ambient temperatures, it may be necessary to operate a high volume fan positioned to blow air through the condenser and radiator to aid in cooling the engine and prevent excessive refrigerant system pressures.
8. When charging is complete, close the valves at the ends of the low and high hoses if not equipped with automatic closing valves. Then, disconnect the manifold gauge set hoses from the vehicle and install the protective caps on the service gauge port fittings.

## REFRIGERANT SYSTEM SERVICE (Continued)

### To Disconnect Spring Lock Coupling

**Tools Required:**

- Spring Lock Coupling Tools T81P-19623-G1, T81P-19623-G2, T83P-19623-C, T85L-19623-A

1. Remove refrigerant from system as outlined. Fit Spring Lock Coupling Tools T81P-19623-G1 (3/8-inch), T81P-19623-G2 (1/2-inch), T83P-19623-C (5/8-inch) or T85L-19623-A (3/4-inch) or equivalent to the coupling (Fig. 3).
2. Close tool and push into open side of cage to expand garter spring and release female fitting.

   NOTE: The garter spring may not release if the tool is cocked while pushing it into the cage opening.
3. After garter spring is expanded, pull fitting apart.
4. Remove tool from disconnected coupling.

### To Connect Coupling

1. Check to ensure that garter spring is in cage of male fitting. If garter spring is missing, install a new spring by pushing it into cage opening. If garter spring is damaged, remove it from cage with a small wire hook (do not use a screwdriver) and install a new spring.
2. Clean all dirt or foreign material from both pieces of coupling.
3. Install new green O-rings on male fitting.

   **Use only the specified green O-rings as they are made of a special material.** The use of any O-ring other than the specified green O-ring may allow the connection to leak intermittently during vehicle operation. Refer to service parts list.

### Service Parts List

| Part Number | Description |
|---|---|
| E35Y-19D690-D | O-ring Seal Kit - A/C Spring Lock Coupling (Kit contains 3/8, 1/2 and 5/8 inch coupling O-rings and 3/8, 1/2 and 5/8 inch coupling garter springs.) |

CCL 3693-A

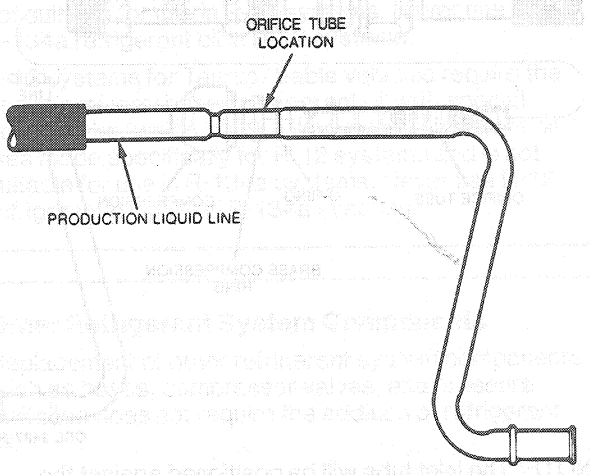
4. Lubricate male fitting and green O-rings and inside of female fitting with clean refrigerant oil.
5. Install plastic indicator ring into cage opening if indicator ring is to be used.
6. Fit female fitting to male fitting and push until garter spring snaps over flared end of female fitting.

   If plastic indicator ring is used, it will snap out of cage opening when coupling is connected to indicate engagement.
7. If indicator ring is not used, ensure coupling engagement by visually checking to verify garter spring is over flared end of female fitting.

### Fixed Orifice Tube Replacement Kit Installation

1. Discharge the A/C refrigerant system. Refer to System Discharging. Observe all safety precautions.
2. Remove the liquid line from the vehicle.
3. Locate the orifice tube by the three indented notches or a circular depression in the metal portion of the liquid line (Fig. 30).

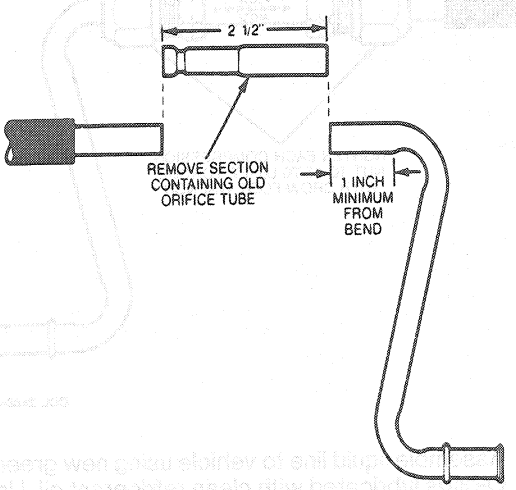
### Fixed Orifice Tube Location




CCL 2485-A

4. Note the angular position of the ends of the liquid line so that it can be reassembled in correct position.
5. Cut a 63.5mm (2-1/2 inch) section from tube at orifice tube location. Do not cut closer than 25.4mm (1 inch) from the start of a bend in tube.

### Orifice Tube Section Removed From Liquid Line



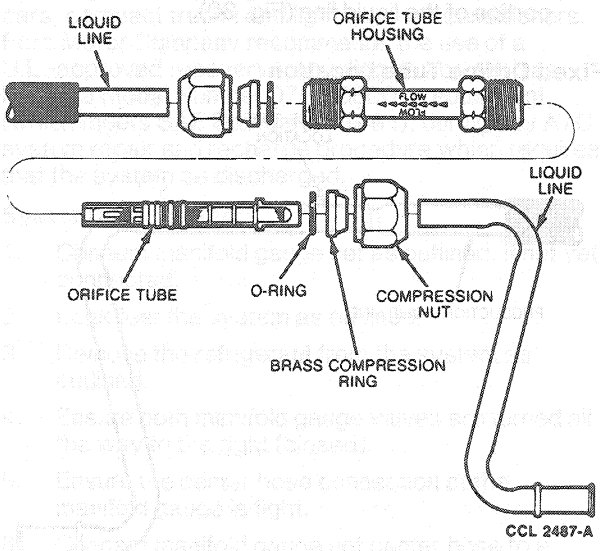

CCL 2486-A

6. Flush the two pieces of liquid line to remove any contaminants.

## REFRIGERANT SYSTEM SERVICE (Continued)

7. Lubricate O-rings with clean refrigerant oil and assemble orifice tube kit (with orifice tube installed) to liquid line. Ensure flow direction arrow is pointing toward evaporator end of liquid line, and taper of each compressor ring is toward compression nut.

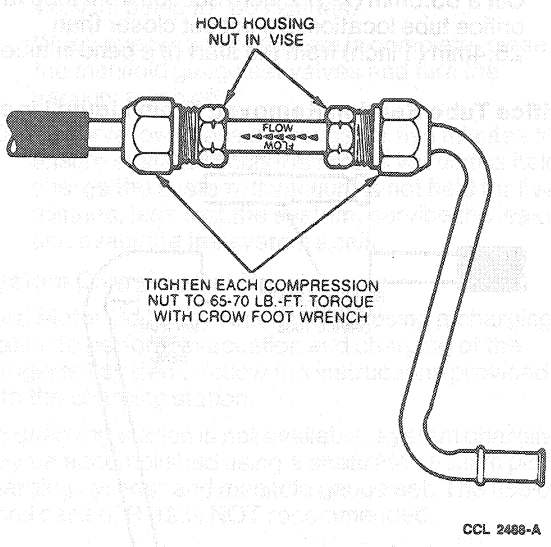
**Orifice Tube Kit Disassembled**




NOTE: The inlet tube will be positioned against the orifice tube tabs when correctly assembled.

8. While holding hex of tube in a vise, tighten each compression nut to 88-95 N·m (65-70 lb-ft) with a crow foot wrench.

**Orifice Tube Kit Installed**




9. Assemble liquid line to vehicle using new green O-rings lubricated with clean refrigerant oil. Use only specified green O-rings at spring lock coupling.
10. Leak test, evacuate and charge system following approved procedures.
11. Check system for proper operation.

**Suction Accumulator / Drier**

**Replacement Guidelines**

Replacement of the suction accumulator / drier is necessary anytime a major component of the refrigerant system is replaced. A major component includes condenser, compressor, evaporator core or a refrigerant hose / line. An orifice tube or O-ring is not considered a major component but the orifice tube should be replaced whenever the compressor is replaced for lack of performance.

In addition to the preceding condition, the accumulator / drier should also be replaced if one of the following conditions exist:

- The accumulator / drier is perforated.
- The refrigerant system has been opened to the atmosphere for a period of time longer than required to make a minor repair.
- There is evidence of moisture in the system such as internal corrosion of metal refrigerant lines or the refrigerant oil is thick and dark.

NOTE: The compressor oil from vehicles equipped with an FX-15 compressor may have a dark color while maintaining a normal oil viscosity. This is normal for this compressor because carbon from the compressor piston rings will discolor the oil and should not be confused with contaminated oil.

When replacing the suction accumulator / drier, the procedure given here must be followed to ensure that the total oil charge in the system is correct after the new accumulator / drier is installed.

1. Drain the oil from the removed accumulator / drier into a suitable measuring container. It may be necessary to drill one or two 1 / 2 inch holes in the bottom of the old accumulator / drier to ensure that all the oil has drained out.
2. Add the same amount of clean new refrigerant oil plus two fluid ounces to the new accumulator / drier. Use only the oil specified for the specific vehicle being serviced.

**Charging From Small Containers**

The refrigerant charge level of A / C systems currently being used is critical to optimum performance. An under-charge or an over-charge will adversely affect performance. Using small cans to charge these systems is not recommended because the charge level cannot be accurately controlled. A charging cylinder or a charging station is the only recommended method.

**Refrigerant System Purging to Remove Air and Moisture Vapor**

The triple evacuation procedures should be used when there are definite indications of moisture in the system. This procedure is effective in removing small amounts of moisture from the refrigerant system. However, if system is contaminated with a large quantity of water, complete system flushing will be required.

## REFRIGERANT SYSTEM SERVICE (Continued)

The principle of the three evacuations is simple. The first pulldown removes approximately 90 percent of the air and moisture vapors.

The first purge with new, dry Refrigerant-12 mixes with the remaining 10 percent.

With the next evacuation, this mixture will be drawn out so that only approximately 10 percent of the remaining air and moisture vapors remain.

The second purge with new, dry Refrigerant-12 will mix with this 10 percent and the third evacuation will finish the job by drawing out practically all the remaining vapors.

If any water was present in the system at the start of this procedure, most of it will still be there. A short period of vacuum is not long enough to boil and vaporize the water. The Refrigerant-12 purges, in passing over the liquid, will absorb only a relatively small amount of water.

This procedure is effective only when no water is in the system, and should not be used if there is any indication of water in the system.

### Adding Refrigerant Oil

It is important that only the specified type and quantity of refrigerant oil be used in the compressor. If there is surplus oil in the system, too much oil will circulate with the refrigerant, reducing the cooling capacity of the system. Too little oil will result in poor lubrication of the compressor.

The A/C compressors used on Taurus and Sable require a special refrigerant oil with special additives. Compressors used on R-12 systems require Motorcraft YN-9 oil. Compressors used on R-134a systems require oil, Ford Specification Number WSH-M1C231-B. Refer to Section 12-03A for compressor oil capacities and compressor replacement procedures.

When it is necessary to replace a component of the refrigeration system, the correct procedures must be followed to ensure the total oil charge on the system is correct after the new component is installed. During normal A/C operation, some refrigerant oil is circulated through the system with the refrigerant and some is retained in the compressor. If certain components of the system are removed for replacement, some of the refrigerant oil will go with the component. To maintain the original total oil charge, it is necessary to compensate for the oil lost by adding oil to the system with the replacement part. Refer to applicable Compressor and Clutch section for the procedure to replace lost oil.

### R-134a Refrigerant Oil

**CAUTION: Do not add R-134a refrigerant oil to an R-12 system. Also, do not add R-12 refrigerant oil YN-9 to an R-134a system. Mixing these two types of refrigerant oils may cause poor lubricant circulation resulting in component failure and damage to the A/C systems.**

The refrigerant oil required for R-134a A/C systems is a polyalkalylene glycol (PAG) oil, Ford specification WSH-M1C231-B or equivalent. This type of refrigerant oil was made specifically for R-134a systems and is not suitable for use in R-12 systems. Never use an R-134a refrigerant oil in R-12 systems.

R-12 systems for Taurus/Sable vehicles require the use of a mineral based refrigerant oil with special additives known as YN-9. This type of refrigerant oil was made specifically for R-12 systems and is not suitable for use in R-134a systems. Never use R-12 refrigerant oil YN-9 in R-134a systems.

### Other Refrigerant System Components

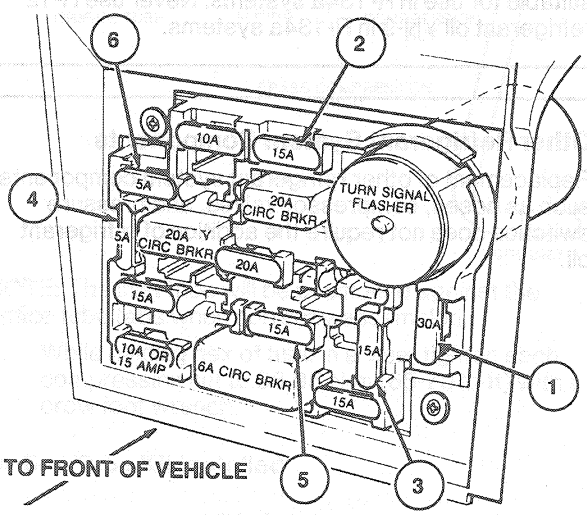
Replacement of other refrigerant system components such as hoses, compressor valves, and pressure switches does not require the addition of refrigerant oil.

## SPECIFICATIONS

### REFRIGERANT SYSTEM COMPONENTS AND CAPACITIES

| Vehicle[2] | Compressor | Clutch Cycling Pressure Switch[3] | Fixed Orifice Tube | Refrigerant Capacity[1] (oz.) | Refrigerant Capacity[1] (kg) |
|---|---|---|---|---|---|
| 3.0L EFI | FX-15 | X | X | 40 ± 1 | 1.13 ± 0.028 |
| 3.8L | FX-15 | X | X | 40 ± 1 | 1.13 ± 0.028 |
| 3.0L SHO | 10P15F | X | X | 40 ± 1 | 1.13 ± 0.028 |

1 Plus (2 oz) (.057 kg) minus (2 oz) (.057 kg)
2 All models equipped with Suction Accumulator / Drier.
3 Pressure switch opens at 169 kPa (24.5 psi)




THE FUSE PANEL IS LOCATED IN THE LOWER LH SIDE OF THE INSTRUMENT PANEL, BEHIND A COVER WHICH MUST BE REMOVED FOR ACCESS. L6394-B

### SPRING LOCK COUPLING COMPONENTS

| | |
|---|---|
| O-Ring | 3/8 inch—391302-S100<br>1/2 inch—391303-S100<br>5/8 inch—391304-S100<br>3/4 inch—391305-S100 |
| Garter Springs | 3/8 inch—E1ZZ-19E576-A (YF-990)<br>1/2 inch—E1ZZ-19E576-A (YF-991)<br>5/8 inch—E35Y-19E576-A (YF-1134)<br>3/4 inch—E69Z-19E576-A |
| **Service Kits** | |
| E35Y-19D690-D | Contains 391302, 391303, 391304, 391305 O-Rings.<br>E1ZZ-19E576-A & B and E35Y-19E576-A Springs |

### TORQUE SPECIFICATIONS

| Description | N·m | Lb-Ft |
|---|---|---|
| Orifice Tube Housing Compression Nut | 88-95 | 65-70 |
| Heater Hose Clamps | 1.81-2.49 | 17-22 (Lb-In) |

## SPECIAL SERVICE TOOLS

| Tool Number | Motorcraft Part Number | Description |
|---|---|---|
| T71P-19703-S and R | — | Fitting Adapters (R-12 System, Low Pressure) |
| D81L-19703-A | YT-367 | Service Access Adapter (R-12 System, High Pressure) |
| T81P-19623-G1 | — | Spring-Lock Coupling Disconnect Tool—3/8 inch |
| T81P-19623-G2 | — | Spring-Lock Coupling Disconnect Tool—1/2 inch |
| T83P-19623-C | — | Spring-Lock Coupling Disconnect Tool—5/8 inch |
| T85L-19623-A | — | Spring-Lock Coupling Disconnect Tool—3/4 inch |
| D87P-19703-A | — | Tee Adapter Tool (R-12 System) |
| D88P-19703-B | — | Leak Test Adapter Kit (Evaporator / Condenser) |

### ROTUNDA EQUIPMENT

| Model | Description |
|---|---|
| 021-00012 | Radiator / Heater Core Pressure Tester |
| 023-00007 | Dial Thermometer |
| 055-00014 or 055-00015 | Electronic Leak Detector |
| 063-00003 | Safety Shield Goggles |
| 063-00010 | Air Conditioning Service Kit |
| 078-00800 | A / C Reclaim System |
| 112-00021 | Ultraviolet Lamp |
| 112-00027 | Fluoro-Lite |
| 112-00028 | A / C Tracer Dye Injector |