



# AIR CONDITIONING SYSTEM DIAGNOSIS

## TROUBLESHOOTING

*An air conditioner is a system which cools and dehumidifies the interior of a vehicle by removing heat and moisture.*

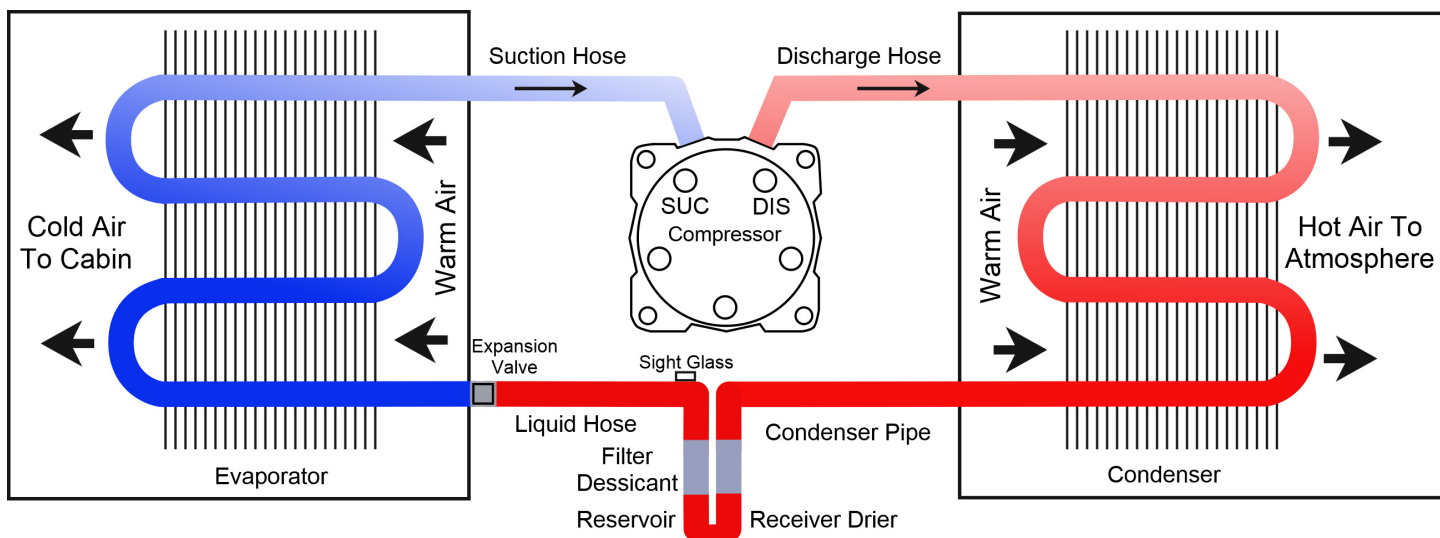
### NO COOLING FROM SYSTEM

- 1 - Blown fuse.
- 2 - Broken or disconnected electrical wire.
- 3 - Broken or disconnected ground wire.
- 4 - Clutch coil or solenoid burned out or disconnected.
- 5 - Electrical switch contacts in thermostat burned excessively or sensing element defective.
- 6 - Blower motor disconnected or burned out.
- 7 - Ignition switch ground or relay burned out.
- 8 - Loose or broken drive belt.
- 9 - Compressor partially or completely frozen.
- 10 - Compressor reed valves inoperative indicated by slight variation of both gauge readings at engine speed.
- 11 - Expansion valve stuck open - indicated by normal discharge pressure, high suction pressure and evaporator flooding.
- 12 - Heater valve inoperative - indicated by hot water in heater and hot discharge air from evaporator.
- 13 - Broken refrigerant line.
- 14 - Fusible plug blown (not used on all systems).
- 15 - Leak in system.
- 16 - Clogged screen or screens in receiver-dehydrator or expansion valve. Plugged hose or coil,
- 17 - Compressor shaft seal leaking.

### INSUFFICIENT COOLING FROM SYSTEM

- 1 - Blower motor sluggish.
- 2 - Compressor clutch slipping.
- 3 - Obstructed blower discharge passage.
- 4 - Clogged air intake filter.
- 5 - Insufficient air circulation over condenser coil (fins clogged with dirt or bugs).
- 6 - Evaporator clogged.
- 7 - Outside air vents open.
- 8 - Insufficient refrigerant in system.
- 9 - Clogged screen in expansion valve indicated by gauge pressures being normal or showing slightly increased discharge pressure and low suction pressure with evaporator air output temperature high.
- 10 - Expansion valve thermal bulb has lost its charge - indicated by too high a low gauge reading and excessive sweating of evaporator and suction line.
- 11 - Clogged screen in receiver - indicated by higher than normal reading on high pressure gauge, lower than normal reading on low pressure gauge, and liquid lines cold to touch with possible frost.
- 12 - Excessive moisture in system - indicated by excessive head pressure gauge reading.
- 13 - Air in system - indicated by excessive head pressure and possibly bubbles in sight glass.
- 14 - Thermostat defective or improperly adjusted indicated by low gauge reading high or clutch cycling at too high a reading.

# TROUBLESHOOTING



## CHECK THESE FIVE POINTS

- 1 - Test gauges connected.
- 2 - All gauge hoses are purged.
- 3 - System is stabilized
- 4 - Performance Test was conducted.
- 5 - Gauge readings are documented.

## LACK OF COOLING

Compressor Running Rough or Intermittently or Inoperative

- 1 - Check belt and belt
- 2 - Check clutch air gap.
- 3 - Check clutch voltage, amps, lead wire, earth.
- 4 - Check shaft turning smoothness test.
- 5 - Check for low refrigerant charge.
- 6 - Leak test compressor.
- 7 - Leak test and diagnose system.

## INTERMITTENT COOLING

- 1 - Defective circuit breaker, blower switch or blower motor.
- 2 - Bad earth connection or loose electrical connection in compressor clutch coil or solenoid.
- 3 - Compressor clutch slipping.
- 4 - Expansion valve icing up - may be caused by excessive moisture in the system or incorrect super heat adjustment.
- 5 - Evaporator, coil icing up - thermostat probe not in coil fins, thermostat adjusted too low, defective thermostat.
- 6 - Clogged evaporator fins.

## NOISY SYSTEM

- 1 - Defective winding or improper connection in compressor clutch coil or solenoid.
- 2 - Loose or excessively worn drive belts.
- 3 - Noisy clutch.
- 4 - Compressor noisy - loose mounting or worn inner parts.
- 5 - Loose panels on car.
- 6 - Compressor oil level low.
- 7 - Blower fan noisy - excessive wear in motor.
- 8 - Idler pulley and bearing defective.
- 9 - Excessive charge in system - rumbling noise or vibration in high pressure line, thumping noise in compressor, excessive head pressure and suction pressure, bubbles or cloudiness in sight glass, or low head pressure.
- 10 - Low charge in system-hissing in evaporator case at expansion valve, bubbles or cloudiness in sight glass or low head pressure.
- 11 - Excessive moisture in system - expansion valve noisy, suction pressure low.

## UNUSUAL NOISE WHEN CLUTCH ENGAGED

- 1 - Check all compressor mounting components.
- 2 - Check engine components.
- 3 - Check for intermittent or slipping clutch.
- 4 - Check clutch bearing,
- 5 - Check shaft turning smoothness.
- 6 - Check oil level.

## UNUSUAL NOISE WHEN CLUTCH DISENGAGED OR CHATTERING

- 1 - Check fuse and electrical supply.
- 2 - Check air gap.

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# TESTING SEQUENCE

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## TEST 1 - SYSTEM INOPERATIVE

- 1 - Check system fuse.
- 2 - Check belt tension. Tighten or replace belt.
- 3 - Check for current at clutch coil. If present, check defective clutch coil or clutch. Ensure good earth connection.
- 4 - Check system controls, relay wiring & thermostat, etc.
- 5 - Make visual check on all fittings and for burst or seeping hoses.
- 6 - Check air gap of clutch.

## TEST 2 - INSUFFICIENT COOLING

**High Side: Low, Low Side: Low**

### ***Bubbles in Sight Glass***

Refrigerant is low. May be caused by small leak.

- 1 - Check for leakage & correct.
- 2 - Add requirement until disappear and both gauges show a normal reading.

### ***NO Bubbles in Sight Glass***

Gauge readings are excessively low. Possibly no liquid in sight glass.

- 1 - A serious leak may be indicated
- 2 - Expansion valve screen may be clogged.
- 3 - Expansion valve may be stuck closed.

Replace valve.

## **High Side: High, Low Side: High**

Refrigerant Overcharge

Note. Sight glass may show bubbles.

Bleed off refrigerant until heavy stream of bubbles appear, then charge with refrigerant until bubbles eliminated from sight glass.

## **Engine Cooling System**

- 1 - Check belt tension and adjust. Use tension gauge.
- 2 - Test radiator pressure cap and system thermostat.
- 3 - Check all hoses.
- 4 - Ensure there is antifreeze in coolant.
- 5 - Check heater water valve.

## **Condenser**

- 1 - May be blocked and not having sufficient air flow. Remove screen and clean condenser.
- 2 - Clearance between radiator and condenser must be to system design dimensions.

## **Expansion Valve**

Test valve using the "R-t34a" test

- 1 - If valve responds to test, remove bulb from tailpipe and clean contacts. Replace bulb and tighten securely.
- 2 - If valve does not respond to test, replace expansion valve.

## **High Side: Normal, Low Side: Normal**

Note: LOW side gauge reading may or may not drop into vacuum while testing.

Moisture in System

- 1 - Purge refrigerant from system.
- 2 - Replace drier.
- 3 - Evacuate system and recharge.

## **High Side: High, Low Side: Normal**

Note: Low side gauge reading will be constant and will not drop.

Air In System

- 1 - Purge refrigerant from system.
- 2 - Replace drier.
- 3 - Evacuate system and recharge.

## **High Side: High, Low Side: Low**

Restriction

Liquid line or receiver-drier shows heavy sweating or frost immediately after point of frost.

- 1 - Remove component, clear restriction or renew component.

## **High Side: Normal, Low Side:**

### **Normal~High**

Thermostatic Switch

Compressor cycles (cuts in and out too rapidly).

Thermostatic switch defective (range between points is incorrectly set)

Replace thermostst.