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Troubleshooting

Basic Troubleshooting Procedures

1. Is there any noise from a loose drive belt?

   - Loose or worn drive belt, various squeaking and slapping noises. If such noises are heard, check and adjust the drive belt tension.

2. Is there any noise from the compressor area?

   - Check the compressor and bracket for loose bolts and tighten them if necessary.

3. Is there any noise from the compressor?

   - Suction/Discharge valve damage and internal wear are possible sources of noise from within the compressor.

4. Has mud or dirt adhered to the condenser?

   - Remove any mud and dirt since this drastically reduces heat radiation, which in turn adversely affects the cooling performance. Do not scratch or bend the condenser fins.

   4.5 Are the condenser fans operating properly?

   - Check power to the fan motors, wire harness, relays (systems must have minimum of 30 PSI to close lower pressure switch)

5. Is there any oil contamination on the pipe unions or the compressor?

   - Oil contamination at such places indicates that refrigerant from the systems is leaking together with compressor oil. If oil contamination is discovered check for leaks using a leak detector and replace as necessary.
   - Carefully check the compressor, manifold, seal washers, shaft seal and pressure switches.

6. Is there any noise from the blower motor?

   - If the fan motor is noisy or does not operate correctly, disassemble the fan motor and repair or replace parts as necessary.

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Troubleshooting

Troubleshooting Chart

A. Blower motor does not operate (Main Unit)

Possible Cause	Inspection	Solution
1. Blown circuit breaker	Inspect the circuit breaker	Reset circuit breaker/repair wiring
2. Broken wiring or bad connection	Check the fan motor ground and connectors	Repair the wiring or connectors
3. Fan motor malfunction	Check the lead wires from the motor with the circuit tester	Replace
4. Broken resistor wiring	Check resistor using a circuit tester	Replace
5. Fan motor switch malfunction	Operate the fan switches in sequence and check whether or not the fan operates	Replace

B. Blower motor operates normally, but air flow is insufficient

Possible Cause	Inspection	Solution
1. Evaporator inlet obstruction	Check the blower inlet	Remove any obstructions and clean
2. Air leak	Check the cooling unit case joints	Repair and adjust
3. Defective thermostat switch. (frozen evap)	Check the switch using a circuit tester	Replace
4. Duct hose off, crushed or torn	Inspect Hose	Repair, Replace

C. Insufficient cooling although air flow and compressor operations are normal

Possible Cause	Inspection	Solution
1. Insufficient refrigerant	There will be little temperature difference between the low and high pressure sides	Repair any leaks and recharge the refrigerant to the correct level
2. Excessive refrigerant	Verify by gauge reading	Utilize your refrigerant recovery equipment to capture excess refrigerant. Charge to the correct refrigerant level.
3. Bad water valve	With the A/C on heater hose from water valve to main unit should be ambient under hood temp	Check power of actuator and actuator motion replace valve
4. Water valve cable	Verify cable and completely shut off water valve	Adjust cable

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D. Condenser fans do not operate (System must have 30 PSI min.)

Possible Cause	Inspection	Solution
1. Loose drive belt	The belt oscillates considerably	Adjust tension
2. Internal compressor malfunction	The drive belt slips	Replace the compressor
	Magnetic Clutch related	
3. Low battery voltage	Clutch slips	Recharge the battery
4. Faulty coil	Clutch slips	Replace the magnetic clutch
5. Oil on the clutch surface	The magnetic clutch face is dirty, causing it to slip	Replace or clean the clutch surface
6. Excessive clearance between the clutch disk. The clutch plate clings when pushed	Check clutch gap according to specification	Adjust the clearance or replace the clutch
7. Open coil	Clutch does not engage and there is no reading when a circuit tester is connected between the coil terminals	Replace
8. Broken wiring or poor grounds	Clutch will not engage at all. Inspect the ground connections	Repair
9. Wiring harness components	Test the conductance of the pressure switch and thermostat	Check operations, referring to the wiring diagram and replace defective pars.

E. Condenser fans do not operate (System must have 30 PSI min.)

Possible Cause	Inspection	Solution
1. Broken wiring or bad connection	Check connections at fan motors and drier mounted relay	Repair and replace
2. Bad relay	Test conductance of relay power in from switch, power in from circuit breaker and power out to fans	Replace relay

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Troubleshooting

Gauge Pressure Related Troubleshooting

Normal compressor suction and discharge pressures at an atmospheric temperature of 30-38 degree Celsius (86-96deg) and engine speed of approx. 1,500 r/min are:

High-pressure side pressure: 1.5-1.7 Mpa (15-17kg/cm, 213-242 psi)
Low-pressure side pressure: 0.13-0.2 Mpa (1.3-2.0kg/cm, 18-28 psi)

Possible Cause	Inspection	Solution
Low-pressure side too high	The low-pressure normally becomes too high when the high-pressue is too high. As this is explained below, the following inspection is only used when the low-pressure side pressure is too high.	
1. Defective thermo-switch	The magnetic clutch switch turns off before the outlet air temperature is sufficiently low	Replace the thermo-switch
2. Defective compressor gasket	The high and low-pressure side gauge pressures equalize when the magnetic clutch is turned off	Replace the compressor
3. Poor expansion valve temperature sensor contact	Frost adhered to the suction hose/pipe	Install the temperature sensor against the low-pressure pipe
4. The expansion valve open too far	Same as above	Replace
Low-pressure side too low		
1. Insufficient refrigerant	Refer to (C) 1., “insufficient refrigerant” on previous page	
2. Clogged drier tank	Considerable temperature difference between the inlet and the outlet sides, or tank is frosted over	Replace the liquid tank
3. Clogged expansion valve	The expansion valve’s inlet side is frosted	Replace the expansion valve
4. Expansion valve temperature sensor gas leak (damaged capillary tube, etc.)	The expansion valve’s outlet side is chilled and low pressure gauge reading will decrease, or a negative reading may be shown. A frost spot may be present at the point of restriction	Clean or replace piping
5. Clogged or blocked piping	When the piping is clogged or blocked the low-pressure gauge reading will decrease, or a negative reading may be shown. A frost spot may be present at the point of restriction	Clean or replace piping
6. Defective thermo-switch	The evaporator is frozen	Adjust or replace the thermo-switch

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Possible Cause	Inspection	Solution
High-pressure side too high		
1. Poor condenser cooling	Dirty or clogged condenser fins. Cooling fans do not operate correctly	Clean and/or repair the fan
2. Excessive refrigerant	Refer to (C) 2., "Excessive refrigerant" on previous page	
3. Air in the system	Pressure is high on both high and low sides	Evacuate and recharge with refrigerant
High-pressure side too low		
1. Insufficient refrigerant	Refer to (C) 1., "Insufficient refrigerant" on previous page	

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Troubleshooting

Gauge Pressure Diagnosis

- Problems in the system can be diagnosed using a manifold gauge by reading the system's low and high pressures.

Normal Pressures
Low-pressure side: 0.13-0.2 Mpa (1.3-2.0kgf/cm, 18-28 psi)

High-pressure side: 1.5-1.7 Mpa (15-17kgf/cm, 213-242 psi)

Conditions
Atmospheric temperature: 30-35° C (86° - 95°)
Engine speed: 1,500 rmp
Blower speed: HI (high speed)
Temperature switch: Full Cooling

Insufficient Refrigerant
Indications:

- Low pressures on both the low-pressure and high-pressure sides
- Discharge temperature will not decrese.

Cause: Improper refrigerant charge.
Solution: Inspect using a leak detector, repair the leak and replenish the refrigerant to the proper charge level.

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Troubleshooting

Excessive Refrigerant (Poor Condenser Radiation)

Indication: Both the low and high pressures are too high.

Causes:

- Pressure increases due to excessive refrigerant
- Insufficient condenser cooling

Solution:

- Verify the refrigerant level
- Clean the condenser
- Check and adjust the fan belt and /or condenser fan motor(s)

Air in Cooling System (Insufficient Suction)

Indications:

- Both the low and high pressures are too high
- The low-pressure side piping is not cold

Cause: Air has entered the system

Solution: Evacuate the system, replenish the refrigerant and check the gauge readings. After prolonged operation with air in the system, the liquid tank must be replaced.

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Troubleshooting

Defective Expansion Valve

Indication: Both the low and high pressures are too high

Causes:

- Improper refrigerant charge
- Defective expansion valve
- Improper temperature sensor installation

Solution:

- Verify refrigerant charge
- Check temperature sensor installation, and insulation
- If refrigerant charge, and temperature sensor installation and insulation are correct, replace the expansion valve.

Insufficient Compressor Operation (Compression)

Indications:

- High pressure on the low-pressure side, pressure too low on the high-pressure side
- The high and low pressures are equal when operation is stopped

Cause: Insufficient compression due to a defective compressor gasket or damaged suction valve

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Troubleshooting

Moisture Intrusion

Indications: The low-pressure side alternates between a vacuum and normal pressure

Causes: Moisture has frozen in the air conditioner system, clogging the expansion valve. When the ice melts. Normal operation resumes.

Solution:

- Replace the liquid tank
- Evacuate the system
- Recharge with refrigerant to the proper level

Refrigerant Does Not Circulate

Indications:

- low-pressure side becomes a vacuum and the high-side pressure side pressure reads 0.49-0.59Mpa (5-6kgf/cm, 72-85 psi)
- Frost or condensation appears on the front and the rear pipe connections of the liquid tank or expansion valve

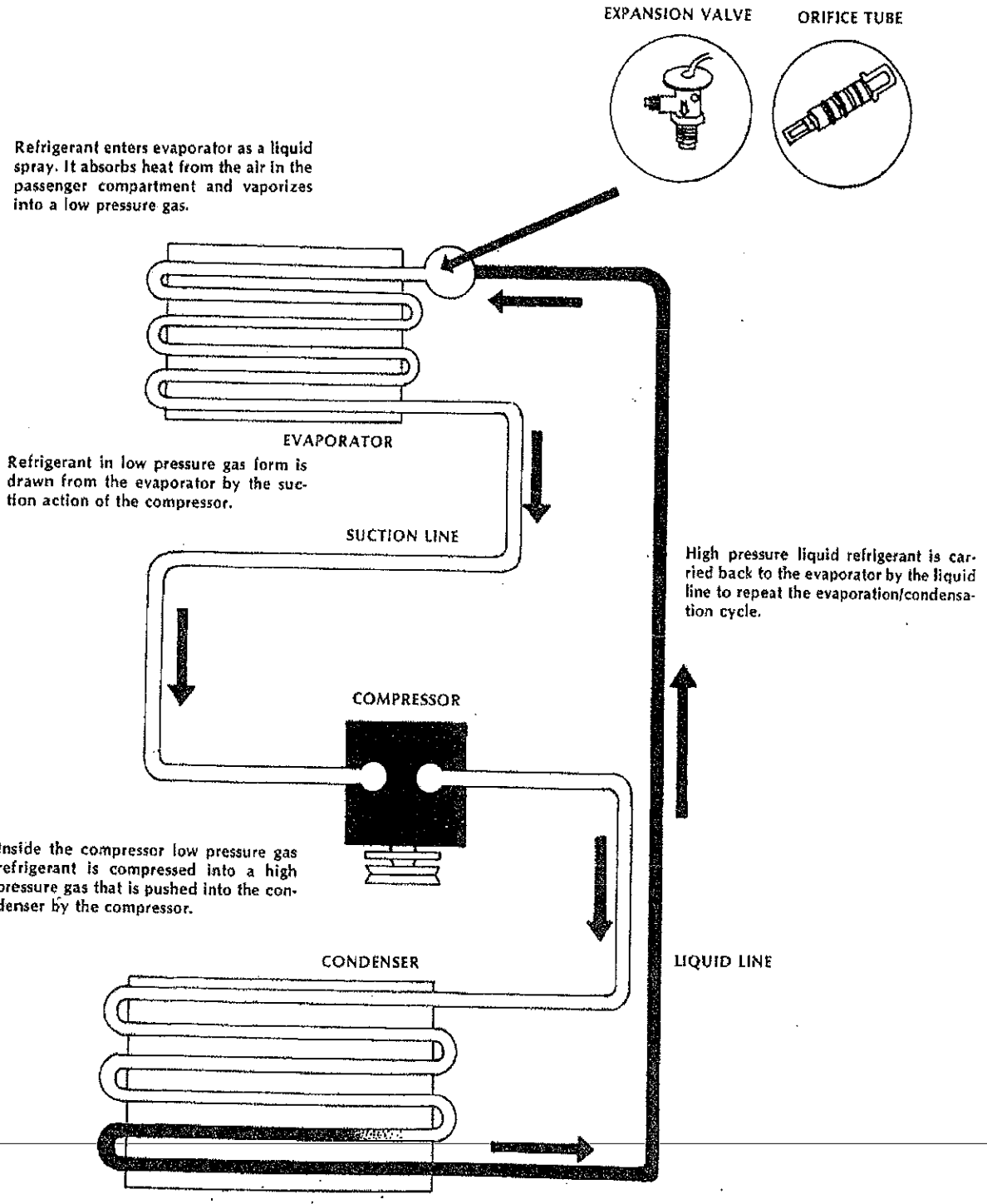
Causes:

- The air conditioner system is blocked by contamination or ice
- The air conditioner system is shut off, by a defective valve temperature sensor

Solution:

- Stop operation and check for contamination or ice
- If moisture is the problem, evacuate the system
- Replace the liquid tank
- Recharge with refrigerant to the proper level

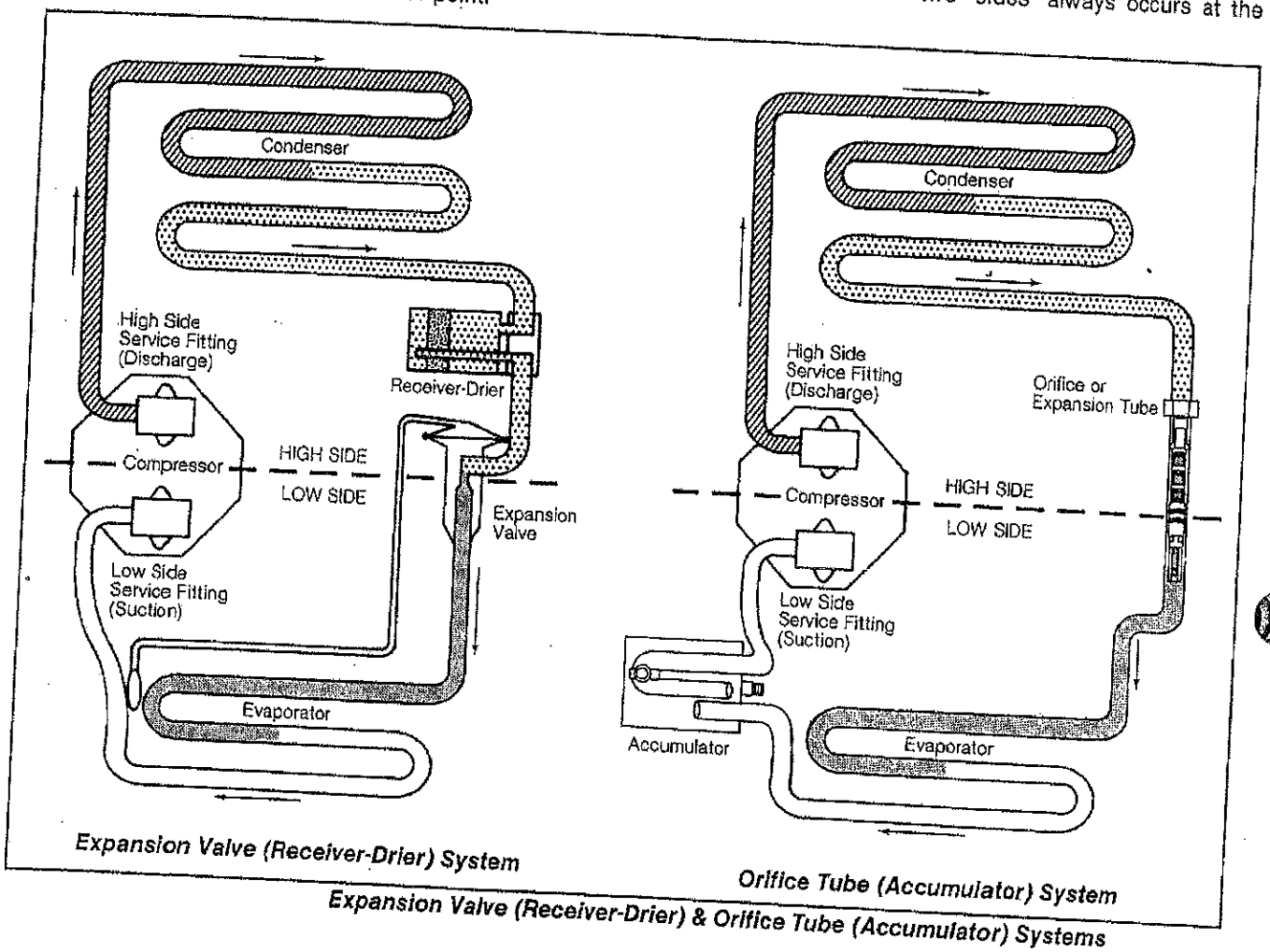
REFRIGERANT CIRCUIT



DESCRIPTION

AIR CONDITIONING SYSTEM HAS HIGH AND LOW SIDES

Let's start our discussion of the A/C system by looking at the following diagram. We have mentioned that an air conditioner has a High Side and Low Side. This is true of all air conditioning systems, and the division of these two "sides" always occurs at the same point.



Expansion Valve (Receiver-Drier) System

Orifice Tube (Accumulator) System

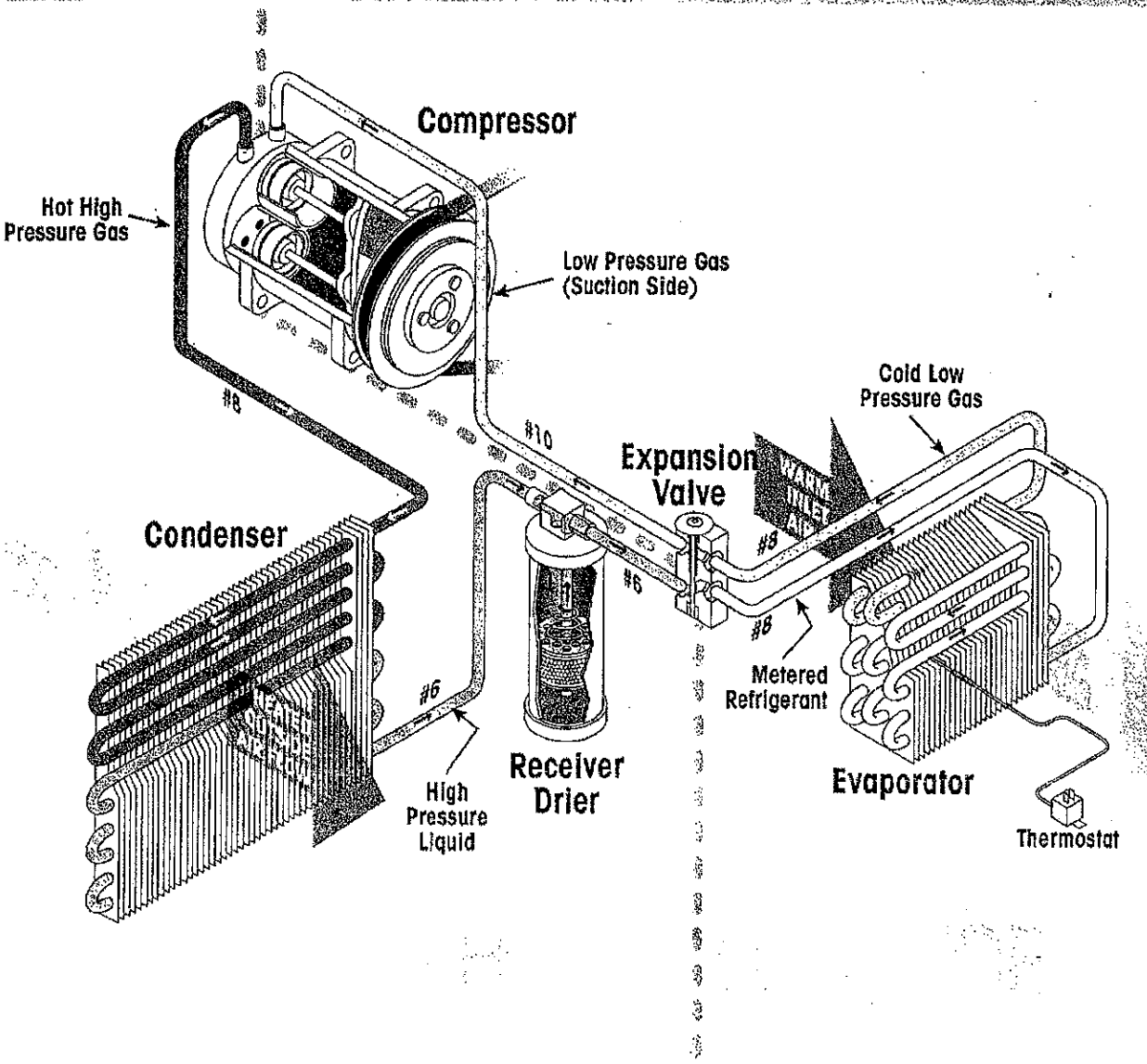
Expansion Valve (Receiver-Drier) & Orifice Tube (Accumulator) Systems

High Side simply refers to the side of the system in which high pressure exists. As shown in the illustration, the high side is (following the flow arrows) from the outlet (discharge) side of the compressor, through the condenser, through the receiver-drier (if equipped) and to the expansion valve (or orifice tube).

It is the compressor's job to create the high pressure (higher temperature) so the R-12 will be able to condense and release heat at the condenser. A pressure differential is created at the expansion valve or orifice tube – the dividing point on the front side of the system. The expansion valve will be explained in detail later in this section.

Low Side is the term used for the portion of the air conditioning system in which low pressure and temperature exist. From the expansion valve (or orifice tube), through the evaporator and accumulator (if equipped) to the inlet side (suction) of the compressor, the R-12 is in a low-pressure state. This allows heat to be transferred from inside the car to the "colder" R-12, which then carries it away.

TYPICAL PLUMBING SCHEMATIC



Air Conditioner components are connected together to illustrate system operation. The components shown are not to scale. The refrigerant and refrigerant oil are clear in color and not visible in this drawing; however, we've attempted to suggest temperature variants through the use of values of gray in the pipeline. The small arrows inside the components and connecting hoses show the direction of refrigerant flow (refrigerant circuit).