USING R-134A REFRIGERANT

HANDLING/SAFETY PRECAUTIONS

1. Always work in a well-ventilated, clean area. Refrigerant is colorless and invisible as a gas. Refrigerant is heavier than oxygen and will displace oxygen in a confined area. Avoid breathing refrigerant vapors. Exposure may irritate eyes, nose and throat.
2. Always wear eye protection when working around A/C system and refrigerant. The system's high pressure can cause severe injury to eyes and skin if a hose were to burst. If necessary, wear rubber gloves or other protective clothing.
3. Refrigerant evaporates quickly when exposed to atmosphere, freezing anything it contacts. If liquid refrigerant contacts eyes or skin (frostbite), DO NOT rub eyes or skin. Immediately flush affected area with cool water for 15 minutes and consult a doctor or hospital.
4. Never use R-134a in combination with compressed air for leak testing. Pressurized R-134a in the presence of oxygen (air concentrations greater than 60 percent by volume) may form a combustible mixture. DO NOT introduce compressed air into R-134a containers (full or empty), A/C system components, or service equipment.
5. DO NOT expose A/C system components to high temperatures (steam cleaning for example), as excessive heat will cause refrigerant system pressure to increase. Never expose refrigerant directly to open flame. If refrigerant needs to be warmed, place bottom of refrigerant tank in warm water. Water temperature MUST NOT exceed 125°F (52°C).

CAUTION: When R-134a is exposed to an open flame, drawn into engine, or detected with a Halide (propane) leak tester, a poisonous gas is formed. Keep work areas well ventilated.

6. Use care when handling refrigerant containers. DO NOT drop, strike, puncture, or incinerate containers. Use Department Of Transportation (DOT) approved (DOT 4BW or DOT 4BA) refrigerant containers.
7. Never overfill refrigerant containers. The safe filling level of a refrigerant container MUST NOT exceed 60% of the container's gross weight rating. Store refrigerant containers at temperatures less than 125°F (52°C).
8. R-134a refrigerant is sold and stored in 30- or 50-pound Light Blue containers, while Freon (R-12) is stored in White colored containers.
9. Refrigerant R-12 and R-134a must never be mixed, as they and their desiccants and lubricants are not compatible. If the refrigerants are mixed, system cross-contamination or A/C system component failure may occur. Always use separate servicing and refrigerant recovery/recycling equipment.
10. Read and follow equipment manufacturer's instructions for all service equipment to be used. The Material Safety Data Sheet (MSDS), provided by refrigerant manufacturer/supplier, contains valuable information regarding the safe handling of refrigerants.

IDENTIFYING R-134A SYSTEMS & COMPONENTS

To prevent refrigerant cross-contamination, use following methods to identify R-134a based systems and components.

Fittings & "O" Rings

All R-134a based A/C systems use 1/2" - 16 ACME threaded fittings (identifiable by square threads) and quick-connect service ports. See **Fig. 1** .

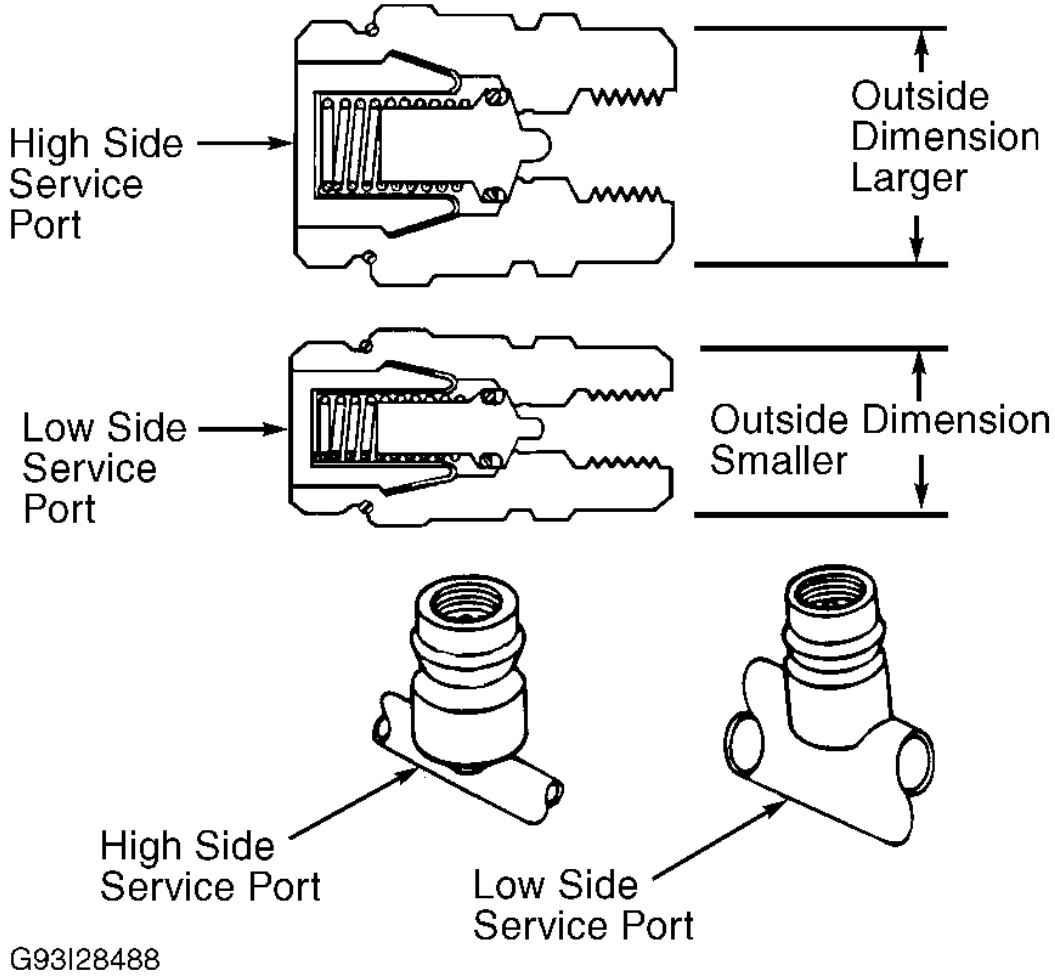


Fig. 1: Identifying R-134a Service Ports
Courtesy of CHRYSLER CORP.

Underhood A/C Specification Labels

Most R-134a based systems will be identified through the use of underhood labels with R-134a refrigerant clearly printed on labels. See **Fig. 2** . Most manufacturers will identify refrigerant type with labels affixed to compressor. Before servicing an A/C system, always determine which refrigerant is being used.

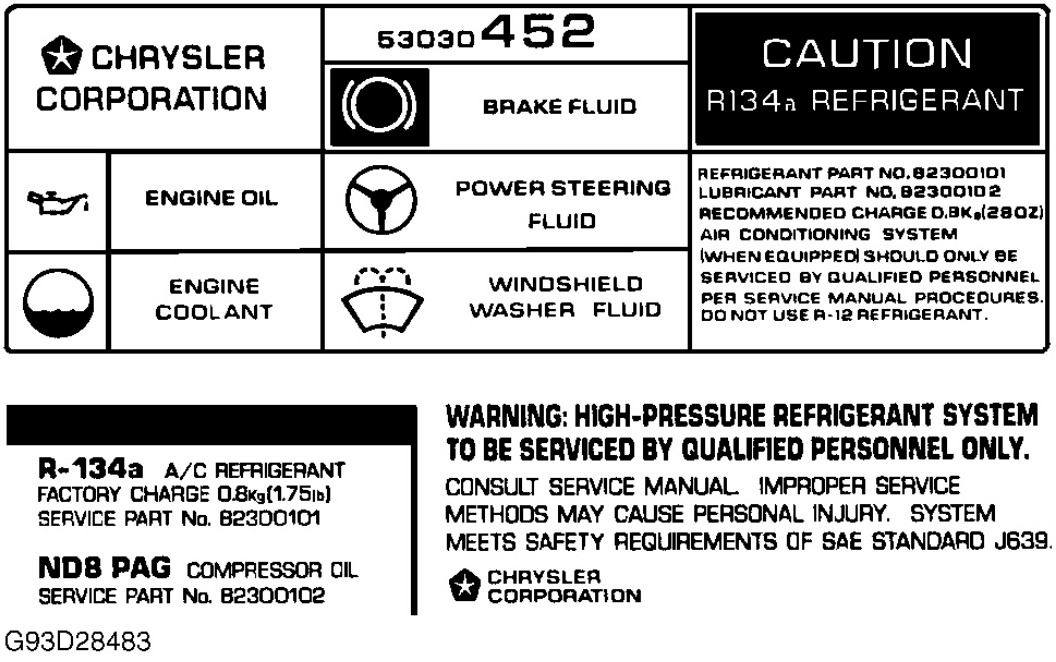


Fig. 2: Underhood Refrigerant Identification Labels (Typical)
Courtesy of CHRYSLER CORP.

REFRIGERANT OILS

Refrigerant R-12 based systems use mineral oil, while R-134a systems use synthetic Polyalkylene Glycol (PAG) oils. Using a mineral oil based lubricant with R-134a will result in A/C compressor failure due to lack of proper lubrication.

Following are the most common R-134a refrigerant oils used by most domestic vehicles:

General Motors

On all models except Saturn, use PAG Refrigerant Oil (Part No. 12345923). On Saturn, use Saturn PAG Refrigerant Oil.

NOTE: Synthetic/PAG oil absorbs moisture very rapidly, 2.3-5.6 percent by weight as compared to a mineral oil absorption rate of .005 percent by weight.

NOTE: **Use ONLY the specified oil for the appropriate system or A/C compressor. Always check the underhood A/C specification label or A/C compressor label before adding refrigerant oil to A/C system.**

SYSTEM SERVICE VALVES

SCHRADER-TYPE VALVES

NOTE: **Although similar in construction and operation to a tire valve, NEVER replace a Schrader-type valve with a tire valve.**

Schrader valve is similar in construction and operation to a tire valve. See **Fig. 3** . When a test gauge hose is attached (hose has built-in valve core depressor), Schrader stem is pushed inward to the open position and allows system pressure to reach the gauge.

If test hose being used does not have a built-in core depressor, an adapter must be used. Never attach hoses or adapters to a Schrader valve unless it is first connected to manifold gauge set.

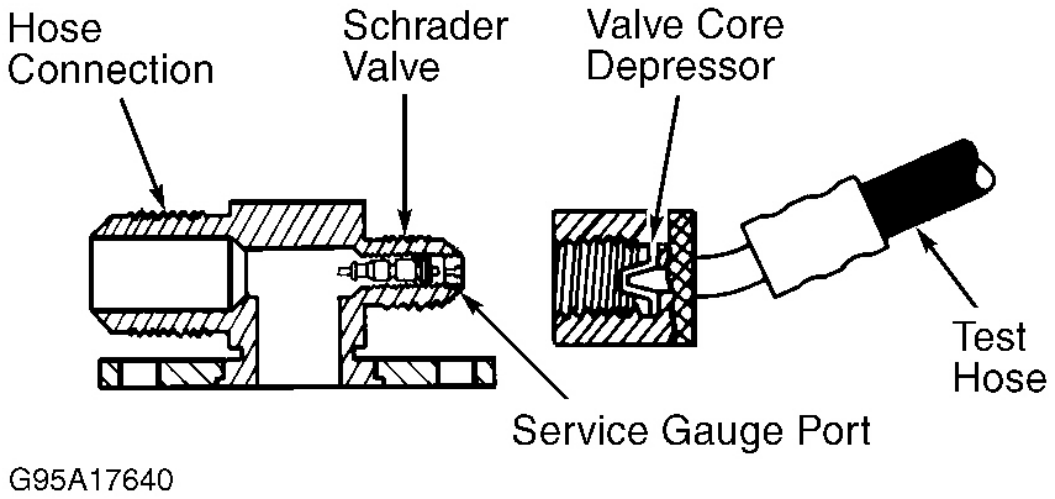


Fig. 3: Schrader Service Valve (Compressor Location Shown)

SPECIAL VALVE CONNECTORS

On some General Motors models, thread size on high-side service valve (3/8" - 24 threads) is different from thread size on low-side service valve (7/16" - 20 threads). Special adapters are required to make this connection. See **Fig. 4** . These adapters are available in 45-degree and 90-degree angles in addition to straight-fixed and flexible adapters.

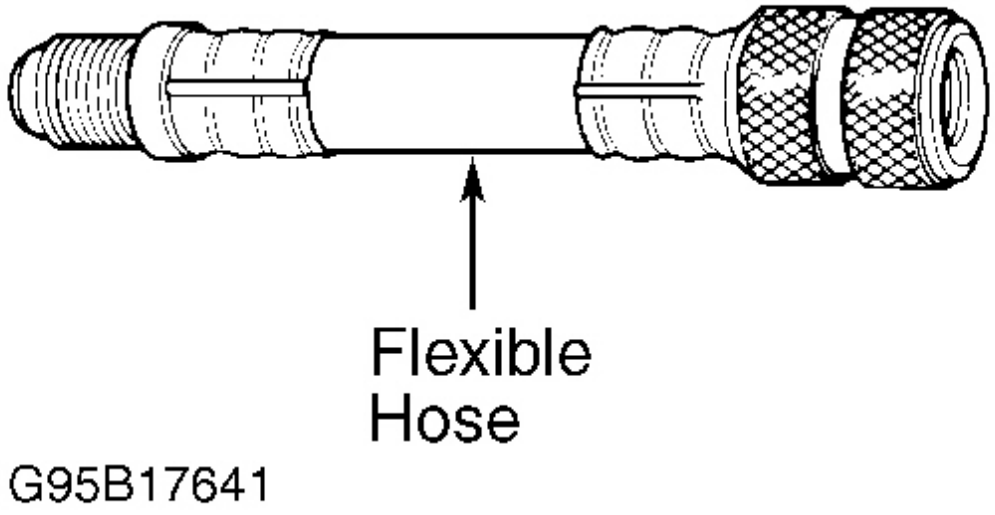


Fig. 4: Flexible High Side Adapter

R-134A SERVICE VALVES/PORTS

All vehicles with R-134a refrigerant use quick-disconnect service valves/ports. All R-134a systems use quick-disconnect fittings with sealing caps that thread into inside of service port instead of onto outside of service port.

The high side uses a large service port, and the low side uses a small service port. See **Fig. 1** . The R-134a service ports have internal metric threads to help prevent the accidental connection of R-12 servicing equipment.

There are 2 types of quick-disconnect service couplings which can be used on R-134a systems. One type of service coupling depresses service port valve when connection is made. The other type connects onto service port but will not depress service port valve until a knob is rotated. See **Fig. 5** .

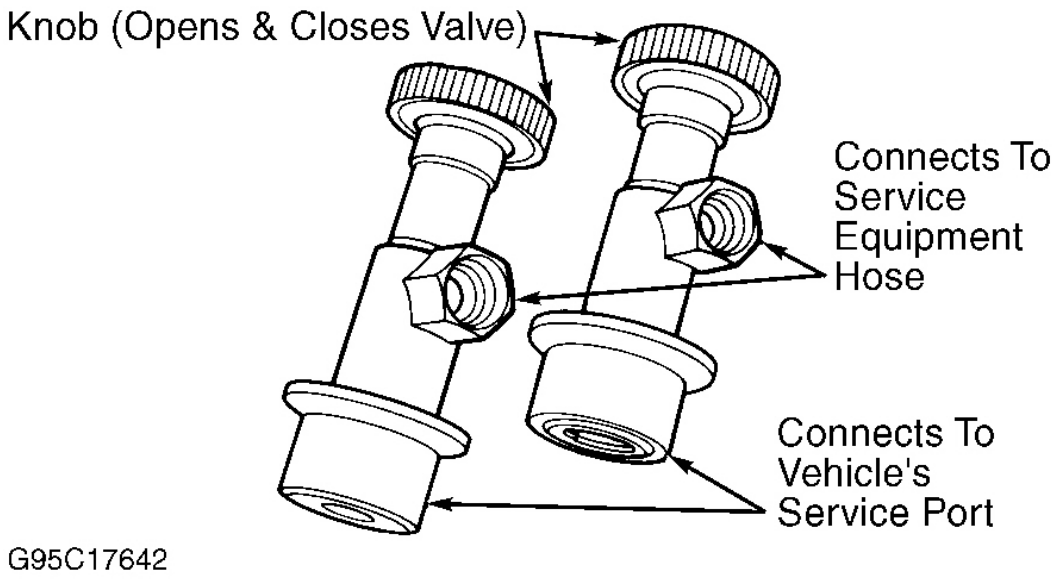


Fig. 5: R-134a Service Couplings
Courtesy of CHRYSLER CORP.

SERVICE VALVE LOCATIONS

For service valve locations, see **SERVICE VALVE LOCATIONS** table.

SERVICE VALVE LOCATIONS

Vehicle	High	Low
"C" Body	(5)	(6)
"E" & "K" Bodies	(5)	(6)
"F" Body	(1)	(2)
"G" Body	(5)	(6)
"H" Body	(3)	(4)
"J" Body	(3)	(4)
"M" Body	(1)	(2)
"N" Body	(1)	(7)
"S" Body	(1)	(2)
"V" Body	(1)	(2)
"W" Body	(1)	(2)
"Y" Body	(8)	(4)

"Z" Body	(6)	(7)

(1) On high pressure (discharge) line, near condenser.

(2) On low pressure (suction) line, near evaporator.

(3) On high pressure line, between compressor and condenser.

(4) On low pressure line, between compressor and accumulator.

(5) On high pressure line, between orifice tube and condenser.

(6) On low pressure line, between orifice tube and evaporator.

(7) On evaporator-to-compressor line, near evaporator Cutlass and Malibu). On evaporator-to-compressor line, near compressor (Achieva, Grand Am and Skylark).

(8) On high pressure (liquid) line between condenser and evaporator, near condenser, on right side of engine compartment.

SERVICE EQUIPMENT

Because R-134a is not interchangeable with R-12, separate sets of hoses, gauges, and recovery/recycling equipment are required to service vehicles. This is necessary to avoid cross-contamination and damaging system.

All equipment used to service systems using R-134a must meet SAE standard J2210. The service hoses on the manifold gauge set must have manual (turn wheel) or automatic back-flow valves at the service port connector ends. This will prevent refrigerant from being released into the atmosphere.

For identification purposes, R-134a service hoses must have a Black stripe along their length and be clearly labeled SAE J2196/134a. The low pressure test hose is Blue with a Black stripe. The high pressure test hose is Red with a Black stripe. The center test hose is Yellow, or White, with a Black stripe.

NOTE: Refrigerant R-12 service hoses will ONLY be labeled SAE J2196.

All R-134a manifold gauge sets can be identified by one or all of the following:

- Labeled FOR USE WITH R-134a on set.
- Labeled HFC-134 or R-134a on gauge face.
- Light Blue color on gauge face.

In addition, pressure/temperature scales on R-134a gauge sets are different from R-12 manifold gauge sets.

MANIFOLD GAUGE SET

A manifold gauge set is used to determine system's high-side and low-side pressures, correct refrigerant charge, and operating efficiency. High (discharge) and low (suction) pressures must be compared to determine system operation. Manifold gauge sets for the 2 refrigerant types are basically the same except for fittings at ends of

hoses. Fittings are different to ensure connection only to appropriate refrigerant system.

Low-Side Gauge

Low-side gauge, which may have a Blue identifying feature, is used to measure low-side (suction) pressure. Low-side gauge is also called a compound gauge because it can measure pressure and vacuum. Pressure scale ranges from 0 to 150 psi; vacuum scale ranges from 0 to 30 in. Hg.

High-Side Gauge

High-side gauge, which may have a Red identifying feature, is used to measure high-side (discharge) pressure. Gauge scale ranges from 0 to 500 psi.

CONNECTING GAUGE SET

NOTE: R-134a quick disconnect service couplings are connected in the same sequence as Schrader-type service valves.

Schrader-Type Valves

1. Put on safety goggles, and cover vehicle's fender. Slowly remove protective caps from Schrader valves to check for leaky valves.

CAUTION: Ensure hand valves on manifold gauge set and the hose-end shutoff valves are closed before attaching test hoses to Schrader valves.

2. Ensure service hoses are equipped with valve core depressor to match Schrader valve. If not, install special adapters for this purpose. If the high-side service hose connector will not fit on high-side Schrader valve, a special adapter must be used. See **SPECIAL VALVE CONNECTORS** .
3. Ensure both manifold gauge set hand valves are closed. Connect low-side service hose to low-side (suction) service valve, and finger tighten connections. Connect high-side service hose to high-side (discharge) service valve, and finger-tighten connections.

NOTE: After test gauges are installed, test hoses must be purged of all air before proceeding with testing.

PURGING TEST HOSES

1. Ensure high-side and low-side hoses are properly connected to service valves, and all hose connections are tight. Place a clean shop towel over end of center service hose.
2. Purge high-side test hose by opening hand valve on high-side gauge for 3-5 seconds. This allows system's refrigerant to force air through test hoses and out of center service hose into the shop towel. Immediately close high-side gauge hand valve.
3. Purge low-side test hose in the same manner using hand valve of low-side gauge. Close hand valve after 3-5 seconds. Purging of test hoses is now complete, and system is ready for testing.

NOTE: **If manifold gauge set is to be used in conjunction with refrigerant recovery/recycling equipment, use instructions provided with the recovery/recycling equipment to properly purge test hoses.**

STABILIZING A/C SYSTEM

1. Once manifold gauge set is attached to system and test hoses have been purged, system is ready for testing. Place all test hoses, gauge set and other equipment away from all moving parts of engine.
2. Start engine, and turn A/C controls to maximum cooling position (full cold or MAX A/C). Set blower fan on high speed. Open doors and/or windows. Operate system for 5-10 minutes. System should now be stabilized and ready for test readings.

PRESSURE-TEMPERATURE RELATIONSHIP

A refrigerant, when confined in an enclosed space, increases in pressure as the temperature increases. Conversely, if the temperature is lowered, the pressure also decreases.

Depending on temperature, a corresponding pressure will exist in such an enclosed space. For example, at 70°F (21.1°C) a gauge will indicate about 71.0 psi (5.0 kg/cm^2). The R-134a PRESSURE-TEMPERATURE RELATIONSHIP table shows this relationship.

R-134a PRESSURE-TEMPERATURE RELATIONSHIP

Temperature °F (°C)	**(1) psi (kg/cm^2)**
20 (-6.7)	18 (1.3)
30 (-1.1)	26 (1.8)
40 (4.4)	35 (2.5)
45 (7.2)	40 (2.8)
50 (10.0)	45 (3.2)
55 (12.8)	51 (3.6)
60 (15.6)	57 (4.0)
65 (18.3)	64 (4.5)
70 (21.1)	71 (5.0)
75 (23.9)	79 (5.6)
80 (26.7)	87 (6.1)
85 (29.4)	95 (6.7)
90 (32.2)	104 (7.3)
95 (35.0)	114 (8.0)
100 (37.8)	124 (8.7)
110 (43.3)	147 (10.3)
120 (48.9)	171 (12.0)
130 (54.4)	199 (14.0)
140 (60.0)	229 (16.1)

150 (65.6)	263 (18.5)
160 (71.1)	300 (21.1)
(1) Pressure readings are provided as a general guideline and may not represent actual readings.	

PRESSURE GAUGE READINGS

The pressure gauge readings used represent an expansion valve type system using a Nippondenso 10-cylinder compressor. See **Fig. 6** -**Fig. 14** . Gauge indications will vary depending on system configuration and compressor application.

Temperature and humidity, as well as other factors, affect pressure gauge readings. Compared to R-12 systems, pressure readings on R-134a systems are generally lower for low-side pressure and higher for high-side pressure. Pressure gauge readings should be used only as a guide.

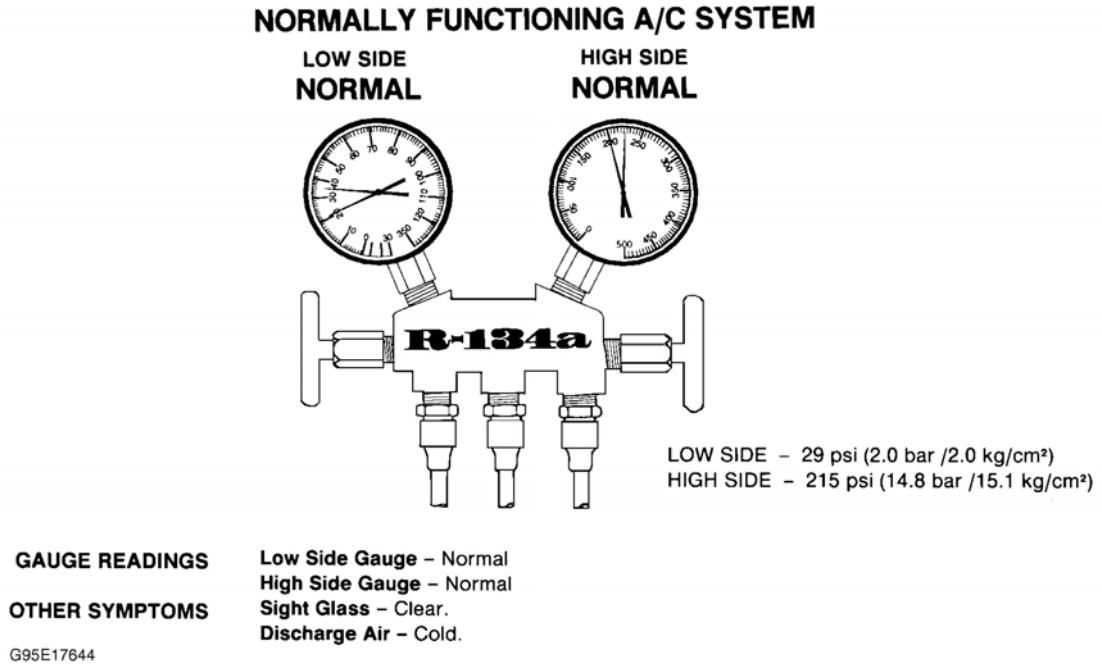


Fig. 6: Normally Functioning R-134a A/C System

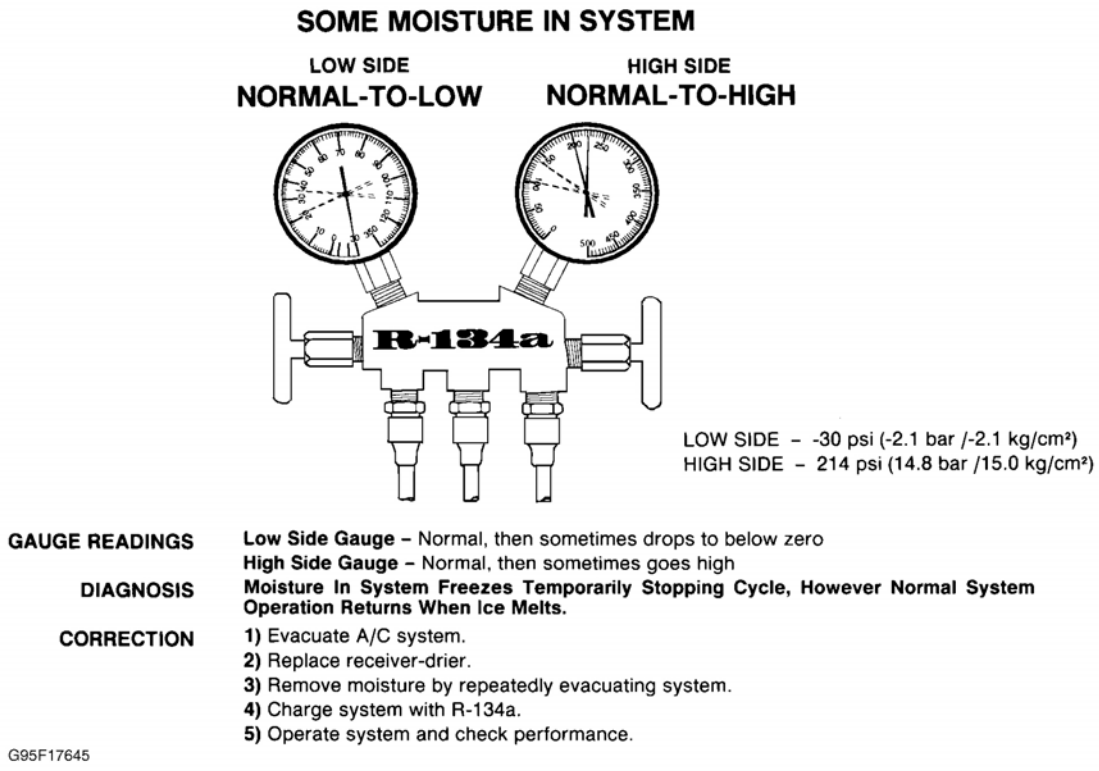


Fig. 7: Some Moisture In R-134a System

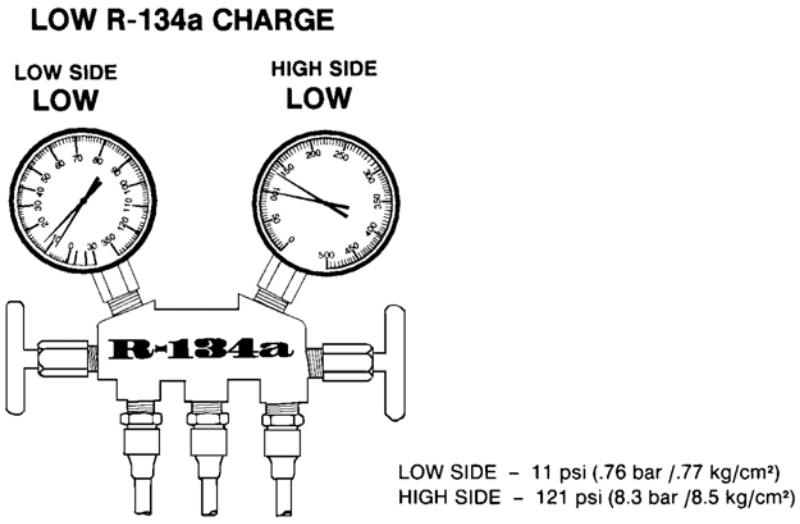


Fig. 8: Low R-134a Charge

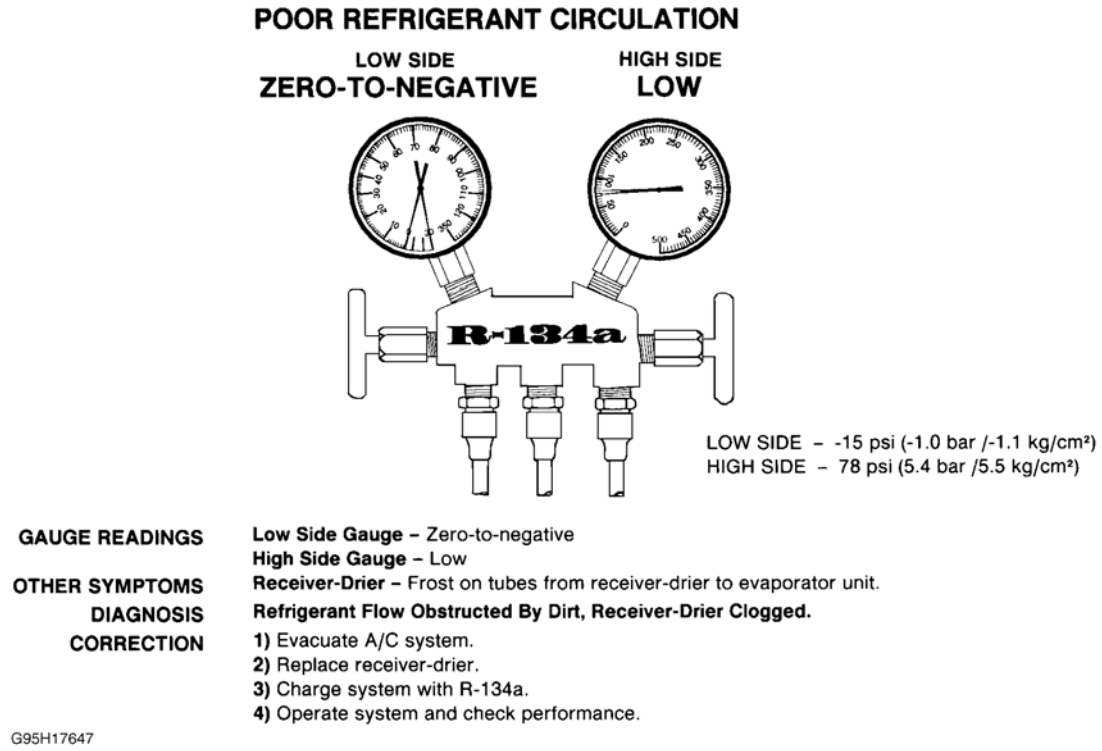


Fig. 9: Poor R-134a Refrigerant Circulation

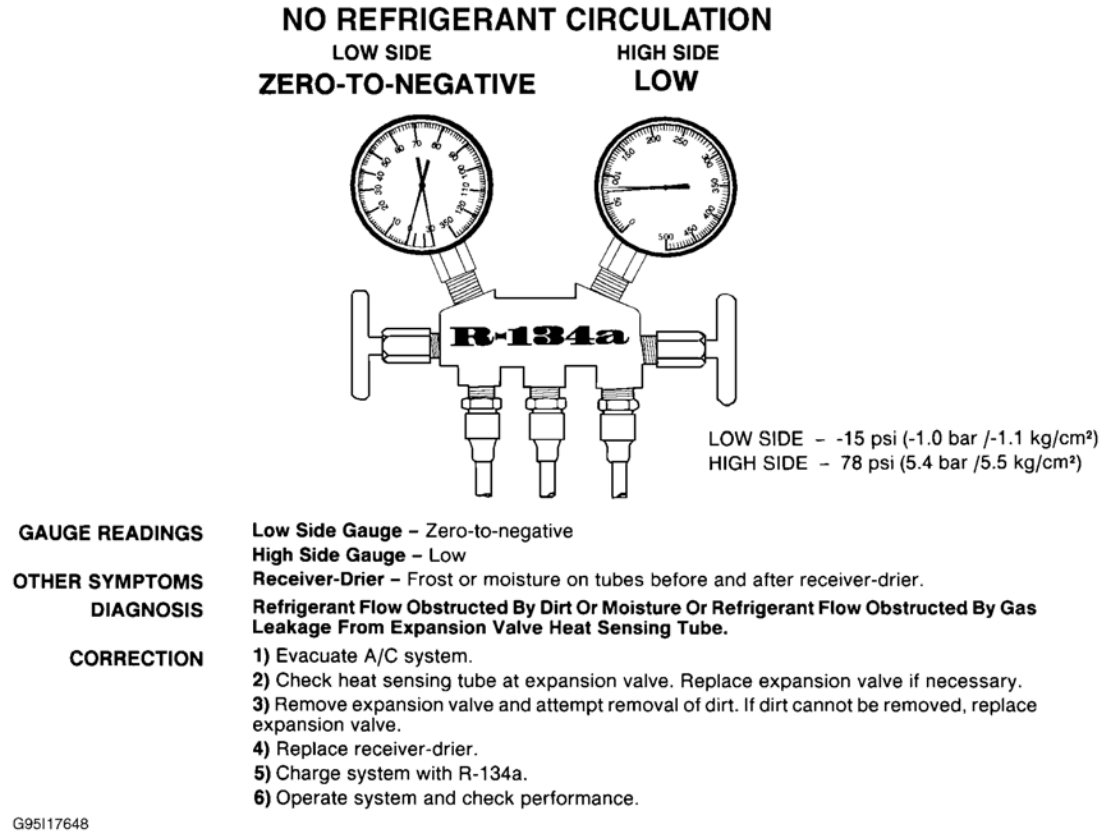
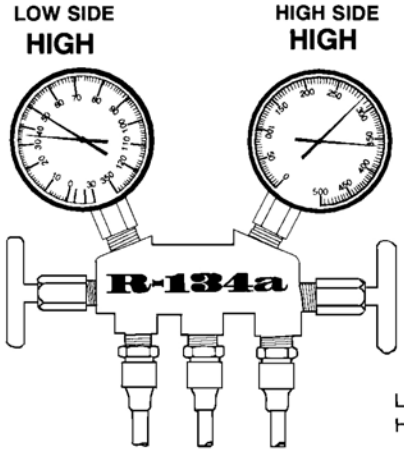


Fig. 10: No R-134a Refrigerant Circulation

INSUFFICIENT COOLING OF CONDENSER OR REFRIGERANT OVERCHARGE



LOW SIDE – 43 psi (3.0 bar /3.0 kg/cm²)
HIGH SIDE – 320 psi (22.1 bar /22.5 kg/cm²)

GAUGE READINGS	**Low Side Gauge –** High **High Side Gauge –** High
OTHER SYMPTOMS	**Sight Glass –** No bubbles visible even after lowering engine RPM.
DIAGNOSIS	**Refrigerant Overcharge, Condenser Cooling Fins Clogged With Dirt Or Cooling Fans Malfunctioning.**
CORRECTION	**1)** Clean condenser cooling fins. **2)** Check cooling fan operation. **3)** Evacuate A/C system. **4)** Charge system with R-134a. **5)** Operate system and check performance.

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Fig. 11: Insufficient Cooling Of Condenser Or R-134a Refrigerant Overcharge

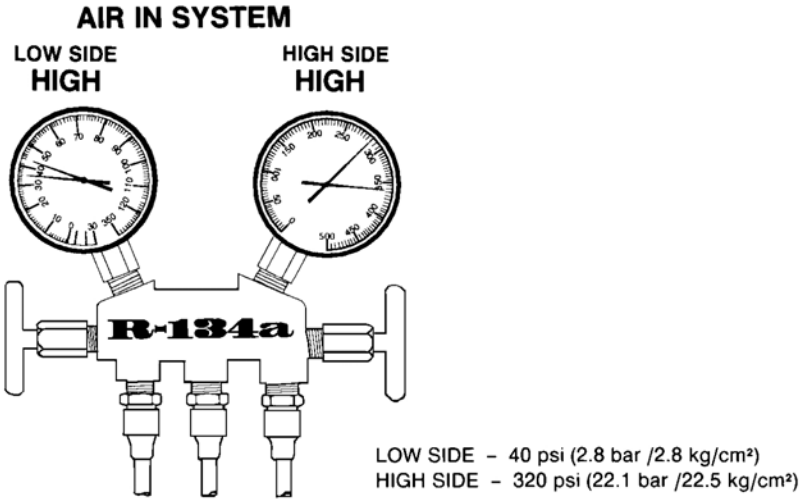
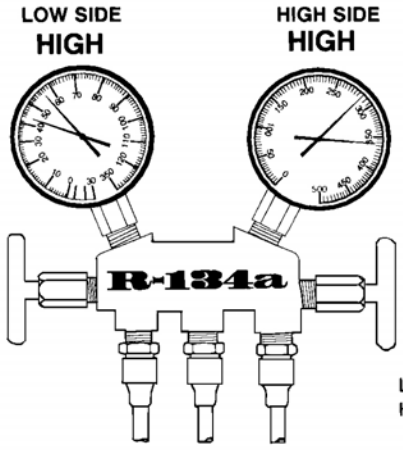


Fig. 12: Air In R-134a System

EXPANSION VALVE IMPROPERLY MOUNTED OR HEAT SENSING TUBE DEFECTIVE (OPENING TOO WIDE)



LOW SIDE – 50 psi (3.5 bar /3.5 kg/cm²)
HIGH SIDE – 320 psi (22.1 bar /22.5 kg/cm²)

GAUGE READINGS	**Low Side Gauge** – High **High Side Gauge** – High
OTHER SYMPTOMS	**Pipes** – Large amount of frost or moisture on low side pipes.
DIAGNOSIS	**Excessive Refrigerant In Low Side Pipes Possibly From Expansion Valve Being Opened Too Wide.**
CORRECTION	**1)** Check heat sensing tube for proper installation. **2)** If heat sensing tube is properly positioned, evacuate A/C system. **3)** Check expansion valve and replace if defective. **4)** Charge system with R-134a. **5)** Operate system and check performance.

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Fig. 13: Expansion Valve Improperly Mounted Or Heat Sensing Tube Defective (Opening Too Wide)

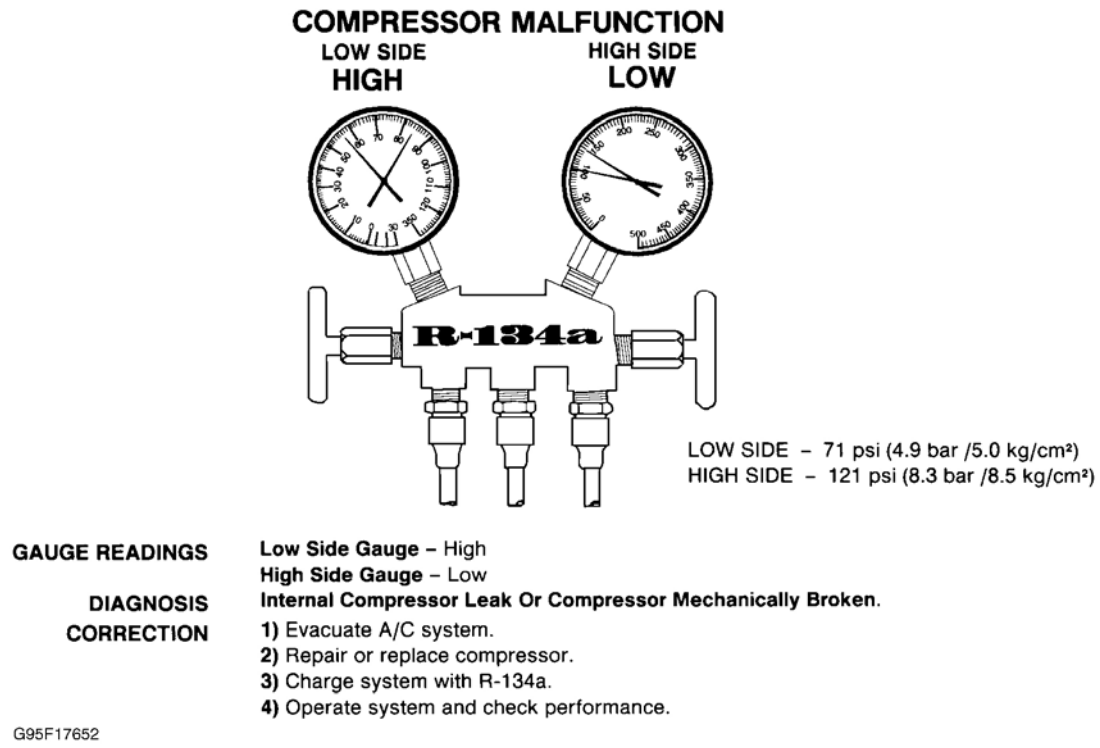

Fig. 14: Compressor Malfunction

ORIFICE TUBE REPLACEMENT

Removal ("C", "E", "K" & "H" Body)

1. Locate orifice tube. See **ORIFICE TUBE LOCATION & REMOVER/INSTALLER APPLICATION** table. Discharge A/C system, using approved recovery/recycling equipment. Disconnect liquid line retaining clips.
2. Disconnect liquid line, at orifice tube location, between evaporator and condenser. Use Dual "O" Ring Joint Separator (J-38042) to hold pressure against liquid line female nut while loosening nut, if necessary. Remove and discard liquid line "O" rings using a nonmetallic tool so seal surface is not damaged.
3. Remove orifice tube using specified orifice tube remover. See **ORIFICE TUBE LOCATION & REMOVER/INSTALLER APPLICATION** table.

Installation

1. Install NEW liquid line "O" rings. Lubricate inside of evaporator inlet line and "O" rings with NEW refrigerant oil. Lubricate NEW orifice tube and "O" ring with NEW refrigerant oil. Insert orifice tube into evaporator inlet line with short screen toward condenser.
2. Tighten liquid line nut to 18 ft. lbs. (24 N.m). To complete installation, reverse removal procedure. Evacuate, charge and test system for proper operation.

Removal ("F" Body)

Discharge A/C system, using approved recovery/recycling equipment. Disconnect negative battery cable. Disconnect A/C pressure switch connector. Use a backup wrench to hold evaporator fitting and loosen evaporator liquid line fitting. Remove bolt. Disconnect evaporator liquid line. Remove and discard "O" rings. Using needle-nose pliers, remove orifice tube from evaporator inlet line.

Installation

1. Clean evaporator line fitting with NEW refrigerant oil. Coat inside of inlet line and NEW evaporator line "O" rings with NEW refrigerant oil. Lubricate NEW orifice tube and "O" ring with refrigerant oil and insert them into inlet line. Insert orifice tube into evaporator inlet line with long screen inlet end toward condenser.
2. Tighten bolt to 12 ft. lbs. (16 N.m). Tighten evaporator line fitting to 28 ft. lbs. (38 N.m). To complete installation, reverse removal procedure. Evacuate, charge and test system for proper operation.

Removal ("J" & "N" Body)

1. Locate orifice tube. See **ORIFICE TUBE LOCATION & REMOVER/INSTALLER APPLICATION** table. Discharge A/C system, using approved recovery/recycling equipment. On "J" body, remove upper closeout panel. On "N" body, raise and support vehicle. On all models, disconnect condenser-to-evaporator line at condenser outlet and discard "O" rings.
2. Disconnect condenser-to-evaporator line clip on right side body rail, behind engine mount. Remove orifice tube using Orifice Tube Remover/Installer (J-26549-E) or needle-nose pliers.
3. If difficulty is encountered during removal of a plugged or restricted orifice tube, remove as much residue as possible. Using a heat gun or hair dryer, carefully apply heat 1/4" from dimples on condenser inlet line. Be careful not to overheat line.
4. If A/C pressure switch is located near orifice tube, remove switch to protect it from heat. While heat is being applied, grip orifice tube using orifice tube remover/installer or needle-nose pliers. Use a turning motion along with a push-pull motion to loosen and remove orifice tube.

Installation

1. Coat inside of condenser inlet line and NEW "O" rings with NEW refrigerant oil. Lubricate orifice tube "O" ring with refrigerant oil and insert into condenser inlet line. Insert orifice tube into condenser inlet line with shorter screen toward evaporator.
2. Connect condenser-to-evaporator line clip on right side body rail. Lubricate NEW "O" rings and connect condenser inlet line. Tighten condenser inlet line nut to 12 ft. lbs. (16 N.m). Install closeout panel. Evacuate, charge and test system for proper operation.

Removal ("W" Body)

1. Locate orifice tube. See **ORIFICE TUBE LOCATION & REMOVER/INSTALLER APPLICATION** table. Remove air cleaner and duct assembly. Discharge A/C system, using approved recovery/recycling equipment. Disconnect negative battery cable. Disconnect ABS modulator and A/C pressure sensor/fan switch electrical connectors.

2. Disconnect liquid line/suction line bracket. Disconnect liquid line at orifice tube. Remove orifice tube using specified orifice tube remover/installer. See **ORIFICE TUBE LOCATION & REMOVER/INSTALLER APPLICATION** table.
3. If difficulty is encountered during removal of a plugged or restricted orifice tube, remove as much residue as possible. Using a heat gun or hair dryer, carefully heat inlet line. If inlet line has small dimples, apply heat 1/4" from dimples. Be careful not to overheat line.
4. If A/C pressure switch is located near orifice tube, remove switch to protect it from heat. While heat is being applied, grip orifice tube using needle-nose pliers. Use a turning motion along with a push-pull motion to loosen and remove orifice tube.

Installation

1. Coat inside of inlet line and NEW "O" ring with NEW refrigerant oil. Lubricate NEW orifice tube and "O" ring with refrigerant oil and insert them into inlet line. Insert orifice tube into evaporator inlet line with short screen toward condenser.
2. Tighten liquid line fitting at orifice tube to 20 ft. lbs. (27 N.m). To complete installation, reverse removal procedure. Evacuate, charge and test system for proper operation.

ORIFICE TUBE LOCATION & REMOVER/INSTALLER APPLICATION

Application	Orifice Tube Location	Orifice Tube Remover/Installer
"C" Body	(1)	J-26549-D
"E" & "K" Body	(1)	J-26549-D
"F" Body	Evaporator Inlet	*****
"G" Body	(2)	J-26549-E
"H" Body	Condenser Outlet	J-26549-D
"J" Body	Condenser Outlet	J-26549-E
"N" Body (3)	Condenser Outlet	J-26549-E
"W" Body	(4)	J-26549-E

(1) In evaporator (liquid) inlet line, between service valves, above accumulator.

(2) Inside evaporator inlet refrigerant line where it connects to condenser outlet.

(3) Cutlass and Malibu only.

(4) In evaporator (liquid) inlet line, between high pressure service valve and evaporator.

REFRIGERANT RECOVERY/RECYCLING

Refrigerant recovery/recycling equipment is used to remove refrigerant from vehicle's A/C system without polluting atmosphere. To remove and recycle refrigerant, ALWAYS follow instructions provided with the refrigerant recovery/recycling equipment being used.

The removed refrigerant is filtered, dried and stored in a tank within the recovery/recycling equipment until it is ready to be pumped back into the vehicle's A/C system.

NOTE: Separate sets of hoses, manifold gauge set and refrigerant recovery/recycling equipment MUST be used for R-12 and R-134a systems. DO NOT mix R-12 and R-134a refrigerants, as their refrigerant oils and desiccants are NOT compatible.

Manufacturer recommends using A/C Refrigerant Recovery, Recycling And Recharging (ACR4) System (J-39500). The ACR4 system has one filtering cycle during recovery plus an automatic multiple pass filtering during evacuation cycle. Follow manufacturer's instructions provided with ACR4 equipment being used.

FLUSHING A/C SYSTEM

NOTE: Information is not available at time of publication.

There is considerable controversy over the question of whether or not to flush A/C systems or how to go about it. Before CFCs were classified as harmful to the environment, it was a common practice to open flush contaminants from a system. The waste fluid was vented to the atmosphere. This practice is now ILLEGAL and can no longer be used.

Most OEMs don't recommend A/C system flushing. They recommend replacing the defective component and installing a liquid line (in-line)filter ahead of the expansion valve or orifice tube.

EVACUATING A/C SYSTEM

CAUTION: DO NOT operate A/C compressor during evacuation procedure or with vacuum applied to A/C system. Compressor may be damaged.

Manufacturer recommends using A/C Refrigerant Recovery, Recycling And Recharging (ACR4) System (J-39500). The ACR4 system has one filtering cycle during recovery plus an automatic multiple pass filtering during evacuation cycle. Follow manufacturer's instructions provided with ACR4 equipment being used.

CHARGING A/C SYSTEM

CAUTION: During charging of A/C system, refrigerant container must be in an upright position. If refrigerant container is upside-down, compressor may be damaged by liquid refrigerant drawn into A/C system.

Manufacturer recommends using A/C Refrigerant Recovery, Recycling And Recharging (ACR4) System (J-39500). The ACR4 system has one filtering cycle during recovery plus an automatic multiple pass filtering during evacuation cycle. Follow manufacturer's instructions provided with ACR4 equipment being used.

LEAK TESTING

TYPES OF LEAK DETECTORS

Bubble Solution Detector

This is a solution applied externally at suspected leak points. Leaking refrigerant will cause the detector to form bubbles and foam. A soap and water solution also works well.

Dye Solution

This is a colored solution that may be introduced into the A/C system. The dye will show up and color components at leak points. Some manufacturers offer refrigerant containing a Red dye. This dye-containing refrigerant is installed by normal charging procedures. Other dye solutions are visible with a Black light only.

Electronic Leak Detector

This instrument will draw in any leaking refrigerant through a test probe, and then sound an audible signal or create a flashing light if refrigerant is found. It is the most sensitive of the leak detectors used. Leak detectors are sensitive to windshield washing solutions, many solvents and cleaners, and some adhesives. Ensure surfaces near test areas are clean and dry to prevent false signal or detector damage. Liquids ingested into detector will damage detector. See **Fig. 15** .

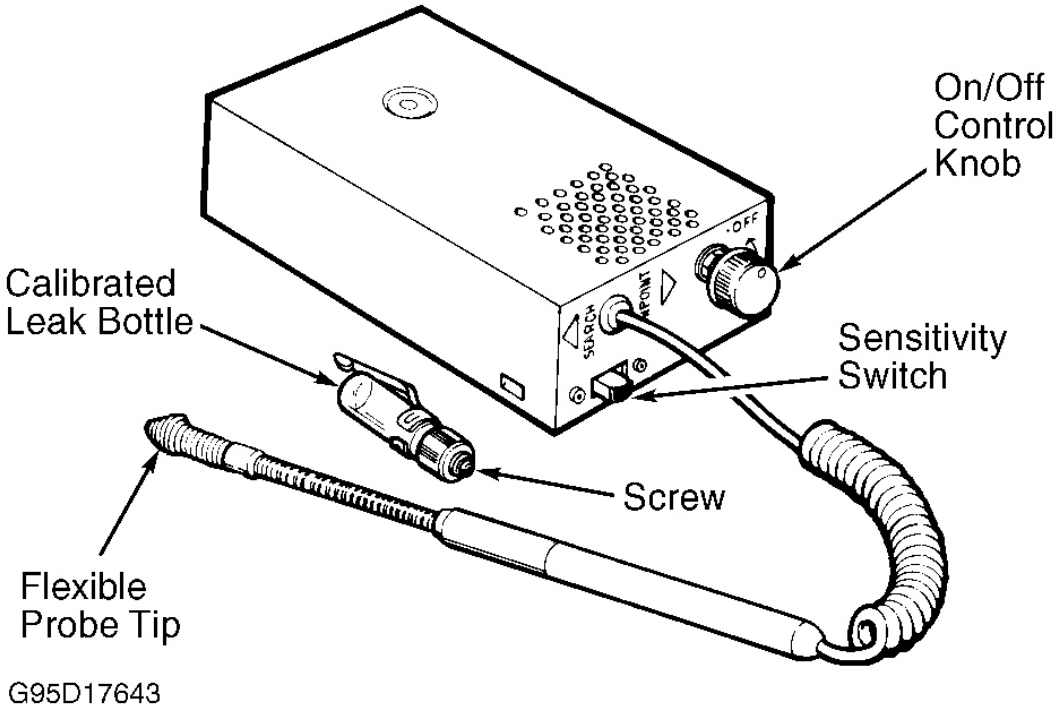

Fig. 15: Electronic Leak Detector

PREPARATION FOR LEAK TESTING

Connect manifold gauge set to air conditioning system. Ensure low-side and high-side gauge set valves are closed. Check system pressure. It should be at least 50 psi (3.5 kg/cm^2). If system is empty, evacuate A/C

system and apply 28 in. Hg of vacuum. If system holds vacuum for 15 minutes there most likely are no leaks present. If low, add just enough refrigerant (about 10 ounces) to bring system to 50 psi (3.5 kg/cm^2).

Ensure all joints, connections, and fittings are free of oil dirt and other contaminants. Using a refrigerant leak detector, check all refrigerant line connections for leaks. Check condenser and compressor seal area.

Start engine and allow to idle. Operate A/C system for about 5 minutes. Set A/C controls to outside air, and high blower speed. Turn A/C on, and open vehicle windows. Turn engine off and wait 2-7 minutes. Refrigerant is heavier than air. Always check for leaks at bottom of refrigerant lines and components. Refrigerant oil will leak with refrigerant. Visually check all connections and compressor clutch area for oil stains. If compressor shaft seal is leaking, a fresh oil streak will normally be seen on underside of hood, above compressor clutch.

Always perform leak testing after A/C service. Move refrigerant leak detector slowly to check for leaks, as leaks will not be detected if leak testing is performed too quickly.

BUBBLE DETECTOR LEAK TESTING PROCEDURE

This leak detection method is recommended when it is impossible or difficult to determine the exact location of the leak using other methods. Although commercial bubble detectors are more effective, household soap solutions may be used.

Using the dauber that comes with the commercial soap solution, apply the solution to all joints, connections, fittings or controls where a leak might be suspected. If high-suds household solutions are used, apply them with a small brush. Wherever bubbles form, leaks are present and must be repaired. check the entire system as there may be more than one leak.

ELECTRONIC LEAK TESTING PROCEDURE

NOTE: Some electronic leak detectors will function on only R-12 systems or on only R-134a systems, and some will function on both R-12 and R-134a systems. Familiarize yourself with the tester being used and know what type of system you are leak testing.

Electronic leak detectors should be used in well ventilated areas. Avoid using them around explosive gases. Always follow manufacturer's instructions for the specific tester being used. If none are available, proceed as follows:

1) Turn all controls and detector sensitivity knob to OFF position or zero setting. Connect leak detector to an approved source of power. Turn switch ON, and allow unit to warm up for approximately 5 minutes.

2) Check operation of tester by positioning probe in a reference source where refrigerant is known to be present in small amounts. Adjust controls and sensitivity knob until detector reacts properly. Move probe away from refrigerant source and the reaction should stop. If it continues, adjust the sensitivity knob to a lower setting.

3) When tester reacts properly, leak test air conditioning system by moving probe UNDER all components, fittings and connections. Keep the probe moving. To check evaporator insert probe into drain tube opening or a

heater duct. DO NOT allow probe to contact refrigerant or refrigerant oil. When leaks are found, repair them as necessary. Keep in mind that there may be more than one leak.

DYE SOLUTION LEAK TESTING PROCEDURES

CAUTION: Dye-charged refrigerant cans are available to be used as internal leak detectors. The use of this type of solution may void some manufacturer's warranties. Be sure to check with the A/C system manufacturer concerning the use of dye-charged leak detectors. Dyes which work in R-12 systems will not work in R-134a systems.

The following procedure is for introducing a dye solution, not dye-charged refrigerant, into A/C system.

1) Connect manifold gauge set to air conditioning system in a normal manner. Remove center hose from manifold gauge set, and replace it with a short piece (6" long) of 1/4" tubing using two 1/4" flare nuts. Connect a container of dye solution to the tubing.

2) Connect one end of gauge set center hose to dye solution container. Connect a container of refrigerant to the other end of the hose. Operate engine at idle speed. Set the air conditioning system for maximum cooling. Slowly open the low-side hand valve to allow the dye solution to enter the system.

3) Charge the system to at least 50 percent capacity. Operate the system for 15 minutes, and then shut off both the air conditioning system and the engine. Check all connections for signs of the colored dye solution. Check the vehicle again 24 hours later. If leaks are found, repair as necessary.