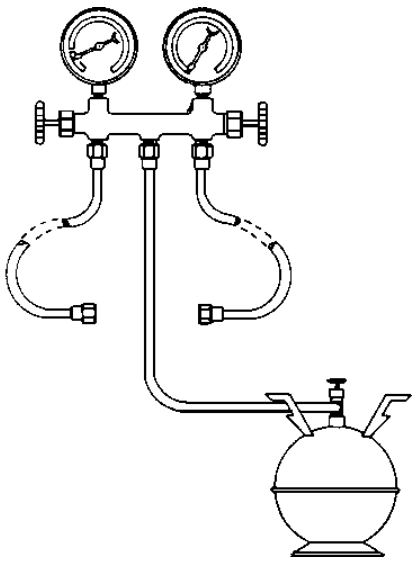
SERVICING PROCEDURE

LEAK TEST EVACUATION CHARGING



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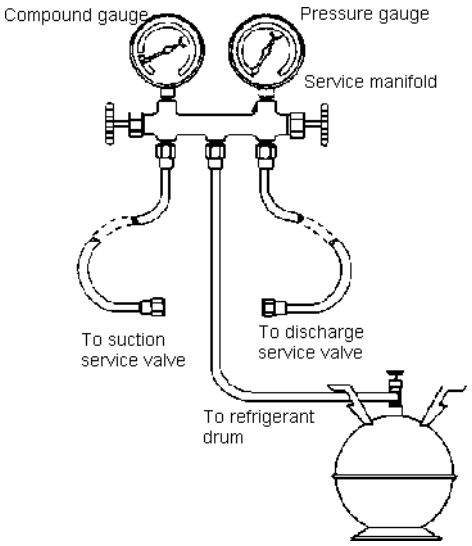
GAUGE MANIFOLD

A necessary instrument in checking and serving air conditioning and heat pump equipment is the gauge manifold. Its purpose is to determine the operating refrigerant pressures in order for the serviceman to analyze the condition of the system.

The valving on the manifold is so arranged that when the valves are closed (front-seated) the center port on the manifold is closed to the gauges and gauge ports. With the valves in the closed position, the gauge ports are still open to the gauges, permitting the gauges to register system pressures. Opening either valve, opens the center port to that side of the manifold and system.

FIGURE 1
SERVICE MANIFOLD



ATTACHING GAUGE MANIFOLD

For leak testing, purging, checking charge, charging liquid or evacuating, connect high pressure side of gauge manifold to Schrader valve on liquid or discharge line. Connect suction side of gauge manifold to Schrader valve on suction line. On heat pumps, the suction line is between compressor and reversing valve.

ATTACHING MANIFOLD HOSE TO SCHRADER VALVE

⚠ WARNING

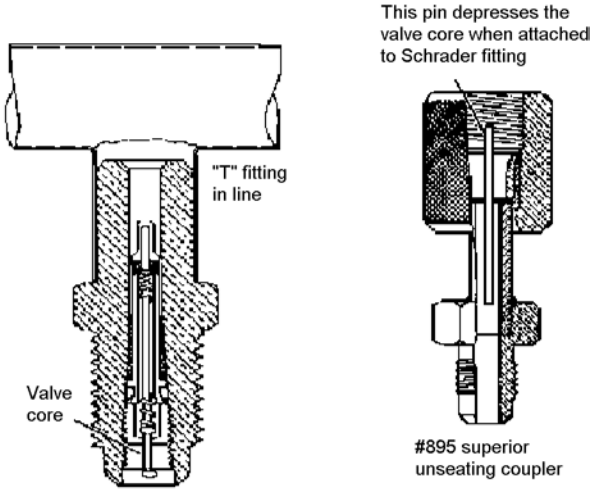
As a safety measure, it is wise to attach refrigerant hoses at the lowest pressure readings on the system. To do this:

A. Put high pressure hose “B” on first. (Unit should not be running.)

B. Put low pressure hose “A” on second. (Unit should be running.)

1. Remove cap from valve.
2. Make sure gauge manifold valves are closed.
3. If hose does not have an unseating pin, a number 395 Superior or equivalent unseating coupler must be used.

FIGURE 2



4. Make sure coupler is lined up straight with Schrader valve. Screw coupler on to valve.
5. Open gauge manifold valve slightly and purge air from hose with refrigerant.
6. Read the suction pressure on compound gauge and heat pressure on pressure gauge.

7. To remove, push end of hose tight against end of Schrader valve and hold in place while quickly unscrewing coupler nut from Schrader valve.
8. Remove coupler from Schrader valve. Replace caps on valve.

⚠ WARNING

As a safety measure, it is wise to detach refrigerant hoses at the lowest pressure readings on the system. To do this:

A. Put high pressure hose "B" on first. (Unit should not be running.)

B. Put low pressure hose "A" on second. (Unit should be running.)

Leak Test

1. Remove gauge port cap from suction and liquid service valve ports and attach manifold gauge hoses. Connect an upright R-22 drum to center port of gauge manifold. Open refrigerant drum valve and manifold high pressure gauge valve to pressurize system to a positive pressure with refrigerant vapor. Pressurize the complete system with dry nitrogen, or CO2 until the pressure reaches 200 psig. **Do not** exceed 250 psig.
2. Close manifold high pressure gauge valve. Check all soldered joints, including those on the evaporator coil with an Electronic Leak Detector. If a leak is found, which requires soldering, pressure in the system must be bled off since it is impossible to solder with unit pressurized. Be sure all leaks are located and marked before bleeding pressure from system.
3. Close drum valve and disconnect from center port. Release nitrogen or CO2 into the atmosphere through suction line of gauge manifold.
4. Correct any leaks and recheck. When leaks, if any have been repaired, system is ready to be evacuated and charged. Relieve all pressure from the system down to 0 psig.

EVACUATION

1. Evacuate system to less than 1,000 microns using a good vacuum pump and an accurate high vacuum gauge. Operate the pump below 1,000 microns for 60 minutes and then close valve to the vacuum pump. Allow the system to stand for 30 additional minutes to be sure a 1,000 micron vacuum or less is maintained.

⚠ WARNING

At no time use the compressor to evacuate the system or any part of it.

2. Disconnect charging line at vacuum pump and connect to refrigerant supply. (Dial-A-Charge Cylinder) crack valve and purge charging line at center on manifold. Then close valve.
3. The system is now ready for the correct operating charge of Refrigerant 22.

CHARGING

1. **Single Package Units** — Refer to the unit serial plate for the full operating charge.
2. **Split Systems** — The outdoor unit factory charge is shown on the unit serial plate. The total system charge required to recharge the system after service repairs should be marked on the serial plate under **total R-22 charge**. This is normally marked by the installer and is determined from the R-22 System Charge Table located on the inside of the outdoor unit access panel.
3. **CTO Adapter Kits** — When using CTO adapters and field tubing, use the procedure outlined in installation manual for outdoor unit.
4. **Filter-Drier Charges** — If a liquid line filter-drier is used, either in conjunction with field tubing and a CTO adapter kit, or as part of procedure for system clean-up after a compressor burn-out, additional R-22 must be added to the system when recharging. This is in addition to the amount determined from the R-22 System Charge Table.

TABLE 1
REFRIGERANT

Part No.	Model No.	Oz. of R-22
5201-001	C-183S	8
5201-002	C-163S	10
5201-009	BFK-083S	7
5201-010	BFK-163S	13

PRELIMINARY CHARGING STEPS

If the system has been open to the atmosphere, it should be first evacuated. Then proceed as follows:

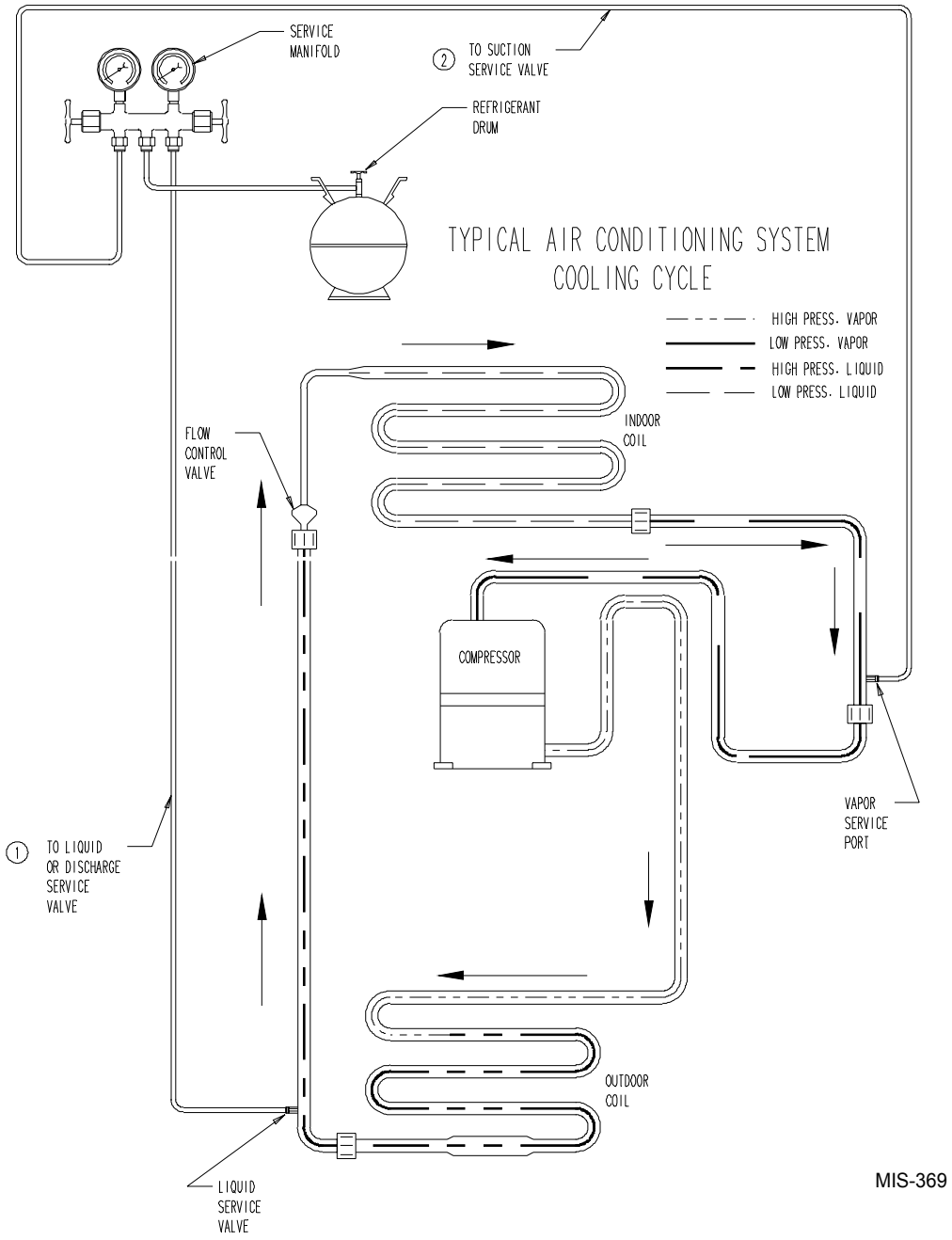
1. Attach a drum of proper, clean refrigerant to the center port of the charging manifold with one of the charging hoses.
2. Attach a second charging hose to the suction gauge (low pressure) side of the gauge manifold.
3. Remove the cap from the suction line valve.
4. Loosely attach the suction gauge hose to the line valve. Open the valve on the refrigerant drum and the suction valve on the charging manifold slightly to purge the air from the manifold and hoses before tightening the fitting.
5. Attach the third hose to the high pressure side of the manifold and the liquid line valve. Repeat steps 3 and 4 above.

CHARGING THE SYSTEM BY WEIGHT ①

1. Connect manifold as instructed.
2. Place refrigerant drum upright on scale and determine exact weight of the refrigerant and cylinder or use a Dial-A-Charge cylinder.
3. With manifold suction valve closed and manifold discharge valve open, open refrigerant cylinder valve and allow pressure in system to balance with pressure of cylinder. For charging in the liquid phase, drum is placed upside down (valve down).
4. When there is approximately a full charge, front seat (close) the discharge manifold valve and let the system stabilize for about five minutes.
5. Start compressor by setting thermostat.
6. Finish charging with vapor by placing drum upright (valve up). Open drum valve and manifold low pressure valve to allow refrigerant to flow into the system. Throttle refrigerant drum valve to keep pressure about 100 psig for R-22.
7. When the correct weight of refrigerant has been added to the unit, close refrigerant cylinder valve and allow unit to run for 30 minutes. Refer to Start-Up Procedure and Check List for further start-up details. Check the charge against the allowable head pressure as shown in the Head Pressure Chart and correct if needed.
8. Front seat gauge manifold valves, disconnect charging and gauge hoses and replace all valve caps.

① This charging method requires the scales or Dial-A-Charge cylinder to be extremely accurate since the charge in this type of system is quite critical.

FIGURE 3
TYPICAL AIR CONDITIONING SYSTEM COOLING CYCLE

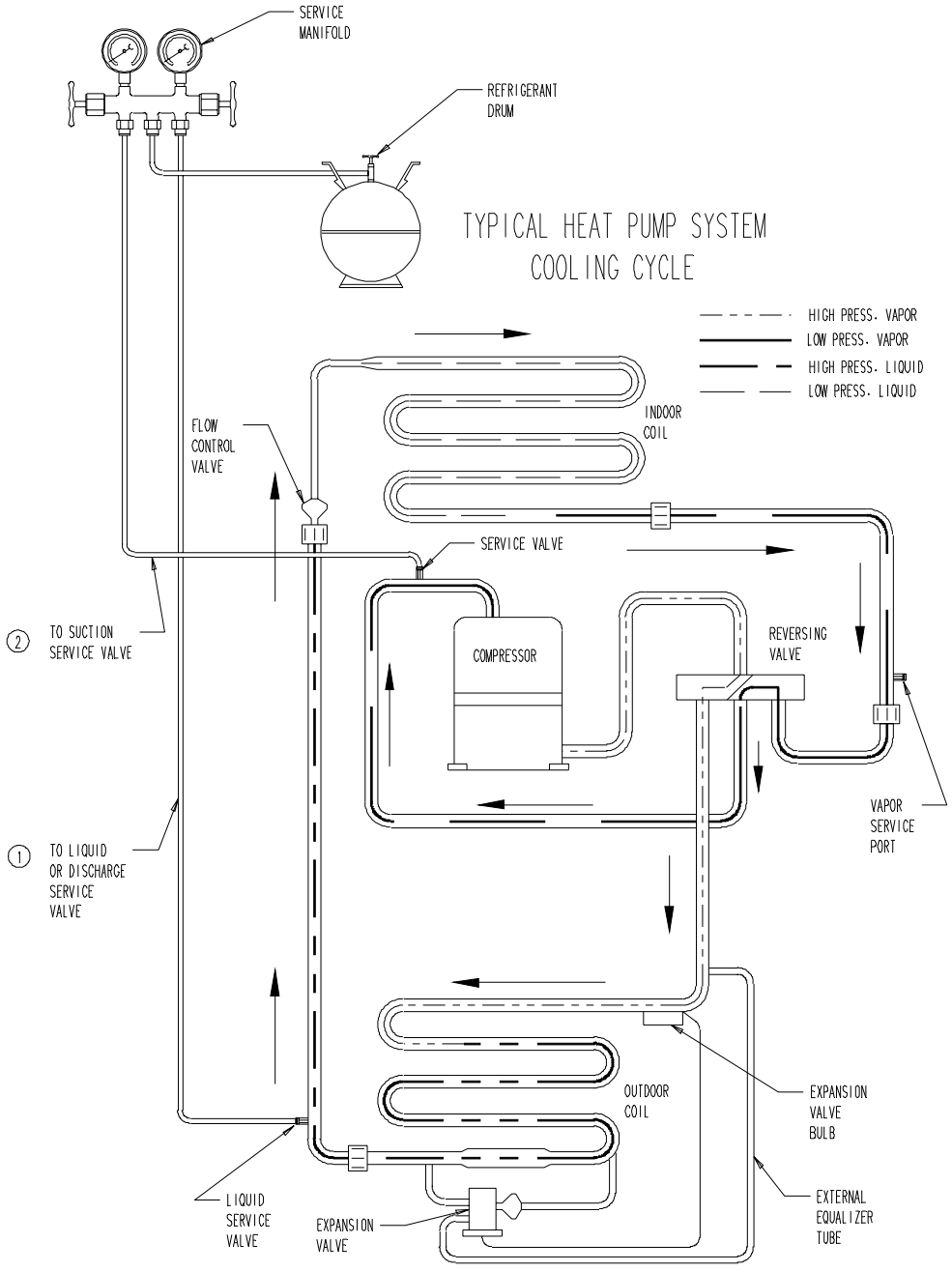


TUBING SET

① Pressure gauge connected to liquid line service valve on split heat pumps and air conditioners and to the discharge service valve on package units.

② Compound gauge connected to tubing suction service valve on air conditioners and suction service valve on heat pumps and packaged units.

FIGURE 4
TYPICAL HEAT PUMP SYSTEM COOLING CYCLE



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TUBING SET

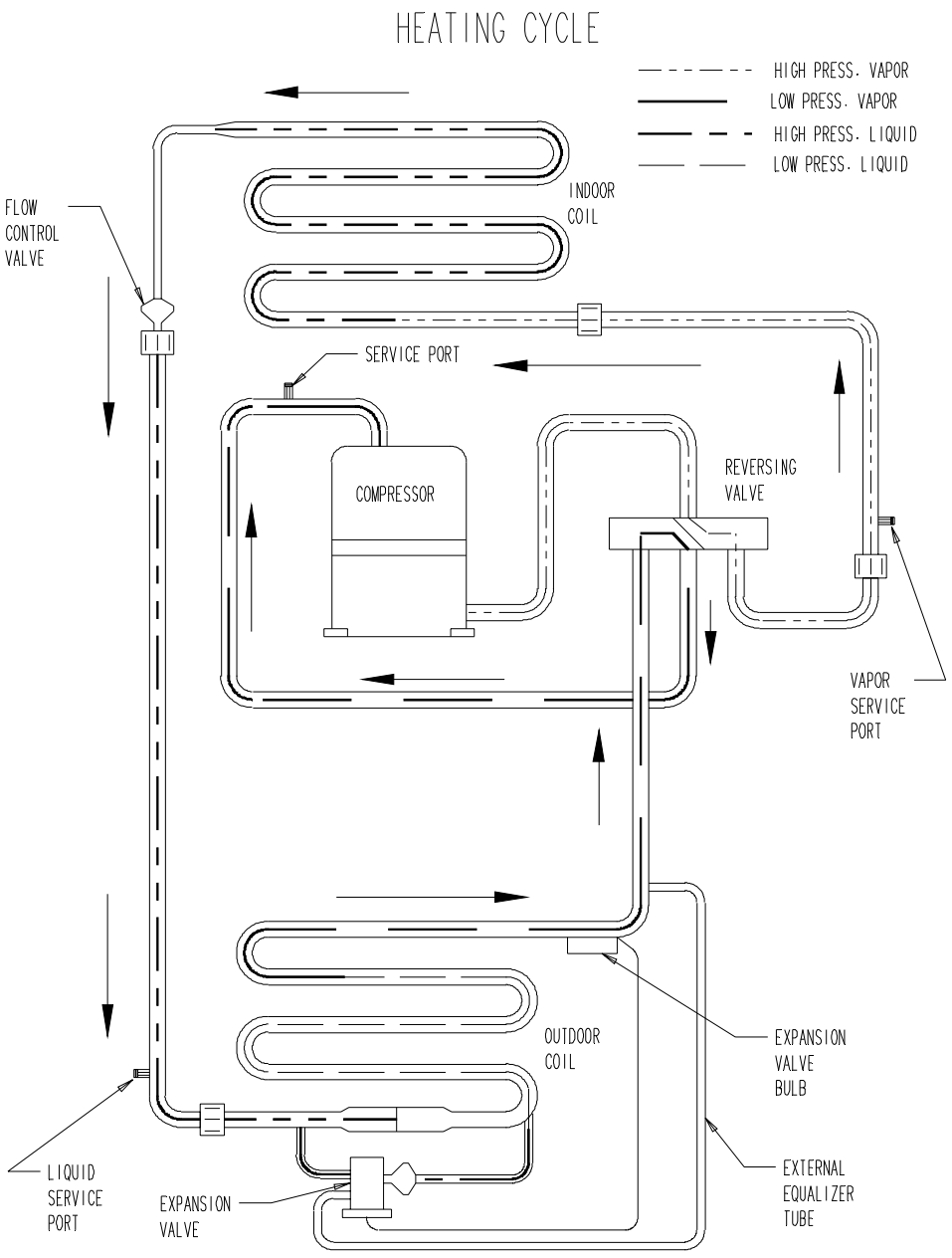
① Pressure gauge connected to liquid line service valve on split heat pumps and air conditioners and to the discharge service valve on package units.

② Compound gauge connected to tubing suction service valve on air conditioners and suction service valve on heat pumps and packaged units.

⚠ WARNING

To speed refrigerant flow, it may be necessary to place refrigerant drum in a pan of warm water (not greater than 130º F). Remember to either consider the total weight of the pan of water or remove the drum for weighing frequently to keep track of the charging process.

FIGURE 4A
HEATING CYCLE



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AIR CONDITIONING AND HEAT PUMP — COOLING

LOW SUCTION — LOW HEAD PRESSURE

1. Restricted air flow over indoor coil.
2. Defective indoor fan motor.
3. Low indoor temperature
4. Iced indoor coil.
5. Restricted liquid line, drier, metering device, etc.
6. Low charge.
7. Low ambient entering air temperature. (Low entering water temperature to water coil.①)

HIGH SUCTION — LOW HEAD PRESSURE

1. Defective or broken valves.
2. IPRV valve open.
3. Defective reversing valve.

LOW SUCTION — HIGH HEAD PRESSURE

1. Partial restriction and then overcharged.

HIGH SUCTION — HIGH HEAD PRESSURE

1. High entering outdoor air temperature. (High entering water temperature.①)
2. Low air flow outdoor coil. (Low water flow.①)
3. Overcharged.
4. Air in system.
5. Restricted outdoor coil. (Restricted water coil.①)
6. High indoor air temperature.

① Water source heat pump.

HEAT PUMP — HEATING

LOW SUCTION — LOW HEAD PRESSURE

1. Restricted air flow through outdoor coil. (Restricted water flow through water coil.①)
2. Defective outdoor motor. (Defective water pump.①)
3. Low outdoor air temperature. (Low water temperature.①)
4. Frozen outdoor coil. (Frozen water coil.①)
5. Restricted liquid line, drier, metering device, etc.
6. Low charge.
7. Low indoor air temperature.

HIGH SUCTION — LOW HEAD PRESSURE

1. Defective or broken valves.
2. IPR valve open.
3. Defective reversing valve.

LOW SUCTION — HIGH HEAD PRESSURE

1. Partial restriction and then overcharged.

HIGH SUCTION — HIGH HEAD PRESSURE

1. High entering outdoor air temperature. (High entering water temperature.①)
2. Low indoor air flow.
3. Overcharged.
4. Air in system.
5. Restricted air coil.
6. High indoor air temperature.

① Water source heat pump.