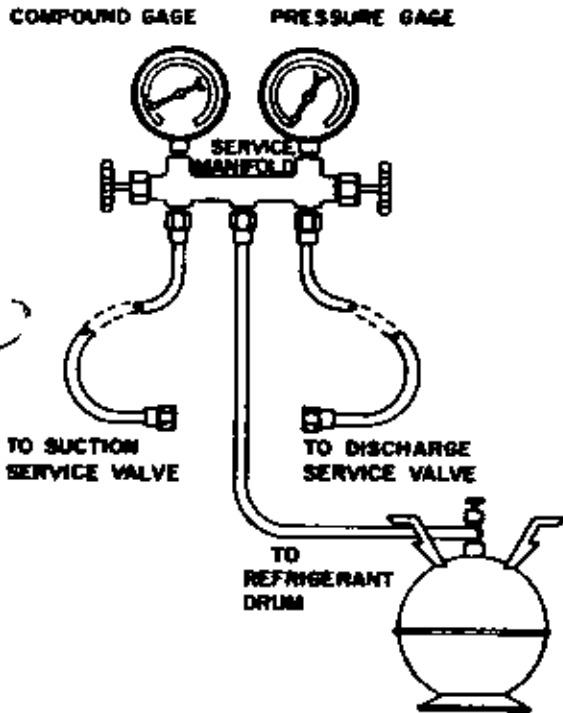


PROCEDURE FOR LEAK TEST-EVACUATION-CHARGING

GAUGE MANIFOLD

A necessary instrument in checking and servicing 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.

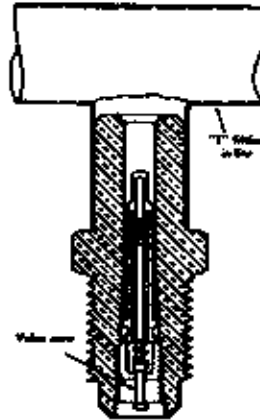


ATTACHING GAUGE MANIFOLD

For leak testing, purging, checking charge, charging liquid or evacuating, connect high pressure side of gauge manifold to Shrader valve on liquid line. Connect suction side of gauge manifold to Shrader valve on vapor line.

ATTACHING MANIFOLD NOSE TO SHRADER VALVE

1. Remove cap from valve.
2. Make sure gauge manifold valves are closed.



This pin depresses the valve open when attached to Shrader fitting



PIN SUPERIOR UNSEATING COUPLER

3. If hose does not have an unseating pin, a number 895 Superior or equivalent unseating coupler must be used.
4. Make sure coupler is lined up straight with Shrader valve. Screw coupler onto valve.
5. Open gauge manifold valve slightly and purge air from hose with refrigerant.
6. To remove, unscrew coupler from Shrader valve.

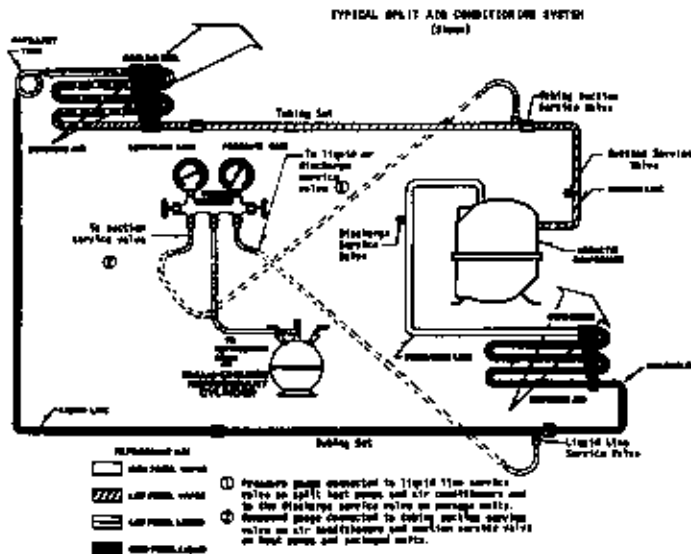
NOTE: If a Shrader valve is used be sure to remove the unseating coupler from the Shrader valve first. Hold coupler and hose tight to valve while loosening nut to prevent loss of charge on disconnect.

LEAK TEST

1. Remove gauge port cap from suction and liquid service valve ports and attach Manifold Gauge Hoses. Connect an upright R22 drum to center port of gauge manifold. Open refrigerant drum valve and manifold high pressure gauge valve to pressurize system. Pressurize the complete system with R22 until the pressure reaches 100 psig. Do not exceed 150 psig.
2. Close manifold high pressure gauge valve. Check all soldered joints, including those on the evaporator coil with an Electronic Leak Detector or Halide Torch. 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 refrigerant 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 the system to less than 1000 microns, using a good vacuum pump and an accurate high vacuum gauge. Operate the pump at 1000 microns, or less, for several hours and then allow the system to stand for several additional hours to be sure the vacuum is maintained.
 2. An alternate method of removing moisture and noncondensables from the system is:
 - a) Evacuate system to 29 inches vacuum. Break vacuum with refrigerant to be used for final charging of system and vapor charge to 35-50 lbs. gauge pressure. Leave vapor charge in system for a minimum of five minutes. Reduce pressure to zero gauge pressure.
 - b) Repeat step (a).
 - c) Evacuate system to 29 inches vacuum. Charge system with the specified kind and quantity of refrigerant.
- NOTE: At no time use the compressor to evacuate the system or any part of it.*
3. 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.
 4. The system is now ready for the correct operating charge of Refrigerant R22.



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 R22 CHARGE. This is normally marked by the installer and is determined from the R22 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 approximately the middle of each of the System Charge Tables. This determines the correct ounces of R22 for the tubing only.

4. FILTER-DRYER 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 R22 must be added to the system when recharging. This is in addition to the amount determined from the R22 System Charge Table.

PART NO.	MODEL NO.	OZ'S OF R22
5202-001	C-083S	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. Connect manifold as instructed.
2. Place refrigerant drum upright on scale and determine exact weight of 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 R22.
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.

Front seat gauge manifold valves, disconnect charging and gauge hoses and replace all valve caps.

NOTE: To speed refrigerant flow, it may be necessary to place refrigerant drum in a pan of warm water (not greater than 130°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.

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.

**R-22 TOTAL SYSTEM CHARGE FOR
SPLIT AIR CONDITIONING AND HEAT PUMP SYSTEMS**

The following tables are used to determine the operating charge for split air conditioning and heat pump systems. The values shown are the total amount of refrigerant received in the precharged system components, which include the outdoor unit, indoor unit, and inter-connecting tubing. This is also the amount of refrigerant required for a system recharge following any refrigeration system repairs.

Find the outdoor section (Table A) matching indoor section (Table B) and connecting tubing set (Table C) for system being used. Add the ounces of charge for each of the system components together. This value is the **TOTAL SYSTEM CHARGE**.

$$\begin{array}{r} \text{_____ OZs} \\ \text{OUTDOOR UNIT} \\ \text{(Table A)} \end{array} + \begin{array}{r} \text{_____ OZs} \\ \text{INDOOR UNIT} \\ \text{(Table B)} \end{array} + \begin{array}{r} \text{_____ OZs} \\ \text{TUBING SET} \\ \text{(Table C)} \end{array} = \begin{array}{r} \text{_____ OZs} \\ \text{TOTAL SYSTEM CHARGE} \end{array}$$

To change total charge to lbs. and OZs, divide by 16.

EXAMPLE: 24BCQ1 with 24QS coil and RW35 tubing set.

$$\begin{array}{r} \text{33 OZs} \\ \text{OUTDOOR UNIT} \end{array} + \begin{array}{r} \text{5 OZs} \\ \text{INDOOR UNIT} \end{array} + \begin{array}{r} \text{7 OZs} \\ \text{TUBING SET} \end{array} = \begin{array}{r} \text{45 OZs} \\ \text{TOTAL SYSTEM CHARGE} \end{array}$$

$$\text{or } \frac{45 \text{ OZs}}{16} = 2 \text{ lbs. } 13 \text{ oz.}$$

In the event that the installer is running his own tubing by using a CTO kit or is modifying a precharged tubing set by adding or subtracting a few feet of tubing length, the tubing set should be evacuated and charged before being connected to the outdoor and indoor sections. To determine TUBING SET ONLY charges, use the following table:

TABLE D (SHOWS CHARGE IN OZS)											
TUBING SET LENGTH IN FT.	10	15	20	25	30	35	40	45	50	55	60
1/4" O.D. LIQUID LINE	2	2	3	3	5	7	9	11	--	--	--
3/8" O.D. LIQUID LINE	2	2	5	8	11	14	17	20	23	26	29

To determine a **TOTAL SYSTEM CHARGE** for a system that is connected with a non-standard tubing length, the outdoor unit basic charge (from Table A) plus the indoor unit basic charge (from Table B), is added to the tube set based on liquid line O.D. size (Table D). This value is the **TOTAL SYSTEM CHARGE**.

NOTE: If your tubing length is between the sizes shown in the table, use a charge value appropriately between the values shown for the tubing length shorter and longer than actual length.

TABLE A SPLIT SYSTEM AIR CONDITIONERS	
MODEL	OUTDOOR UNIT FACTORY CHARGE
18ECQ1	23 oz.
24ECQ1	33 oz.
30ECQ2	44 oz.
31ECQ	50 oz.
36ECQ4	49 oz.
37ECQ	54 oz.
42ECQ1	84 oz.
48ECQ2	86.5 oz.
60ECQ1	101 oz.
SPLIT HEAT PUMPS	
MODEL	OUTDOOR UNIT FACTORY CHARGE
18HPQ1	56 oz.
18HPQ2	41 oz.
24HPQ1	47 oz.
24HPQ2	47 oz.
30HPQ3	67 oz.
30HPQ4	73 oz.
36HPQ3	84 oz.
36HPQ4	83 oz.
42HPQ	86 oz.
48HPQ2	95 oz.
60HPQ3	126 oz.
WQS30	50 oz.
WQSD30	52 oz.
WQS36	59.5 oz.
WQSD36	61.5 oz.

TABLE B INDOOR UNITS		
HORIZONTAL "H" EVAPORATOR COILS		
MODEL	FACTORY CHARGE	FOR USE WITH
3HCQ	7 oz.	30ECQ2, 31ECQ, 36ECQ4, 37ECQ
4HCQ	12 oz.	42ECQ1, 48ECQ2
5HCQ	7 oz.	60ECQ1
"A" EVAPORATOR COILS		
18QS3	9 oz.	18ECQ1
24QS	5 oz.	24ECQ1
24CQ	3 oz.	18ECQ1, 24ECQ1
34CQ3	5 oz.	30ECQ3, 31ECQ, 36ECQ4, 37ECQ
34CQ4	21.5 oz.	31ECQ
34CQ5	17.5 oz.	37ECQ
44CQ1	7 oz.	42ECQ1, 48ECQ2
44CQ2	2.5 oz.	48ECQ2
54CQ1	7 oz.	48ECQ2, 60ECQ1
BLOWER COIL UNITS		
B18EQ1	7 oz.	18ECQ1
B24EQ1	4 oz.	24ECQ1
B36EQ4	8 oz.	30ECQ2, 31ECQ, 36ECQ4, 37ECQ, 30HPQ3, 36HPQ3
B36EQ1	8 oz.	WQS30, WQSD30, WQS36, WQSD36, 30HPQ4, 36HPQ4
B48EQ4	23 oz.	42ECQ1, 48ECQ2, 60ECQ1, 42HPQ, 48HPQ2
B18EH1	7 oz.	18HPQ2, 24HPQ2
B18EH4	7 oz.	18HPQ1
B24EH4	7 oz.	24HPQ1
B24EH1	7 oz.	18HPQ2, 24HPQ2
B30EH4	2 oz.	31ECQ, 30ECQ2, 30HPQ4
B60EH4	23 oz.	60HPQ3
HEAT PUMP COIL		
H18QS	7 oz.	18HPQ1
H18QS1	7 oz.	18HPQ2, 24HPQ2
H24QS	7 oz.	24HPQ1
H24QS1	7 oz.	18HPQ2, 24HPQ2
H30QS	2 oz.	31ECQ, 30ECQ2, 30HPQ4
H34Q	10 oz.	30HPQ3, 30HPQ4, 36HPQ3, 36HPQ4, WQS30, WQSD30, WQS36, WQSD36
H54Q	23 oz.	42HPQ, 48HPQ2, 60HPQ3

TABLE C CHARGED TUBING SETS FOR USE WITH 18ECQ1, 24ECQ1, 18HPQ1, 24HPQ1, 18HPQ2, 24HPQ2				
MODEL	CHARGE	LENGTH IN FT.	LIQUID LINE	SUCTION LINE
CT15	2 oz.	15	1/4"	5/8"
RM25	3 oz.	25	1/4"	5/8"
RM35	7 oz.	35	1/4"	5/8"
RM45	11 oz.	45	1/4"	5/8"
FOR USE WITH 30ECQ2, 31ECQ, 36ECQ4, 37ECQ, 30HPQ3, 36HPQ3, 30HPQ4, 36HPQ4, WQS30-36, WQSD30-36				
CT0	NONE*	0	3/8"	3/4"
CT15	2 oz.	15	1/4"	5/8"
CT25	3 oz.	25	1/4"	3/4"
CT35	14 oz.	35	3/8"	3/4"
CT45	20 oz.	45	3/8"	3/4"
FOR USE WITH 42ECQ1, 48ECQ2, 60ECQ1, 42HPQ, 48HPQ2 AND 60HPQ3				
CT0-12	NONE*	0	3/8"	7/8"
CT25-12	2 oz.	15	3/8"	7/8"
CT35-12	8 oz.	25	3/8"	7/8"
CT35-12	14 oz.	35	3/8"	7/8"
CT45-12	20 oz.	45	3/8"	7/8"

*CT0 AND CT0-12 FOR FIELD INSTALLED TUBING. (SEE TABLE D FOR CHARGING)