Number One Air Conditioning Maker

Carrier

Division of Carrier Corporation
Carrier Parkway • Syracuse N Y 13201

Installation, Start-Up and Service Instructions

38GK

Air-Cooled Condensing Units

INTRODUCTION

The 38GK condensing units are designed for use with Carrier approved evaporator coils or fan coils which have capillary tube or AccuRater ™ refrigerant control. They may also be used with evaporators which have expansion valves that equalize pressure during the off cycle. If an expansion valve without pressure equalization feature is used, add an accessory start capacitor kit to condensing unit.

Install these condensing units either thru-the-wall, outdoors on a slab or on the roof. When installing units, allow sufficient space for air-flow clearance, wiring, refrigerant piping and servicing units. Consult local building codes and National Electrical Code (NEC) for special installation requirements. See Fig. 1 and Tables 1 and 2 for detailed unit installation data.

→ **Table 1 — Physical Data**

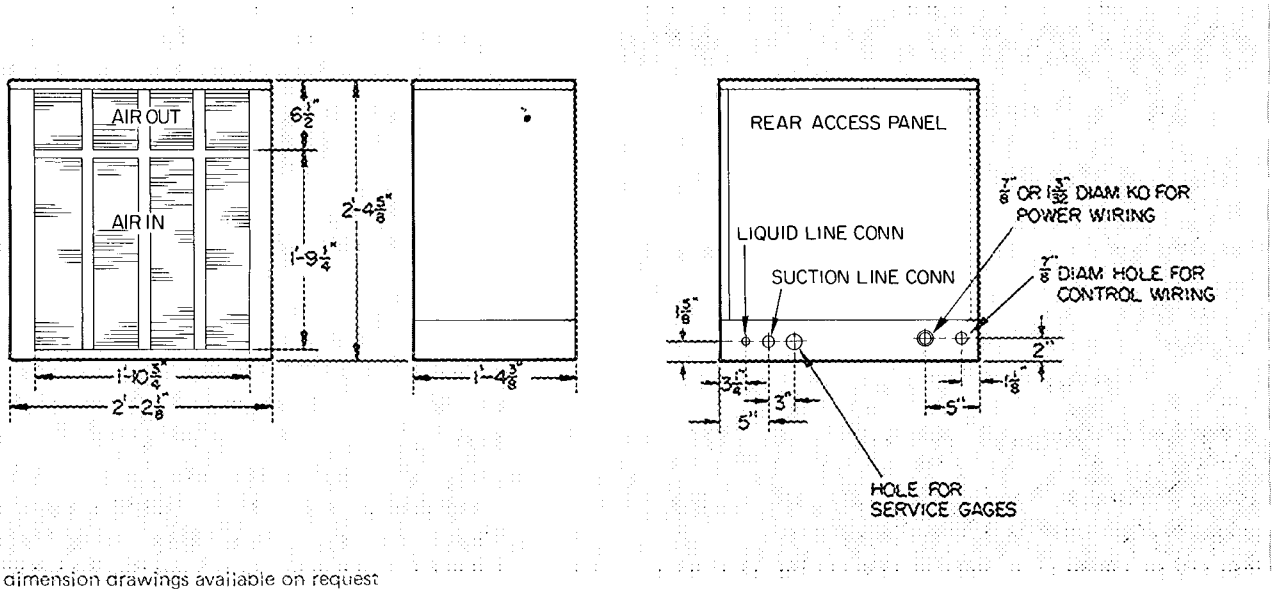
COND UNIT	38GK001	38GK002	38GK003
OPER WT (lb)	144	162	186
R-22 CHG (lb-oz)	2-3	3-5	4-3
COND FAN	Twin Centrifugal Blowers — Direct Drive		
Discharge	Horizontal		
Motor Hp	1/4		
Rpm	1550		
Diam + Width (in.)	6 5/16 + 5 1/2		
DIM. (ft-in.)			
Length	2-2 1/8		
Width	1-4 3/8		
Height	2-4 5/8		
CONN.* (in.)			
Suction (ODF)	5/8		3/4
Liquid (ODF)	3/8		3/8

*Units are equipped with Carrier Compatible Fittings for refrigerant connections

Table 2 — Installation Data (ft-in.)

COND UNIT		38GK001	38GK002	38GK003
THRU-THE-WALL CLEARANCE DIM.		2-2 1/2 x 2-5		
AIR CLEARANCE		3-0		
CONCRETE MOUNTING PAD DIMENSIONS		2-3 x 1-5 x 0-5		
SERVICE CLEARANCE	Ends	0*		
	Back	1-6*		

*Units are serviced from rear access panel Therefore, units can be installed with 0-in end clearance



Certified dimension drawings available on request

Fig. 1 — Dimensions and Connections

INSTALLATION

Mounting Thru-The-Wall

An opening approximately 26-1/2 x 29 in. shall be made in a wall as close to a nearby cooling coil as possible. Refer to Fig. 2 to build a frame in a manner to support the condensing unit.

1. Locate unit with frame into the opening until the unit extends approximately 1 in. beyond the outside (finished) wall.
2. Tilt to the front to allow the water to drain off. See Fig. 3.
3. Fasten the unit to the frame with metal straps.
4. Use flashing under the unit and caulk all edges to provide a weathertight seal (Fig. 3).

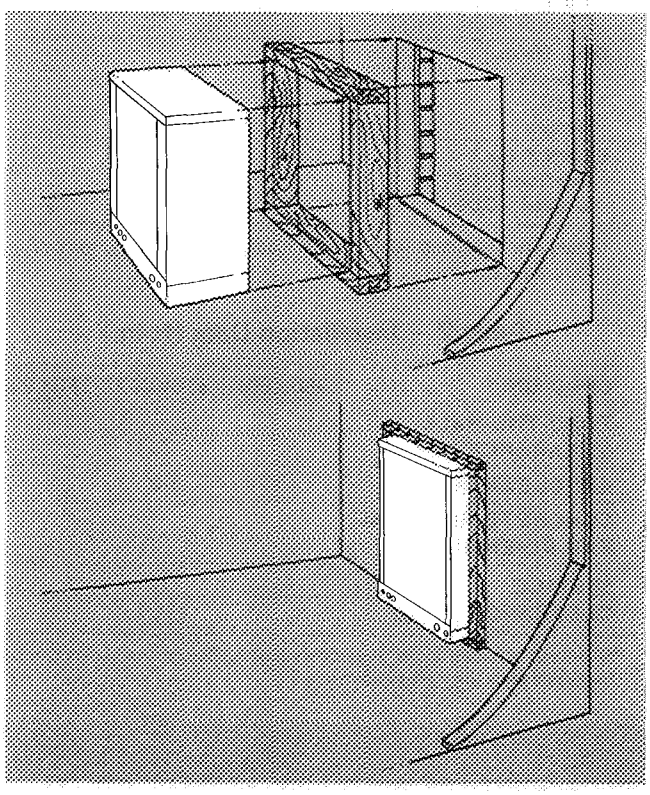


Fig. 2 — Roughing-In Supporting Frame

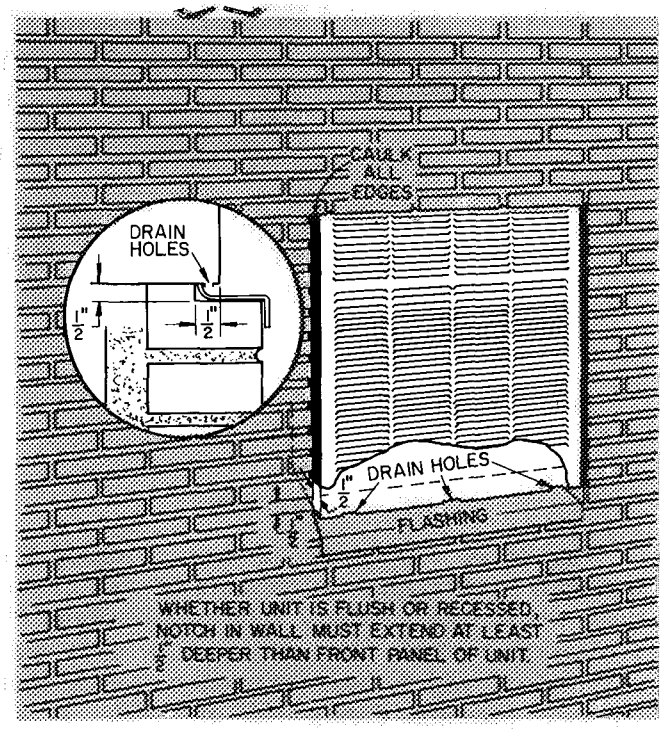


Fig. 3 — Flush or Recess Mounting

→ **Table 3 — Recommended Liquid Line Sizes**

COND UNIT	MAX COND* UNIT HT (ft)		REFRIG LINE LGTH (ft)		
	Above Evap	Below Evap	0-49	50-100	101-150*
			Liquid Line Diameter (in.)		
38GK001	40	50	3/8	3/8	3/8*
38GK002	40	70			
38GK003	40	60			

Crankcase heater required

*Decrease maximum allowable vertical separation by 20% for every 10 ft of refrigerant line length over 100 feet At 150 ft of line length, 0 ft vertical separation is allowed

Table 4 — Recommended Suction Line Diameters

UNIT	MODEL	SUCTION LINE LENGTH (ft)	SUCTION LINE DIAMETER (in.)
38GK001	(All)	0 – 46	5/8
		47 – 120	3/4
		121 – 150	7/8*
38GK002	(All)	0 – 28	5/8
		29 – 72	3/4
		73 – 150	7/8*
38GK003	201	0 – 19	3/4
		20 – 52	3/4
		53 – 116	7/8*
38GK003	301	0 – 18	3/4
		19 – 48	3/4
		49 – 107	7/8*

*Field-supplied 7/8-in to 3/4-in adapter is required

NOTE

The above table is based on a line loss of 2 F Longer lengths can be used in each diameter listed, but the result will be larger line losses Refer to Carrier, Syracuse Engineering Office for specific details

REFRIGERANT LINE SIZING

Selection of Correct Liquid Line — See Table 3 for maximum allowable vertical and horizontal distance between condensing unit and evaporator using recommended 3/8-in. liquid line.

Selection of the Correct Suction Line Diameter — To keep line losses at a minimum, refer to Table 4 to select the correct suction line diameters.

INSTALLING REFRIGERANT LINES

General — The condensing unit is fully charged at the factory. Be sure both service valves are front-seated (turned clockwise) to avoid loss of the charge. *Do not remove refrigerant line connection seals from the condensing unit, the matching coil, nor the refrigerant tubing, until ready to make the actual connection at the point of seal.*

If accessory tubing package or evaporator coil has been open for more than 15 seconds per connection, evacuate or purge evaporator coil and tubing system (use field-supplied refrigerant, not unit refrigerant). Always evacuate or purge if field-supplied tubing is used. See Purging.

Ensure field-supplied tubing is of refrigerant grade. Insulate the suction line with insulation that has an adequate vapor barrier (Armaflex or Ensolex). Evacuate tubing.

When a complete Carrier system is used, a filter-drier is not required. However, if other than Carrier accessory tubing package or evaporator is used, or if refrigerant tubing or coil is exposed to atmospheric conditions for longer than 10 minutes, install a filter-drier in the system near evaporator coil. *Additional refrigerant must be added to the system to compensate for the additional volume of the filter-drier.*

Installation

1. Run refrigerant lines as directly as possible, avoiding all unnecessary turns and bends.
2. Tape the liquid line to the top of the insulated suction line for support.
3. Suspend the refrigerant lines so that they do not damage the insulation on the suction line and do not transmit vibration to the structure.
4. If the refrigerant lines are too long, the lines should be rolled into a loop and placed in a horizontal plane, or the excess may be cut off.
5. Check to be sure both service valves are frontseated (turned clockwise). It is necessary to remove the valve stem caps to check.
6. Connect tubing to the condensing unit. The refrigerant tubing and evaporator coil should be leak tested upon completion.

Connection Procedure — When making piping connections, be sure to provide clearance at unit for electrical connections.

Connect refrigerant liquid and suction lines to condensing unit, Fig. 1 (page 1). Unit Compatible Fittings permit 2 methods of refrigerant line connection: mechanical (quick connect) or sweat connection. Make suction line connection first.

MECHANICAL CONNECTION (Mate one set of connections at a time.)

1. Loosen nut on Compatible Fitting one turn. Do not remove.
2. Remove plug and be sure O-ring is in the groove inside the Compatible Fitting.
3. Cut tubing to correct length.
4. Insert tube into Compatible Fitting until it bottoms. Be sure tube is bottomed while nut is being tightened.
5. Tighten nut until it bottoms on back coupling flange.

SWEAT CONNECTION (Use refrigerant grade tubing.)

1. Remove locking nut, rubber O-ring and Schrader core from valve.
2. Cut tubing to correct length.
3. Insert tube into Compatible Fitting. Wrap top and bottom of service valves in wet cloth to prevent damage by heat. Solder with low-temperature (450 F) silver alloy solder.
4. Replace Schrader core.
5. Evacuate or purge system with field-supplied refrigerant.

Leak Testing

No installation is complete until all field and factory joints have been checked for leaks.

1. Remove the valve stem caps from both service valves and check to be sure the valves are frontseated (turned clockwise). Remove the service port caps.
2. Attach a gage manifold to service ports of the service valves and purge the hoses.
3. Pressurize the evaporator coil and the interconnecting refrigerant tubing with vapor from an external refrigerant cylinder of R-22 until the system and cylinder pressures are equalized. NOTE: NEVER USE A UNIT CHARGE FOR LEAK TESTING.
4. Leak test with an electronic detector, a halide torch, or a liquid soap solution.
5. Release the pressure and repair any leaks found.
6. If the system is to be purged or evacuated, leave the service valves in the frontseated position.
7. If the system is free of leaks, you may then prepare the unit for operation by:
   a. Backseating (turn counterclockwise) both service valves.
   b. Removing the gage manifold.
   c. Replacing the caps on the service port and valve stem.

Purging — To purge unit, *do not use the unit charge* Proceed as follows:

1. Remove the valve stem caps from both service valves and check the valve stems to be sure they are frontseated (clockwise).
2. Remove the service port caps from both service valves and connect a refrigerant cylinder of R-22 to the service port of the liquid line service valve.
3. Open the refrigerant cylinder valve and allow approximately 1/2 to 1 pound of refrigerant to flow thru the system and out the service port on the suction line service valve.

4. Pressurize the system with refrigerant to 10 psig and backseat (turn counterclockwise) both service valves.
5. Remove the refrigerant cylinder. Replace the valve stem and service port caps on both service valves (be sure they are tight) if system is to be left in purged condition.

ELECTRICAL DATA AND WIRING

→ **Table 5 — Electrical Data**

COND UNIT	V/PH	OPER* VOLTS		COMPR		FAN	BRANCH CIRCUIT		
		Max	Min	LRA	FLA	FLA	Wire Size† (AWG)	Max Ftt Wire	Fuse‡ Amps
001	208/1	229	187	60 0	12 2	1 9	12	37	25
	230/1	253	207	51 0	11 0		12	44	25
002	208/1	229	187	74 0	15 5	1 9	10	48	30
				80 0	15.7		10	47	30
	230/1	253	207	61 0	13.6		12	37	30
				72.0	14.1		10	37	30
003	208/1	229	187	94.0	20.5	1 9	10	37	45
				99.0	20.0		10	38	45
	230/1	253	207	86 0	18.5		10	45	40
				88.0	18.3		10	46	40

Electrical data for unit models with 06M compressor

FLA — Full Load Amps
LRA — Locked Rotor Amps

*Permissible limits of the voltage range at which the units will operate satisfactorily

†Copper wire sizes and lengths. Use latest National Electrical Code (NEC) for aluminum wire sizes

‡Maximum dual element fuse size

NOTES:
1 Control circuit voltage is 24 volts on all units
2 Aluminum field wiring may be used

Wiring — Field wiring must comply with local and national fire, safety and electrical codes. Voltage to unit must be within ± 10% of voltage indicated on nameplate. Contact local power company for correction of improper line voltage.

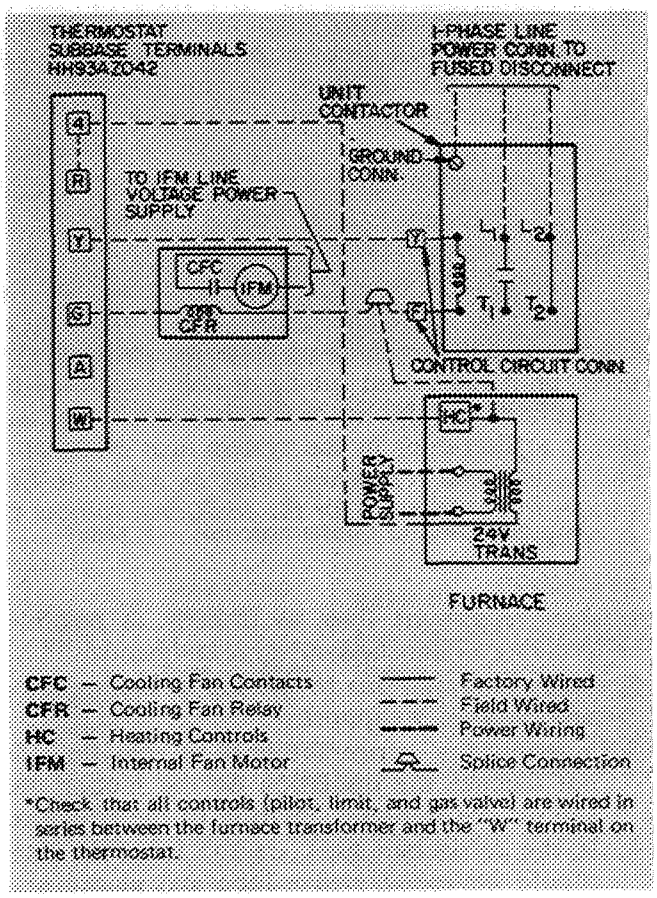
Operation of unit on improper line voltage constitutes abuse and is not covered by Carrier Warranty.

See Table 5 for recommended wire and fuse size. When making electrical connections, provide clearance at unit for refrigerant piping connections.

INSTALL A BRANCH CIRCUIT FUSED DISCONNECT of adequate size to handle unit starting current. Locate disconnect within sight of and readily accessible to the unit, per section 440-14 of National Electrical Code (NEC).

BRING LINE POWER LEADS INTO UNIT — Extend leads from fused disconnect into unit thru hole provided in service panel, Fig. 1 Connect ground lead to ground lug in control box for safety. Connect line power leads to contactor screw terminals L1 and L2. See Fig. 4. Contactor terminals are approved for use with copper or aluminum field wiring.

CONTROL POWER (24 v) — *Use furnace or fan-coil transformer as 24-v supply for system Transformer must have a minimum capacity of 30 va.* Bring control wiring thru hole in unit service panel and connect to pigtails from unit contactor. Contactor pigtails are labeled Y and F. Refer to Fig. 4 for system control circuit connections.



→ **Fig. 4 — Control Circuit Connections**

→ START-UP

Energize crankcase heater (if so equipped) a minimum of 24 hours before starting unit. To energize heater only, turn the thermostat to "Off" position and close electrical disconnect to condensing unit.

Start Procedure

1. Backseat (open) liquid and suction line service valves.
2. Set thermostat selector switch at "Off."
3. Set room thermostat to desired temperature.
4. Close electrical disconnects energizing entire system.
5. Set room thermostat at "Cool" and fan switch as desired ("Fan") ("Auto."). Operate unit for 15 minutes, then check system refrigerant charge. See Refrigerant Charging.

Motors and controls operate satisfactorily in a range from 10% above to 10% below nominal unit voltage (Table 5).

Do not connect charging hoses during initial start procedure. (Loss of charge from this procedure may result in capacity reduction.) If necessary to add manifold gages for servicing, refer to Carrier Standard Service Techniques Manual, Chapter 1, page 1-5, Fig. 8, for bypass method of returning charge to system.

REFRIGERANT CHARGING

38GK condensing units contain operating charge for complete system when connected to Carrier evaporators using 25 ft of accessory tubing. Charge adjustment may be required on other systems.

Checking Charge

1. Remove the valve stem caps from both service valves and check the valve stems for the backseat position (counterclockwise).
2. Remove the service port cap from both service valves and attach a gage manifold. Purge the gage manifold and hoses.
3. Start the unit and allow it to run until operating conditions stabilize and pressures level out. To obtain pressure readings, the service valve stems need only be turned clockwise approximately one turn from the backseat position.
4. Evaluate the system performance and the refrigerant charge level as in Chargemaster® Operation section.
5. When the correct refrigerant charge level is obtained, turn both service valves counterclockwise. Remove the gage manifold.
6. Replace the valve stem and service port caps.

CHARGEMASTER OPERATION – Operate unit 10 minutes before using Chargemaster (Carrier Part No. 38GC680004).

1. Tape Chargemaster feeler bulb to suction line close to condensing unit. Insulate bulb. Ensure suction line is clean for good contact with bulb.
2. Connect refrigerant drum to Chargemaster inlet port with drum in position for vapor charging.
3. Connect Chargemaster outlet port to unit suction valve service port.
4. Crack valves on refrigerant drum and Chargemaster to purge lines from drum to suction valve. After purging lines, close valve on Chargemaster only.
5. Measure outdoor air dry-bulb temperature.
6. Crack unit suction valve and read *evaporator temperature at red needle position* on Chargemaster temperature gage and *suction line temperature at black needle position.*

CAUTION: Do not read evaporator temperature with Chargemaster valve open.

7. Enter Suction Line Temperature, Table 6, at outdoor air temperature (step 5) and evaporator temperature (step 6). Find the suction line temperature required for correct system charge. If actual suction line temperature (step 6) is higher than table value, the system is undercharged. If suction line temperature is lower than table value, the system is overcharged.

   Example: At outdoor air temperature of 84 F and evaporator temperature of 40 F, the system will be correctly charged at 66 F (± 2 F) suction line temperature.

→ **Table 6 – 38GK Chargemaster Charging Chart (Capillary Tube or AccuRater ™ Systems)**

OUTDOOR TEMP (F)	EVAPORATOR TEMP (F)*									
	21	25	28	31	34	37	40	43	45	48
	Suction Line Temperature									
60	32	40	51							
62	30	38	49							
64	28	37	47	60						
66	27	35	45	57						
68		34	43	54	67					
70		32	41	52	64					
72		31	39	50	61	72				
74		30	37	48	58	69				
76		29	36	46	56	66				
78		27	35	44	54	63	73			
80		26	33	42	52	61	72			
82			32	40	50	59	68	80		
84			31	38	48	57	66	76		
86			29	37	46	55	63	73	85	
88				35	44	53	61	70	81	
90				34	42	51	59	68	78	90
92				33	41	49	57	65	75	86
94					39	47	55	63	72	83
96					38	45	53	61	70	80
98					36	44	51	59	67	77
100						42	49	57	65	75
102						41	48	55	63	73
104						39	46	53	61	70
106							45	51	59	68
108							43	49	57	65
110							41	47	55	63
112								46	53	61
114									50	59

Example

*Saturated evaporator temperature which is the equivalent temperature of pressure taken at the condensing unit suction service valve

8 Add charge by slowly opening Chargemaster® valve. If necessary, reduce charge by bleeding at liquid line service valve. Check outdoor air and evaporator temperature during procedure. If they change, refer back to Suction Line Temperature table for new value.

Correct use of Chargemaster ensures an optimum refrigerant charge will be in system when conditions and system components are normal. However, the Chargemaster does not solve or fix system abnormalities. It indicates correct charge for condition of system. It will not make corrections for dirty filters, slow fans, excessively long or short suction lines or other abnormal conditions. This charging device ensures that a correct relationship exists between outdoor temperature, evaporator temperature, and suction line temperature on a specific system.

Charging By Weight — Remove any refrigerant remaining in the system before recharging. A Dial-a-Charge cylinder may be used to recharge the system with reference to nameplate for correct system charge.

SERVICE

Access to all controls and unit components is thru rear access panel.

Blower Wheel and Motor Removal — The blower assembly may easily be removed thru the rear access panel in the following manner·

1. Shut off all power to the unit.
2. Loosen and remove 3 screws holding the rear access panel in place and remove the rear access panel from the unit. See Fig. 5.
3. Disconnect the 2 electrical leads from the blower motor to the compressor contactor.
4. Remove the 2 screws from the motor mounting clamps, the 4 mounting screws from the blower housings and remove both housings from the rear flange.
5. Insert a 3/8 x 9 in. long Allen wrench into the hole at bottom of the blower housing.
6. Loosen and remove the setscrews on both blower wheels and remove the wheels from the shaft.
7 Lift out motor. *Motor may be replaced at this time, if necessary.*
8. Place both wheels into each housing, and insert motor shaft of motor thru housing and blower wheel for proper wheel positioning.
9. Place blower housing onto the rear flange.
10. Start the 4 mounting screws of the blower housing and align the blower motor between the mounting brackets.

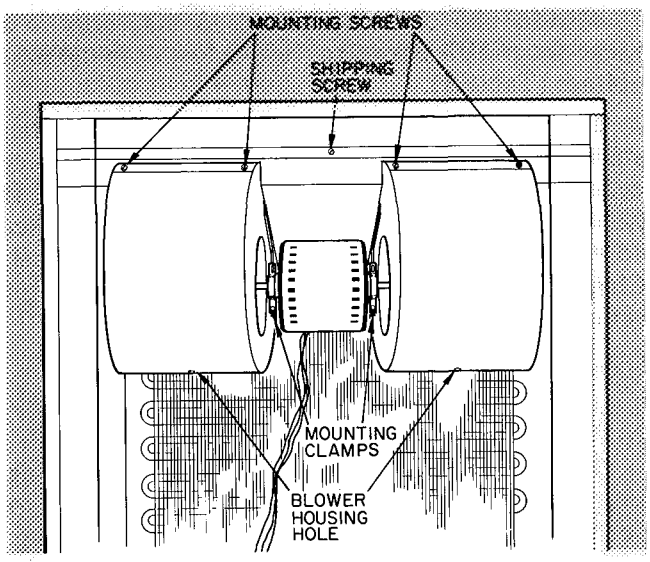


Fig. 5 — Rear Access Panel Removed

11. Place a brace between the blower motor and the compressor to support the motor.
12. Attach the rear clamp, first, then the front clamp to the motor mounting brackets before tightening the clamp screws.
13. Rotate the blower wheel until the bottom holes of the blower housing, the large hole in the blower wheel, and the Allen setscrews are aligned.
14. Adjust and tighten the blower wheels in position on the motor shaft, using the Allen wrench.
15. Tighten the 4 mounting screws of the blower housing.
16. Connect the 2 electrical leads from the blower to the compressor contactor. *Make sure both speed taps of the motor are not energized at the same time.*
17. Replace the rear access panel and tighten the 3 screws.
18. Turn on power to unit.

38GK Unit Single-Phase Compressors of the split capacitor (PSC) type require an equalized system pressure to start. (Equalization takes approximately 3 minutes.) When supply voltage is within permissible limits and compressor does not start, give compressor a temporary capacitance boost. See Carrier Standard Service Techniques Manual, Chapter 2, for details. Use a 130 mfd start capacitor. Run compressor for 10 minutes, then shut off and allow system pressure to equalize. Try restarting without boost capacitor. If after 2 attempts (without boost capacitor) the compressor does not start, add an accessory start capacitor relay package.

Compressor Protection — Compressor motor is protected by an internal current and temperature sensitive overload. Excessive current or temperature will cause overload to open, giving the indication of an open circuit in the motor windings. The overload will reset automatically when internal motor temperatures drop to a safe level (overloads may require up to 30 minutes to reset). When an internal overload is suspected of being open, check by using an ohmmeter or continuity tester. See Carrier Standard Service Techniques Manual, Chapter 2, for complete instructions.

→ **Compressor Removal** — Follow safety codes, and wear safety glasses and work gloves. Have quenching cloth available (step 7).

CAUTION: Aluminum tubing is used in 38GK unit coils. Do not overheat or place excessive strain on tubing or damage may result.

1. *Shut off power to unit.* Remove unit rear access panel.
2. Remove refrigerant from system using refrigerant removal methods describing in Carrier Standard Service Techniques Manual, Chapter 1.
3. Disconnect compressor wiring at compressor terminal box.
4. Using a tubing cutter, cut suction and discharge (hot gas) lines at convenient place near compressor for easy reassembly to new compressor with copper slip couplings.

CAUTION: Excessive movement of copper lines at compressor may cause a break where lines connect to condenser coil.

5. Remove compressor hold-down bolts and lift compressor out.
6. Remove mounting grommets on springs from old compressor and install on new compressor.
7. Carefully unbraze suction and discharge line piping stubs from old compressor. If oil vapor in piping stubs ignites, use quenching cloth. Braze piping stubs onto new compressor.
8. Install new compressor in unit. Braze suction and discharge lines to compressor piping stubs at points where cut (step 4), using field-supplied copper couplings. Ensure that compressor hold-down bolts are in place. Connect wiring.
9. Clean system. Add new liquid line filter-drier.
10. Evacuate and recharge unit.

Pumpdown Procedure — The 38GK units may be pumped down in order to make repairs on low side of system without losing complete refrigerant charge.

1. Attach pressure gage to suction service valve gage port.
2. Frontseat the liquid line valve.
3. Start unit and run until suction pressure reaches 5 psig (see CAUTION).
4. Shut unit off and frontseat suction valve.
5. Vent remaining pressure to atmosphere.

CAUTION: The 38GK condensers will hold only factory supplied amount of refrigerant. Additional refrigerant may cause units to relieve pressure thru internal pressure relief valve (indicated by a sudden rise of suction pressure) before suction pressure reaches 5 psig. If this occurs, shut unit off immediately, frontseat suction valve, and vent remaining pressure to atmosphere.

Cleaning Condenser Coil — Clean by washing with dry refrigerant, low-pressure water or steam. Direct spray from inside out.

Lubrication

FAN MOTOR BEARINGS are prelubricated.

COMPRESSOR contains factory oil charge. If oil must be added, see Carrier Standard Service Techniques Manual, Chapter 1, page 1-21 for instructions. Use Carrier PP33-1, Texaco Capella B or Suniso 3G oil.

COMPATIBLE FITTING REPAIR

Leaking Mechanical Connection – Frontseat condensing unit service valves and relieve refrigerant pressure in tubing. Back locknut off Compatible Fitting onto tube. Cut fitting between threads and seal ring head as shown in Fig. 6. Remove tubing section remaining in threaded portion of fitting. Discard locknut.

Clean, flux, and insert new tube end into remaining portion of Compatible Fitting. *Wrap valve base in wet rag.* Heat and apply low temperature (450 F) solder.

Leaking Sweat Connection – Frontseat service valves and relieve refrigerant pressure in tubing. Clean and flux area around leak and apply low temperature (450 F) solder.

Evacuate or purge evaporator coil and tubing system. Add refrigerant charge (see charging instructions).

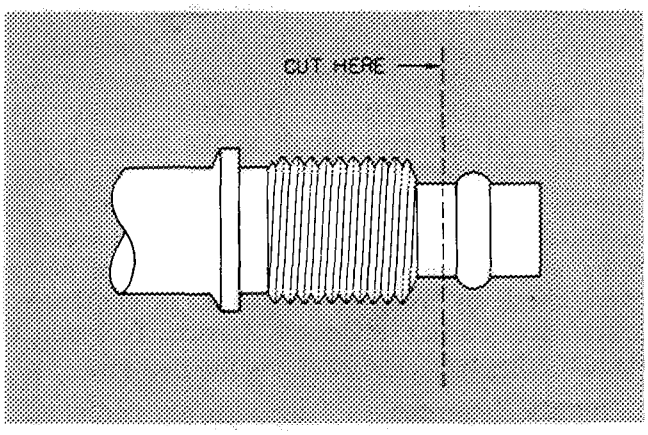


Fig. 6 – Repair of Mechanical Connection