

SUPERSEDED BY 38SE-3SI 3/75

# Air-Cooled Condensing Units

→ This booklet includes wiring changes on 38GR units starting from serial no. K200001.

### TRANSPORTATION DAMAGE

File claim with shipping company if shipment is damaged or incomplete.

### PRELIMINARY SURVEY

Consult local building codes and National Electric Code (NEC) for special installation requirements.

When installing unit, allow sufficient space for air-flow clearance, wiring, refrigerant piping and servicing unit. Recommended minimum requirement is 3 ft (Fig. 1). Position unit so water from roof or eaves will not pour directly on top of unit.

Install unit on a solid, level mounting pad. Position tie-down bolts in pad. Any two holes in unit base may be used to fasten unit to pad.

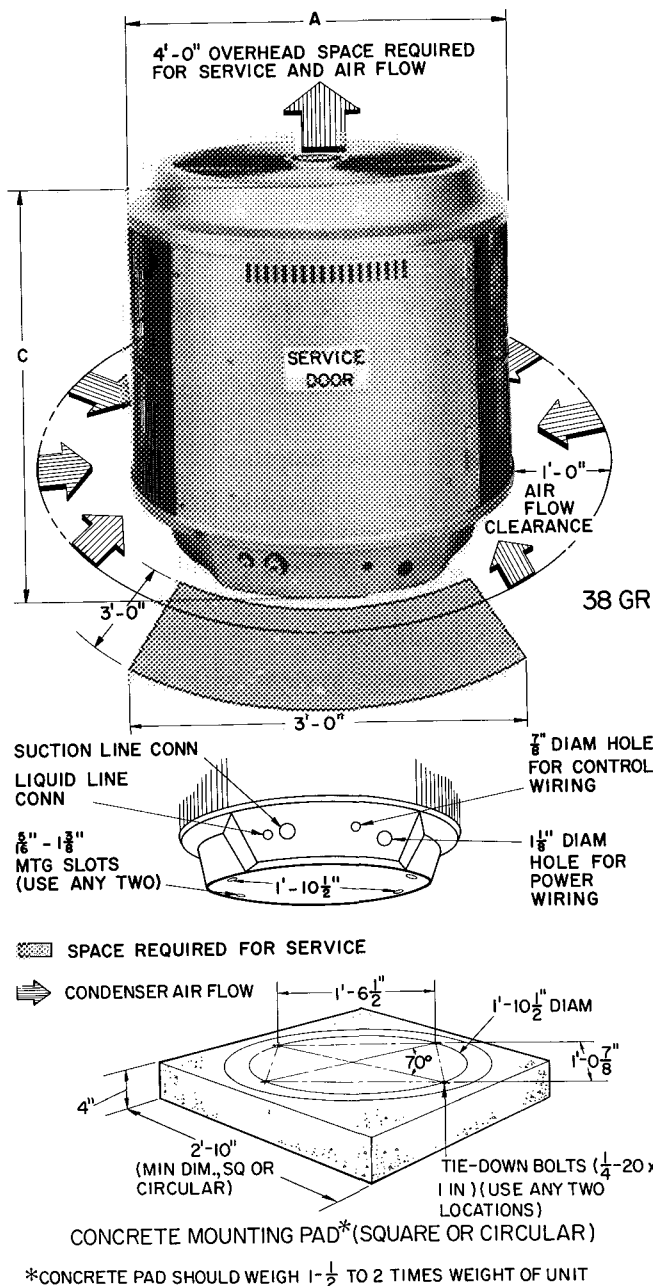
**38GR Condensing Units Connected to Carrier Approved Evaporators with Carrier Accessory Tubing** — 38GR units contain correct refrigerant charge when evaporator is same size, or one size larger than condensing unit and are connected with Carrier accessory tubing. Check refrigerant charge when tubing lengths are above 50 feet. See Refrigerant Charging for details.

**38GR Condensing Units Connected to Non-Carrier Evaporators** — Check refrigerant charge when the 38GR is added to a system in which other than a Carrier approved evaporator is being used or where the evaporator has been previously installed. Field-supplied refrigerant piping must be in accordance with Refrigerant Piping Data table. Where evaporator is below condensing unit, reduce liquid line size one diameter (min 1/4-in. OD).

### PIPING CONNECTIONS

38GR condensing units can be connected to evaporator sections using Carrier accessory tubing package or field-supplied tubing of refrigerant grade. (Accessory tubing not available for 38GR006.) See Table 2 for accessory tubing sizes and Table 3 for recommended field-supplied tubing sizes. Do not use damaged or contaminated tubing. Do not use less than 10 ft of liquid line. Do not cut 5/16-in. or 1/4-in. liquid line. Bend or coil to fit.

If accessory tubing package or evaporator section 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). If necessary, refer to Carrier System Design Manual, Part 3, for standard piping techniques.



**Fig. 1 — Dimensions, Connections and Mounting Pad**

**Table 1 — Installation Data**

| CONDENSING UNIT     | 38GR     |     |         |     |     |        |
|---------------------|----------|-----|---------|-----|-----|--------|
|                     | 002      | 003 | 004     | 045 | 005 | 006*   |
| OPERATING WT (lb)   | 151      | 170 | 182     | 194 | 234 | 260    |
| DIMENSIONS (ft-in.) | Diam A   |     | 2-5 1/4 |     |     |        |
|                     | Height B | 2-4 | 2-4     | 2-4 | 2-8 | 2-8    |
| REFRIG CONN.        | Suct ODF | 3/4 | 3/4     | 3/4 | 3/4 | 1 1/8* |
|                     | Liq ODF  | 3/8 |         |     |     |        |

\*38GR006 supplied with 3/4 to 1-1/8 in suction valve connection adapter (field installed)

**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). Unit compatible fitting permits two methods of refrigerant line connection: mechanical (quick connect) or sweat connection.

**38GR006 UNITS** — Remove suction line adapter taped to compressor suction line and connect to suction line compatible fitting. Sweat connect refrigerant suction line to adapter. Connect liquid refrigerant line to unit.

**Table 2 — Accessories**

| PART NUMBER             | DESCRIPTION  |             |                     |             |           |           |           |
|-------------------------|--|-------------|---------------------|-------------|-----------|-----------|-----------|
| HH01AD040               | Low-Voltage Control - Honeywell Deluxe Thermostat  |             |                     |             |           |           |           |
| HH93AZ040               | Thermostat Subbase   |             |                     |             |           |           |           |
| HH51AR001               | Comfort Control Center (Use with HH01AD040)  |             |                     |             |           |           |           |
| HH07AT070,<br>HH07AT074 | Low-Voltage Control - Honeywell Thermostat   |             |                     |             |           |           |           |
| HH93AZ076               | Thermostat Subbase (with Automatic Changeover)   |             |                     |             |           |           |           |
| HH01AD042<br>HH93AZ042  | Low-Voltage Control - Honeywell Thermostat Thermostat Subbase  |             |                     |             |           |           |           |
| HH01YA092<br>HH93YZ094  | Low-Voltage Control - Grayson Thermostat Thermostat Subbase  |             |                     |             |           |           |           |
| 32LM001-301             | Solid State Head Pressure Control<br>Special field-installed fan motor required  |             |                     |             |           |           |           |
|                         | <table border="1"> <tr> <td>Unit</td> <td>38GR002,003,004,045</td> <td>38GR005,006</td> </tr> <tr> <td>Motor No.</td> <td>HC38VE851</td> <td>HC40VL701</td> </tr> </table> | Unit        | 38GR002,003,004,045 | 38GR005,006 | Motor No. | HC38VE851 | HC40VL701 |
| Unit                    | 38GR002,003,004,045  | 38GR005,006 |                     |             |           |           |           |
| Motor No.               | HC38VE851  | HC40VL701   |                     |             |           |           |           |
| 38GC900-152             | Indoor Fan Relay (Six - 38BA400693)  |             |                     |             |           |           |           |
|                         | Tubing Packages (not available for 38GR006). Packages have 3/4-in. suction line and 3/8-in. liquid line. Suction line is insulated and has a 90° bend on one end           |             |                     |             |           |           |           |
| 38GC900071              | 10 ft  |             |                     |             |           |           |           |
| 38GC900081              | 18 ft  |             |                     |             |           |           |           |
| 38GC900091              | 25 ft  |             |                     |             |           |           |           |
| 38GC900101              | 35 ft  |             |                     |             |           |           |           |
| 38GC900111              | 50 ft  |             |                     |             |           |           |           |

**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. Use gage on tag attached to service valve to mark tube end for correct insertion depth. Insert tube into compatible fitting until it bottoms. (Tube should be inserted at least as far as mark on tubing.)
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.

**SERVICE DOOR**

Service door can be opened or removed for wiring or servicing unit.

Remove three screws from left side of service door (Fig. 1) to swing door open.

→ **Door Removal** — Ensure power is off. Disconnect wiring from control panel which is mounted on door. Refer to Fig. 4 and 5. After wiring is disconnected, lift door from roll pin hinges.

**Table 3 — Refrigerant Piping Data**

| COND UNIT | REFRIG CONTROL | MAX COND UNIT HT (ft) |            | REFRIGERANT LINE LENGTH (ft) |        |         |        |         |        |         |        |         |        |
|-----------|----------------|-----------------------|------------|------------------------------|--------|---------|--------|---------|--------|---------|--------|---------|--------|
|           |                | Above Evap            | Below Evap | 25                           |        | 50      |        | 75      |        | 100     |        | 150     |        |
|           |                |                       |            | Line Diameter (in. OD)       |        |         |        |         |        |         |        |         |        |
|           |                | Suction               | Liquid     | Suction                      | Liquid | Suction | Liquid | Suction | Liquid | Suction | Liquid | Suction | Liquid |
| 38GR002   | TXV            | 90                    | 90         | 3/4                          | 3/8    | 3/4     | 3/8    | 3/4     | 3/8    | 3/4     | 3/8    | 3/4     | 3/8    |
|           | Cap. Tube      | 70                    | 50         |                              |        |         |        |         |        |         |        |         |        |
| 38GR003   | TXV            | 90                    | 90         | 3/4                          | 3/8    | 3/4     | 3/8    | 3/4     | 3/8    | 3/4     | 3/8    | 7/8     | 3/8    |
|           | Cap. Tube      | 70                    | 50         |                              |        |         |        |         |        |         |        |         |        |
| 38GR004   | TXV            | 90                    | 90         | 3/4                          | 3/8    | 3/4     | 3/8    | 7/8     | 3/8    | 7/8     | 1/2    | 7/8     | 1/2    |
|           | Cap. Tube      | 70                    | 50         |                              |        |         |        |         |        |         |        |         |        |
| 38GR045   | TXV            | 90                    | 90         | 3/4                          | 3/8    | 3/4     | 1/2    | 7/8     | 1/2    | 7/8     | 1/2    | 7/8     | 1/2    |
|           | Cap. Tube      | 70                    | 50         |                              |        |         |        |         |        |         |        |         |        |
| 38GR005   | TXV            | 90                    | 90         | 3/4                          | 3/8    | 7/8     | 1/2    | 7/8     | 1/2    | 7/8     | 1/2    | 1 1/8   | 5/8    |
|           | Cap. Tube      | 70                    | 50         |                              |        |         |        |         |        |         |        |         |        |
| 38GR006   | TXV            | 90                    | 90         | 1 1/8                        | 3/8    | 1 1/8   | 5/8    | 1 1/8   | 5/8    | 1 1/8   | 5/8    | 1 1/8   | 5/8    |

Cap. Tube — Capillary Tube

TXV — Thermal Expansion Valve

# ELECTRICAL DATA AND WIRING

**Table 4 — Electrical Data**

| COND UNIT  | V/PH  | COMPR |      |     | FAN              |              |            | BRANCH CIRCUIT |    |  |
|------------|-------|-------|------|-----|------------------|--------------|------------|----------------|----|--|
|            |       | LRA   | FLA  | FLA | Wire Size* (AWG) | Max Ft* Wire | Fuse† Amps |                |    |  |
| 38GR002--- | 230/1 | 72.0  | 14.8 | 1.0 | 12               | 10           | 39.8       | 62.8           | 25 |  |
| 38GR002310 |       | 72.0  | 14.8 | 1.0 | 12               | 10           | 39.8       | 62.8           | 25 |  |
| 38GR003--- |       | 90.0  | 19.2 | 1.1 | 10               | 8            | 48.9       | 76.2           | 30 |  |
| 38GR00310  |       | 90.0  | 19.2 | 1.1 | 10               | 8            | 48.9       | 76.2           | 30 |  |
| 38GR004--- |       | 100.0 | 22.9 | 1.3 | 10               | 8            | 41.0       | 64.0           | 35 |  |
| 38GR004310 |       | 100.0 | 22.9 | 1.3 | 10               | 8            | 41.0       | 64.0           | 35 |  |
| 38GR045--- | 200/3 | 108.0 | 26.9 | 1.3 | 8                | 6            | 54.9       | 84.9           | 40 |  |
| 38GR005--- |       | 118.0 | 30.4 | 2.0 | 8                | 6            | 47.8       | 73.8           | 50 |  |
| 38GR006--- |       | 155.0 | 39.0 | 2.0 | 6                | 4            | 58.3       | 89.5           | 60 |  |
| 38GR003--- |       | 60.0  | 13.0 | 1.1 | 12               | 10           | 51.8       | 81.9           | 25 |  |
| 38GR003410 |       | 70.0  | 13.0 | 1.1 | 12               | 10           | 51.8       | 81.9           | 25 |  |
| 38GR004--- |       | 69.0  | 14.0 | 1.3 | 12               | 10           | 47.8       | 75.5           | 25 |  |
| 38GR004410 | 80.0  | 14.0  | 1.3  | 12  | 10               | 47.8         | 75.5       | 25             |    |  |
| 38GR045--- | 230/3 | 87.0  | 14.0 | 1.3 | 12               | 10           | 47.8       | 75.5           | 25 |  |
| 38GR005--- |       | 90.0  | 18.6 | 2.0 | 10               | 8            | 56.0       | 99.5           | 30 |  |
| 38GR006--- |       | 110.0 | 23.0 | 2.0 | 8                | 6            | 82.0       | 109.4          | 40 |  |
| 38GR003--- |       | 50.0  | 11.5 | 1.1 | 12               | 10           | 64.3       | 101.4          | 20 |  |
| 38GR003510 |       | 60.0  | 11.5 | 1.1 | 12               | 10           | 64.3       | 101.4          | 20 |  |
| 38GR004--- |       | 60.0  | 12.6 | 1.3 | 12               | 10           | 58.1       | 92.0           | 20 |  |
| 38GR004510 | 70.0  | 12.6  | 1.3  | 12  | 10               | 58.1         | 92.0       | 20             |    |  |
| 38GR045--- | 460/3 | 87.0  | 12.4 | 1.3 | 12               | 10           | 58.9       | 93.2           | 20 |  |
| 38GR005--- |       | 78.5  | 16.1 | 2.0 | 10               | 8            | 70.5       | 125.2          | 30 |  |
| 38GR006--- |       | 100.0 | 20.5 | 2.0 | 10               | 8            | 56.7       | 100.7          | 35 |  |
| 38GR004--- |       | 30.0  | 6.5  | 7   | 14               | 12           | 139.0      | 224.0          | 15 |  |
| 38GR004610 |       | 35.0  | 6.5  | 7   | 14               | 12           | 139.0      | 224.0          | 15 |  |
| 38GR045--- |       | 46.0  | 6.2  | 7   | 14               | 12           | 145.0      | 234.0          | 15 |  |
| 38GR005--- | 39.3  | 8.3   | 1.2  | 14  | 12               | 105.0        | 170.0      | 15             |    |  |
| 38GR006--- | 50.0  | 10.3  | 1.2  | 14  | 12               | 87.0         | 140.0      | 20             |    |  |

Corresponding wire sizes and wire lengths

FLA — Full Load Amps

LRA — Locked Rotor Amps

--- Electrical data shown applicable to all units for which complete model numbers are not shown Example: 38GR003\_\_\_applies to all 003 models except 38GR003510

\*Copper wire sizes and lengths Use latest National Electric Code (NEC) for aluminum wire sizing

†Maximum dual element fuse size

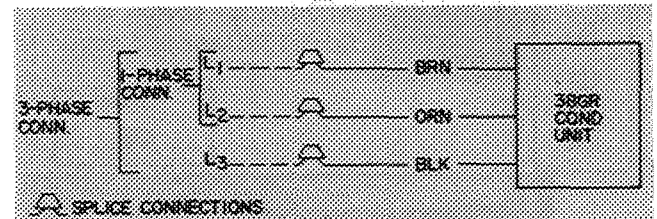
**NOTES**

- Motors and controls will operate satisfactorily from 10% above to 10% below unit voltage Control circuit voltage is 24 volts on all units On 3-phase units, phases must be balanced within 2%
- Nominal Distribution System Voltage (NDSV) is 240 v for 230 v, 1-ph units; 208 v for 200 v, 3-ph units; 220-240 v for 230 v, 3-ph units; 440-480 v for 460 v, 3-ph units

→ **Wiring** and electrical information below pertain to current 38GR units from serial no K200001. Field wiring must comply with local and national codes. Install a branch circuit fused disconnect of adequate size to handle starting current. When making electrical connections, provide clearance at unit for refrigerant piping connections.

LINE POWER wiring is brought thru hole provided in base pan (Fig. 1) and into unit junction box, Fig. 5. Splice line power leads to brown and orange pigtailed on 1-phase units, or brown, orange and black pigtailed on 3-phase units. See Fig. 2. Use wire nuts supplied with unit. When aluminum field wire is used, lubricate splices with splice compound (also supplied) before using wire nuts.

CONTROL POWER (24 v) wiring is brought thru hole provided in unit base pan (Fig. 1) and into low-voltage section of unit junction box. Splice control leads to yellow pigtailed on control relay. See Fig. 3. Use wire nuts supplied with unit. When aluminum field wire is used, lubricate splices with supplied splice compound. Furnace or fan-coil transformer must be used as 24-v supply for system as shown in Fig. 3. Current 38GR condensing units (from serial no. K200001) are equipped with transformer used to power contactor thru unit control circuit.



**Fig. 2 — Line Power Connections**

**START-UP INSTRUCTIONS**

Energize crankcase heater a minimum of 4 hours before starting unit.

**Start Procedure**

- Backseat (open) liquid and suction line service valves.
- Close electrical disconnects energizing entire system.
- Set room thermostat to desired temperature.
- Set room thermostat to "Cool" and fan switch as desired ("Fan") ("Auto."). Unit will start in 4 to 6 minutes. Operate unit for 15 minutes, then check system refrigerant charge. See Refrigerant Charging.

Motors and controls will operate satisfactorily in a range from 10% above to 10% below nominal unit voltage (Table 4).

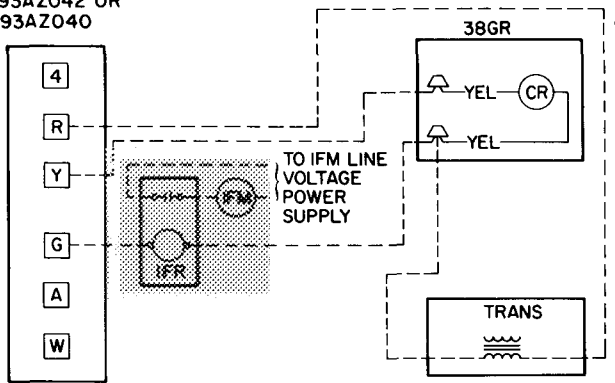
Do not connect charging hoses to capillary-controlled system during initial start procedure. (Loss of charge from this procedure may result in capacity reduction.) If necessary to add manifold gages for servicing, refer to Carrier Standard Service Techniques Manual, Chapter 1, pages 1-5, Fig. 8, for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

**Table 5 — Service Data**

| COND UNIT | R-22 CHG* (lb-oz) | CONDENSER FAN |     |            |      |      |
|-----------|-------------------|---------------|-----|------------|------|------|
|           |                   | Rpm           |     | Diam (in.) | Cfm  |      |
|           |                   | Hi            | Lo  |            | Hi   | Lo   |
| 38GR002   | 5-10              | 1050          | 850 | 20         | 2800 | 2300 |
| 38GR003   | 5-6               | 1050          | 850 | 20         | 2800 | 2300 |
| 38GR004   | 6-5               | 1050          | 850 | 20         | 3100 | 2600 |
| 38GR045   | 6-5               | 1050          | 850 | 20         | 3100 | 2600 |
| 38GR005   | 6-10              | 1070          | 870 | 20         | 3700 | 3200 |
| 38GR006   | 6-10              | 1070          | 870 | 20         | 3700 | 3200 |

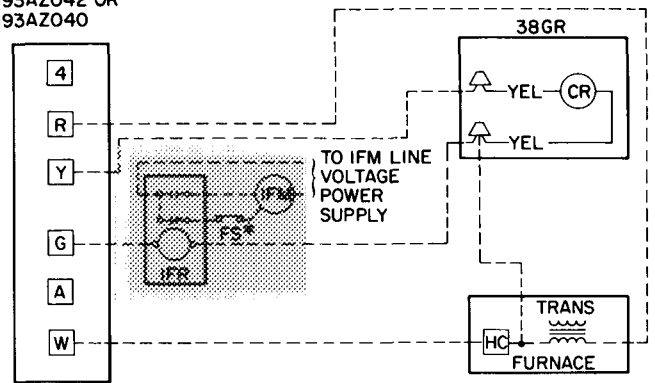
\*Factory refrigerant charge adequate when condensing units are connected to Carrier approved evaporators that are the same size as (or one size larger than) condensing unit with Carrier accessory tubing See Refrigerant Charging for details

THERMOSTAT SUBBASE  
HH93AZ042 OR  
HH93AZ040



ARRANGEMENT A-  
(COOLING ONLY)

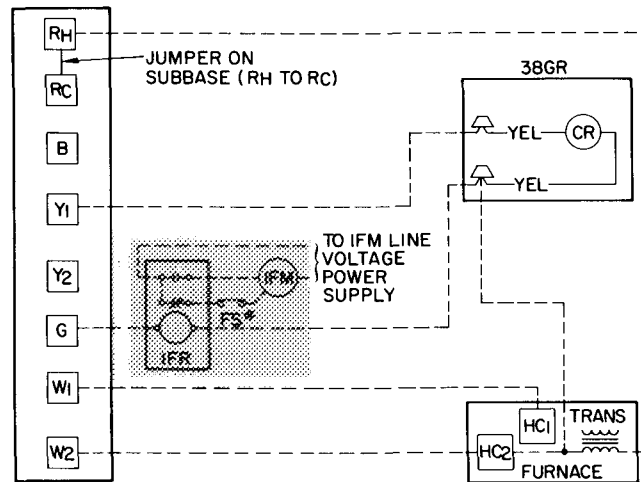
THERMOSTAT SUBBASE  
HH93AZ042 OR  
HH93AZ040



ARRANGEMENT B-  
ONE TRANSFORMER  
(COOLING AND ONE-STAGE HEAT)

\*CONNECT FS TO LOW-SPEED INDOOR FAN TERMINAL  
WHEN TWO-SPEED FAN IS USED

THERMOSTAT SUBBASE  
HH93AZ076



ARRANGEMENT C-  
ONE TRANSFORMER  
(COOLING AND TWO-STAGE HEAT)

\*CONNECT FS TO LOW-SPEED INDOOR FAN TERMINAL  
WHEN TWO-SPEED FAN IS USED

IFR, FS and IFM are located in furnace on heating-cooling applications. If necessary IFR is required for cooling only applications, locate (IFR) in fan coil

- Clg** - Cooling
- CR** - Control Relay (10 va)
- FS** - Fan Switch
- HC** - Heating Control
- Htg** - Heating
- IFM** - Indoor Fan Motor

- IFR** - Indoor Fan Relay
- Trans** - Transformer
- Field Splice
- Field Wiring
- Factory Wiring

→ Fig. 3 – Control Circuit Connections

## UNIT PROTECTION

**High-Pressure Relief Valve** is located in compressor. Relief valve opens at a pressure differential of approximately 450 – 550 psi between suction and discharge. Valve permits pressure equalization at running condition described above and during unit shutdown. A hissing sound during pressure equalization does not indicate bad valves.

**High Pressurestat** is located on unit liquid line and has black leads. High pressurestat settings are: cutout,  $425 \pm 5$  psig; cut-in,  $320 \pm 20$  psig.

**Low Pressurestat** is located on unit suction line and has blue leads. Low pressurestat settings are: cutout,  $31 \pm 4$  psig; cut-in,  $60 + 15$  psig – 0 psig.

**Internal Compressor Thermostat** resets automatically when internal motor temperatures drop to a safe level (thermostat may require up to 30 minutes to reset). When internal thermostat is suspected of being open, check by using an ohmmeter or continuity tester. If necessary, refer to Carrier Standard Service Techniques Manual, Chapter 2, for complete instructions.

**Outdoor Fan Thermostat** switches fan to high speed (Table 5) when outdoor temperature reaches 90 F – maintains proper condensing temperature at high outdoor air temperatures. Thermostat is located on Control Panel, Fig. 4.

**Filter-Drier** is installed in liquid line.

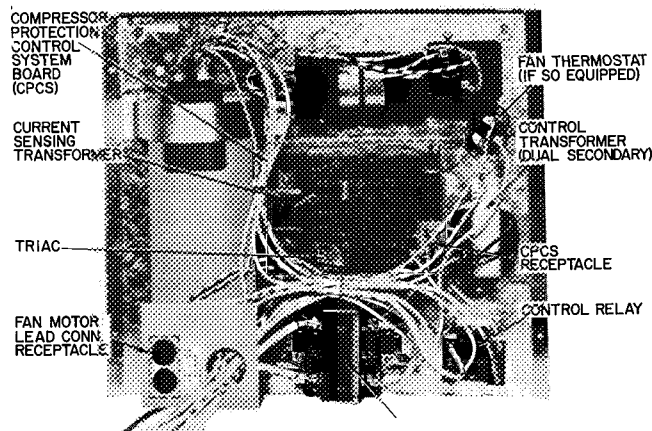
**Compressor Protection Control System (CPCS – Solid State, Fig. 4)** provides: compressor motor locked rotor protection; compressor start winding protection; compressor motor running overload protection; compressor overtemperature protection; contactor anti-chatter protection.

The CPCS also provides for a 4- to 6-minute delay before restarting compressor after shutdown for any reason. If compressor loading was light at the moment compressor was shut off, the delay will be approximately 4 minutes. If loading was heavy, the delay will be approximately 6 minutes. The CPCS board is located on control panel beneath a sheet metal protective cover. To troubleshoot the CPCS, remove protective sheet metal cover, and use unit label diagram or wiring booklet with Control Circuit Troubleshooting Chart, page 6.

### → CONTROL CIRCUIT TROUBLESHOOTING CHART NOTES:

1. Ensure thermostat calls for cooling before troubleshooting unit.
2. To disconnect plug from receptacle on CPCS board – press in tabs located on the receptacle, and pull plug gently while holding tabs. Do not pull on wiring.

3. Receptacle female connections, which do not grip the male pin tightly, may be repaired with a small pen knife.
4. When taking meter readings at CPCS receptacle, bottom meter probe into terminal hole to ensure good electrical contact.
5. Replace CPCS board if electrical short circuit causes compressor failure. An electrical short in compressor can short the triac (electronic switch located on CPCS board). Triac may fail in a closed (conducting) position and will not open the control circuit.



→ Fig. 4 – Control Panel (Cover Removed)

## COMPRESSOR REMOVAL

See Table 6 for compressor information and Fig. 5 for component location.

1. Shut off power to unit. Vent refrigerant to atmosphere or use refrigerant removal methods shown in Carrier Standard Service Techniques Manual, Chapter 1.
2. Remove unit top cover (grille). Open or remove service door.
- 3. Disconnect fan motor leads (4) from control panel located on service door. See Fig. 4 and refer to Service Door on page 2. Remove 6 screws holding fan motor orifice assembly in place and lift assembly from unit.
4. Compressor sound shield is fastened to tube sheets with 4 screws and to base pan with 3. Loosen screws and remove sound shield by sliding it straight up using tube sheets as guides.
5. Remove power leads from compressor terminal box. Unsweat suction and hot gas lines.
6. Remove compressor hold-down bolts. Lift compressor out thru top of unit.

# CONTROL CIRCUIT TROUBLESHOOTING CHART

**CAUTION:** Compressor current sensing transformer is located on compressor protection control system (CPCS) board. Shut line power off before attempting any service operations (because of presence of high voltage).

Before attempting any corrective action, wait 8 minutes after power is supplied to permit CPCS time delay period to end. If control circuit is broken and unit has no time delay (or if time delay is over 8 minutes), replace CPCS board

## IMPROPER UNIT OPERATION

### STEP 1

Check contactor operation

CONTACTS CLOSE IMMEDIATELY, UNIT DOES NOT RUN

CPCS Board and control circuit function. Check compressor, run capacitor, start gear and internal compressor protection

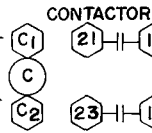
CONTACTS WON'T STAY CLOSED OR OPEN BEFORE ROOM THERMOSTAT IS SATISFIED

Check system pressures and current draw

## CONTACTS NEVER CLOSE

### STEP 2

Check unit voltage at terminals 21 and 23 on contactor



VOLTAGE LOW OR NO VOLTAGE

Obtain correct voltage

## VOLTAGE CORRECT

### STEP 3

Check control circuit and current transformer wiring and connections

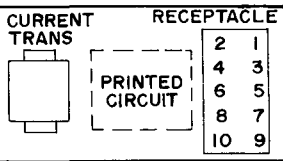
LOOSE CONNECTIONS OR IMPROPER WIRING

Repair connection or correct wiring

## WIRING AND CONNECTIONS GOOD

### STEP 4

Check output at 5 va secondary of unit voltage transformer (at terminals 2 and 10 on CPCS receptacle) Should be 23-30 volts



VOLTAGE LOW OR NO VOLTAGE

Replace transformer

## BOARD VOLTAGE CORRECT

### STEP 5\*

Check output at 25 va secondary of unit voltage transformer (at CPCS receptacle terminal 3 and C<sub>2</sub> on contactor) Should be 23-30 volts

VOLTAGE LOW OR NO VOLTAGE

Replace transformer

## VOLTAGE CORRECT

### STEP 6\*

Check contactor voltage at C<sub>1</sub> and C<sub>2</sub> terminals on contactor (C) Should be 23-30 volts

VOLTAGE CORRECT

Replace contactor

## NO VOLTAGE

### STEP 7\*

Check control circuit voltage from contactor (C) terminal C<sub>2</sub> to terminal 1 on control relay. Should be 20-29 volts

VOLTAGE IS LOWER THAN 20 VOLTS†

Check indoor unit power, indoor transformer, thermostat or control relay

## VOLTAGE CORRECT

### STEP 8\*

Check control circuit voltage from contactor (C) terminal C<sub>2</sub> to junction of high-pressure switch (HPS) and low-pressure switch (LPS) Should be 20-29 volts

VOLTAGE IS LOWER THAN 20 VOLTS†

System pressure too high or bad high-pressure switch

## VOLTAGE CORRECT

### STEP 9\*

Check control circuit voltage from contactor (C) terminal C<sub>2</sub> to terminal 8 on CPCS receptacle. Should be 20-29 volts

VOLTAGE IS LOWER THAN 20 VOLTS†

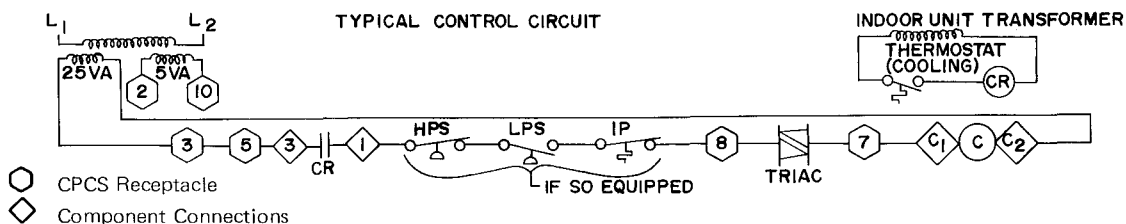
System pressure too low, bad low-pressure switch or open internal protector (IP)

## VOLTAGE CORRECT

### STEP 10

Replace CPCS board

\*



- CPCS Receptacle
- ◇ Component Connections

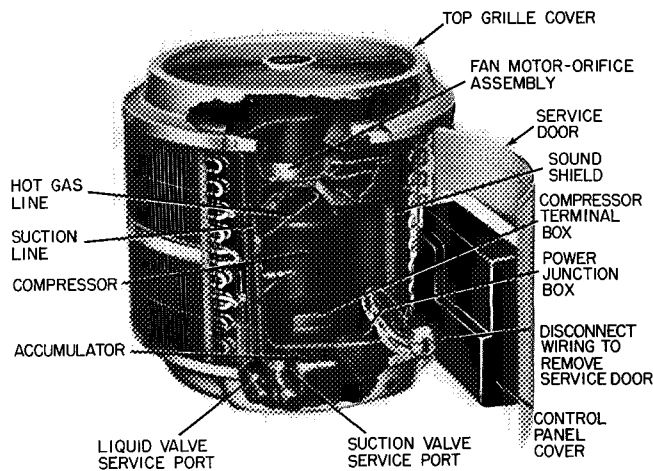
†Voltage reading less than 20 volts may result from feedback circuit

**Table 6 – Compressor Data**

| COND UNIT  | V/PH       | PRODUCTION COMPRESSOR* | OIL RECHARGE (oz) |
|------------|------------|------------------------|-------------------|
| 38GR002--- | 230/1*     | 38GL400324             | 40 5              |
| 38GR002310 |            | MD2723CB               | 43 2              |
| 38GR003--- |            | 38GR400234             | 31 5              |
| 38GR003310 |            | MC3423CB               | 43 2              |
| 38GR004--- |            | 38GC401564             | 45 0              |
| 38GR004310 |            | MC4023CB               | 43 2              |
| 38GR045--- | 200/3      | 48DL400794             | 45 0              |
| 38GR005--- |            | RC5425CJ               | 72 0              |
| 38GR006--- |            | RC7025CT               | 72.0              |
| 38GR003--- |            | RF3522CJ               | 50 4              |
| 38GR003410 |            | MF3423CB               | 43 2              |
| 38GR004--- |            | RF3922CJ               | 50 4              |
| 38GR004410 | 230/3      | MF4023CB               | 43 2              |
| 38GR045--- |            | 48DL400804             | 45 0              |
| 38GR005--- |            | RF5425CJ               | 72 0              |
| 38GR006--- |            | RF7025CJ               | 72.0              |
| 38GR003--- |            | RG3522CJ               | 50 4              |
| 38GR003510 |            | MG3423CB               | 43 2              |
| 38GR004--- | 460/3      | RG3922CJ               | 50 4              |
| 38GR004510 |            | MG4023CB               | 43 2              |
| 38GR045--- |            | 48DL400804             | 45 0              |
| 38GR005--- |            | RG5425CJ               | 72 0              |
| 38GR006--- |            | RG7025CJ               | 72.0              |
| 38GR004--- |            | 460/3                  | RH3922CJ          |
| 38GR004610 | MH4023CB   |                        | 43 2              |
| 38GR045--- | 48DL400814 |                        | 41 4              |
| 38GR005--- | RH5425CJ   |                        | 64 8              |
| 38GR006--- | RH7025CJ   |                        | 64 8              |

\*All 38GR single-phase compressors are capacitor start. Refer to Service Parts Catalog for replacement compressor model numbers.

---Tabular data shown applicable to all models except those shown italicized 000.



**Fig. 5 – Condensing Unit with Service Door Open**

**PUMPDOWN PROCEDURE**

The 38GR 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. Jumper low-pressure switch.

4. Start unit and run until suction pressure reaches 5 psig (see Caution).
5. Shut unit off and frontseat suction valve.
6. Vent remaining pressure to atmosphere.

**CAUTION:** The 38GR condensers will hold only factory supplied amount of refrigerant. Additional refrigerant may cause units to cycle on high pressurestat (indicated by a high discharge pressure or 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.

**REFRIGERANT CHARGING**

38GR units contain correct operating charge for complete system when connected to Carrier approved evaporators that are the same as (or one size larger than) condensing unit, with Carrier accessory tubing. For every 10 ft of liquid line of recommended size over 50 ft, add refrigerant charge as follows: .7 lb for 1/2-in. line, .4 lb for 3/8-in. line, 1.1 lb for 5/8-in. line. Charge adjustment may be required on other systems.

To check or adjust refrigerant charge on all Carrier approved systems, use a Carrier Charge-master® (Part no. 38GC680004) for capillary tube or AccuRater™ systems and Charging Chart Method for thermal expansion valve systems.

To recharge these systems, use Weight Method when evaporator is same size or one size larger than condensing unit, and they are connected with Carrier accessory tubing; Chargemaster for remaining Carrier capillary tube or AccuRater systems and Charging Chart Method for remaining Carrier thermal expansion valve systems. When 38GR condensing unit is connected to other than a Carrier evaporator, use Weight Method or Sight Glass Method of recharging.

Evacuate 38GR systems to 5,000 microns (29.7-in. vacuum) before recharging. Refer to Carrier Standard Service Techniques Manual, Chapter 1, for system evacuation-dehydration instructions and details of charging instructions listed below.

**CAUTION:** Do not overcharge these systems. An overcharge may result in compressor damage due to refrigerant flooding.

**Charging Chart Method** – Use Charging Chart, Fig. 6 or 7. See Carrier Standard Service Techniques Manual, Chapter 1, for procedure.

**Weight Method** – Refer to Table 5 or unit nameplate for correct system refrigerant charge. Blow any refrigerant remaining in system before recharging.

When system is not evacuated, subtract the following amount from total charge:

- 38GR002 – .10 lb (1.6 oz)
- 38GR003,004,045,005,006 – .20 lb (3.2 oz)

Keep refrigerant recharge within one oz of specified charge on 38GR002 systems and within 2 oz on 38GR003,004,045,005,006 systems.

Dial-a-charge charging cylinder is an accurate device used to recharge systems by weight. These cylinders are available at refrigeration supply firms.

**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 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.

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.

**Sight Glass Method** – A satisfactory operating charge can be obtained on 38GR TXV systems by charging to a clear sight glass. For optimum charge, use Charging Chart Method.

Elevate high-side pressure to 380 ± 10 psig by blocking condenser fan discharge or condenser entering air. Charge to a clear sight glass while holding high-side pressure constant.

**Table 7 – Chargemaster Charging Chart (Capillary Tube of AccuRater™ Systems)**

| OUTDOOR TEMP (F) | EVAPORATOR TEMP (F)       |    |    |    |    |    |    |    |    |    |
|------------------|---------------------------|----|----|----|----|----|----|----|----|----|
|                  | 21                        | 25 | 28 | 31 | 34 | 37 | 40 | 43 | 45 | 48 |
|                  | Suction Line Temperatures |    |    |    |    |    |    |    |    |    |
| 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 | 75 |    |    |    |
| 80               |                           | 26 | 33 | 42 | 52 | 61 | 72 |    |    |    |
| 82               |                           |    | 32 | 40 | 50 | 59 | 68 | 80 |    |    |
| 84               |                           |    | 31 | 39 | 48 | 57 | 65 | 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



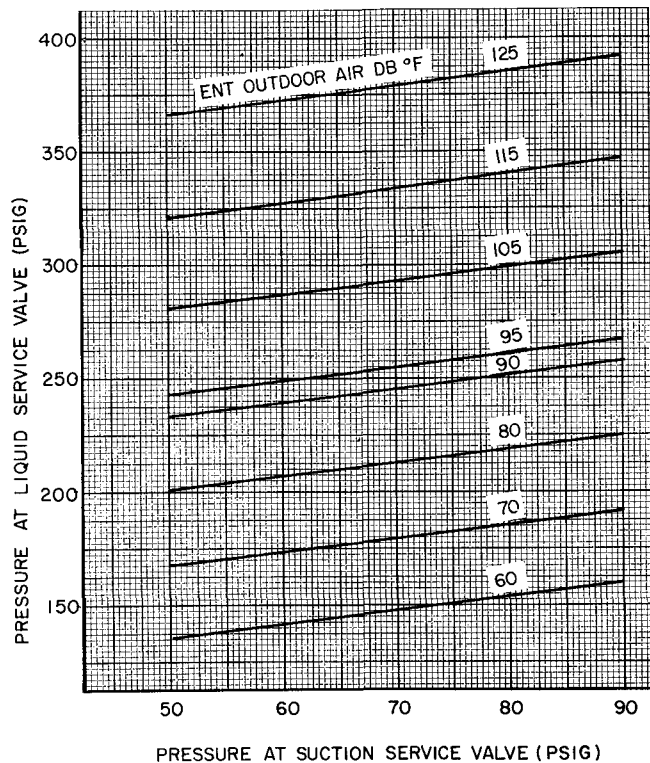


Fig. 6 - 38GR002,003,004,045,005  
Charging Chart - TXV Systems

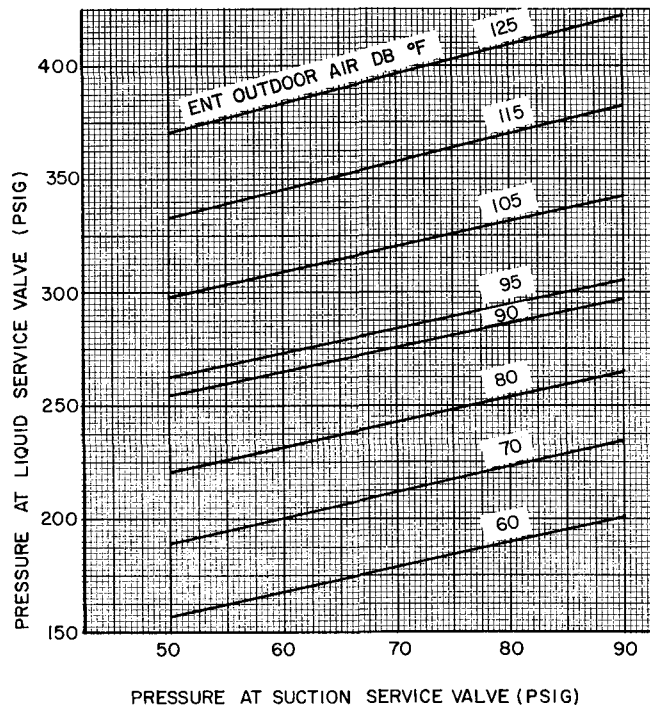


Fig. 7 - 38GR006 Charging Chart -  
TXV Systems

### 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

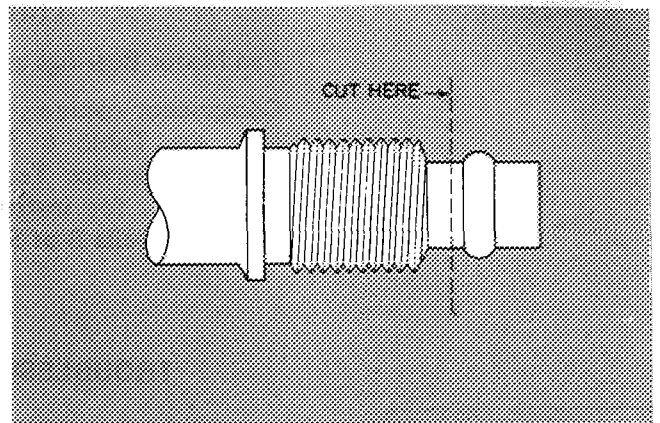


Fig. 8 - Repair of Mechanical Connection

seal ring head as shown in Fig. 8. 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).

### CONDENSER

**Coil Cleaning** - Clean by washing with refrigerant, low-pressure water or steam.

**Fan** is correctly positioned in unit by placing fan on motor shaft - align flat mark on top of fan hub with flat on shaft. Press down evenly on top of fan hub until shaft bottoms in fan hub.

### Fan Motor Removal

1. Shut off power to unit.
2. Remove unit top cover (grille). Open or remove service door. With door open, remove control panel cover.
- 3. Disconnect fan motor leads (4) from control panel located on service door. See Fig. 4.
4. Remove fan from motor shaft by pulling upward on fan hub.
5. Remove bolt holding fan motor to motor mounting bracket. Remove motor with wiring thru top of unit. To replace motor: place motor on self-positioning motor mounting bracket and retighten bolt.

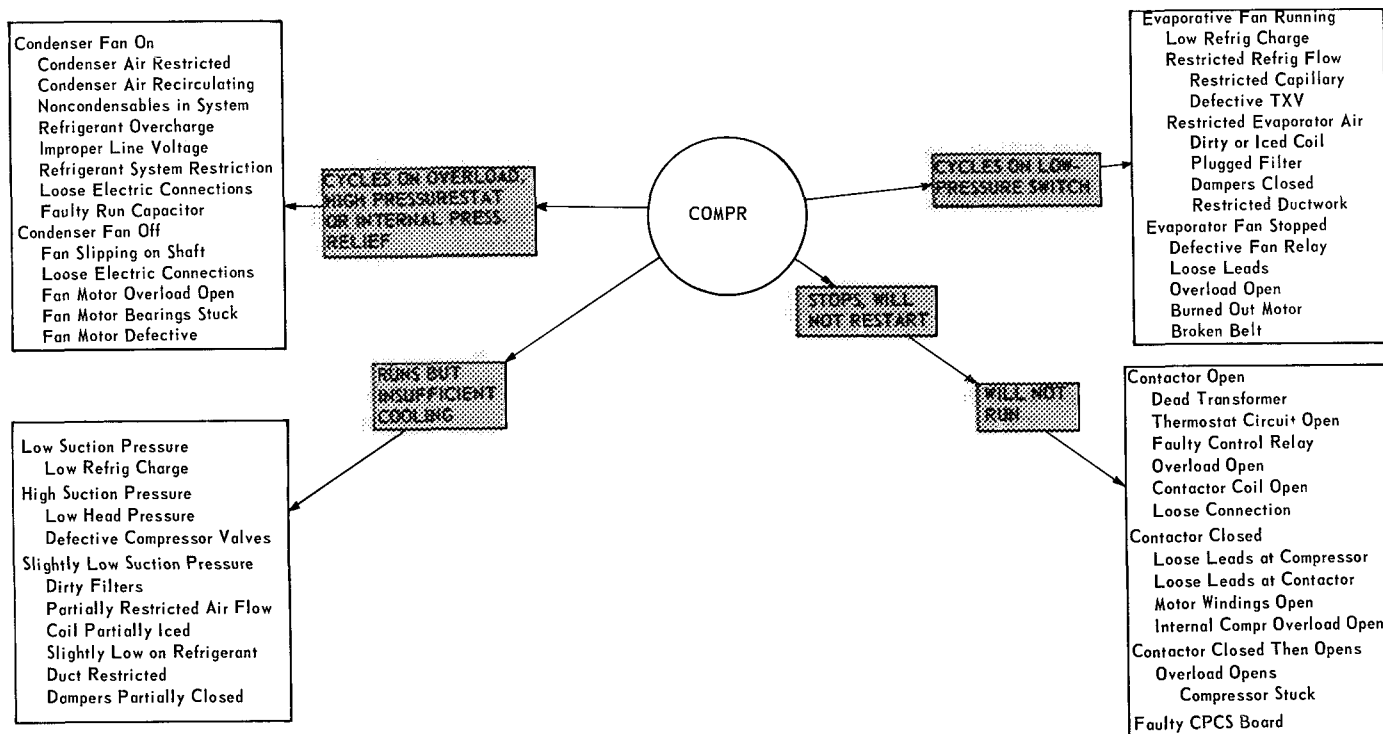
When replacing metal fan with plastic fan, remove slinger and spacer from fan motor shaft. Wipe motor shaft clean - remove all rust preventative.

## LUBRICATION

Fan Motor Bearings are prelubricated.

**Compressor** contains factory oil charge. When oil is lost, see Table 6 for oil recharge and Carrier Standard Service Techniques Manual, Chapter 1, page 1-21, for instructions. Use Carrier PP33-1, Texaco Capella B or Suniso 3G oil.

### TROUBLESHOOTING CHART



For replacement items use Carrier Specified Parts.

Manufacturer reserves the right to change any product specifications without notice.

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