installation, start-up and service instructions

AIR-COOLED SPLIT SYSTEM HEAT PUMP

575B/575C/541A
Sizes 072-180
6 to 15 Tons

Cancels: II 575B-72-3

II 575B-72-4
9/15/04

CONTENTS

SAFETY CONSIDERATIONS

Installing, starting up, and servicing air-conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location (roofs, elevated structures, etc.).

Only trained, qualified installers and service mechanics should install, start-up, and service this equipment. Untrained personnel can perform basic maintenance functions such as cleaning coils. All other operations should be performed by trained service personnel.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

Follow all safety codes. Wear safety glasses and work gloves. Keep quenching cloth and fire extinguisher nearby when brazing. Use care in handling, rigging, and setting bulky equipment.

⚠ **WARNING:** Before installing or servicing system, always turn off main power to system and install lock-out tag on disconnect. There may be more than one disconnect switch. Electrical shock can cause personal injury.

GENERAL

The split system heat pump units described in this book are designed for use with the 524A-H indoor packaged air handler sections only.

INSTALLATION

I. COMPLETE PRE-INSTALLATION CHECKS

A. Uncrate Unit

Remove unit packaging except for the top skid assembly, which should be left in place until after the unit is rigged into its final location.

B. Inspect Shipment

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

C. Consider System Requirements

- Consult local building codes and National Electrical Code (NEC) for special installation requirements.
- Allow sufficient space for airflow clearance, wiring, refrigerant piping, and servicing unit. See Fig. 1-3 for unit dimensions. Figure 4 shows typical component locations for 541A180 units.
- Locate unit so that outdoor coil airflow is unrestricted on all sides and above.
- Unit may be mounted on a level pad directly on the base channels or mounted on raised pads at support points. See Table 1 for unit operating weights.

II. RIG AND MOUNT UNIT

⚠ **CAUTION:** Be sure unit panels are securely in place prior to rigging. Be careful rigging, handling, and installing unit. Improper unit location can cause system malfunction and material damage. Inspect base rails for any shipping damage and make sure they are fastened securely to unit before rigging.

A. Rigging

These units are designed for overhead rigging. Refer to rigging label for preferred rigging method. Spreader bars are not required if top crating is left on unit. All panels must be in place when rigging. As further protection for coil faces, plywood sheets may be placed against sides of unit, behind cables. Run cables to a central suspension point so that angle from the horizontal is not less than 45 degrees. Raise and set unit down carefully.

If it is necessary to roll the unit into position, mount the unit on field-supplied rails placed lengthwise under the unit, using a minimum of 3 rollers. Apply force to the rails, not the unit. If the unit is to be skidded into position, place it on a large pad and drag it by the pad. Do not apply any force to the unit.

Raise from above to lift unit from the rails or pad when unit is in final position.

After unit in position, remove all shipping materials and top crating.

B. Locate Unit

For service access and unrestricted airflow, provide clearance on each end and side of unit. Position unit so that there is unrestricted airflow above unit.

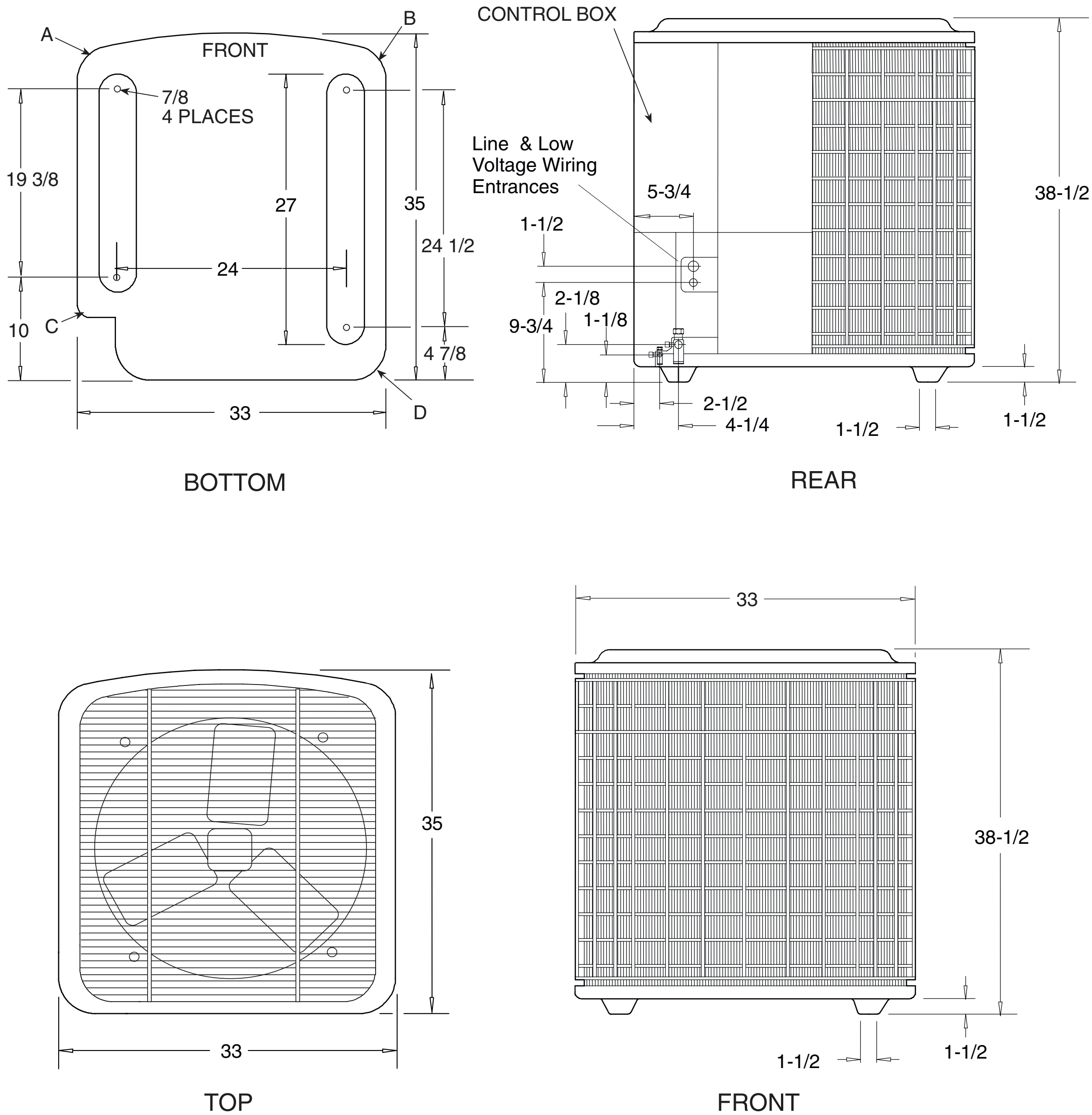
NOTE: Before mounting unit, remove holddown brackets and release skid.

If conditions or local codes require unit to be fastened to pad, use the mounting holes in the base rails.

C. Mount Unit

The unit may be mounted on a solid, level concrete pad, on accessory mounting legs, or on field-supplied raised supports at each mounting position. (Note that mounting hardware is field supplied.)

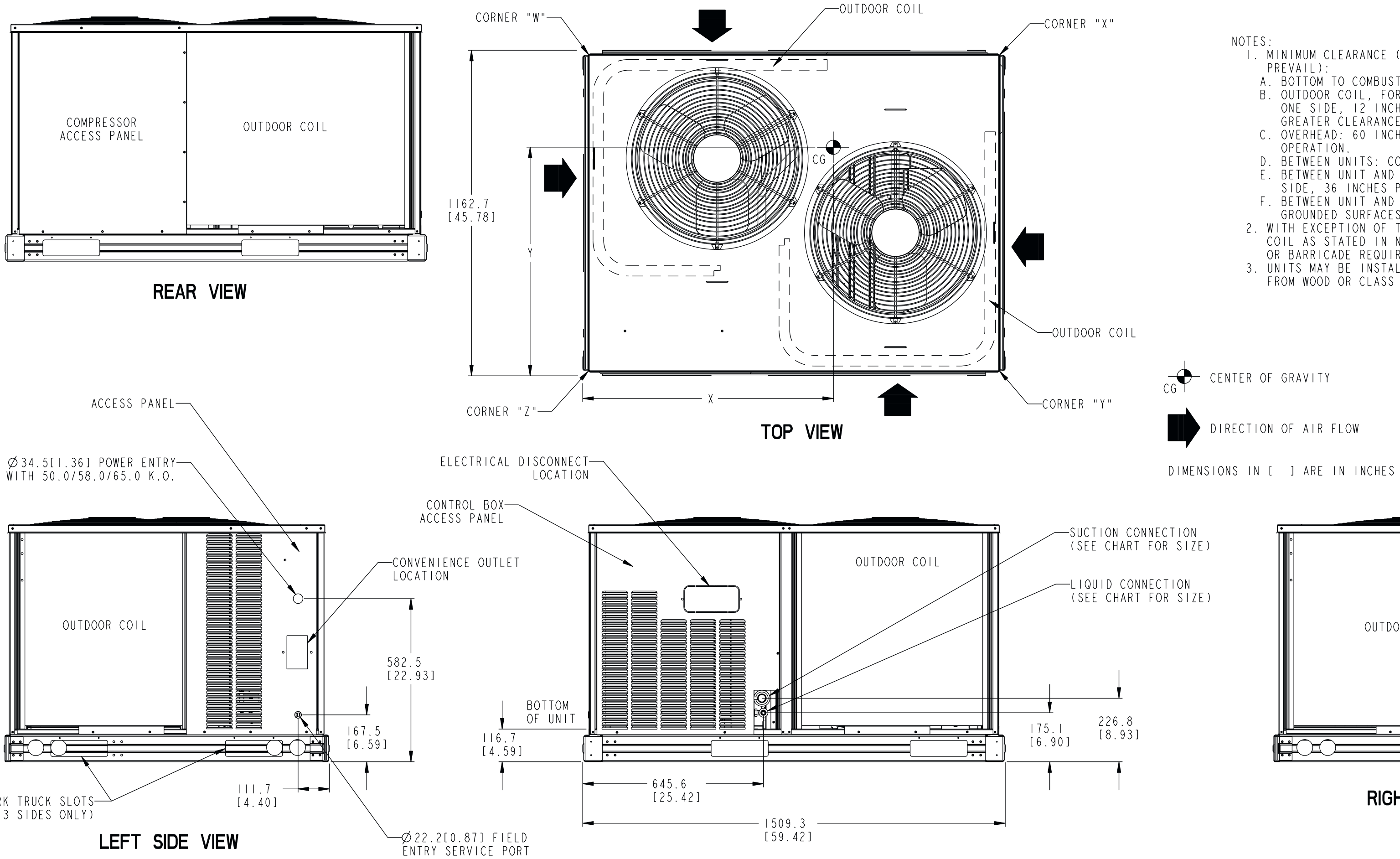
Bolt unit securely to pad or supports after unit is in position and is level. Be sure to mount unit level to ensure proper oil return to compressors. Mounting holes on unit can be used to secure unit to vibration isolators, if required.



NOTES:
1. All dimensions are in inches.
2. Recommended clearance for proper airflow (local codes or jurisdictions may prevail):
   Top — 60 in.
   Sides — 24 in. on 3 sides, one side may be 6 in. (Control box side should have 24-in. clearance for service access.)
3. Corner Weights (lb): A = 86
   B = 84
   C = 92
   D = 90

Fig. 1 — 575B072 Unit Dimensions

UNIT 575C	ELECTRICAL CHARACTERISTICS	ALUMINUM COIL												COPPER COILS											
		STD. UNIT WT.		CORNER W		CORNER X		CORNER Y		CORNER Z		CENTER OF GRAVITY (MM [IN.])		STD. UNIT WT.		CORNER W		CORNER X		CORNER Y		CORNER Z		CENTER OF GRAVITY (MM [IN.])	
		LB.	KG.	LB.	KG.	LB.	KG.	LB.	KG.	LB.	KG.	X	Y	LB.	KG.	LB.	KG.	LB.	KG.	LB.	KG.	LB.	KG.	X	Y
090	208/230-3-60, 460-3-60	464	210	120	54	142	64	108	49	94	43	812.8[32.00]	660.4[26.00]	565	256	135	61	173	79	144	65	113	51	850.9[33.50]	635.0[25.00]
120	208/230-3-60, 460-3-60, 575-3-60	506	230	120	54	168	76	127	58	91	42	889.0[35.00]	666.8[26.25]	607	275	130	59	203	92	166	75	108	49	927.1[36.50]	641.4[25.25]



NOTES:

1. MINIMUM CLEARANCE (LOCAL CODES OR JURISDICTION MAY PREVAIL):
   - A. BOTTOM TO COMBUSTIBLE SURFACES: 0 INCHES.
   - B. OUTDOOR COIL, FOR PROPER AIR FLOW: 36 INCHES ONE SIDE, 12 INCHES THE OTHER. THE SIDE GETTING THE GREATER CLEARANCE IS OPTIONAL.
   - C. OVERHEAD: 60 INCHES, TO ASSURE PROPER OUTDOOR FAN OPERATION.
   - D. BETWEEN UNITS: CONTROL BOX SIDE, 42 INCHES PER NEC.
   - E. BETWEEN UNIT AND UNGROUNDED SURFACES: CONTROL BOX SIDE, 36 INCHES PER NEC.
   - F. BETWEEN UNIT AND BLOCK OR CONCRETE WALLS AND OTHER GROUNDED SURFACES: CONTROL BOX SIDE, 42 INCHES PER NEC.
2. WITH EXCEPTION OF THE CLEARANCE FOR THE OUTDOOR COIL AS STATED IN NOTE 1B, A REMOVABLE FENCE OR BARRICADE REQUIRES NO CLEARANCE.
3. UNITS MAY BE INSTALLED ON COMBUSTIBLE FLOORS MADE FROM WOOD OR CLASS A, B OR C ROOF COVERING MATERIAL.

SERVICE VALVE CONNECTIONS (IN.)		
UNIT 575C	SUCTION	LIQUID
090	1-1/8	1/2
120	1-3/8	1/2

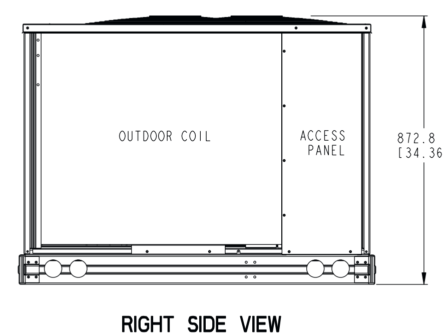
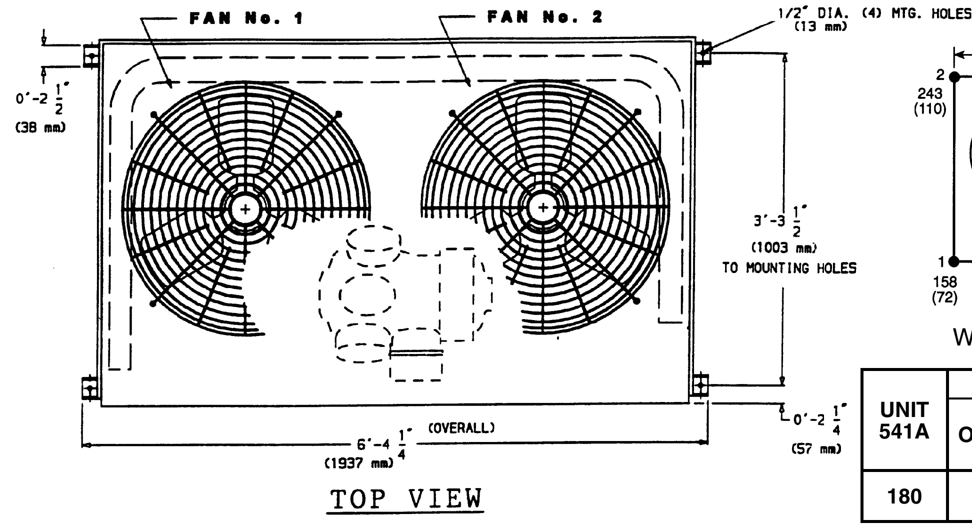
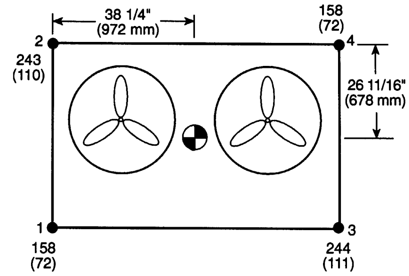


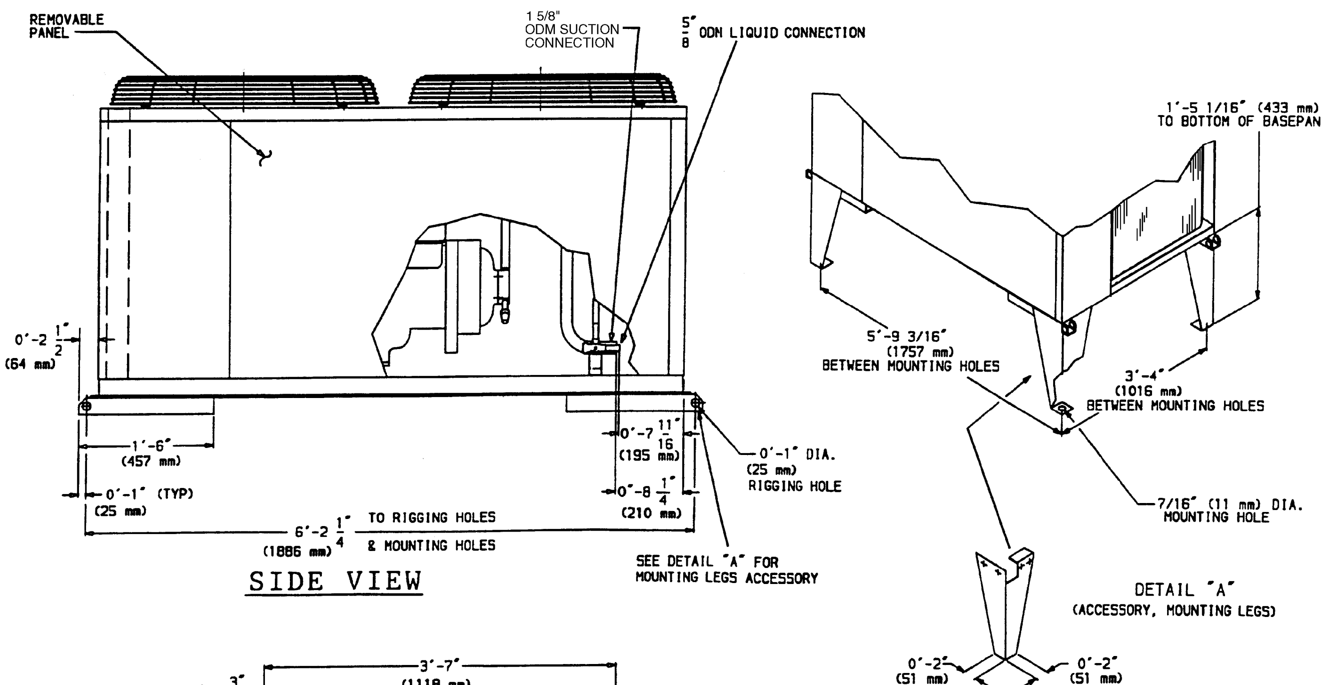
Fig. 2 — 575C090,120 Unit Dimensions

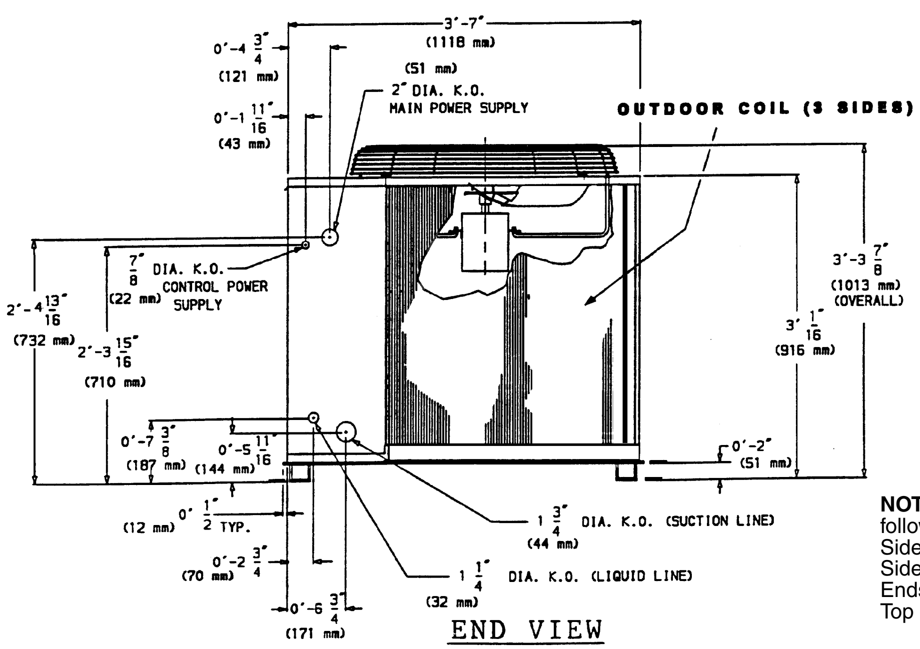




WEIGHT DISTRIBUTION

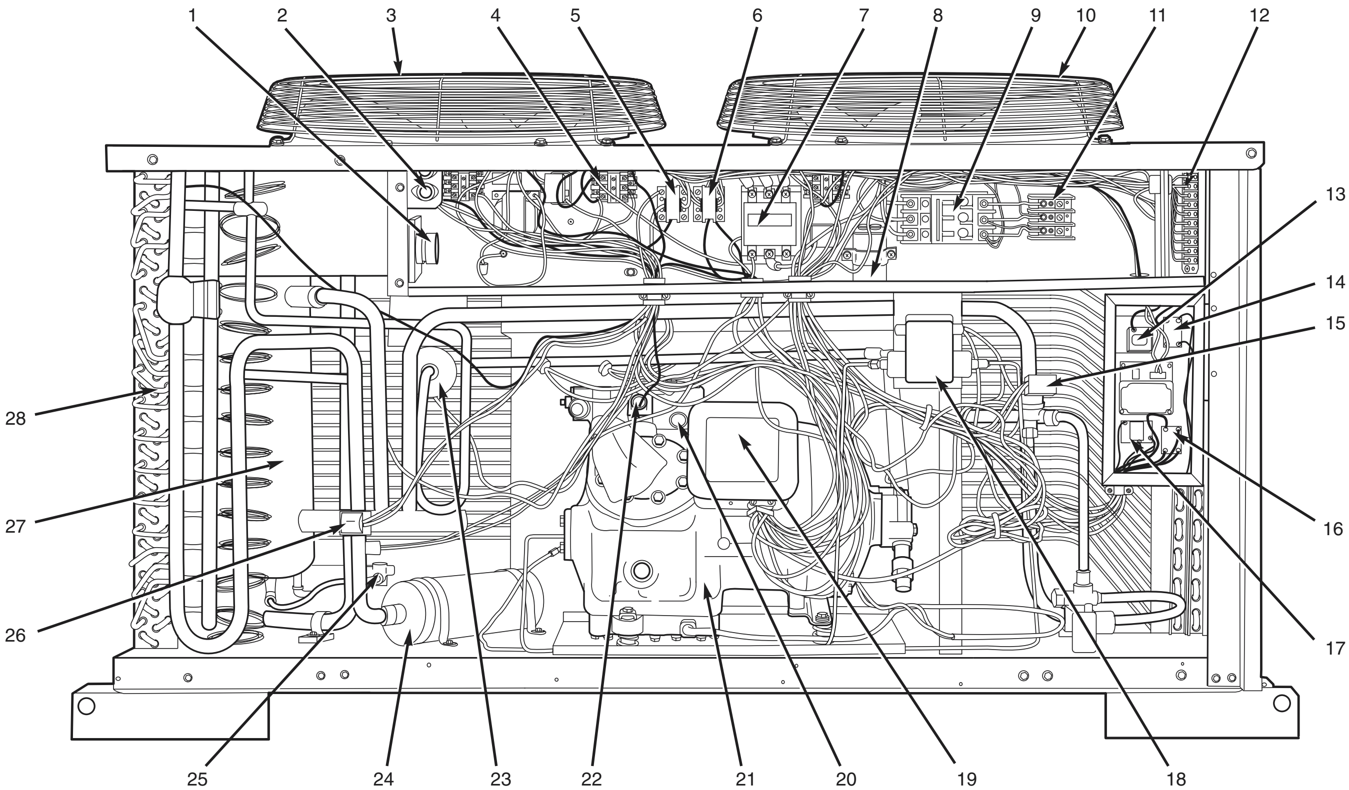
UNIT 541A	WEIGHT — lb (kg)				
	Total Operating Weight	Support Point			
		1	2	3	4
180	803 (364)	158 (72)	243 (110)	244 (111)	158 (72)





NOTE: Recommended service clearances are as follows (local codes or jurisdictions may prevail):
Side (compressor) — 3½ ft (1067 mm)
Side (opposite compressor) — 3 ft (914 mm)
Ends — 2 ft (616 mm)
Top — 5 ft (1524 mm)

Fig. 3 — 541A180 Unit Dimensions



LEGEND

1 — Defrost Board/Time Guard II Control
2 — Fuse
3 — Fan No. 1
4 — Compressor Lockout (CLO) Device
5 — Outdoor-Fan Relay
6 — Outdoor-Fan Contactor
7 — Compressor Contactor
8 — Fan Motor Capacitors
9 — Circuit Breaker
10 — Fan No. 2
11 — Power Terminal Block
12 — Control Terminal Block
13 — Compressor Lockout (CLO2 for Crankcase Heater)
14 — Control Relay (CR3)
15 — Liquid Line Solenoid
16 — Control Relay (CR2)
17 — No Dump Relay (NDR)
18 — Oil Pressure Switch
19 — Fusible Plug (hidden)
20 — High-Pressure Switch
21 — Compressor
22 — Capacity Control Solenoid
23 — Filter Drier
24 — Muffler
25 — Oil Solenoid
26 — Reversing Valve
27 — Accumulator
28 — Coil

Fig. 4 — Component Locations — 541A180 Shown

Table 1 — Physical Data — 575B072, 575C090,120 and 541A180 Units

UNIT	575B072	575C090	575C120	541A180
NOMINAL CAPACITY (tons)	6	7.5	10	15
OPERATING WEIGHTS (lb)				
Aluminum-Fin Coils (standard)	345	464	506	803
Copper-Fin Coils (optional)	N/A	565	607	945
REFRIGERANT*	R-22			
Operating Charge, Typical (lb)†	20	20	22	37
Shipping Charge (lb)	1	9	9	3
COMPRESSOR	Scroll			Semi-hermetic reciprocating
Qty...Model	1...SR_75	1...ZR_94	1...ZR125	1...06DF537††
Oil Charge (oz)	88	90	110	128
No. Cylinders	N/A			6
Speed (rpm)	3500			1750
OUTDOOR FANS				
Qty...Rpm	1…1100	2…1100		2…1075
Diameter (in.)	26	22		26
Nominal Hp	$\frac{3}{4}$	$\frac{1}{4}$		$\frac{1}{2}$
Nominal Airflow (cfm total)	6300	6500		11,000
Watts (total)	750	570		1460
OUTDOOR COILS (Qty)	1	2		1
Face Area (sq ft total)	24	29.2		29.2
Rows...Fins/in.	2…18	2…17		3…15
Storage Capacity (lb)**	17.3	34.2		40.1
CONTROLS				
Pressurestat Settings (psig)				
High Pressure				
Open	420	428 ± 10		395 ± 20
Close	300	320 ± 20		295 ± 20
Low Pressure				
Open	5	7 ± 3		7 ± 3
Close	20	22 ± 5		22 ± 5
PIPING CONNECTIONS (in. ODM)				
Vapor	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{3}{8}$	$1\frac{5}{8}$
Liquid	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$

*Unit is factory supplied with holding charge only.
†Typical operating charge with 25 ft of interconnecting pipe.
**Storage capacity of condenser coil with 80% full of liquid at 95 F.
††Equipped with an electric solenoid unloader, capacity steps are 100% and 67%.

III. COMPLETE REFRIGERANT PIPING CONNECTIONS

Refrigerant lines must be carefully designed and constructed to ensure equipment reliability and efficiency. Line length, pressure drop, compressor oil return, and vertical separation are several of the design criteria that must be evaluated. See Table 2.

IMPORTANT: Do not bury refrigerant piping underground.

IMPORTANT: Piping must be properly sized and installed for the system to operate efficiently.

A. Check Vertical Separation

If there is any vertical separation between the indoor and outdoor units, check to ensure that the separation is within allowable limits. Relocate equipment if necessary. See Table 3.

B. Refrigerant Line Sizing

Consider the length of the piping required between the outdoor and indoor units. The maximum allowable line length is 100 ft. See Table 3. Refrigerant suction piping should be insulated.

IMPORTANT: A refrigerant receiver is not provided with the unit. Do not install a receiver.

IMPORTANT: For 575C090,120 applications with liquid lift greater than 20 ft, use 5/8-in. liquid line. Maximum lift is 60 ft.

Table 2 — Refrigerant Piping Sizes

OUTDOOR UNIT	LENGTH OF PIPING ft						MAXIMUM LIQUID LINE (in. OD)*
	0-25		26-60		61-100		
	Line Size (in. OD)						
	L	V	L	V	L	V	
575B072	1/2	1 1/8	5/8	1 1/8	5/8	1 1/8	5/8
575C090	3/8	1 1/8	1/2	1 1/8	1/2	1 1/8	5/8
575C120	1/2	1 3/8	1/2	1 3/8	1/2	1 3/8	5/8
541A180	5/8	1 5/8	3/4	1 5/8	3/4	1 5/8	3/4

*If there is a vertical separation between indoor and outdoor units, see Table 3 — Maximum Vertical Separation.

LEGEND

L — Liquid Line **V** — Vapor Line

NOTES:

1. Pipe sizes are based on a 2 F loss for liquid and vapor lines.
2. Pipe sizes are based on the maximum linear length, shown for each column, plus a 50% allowance for fittings.
3. Charge units with R-22 refrigerant in accordance with unit installation instructions.
4. Maximum line length must not exceed 100 ft.
5. Do not bury refrigerant piping.

Table 3 — Maximum Vertical Separation*

OUTDOOR UNIT		INDOOR UNIT 524A-H	DISTANCE FT
			Outdoor Unit Above 524A-H
575B	072	090	50
575C	090	090	60
	120	120	60
541A	180	180	80

*Vertical distance between indoor and outdoor units.

C. Install Filter Drier(s) and Moisture Indicator(s)

Every unit should have a filter drier and liquid-moisture indicator (sight glass). In some applications, depending on space and convenience requirements, it may be desirable to install 2 filter driers and sight glasses. One filter drier and sight glass may be installed at A locations in Fig. 5. If desired, 2 filter driers and sight glasses may be installed at B locations in Fig. 5.

Select the filter drier for maximum unit capacity and minimum pressure drop. Complete the refrigerant piping from indoor unit to outdoor unit before opening the liquid and vapor lines at the outdoor unit. For specific filter driers see Table 4.

D. Liquid Line Piping Procedure

Pipe the system liquid line as follows:

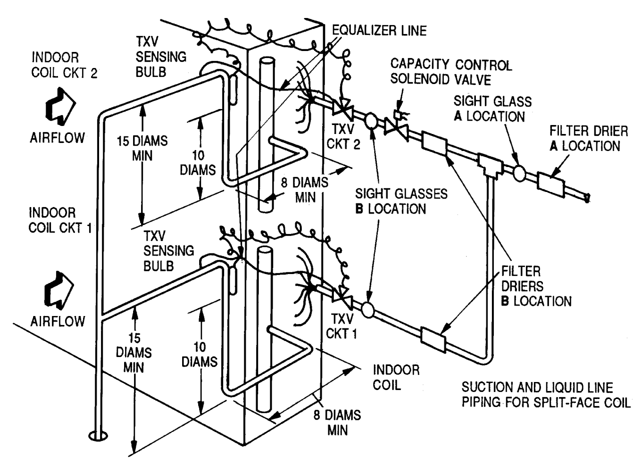
> ⚠ **WARNING:** Unit is pressurized with a holding charge of refrigerant. Recover R-22 holding charge before removing runaround liquid piping loop. Failure to recover holding charge before removing piping loop could result in equipment damage and personal injury.

1. Open service valves in sequence:
   a. Discharge service valve on compressor.
   b. Suction service valve on compressor.
   c. Liquid line valve.
2. Remove 1/4-in. flare cap from liquid valve Schrader port.
3. Attach refrigerant recovery device and recover holding charge.
4. Remove runaround loop (581A180 only).
5. Connect system liquid line from liquid connection of outdoor unit (575B,C, 541A) to indoor unit (524A-H) liquid line connections. Select proper field-supplied bi-flow filter driers and install in the liquid line. See Fig. 5. Install a field-supplied liquid moisture indicator between the filter drier(s) and the liquid connections on the indoor unit. Braze or silver alloy solder all connections. Pass nitrogen or other inert gas through piping while making connections to prevent formation of copper oxide. (Copper oxides are extremely active under high temperature and pressure. Failure to prevent collection of copper oxides may result in system component failures.)

E. Liquid Line Solenoid Valve

Addition of a liquid solenoid valve (LLSV) is required (except for 541A180 units that already have LLSV factory-installed). The LLSV must be a bi-flow type suited for use in heat pump systems. Refer to Table 4. Wire the solenoid valve in parallel with the compressor contactor coil.

The LLSV must be installed at the outdoor unit with the flow arrow pointed toward the outdoor unit (in-flow direction for the Heating mode).



LEGEND

TXV — Thermostatic Expansion Valve

Fig. 5 — Location of Sight Glass(es) and Filter Driers

Table 4 — Refrigerant Specialties Part Numbers

UNIT	LIQUID LINE SIZE	LIQUID LINE SOLENOID VALVE (LLSV)	LLSV COIL	SIGHT GLASS	FILTER DRIER
575B072	1/2″	200RB GS-1928 5T4	AMG-24/50-60	AMI1TT4	*
	5/8″	200RB GS-1929 5T5	AMG-24/50-60	AMI1TT5	*
575C090	3/8″	200RB GS-1928 5T4†	AMG-24/50-60	AMI1TT3	P504-8083S
	1/2″	200RB GS-1928 5T4	AMG-24/50-60	AMI1TT4	P504-8084S
575C120	1/2″	200RB GS-1928 5T4	AMG-24/50-60	AMI1TT4	P504-8164S
541A180	5/8″	**	**	AMI1TT5	P504-8085S Qty 2
	3/4″	**	**	AMI1TT5	P504-8085S Qty 2

*A filter drier is shipped loose with the 575B072 units.
†Bushings required.
**Factory Installed.

F. Provide Safety Relief

A fusible plug is located on the compressor crankcase or in the liquid line. See Fig. 6. Do not cap this plug. If local code requires additional safety devices, install them as directed.

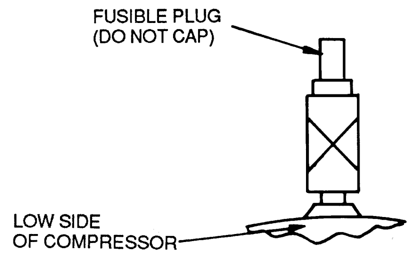


Fig. 6 — Location of Fusible Plug — 541A180 Unit

Head Pressure Control (541A180 only)

Fan cycling for head pressure control is a standard offering but is functional on the cooling cycle only. Number 2 fan cycles as a function of liquid pressure. Fan cycling pressure switch cycles the fan off at 160 ± 10 psig as pressure decreases and cycles back on at 255 ± 10 psig. Switch is automatically bypassed in heating cycle. Table 5 shows minimum outdoor air temperature for full cooling capacity.

G. Vapor Line Piping Procedure

Connect system vapor line to the vapor line stub on the outdoor unit and the vapor stubs on the indoor unit. At the indoor unit, construct vapor piping branches as shown in Fig. 7 for good mixing of the refrigerant leaving the indoor coil during cooling. This will ensure proper TXV (thermostatic expansion valve) bulb sensing.

Where vapor line is exposed to outdoor air, line must be insulated. See Table 6 for insulation requirements.

Table 5 — Minimum Outdoor Air Operating Temperature

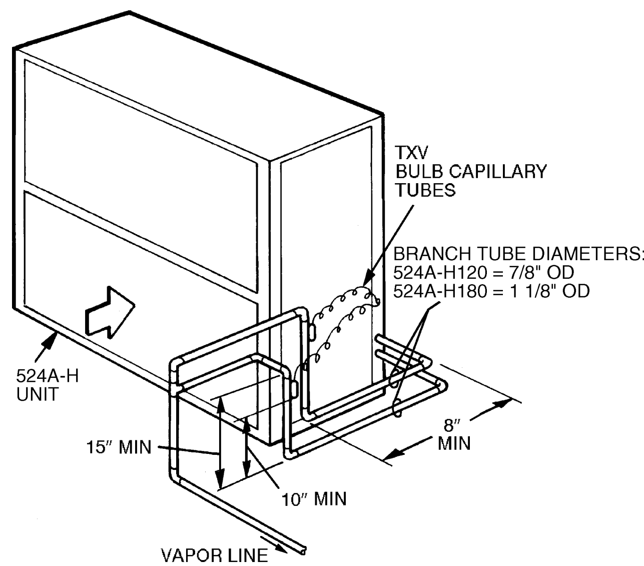
UNIT		% COMPRESSOR CAPACITY	MINIMUM OUTDOOR TEMP — F*	
			Standard Unit	Head Pressure Control†
575B	072	100	0	0
575C	090		35	–20
	120		35	–20
541A	180	100 67	23 36	–20 –20

*Applies to Cooling mode of operation only.
†Wind baffles (field-supplied and field-installed) are recommended for all units with low ambient head pressure control. Refer to Low Ambient Control Installation Instructions (shipped with accessory) for details.

Table 6 — Insulation for Vapor Line Exposed to Outdoor Conditions

LENGTH OF EXPOSED VAPOR LINE*	INSULATION THICKNESS†
ft	in.
10	3/8
25	1/2
35	3/4
50	3/4

*Recommended vapor line insulation for piping exposed to outdoor conditions to prevent loss of heating during heating cycle. When vapor line goes through interior spaces, insulation should be selected to prevent condensation on cooling cycle. Heating capacity should be reduced 1000 Btuh if over 35 ft of vapor line with 3/4 in. insulation is exposed to outdoor conditions.
†Closed cell foam insulation with a thermal conductivity of: 0.28 Btu • in./ft^2 • h • °F.



LEGEND
TXV — Thermostatic Expansion Valve

Fig. 7 — Vapor Line Branch Piping Details

IV. COMPLETE ELECTRICAL CONNECTIONS

A. Power Supply

Electrical characteristics of available power supply must agree with nameplate rating. Supply voltage must be within tolerances shown in Table 7. Phase imbalance must not exceed 2%. *Operation of unit on improper supply voltage or with excessive phase imbalance constitutes abuse and is not covered by Bryant warranty.*

Per local code requirements, provide an adequate fused disconnect switch within sight of unit and out of reach of children. Provision the switch for locking open (off) to prevent power from being turned on while unit is being serviced. The disconnect switch, fuses, and field wiring must comply with local requirements. Refer to Table 7 for unit electrical data.

B. Power Wiring

All power wiring must comply with applicable local requirements. Run power wires from disconnect switch through unit power opening and connect to terminal block inside the unit control box. Unit must be grounded.

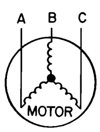
C. Unbalanced 3-Phase Supply Voltage

Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance:

% Voltage Imbalance:

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3}$$

$$= 457$$

(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

$$\text{\% Voltage Imbalance} = 100 \times \frac{7}{457}$$

$$= 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

> ⚠ **WARNING:** Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code), ANSI/NFPA (American National Standards Institute/National Fire Protection Association), and local electrical codes. Failure to follow this warning could result in the installer being liable for personal injury of others.

IMPORTANT: Operation of unit on improper power supply voltage or with excessive phase imbalance constitutes abuse and is not covered by Bryant warranty.

D. General Wiring Notes (See Fig. 8-13)

1. A crankcase heater is wired in the control circuit so it is always operable as long as power supply disconnect is on, even if any safety device is open or unit stop/start switch is off.
2. The power-circuit field supply disconnect should never be open except when unit is being serviced or is to be down for a prolonged period. When operation is resumed, crankcase heater should be energized for 24 hours before start-up. *If system is to be shut down for a prolonged period, it is recommended that the suction and discharge valves be closed to prevent an excessive accumulation of refrigerant in the compressor oil.*
3. Terminals for field power supply are suitable for copper, copper-clad aluminum, or aluminum conductors.
4. Bryant recommends an indoor airflow switch (field supplied) be installed and interlocked with the outdoor unit. This prevents the outdoor unit from operating if indoor airflow fails (broken fan belt, etc.). Operation of the compressor in vacuum can damage bearing surfaces. Install indoor airflow switch in a convenient location at the indoor supply air duct and wire per Fig. 14.
5. If the system is equipped with an accessory electric heater, refer to the 524A-H installation instructions and tables.

E. Control Circuit Wiring

Control voltage is 24 v. See unit label diagram for field supplied wiring details. Route control wires through opening in unit to connection in unit control box.

<u>Control Transformer Wiring</u>

On 208/230V units, check the transformer primary wiring connections. See Fig. 8 or refer to unit label diagram.

For 575B,C Unit — If unit will be operating at 208-3-60 power, remove black wire (BLK) from the transformer primary connection labeled “230” and move it to the connection labeled “208”. See Fig. 8.

For 541A Unit — Transformers no. 1 and 2 are wired for a 230-v unit. If a 208/230-v unit is to be run with a 208-v power supply, the transformers must be rewired as follows:

1. Remove cap from red (208 v) wire.
2. Remove cap from orange (230 v) spliced wire.
3. Replace orange wire with red wire.
4. Recap both wires.

IMPORTANT: BE CERTAIN UNUSED WIRES ARE CAPPED. Failure to do so may result in damage to the transformer.

Duplex 575C120, 541A180 with 524A-H240 or 524A-H300

In order to properly connect two heat pump condensing units to a single 524A-H packaged air handler, it is necessary to add field-supplied Fan Coil Relay Board(s), P/N 33ZCRLYBRD. Relay board(s) no. 1 and no. 2 should be installed in the control box of condensing unit.

IMPORTANT: The common (COM) terminals from the fan coil relay board(s) must be connected to the 'C' terminal in condensing unit 'A'.

Route thermostat cable or equivalent single leads of no. 18 AWG (American Wire Gage) colored wire from sub-base terminals through conduit in unit to low-voltage connections as shown on unit wiring diagram and Fig. 12 and 13.

NOTE: For wire runs up to 50 ft, use no. 18 AWG insulated wire (35 C minimum). For 51 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and a splice at the thermostat.

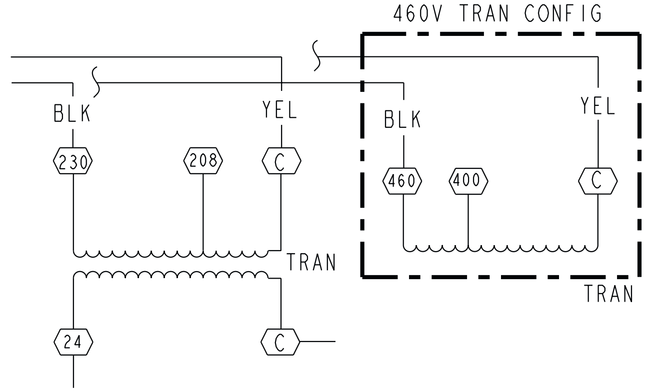


Fig. 8 — Wiring Diagram — 575C090,120 — Control Transformer

Table 7 — Electrical Data

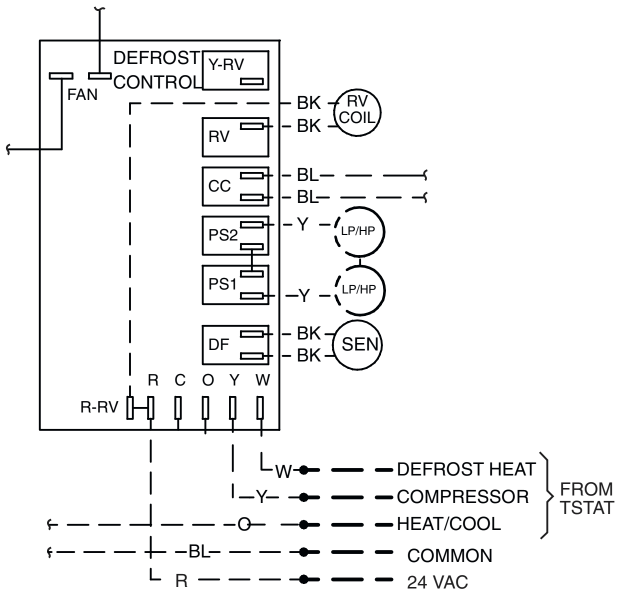
UNIT		FACTORY-INSTALLED OPTION	NOMINAL VOLTAGE (V-Ph-Hz)	VOLTAGE RANGE*		COMPRESSOR		FAN MOTORS	POWER SUPPLY	
				Min	Max	RLA	LRA	FLA	MCA	MOCP
575B	072	NONE	208/230-3-60	187	253	18.9	146	5.1	28.7	45
			460-3-60	414	506	9.5	73	2.6	14.5	20
			575-3-60	517	633	7.6	58	1.2	10.7	15
575C	090	NONE OR DISCONNECT	208/230-3-60	187	254	29.0	190	1.5	39.0	60
		CONVENIENCE OUTLET							43.8	60
		NONE OR DISCONNECT	460-3-60	418	506	15.0	95	0.7	19.8	30
		CONVENIENCE OUTLET							21.9	30
	120	NONE OR DISCONNECT	208/230-3-60	187	254	34.0	225	1.5	45.0	60
		CONVENIENCE OUTLET							50.0	70
		NONE OR DISCONNECT	460-3-60	418	506	17.0	114	0.7	23.0	30
		CONVENIENCE OUTLET							25.0	30
		NONE OR DISCONNECT	575-3-60	523	632	14.0	80	0.7	18.0	25
		CONVENIENCE OUTLET							20.0	25
541A	180	NONE	208/230-3-60	187	253	63.6	266	4.3	87.5	125
			460-3-60	414	528	29.3	120	2.3	40.7	60
			575-3-60	518	660	23.8	96	1.8	33.0	50

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
RLA — Rated Load Amps

*Units are suitable for use on electrical systems where voltage supplied to the unit terminals is not below or above the listed limits.

NOTES:
1. The MCA and MOCP values are calculated in accordance with the NEC, Article 440.
2. Motor RLA and LRA values are established in accordance with Underwriters' Laboratories (UL), Standard 1995.
3. The 575-v units are UL, Canada-listed only.
4. Convenience outlet is available as either a factory-installed option or a field-installed accessory and is 115-v, 1 ph, 60 Hz.



LEGEND

DF	—	Defrost Relay
LP/HP	—	Low or High-Pressure Switch (Optional)
PS	—	Pressure Switch
RV	—	Reversing Valve
SEN	—	Outdoor Coil Temperature Sensor
TSTAT	—	Thermostat
		Line Voltage Factory
		Low Voltage Factory
		Low Voltage Field

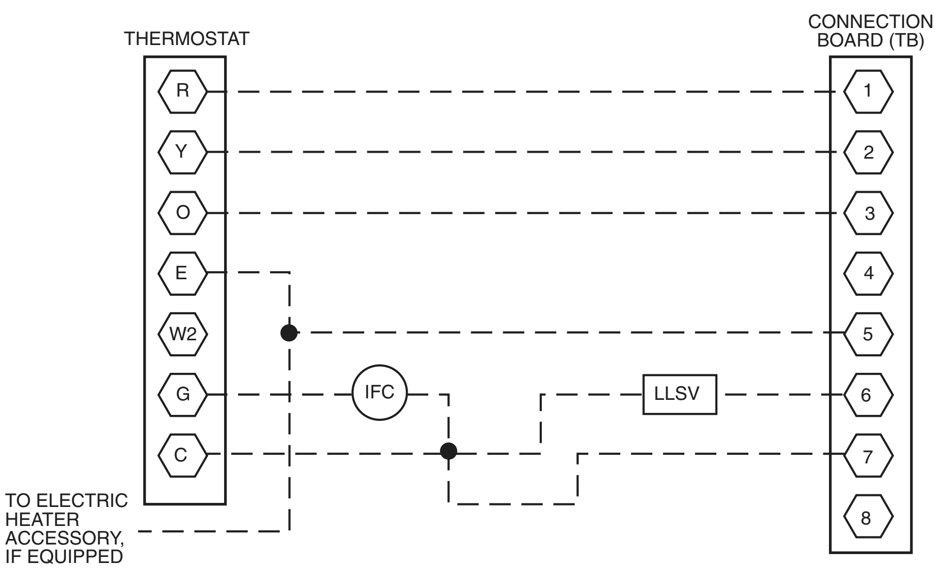
COLOR CODE

BK	Black
BL	Blue
O	Orange
R	Red
W	White
Y	Yellow

NOTES:
1. All electrical work must be done in conformance with the National Electrical Code (NFPA No. 70) and in conformance with local codes and authorities having jurisdiction.
2. For use with copper conductors only.

⚠ **CAUTION:** Not suitable for use on systems exceeding 150 volts to ground.

Fig. 9 — Wiring Diagram — 575B072; 208/230-3-60 Units

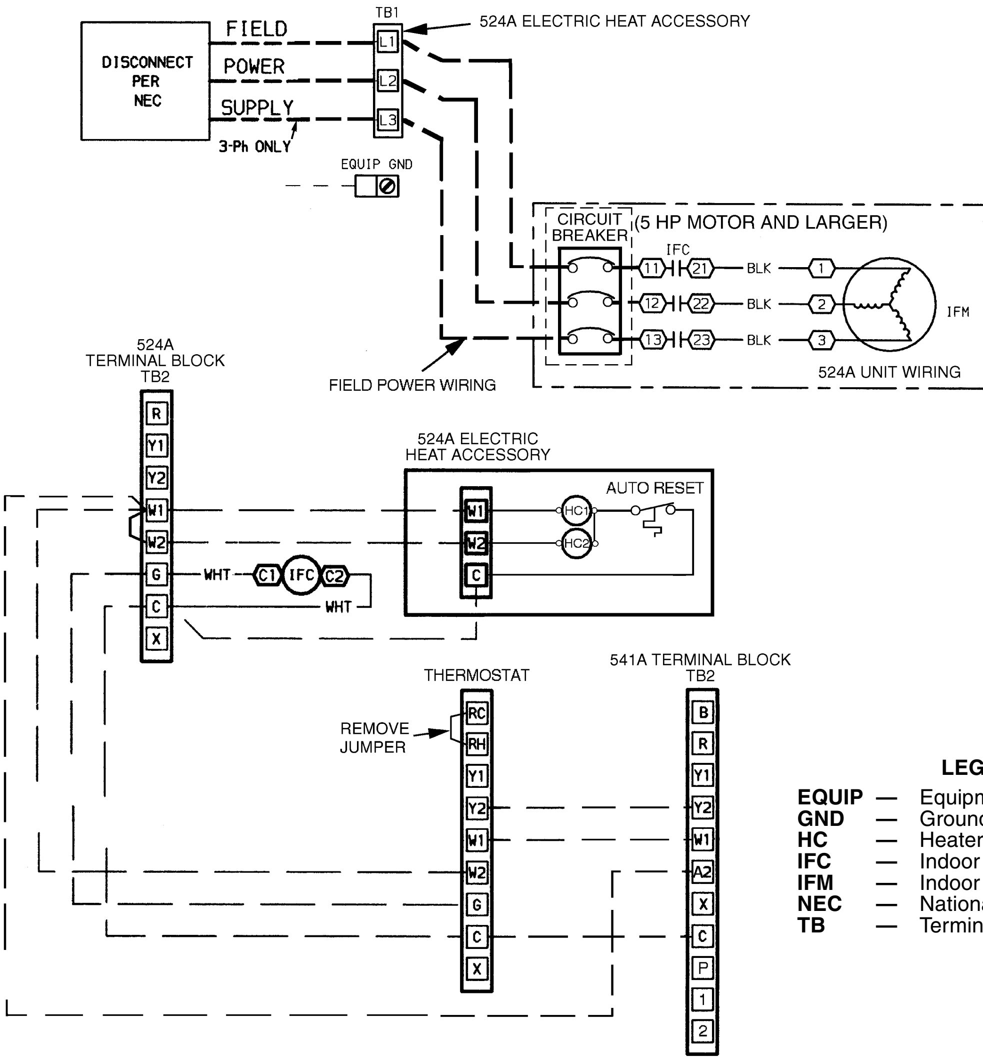


LEGEND

IFC	—	Indoor Fan Contactor
LLSV	—	Liquid Line Solenoid Valve
TB	—	Terminal Block
- - - -		Field Wiring

NOTES:
1. For thermostat and subbase part no. see price pages.
2. Use copper conductors only.

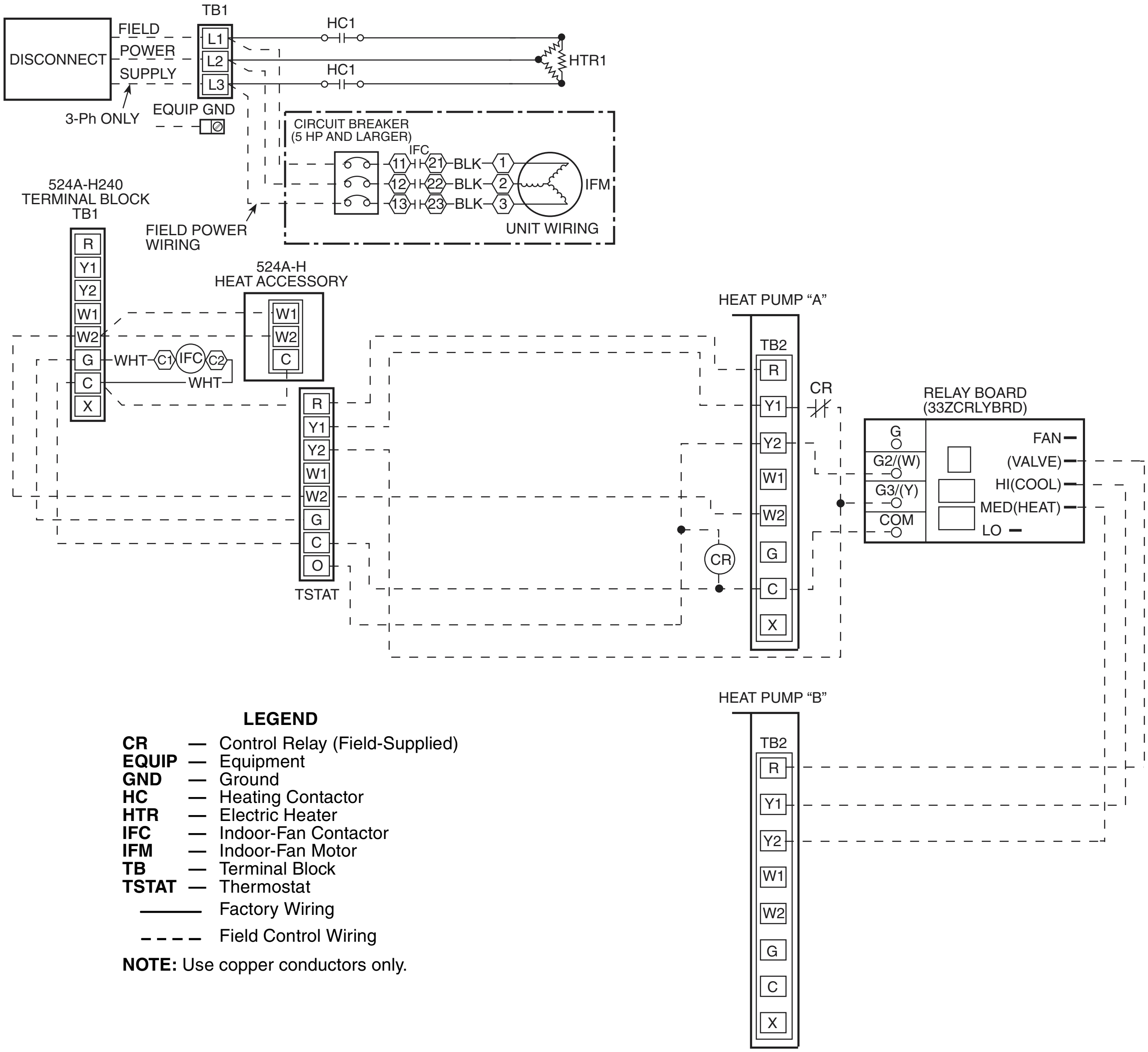
Fig. 10 — Wiring Diagram — 575C090,120; 230-3-60 Units



LEGEND

EQUIP	—	Equipment
GND	—	Ground
HC	—	Heater Contactor
IFC	—	Indoor Fan Contactor
IFM	—	Indoor Fan Motor
NEC	—	National Electrical Code
TB	—	Terminal Block

Fig. 11 — Wiring Diagram — 541A180 Unit With Standard Thermostat and Electric Heat

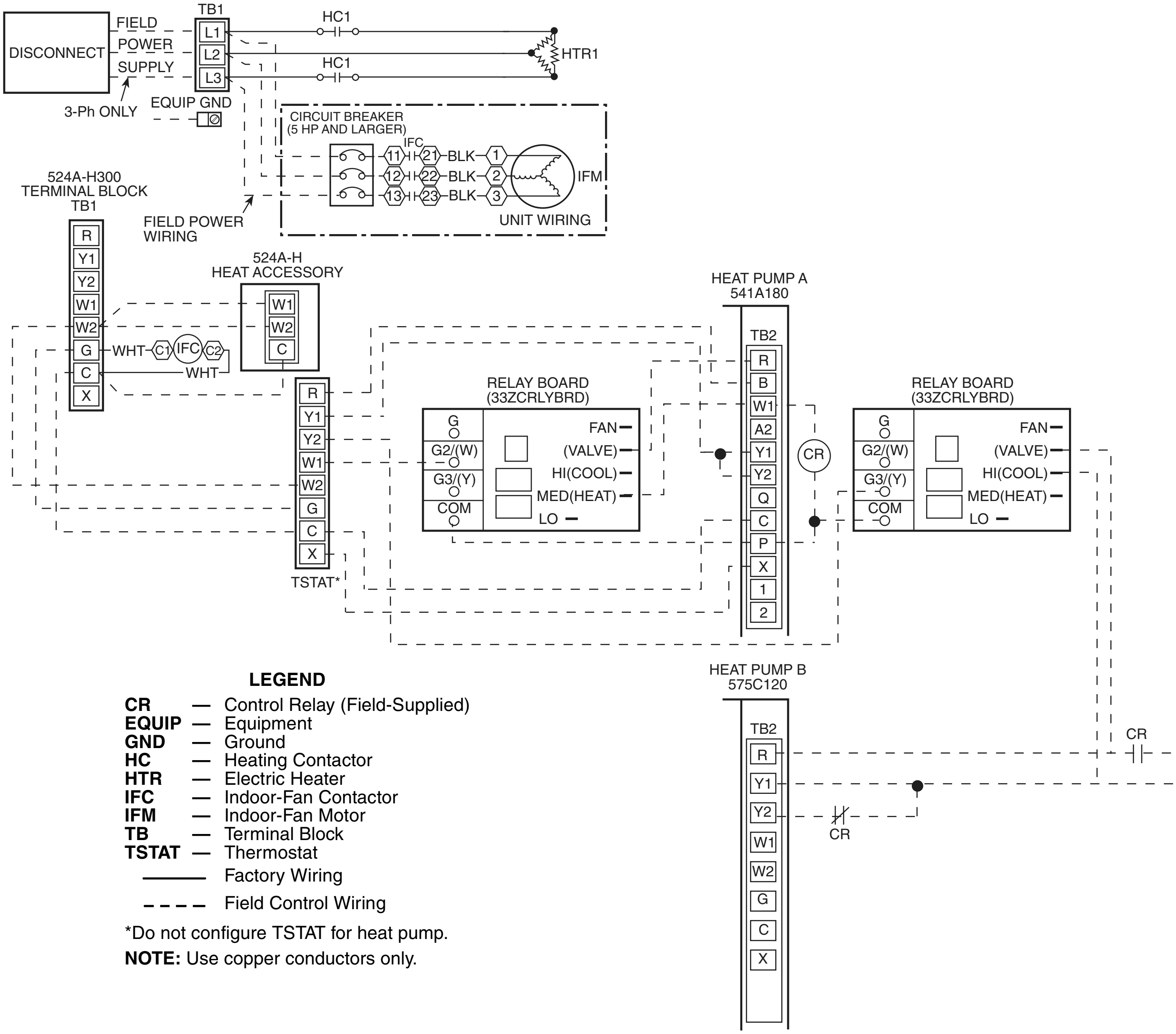


LEGEND

CR	—	Control Relay (Field-Supplied)
EQUIP	—	Equipment
GND	—	Ground
HC	—	Heating Contactor
HTR	—	Electric Heater
IFC	—	Indoor-Fan Contactor
IFM	—	Indoor-Fan Motor
TB	—	Terminal Block
TSTAT	—	Thermostat
———		Factory Wiring
- - - -		Field Control Wiring

NOTE: Use copper conductors only.

Fig. 12 — Wiring Diagram — Duplex 575C120 With 524A-H240 and Electric Heat



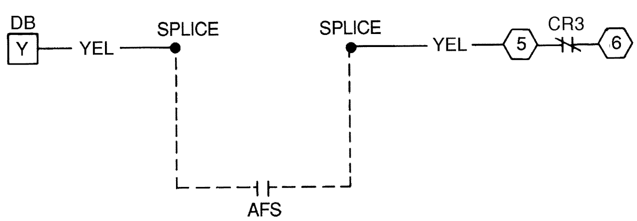
LEGEND

CR — Control Relay (Field-Supplied)
EQUIP — Equipment
GND — Ground
HC — Heating Contactor
HTR — Electric Heater
IFC — Indoor-Fan Contactor
IFM — Indoor-Fan Motor
TB — Terminal Block
TSTAT — Thermostat
——— Factory Wiring
– – – – Field Control Wiring

*Do not configure TSTAT for heat pump.

NOTE: Use copper conductors only.

Fig. 13 — Wiring Diagram — Duplex 575C120 and 541A180 With 524A-H300 and Electric Heat



LEGEND

AFS — Airflow Switch (Sail Switch)
CR — Control Relay
DB — Defrost Board
——— Factory Wiring
– – – – Field Control Wiring

NOTES:

1. Locate YEL wire between Y on DB and terminal 5 of CR3 and cut.
2. Splice airflow switch (AFS) (field supplied) contact wires (field provided) to two ends of cut YEL wire as depicted.

Fig. 14 — Typical Field Wiring for Airflow Switch — 541A180/524A-H

PRE-START-UP

IMPORTANT: Before beginning Pre-Start-Up or Start-Up, review Start-Up Checklist at the back of this book. The checklist assures proper start-up of the system and provides a record of unit condition, application requirements, system information, and operation at initial start-up.

> ⚠ **CAUTION:** Do not attempt to start the heat pump system, even momentarily, until the following steps have been completed. Compressor damage may result.

I. PRELIMINARY CHECKS

1. Check all air handler and other equipment auxiliary components. Consult manufacturer's instructions regarding any other equipment attached to unit. If unit has field-installed accessories, be sure all are properly installed and correctly wired. If used, airflow switch must be properly installed. See Fig. 14 for typical field wiring.
2. As shipped, compressor is held down by 4 bolts. After unit is installed, loosen each bolt and locknut until flat washer or snubber can be moved with finger pressure. Be sure compressor floats freely on the mounting springs (541A units only). See Fig. 15A and 15B for compressor mounting.
3. Check tightness of all electrical connections.
4. Electrical power source must agree with nameplate rating.
5. Turn on crankcase heater for 24 hours before starting the unit to be sure all refrigerant is out of the oil. To energize crankcase heater, perform the following steps:
   a. Set the space thermostat system switch to OFF, or adjust the temperature so there is no demand for cooling.
   b. Close the field disconnect.
   c. Leave the compressor circuit breaker off. The crankcase heater is now energized.
6. Leak test the field refrigerant piping, connections and joints, and indoor coil. To perform leak test, complete the following steps:
   a. Pressurize refrigerant piping; do not exceed 150 psi.
   b. Using soap bubbles and/or an electronic leak detector, test refrigerant piping, connections and joints, and the indoor coil. See Fig. 16.
   c. Check for leaks.

   Evacuate and dehydrate entire refrigerant system.
7. 541A180 only — compressor oil level should be visible in sight glass. Adjust the oil level as required. No oil should be removed unless the crankcase heater has been energized for at least 24 hours. See Start-Up section, Preliminary Oil Charge.

   NOTE: The 575B, 575C units do not have a compressor oil level sight glass. These units are factory charged with the required amount of oil. If required, use the following oil for replacement: For 575B units use Zerol 150, part number P903-2001. For 575C units use RCD, part number P903-0101.
8. Backseat (open) compressor suction and discharge valves. Now close valves one turn to allow refrigerant pressure to reach test gages.

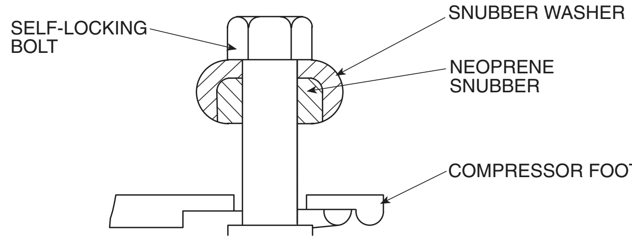


Fig. 15A — Compressor Mounting — 575B072 and 575C090,120 Units

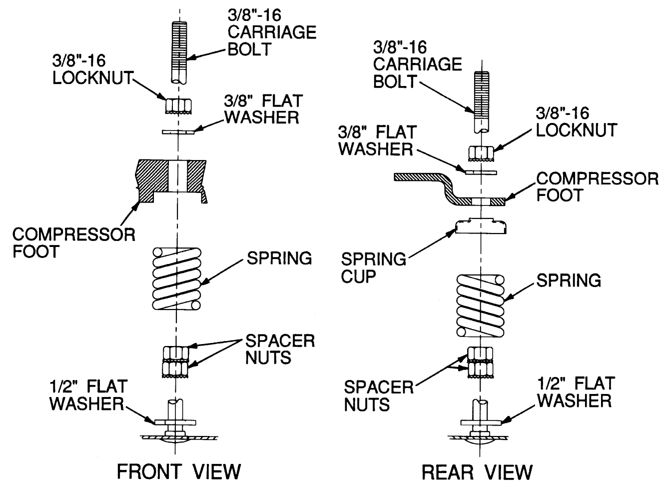
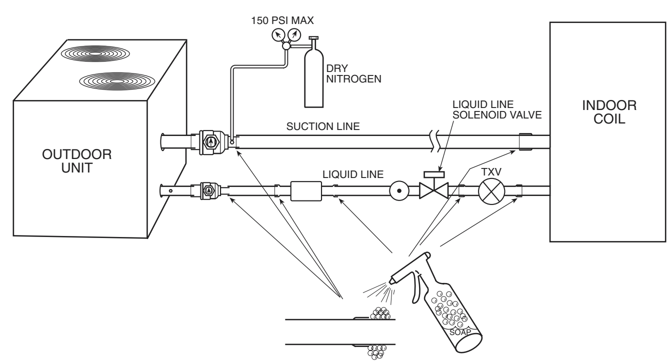


Fig. 15B — Compressor Mounting — 541A180 Units



→ Fig. 16 — Recommended Process for Checking for Leaks

II. PRELIMINARY CHARGE

> ⚠ **CAUTION:** The 575C090 and 575C120 units contain a 9 lb charge of refrigerant. Add remainder of preliminary charge and allow pressure to equalize before starting compressor. Failure to do so WILL cause the compressor to overheat in a few minutes, possibly causing permanent compressor damage. **The amount of refrigerant added must be at least 80% of the operating charge listed in the Physical Data table (Table 1).**

Before starting the unit, charge liquid refrigerant into the high side of the system through the liquid service valve. Allow high and low side pressures to equalize before starting compressor. If pressures do not equalize readily, charge vapor on low side of system to assure charge in the evaporator. Refer to GTAC II, Module 5, Charging, Recovery, Recycling, and Reclamation for liquid charging procedures.

III. LIQUID LINE SOLENOID

To minimize refrigerant migration to the compressor during the heat pump OFF cycle, the 575B,C unit must have a bi-flow liquid line solenoid valve (field supplied). The valve opens when the compressor is energized, and closes when the compressor is deenergized. This reduces compressor flooded starts, thus significantly increasing compressor life.

IV. ACCUMULATOR

The unit accumulator controls the rate of liquid refrigerant to the compressor during heat pump operation.

The 541A accumulator features a unique method for returning oil to the compressor. The oil return mechanism is external to the accumulator. The mixture of oil and refrigerant is metered to the compressor by a brass orifice which is removable and cleanable. The oil return mechanism also contains a solenoid valve that opens when the compressor is ON and closes when the compressor is OFF. This keeps the liquid refrigerant stored in the accumulator from draining to the compressor during the heat pump OFF cycle, which further protects the compressor against flooded starts.

START-UP

⚠ **CAUTION:** Compressor crankcase heater must be on for 24 hours before start-up. After the heater has been on for 24 hours, the unit can be started.

⚠ **CAUTION:** Prior to starting compressor, a preliminary charge of refrigerant must be added to avoid possible compressor damage.

I. COMPRESSOR ROTATION (575B,C Units)

On 3-phase units with scroll compressors, it is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Note that the condenser fan is probably also rotating in the wrong direction.
2. Turn off power to the unit, tag disconnect.
3. Reverse any two of the unit power leads.
4. Reapply power to the compressor, verify correct pressures.

The suction and discharge pressure levels should now move to their normal start-up levels.

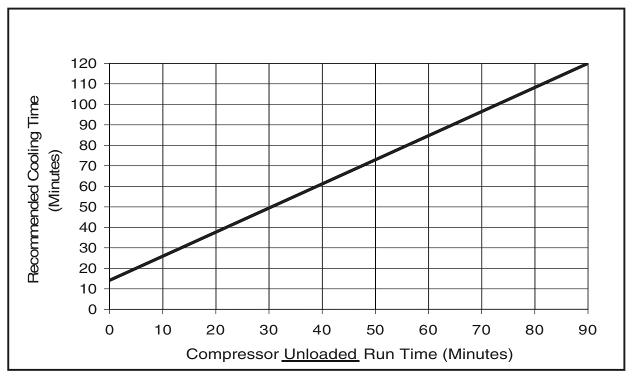
II. COMPRESSOR OVERLOAD

This overload interrupts power to the compressor when either the current or internal motor winding temperature becomes excessive, and automatically resets when the internal temperature drops to a safe level. This overload usually resets within 60 minutes (or longer). If the internal overload is suspected of being open, disconnect the electrical power to the unit and check the circuit through the overload with an ohmmeter or continuity tester.

III. ADVANCED SCROLL TEMPERATURE PROTECTION (ASTP)

Advanced Scroll Temperature Protection (ASTP) is a form of internal discharge temperature protection that unloads the scroll compressor when the internal temperature reaches approximately 300 F. At this temperature, an internal bi-metal disk valve opens and causes the scroll elements to separate, which stops compression. Suction and discharge pressures balance while the motor continues to run. The longer the compressor runs unloaded, the longer it must cool before the bi-metal disk resets. See Fig. 17.

To manually reset ASTP, the compressor should be stopped and allowed to cool. If the compressor is not stopped, the motor will run until the motor protector trips, which occurs up to 90 minutes later. Advanced Scroll Temperature Protection will reset automatically before the motor protector resets, which may take up to 2 hours. A label located above the terminal box identifies Copeland Scroll compressor models (ZR94, 108 and 125) that contain this technology. See Fig. 18.



*Times are approximate.

NOTE: Various factors, including high humidity, high ambient temperature, and the presence of a sound blanket will increase cool-down times.

Fig. 17 — Recommended Minimum Cool-Down Time After Compressor is Stopped*

Fig. 18 — Advanced Scroll Temperature Protection Label

IV. COMPRESSOR LOCKOUT DEVICE

The compressor lockout (CLO) device prevents the compressor from starting or running in a high pressure, loss-of-charge or freezestat open situation. Reset the CLO device by setting the thermostat to eliminate cooling demand and return it to the original set point. If the system shuts down again for the same fault, determine the possible cause before attempting to reset the CLO device.

V. PRELIMINARY OIL CHARGE (541A)

The compressor is factory charged with oil (see Table 1). When oil is checked at start-up, it may be necessary to add or remove oil to bring it to the proper level. Add oil only if necessary to bring oil into view in sight glass. *Use only Bryant-approved compressor oil.* One recommended oil level adjustment method is as follows:

A. Add Oil

Close suction service valve and pump down crankcase to 2 psig. Wait a few minutes and repeat until pressure remains steady at 2 psig. Remove oil fill plug above the sight glass, add oil through plug hole, and replace plug. Run compressor for 20 minutes and check oil level.

NOTE: Use only Bryant-approved compressor oil. Approved sources are:

Petroleum Specialties, Inc.. . . . . Cryol 150A
Texaco, Inc. . . . . Capella WF-32
Witco Chemical Co.. . . . . Suniso 3GS

Do not use oil that has been drained out, or oil that has been exposed to atmosphere.

B. Remove Oil

Pump down compressor to 2 psig. Loosen the $^{1}/_{4}$-in. pipe plug at the compressor base and allow the oil to seep out past the threads of the plug. Retighten plug when level is correct.

NOTE: The crankcase is slightly pressurized. Do not remove the plug, or the entire oil charge will be lost.

Small amounts of oil can be removed through the oil pump discharge connection while the compressor is running.

VI. START UNIT

The field disconnect is closed, the fan circuit breaker is closed, and the space thermostat is set above ambient so that there is no demand for cooling. Only the crankcase heater will be energized.

Next, close the compressor circuit breaker and then reset space thermostat below ambient so that a call for cooling is ensured.

NOTE: Do not use circuit breaker to start and stop the compressor except in an emergency.

After starting, there is a delay of at least 3 seconds before compressor starts.

VII. ADJUST REFRIGERANT CHARGE

⚠ **CAUTION:** Never charge liquid into the low-pressure side of system. Do not overcharge. During charging or removal of refrigerant, be sure indoor-fan system is operating.

⚠ **CAUTION:** Charge unit on cooling cycle only. If unit is charged on heating cycle, overcharging may occur.

Refer to Charging Charts Fig. 19A-19C and Table 8. Do not exceed maximum refrigerant charge. Vary refrigerant until the conditions of the chart are met. Note that charging charts are different from type normally used. Charts are based on charging the units to the correct subcooling for the various operating conditions. Accurate pressure gage and temperature sensing device are required.

Connect the pressure gage to the service port on the liquid line service valve. Mount the temperature sensing device on the liquid line, close to the liquid line service valve and insulate it so that outdoor ambient temperature does not affect the reading. Indoor airflow must be within the normal operating range of the unit. Operate unit a minimum of 15 minutes. Ensure pressure and temperature readings have stabilized. Plot liquid pressure and temperature on chart and add or reduce charge to meet curve. Adjust charge to conform with charging chart, using the liquid pressure and temperature to read chart.

If the sight glass is cloudy, check refrigerant charge again. *Ensure all fans are operating.* Also ensure maximum allowable liquid lift has not been exceeded. If charged per chart and if the sight glass is still cloudy, check for a plugged filter drier or a partially closed solenoid valve. Replace or repair, as needed.

VIII. CHECK HEATING CYCLE OPERATION

Place thermostat selector switch at HEAT and reset the space set point above ambient temperature so that a call for heating is ensured. Compressor will start within 5 minutes. Observe system operation.

IX. CHECK COMPRESSOR OIL LEVEL (541A)

After adjusting the refrigerant charge, allow the system to run fully loaded for 20 minutes. Running oil level should be within view in the crankcase sight glass. Stop compressor at the field power supply disconnect and check the crankcase oil level. Add oil only if necessary to bring the oil into view in the sight glass. If oil is added, run the system for an additional 10 minutes, then stop and check oil level. If the level remains low, check the piping system for proper design for oil return; also check the system for leaks.

If the initial check shows too much oil (too high in the sight glass) remove oil to proper level. See Preliminary Oil Charge section for proper procedure for adding and removing oil.

When the above checks are complete, repeat the procedure with the unit operating at minimum load conditions. Unload the compressor by disconnecting the field-control circuit lead at TB2 [Y2] .

Reconnect the field-control circuit lead when checks are complete.

X. FINAL CHECKS

Ensure all safety controls are operating, control panel covers are on, and the service panels are in place.

Table 8 — Maximum Refrigerant Charge

UNIT		R-22 (lb)
575B	**072**	27.0
575C	**090**	34.2
	120	34.2
541A	**180**	62.0

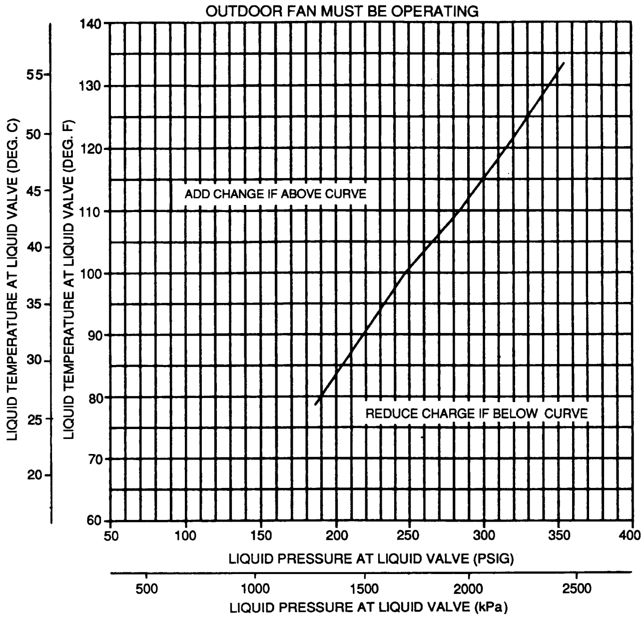


Fig. 19A — 575B072 Charging Chart

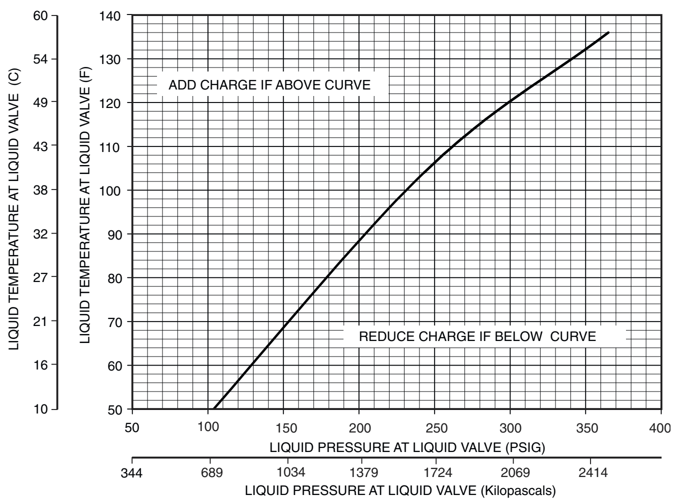


Fig. 19B — 575C090,120 Charging Chart

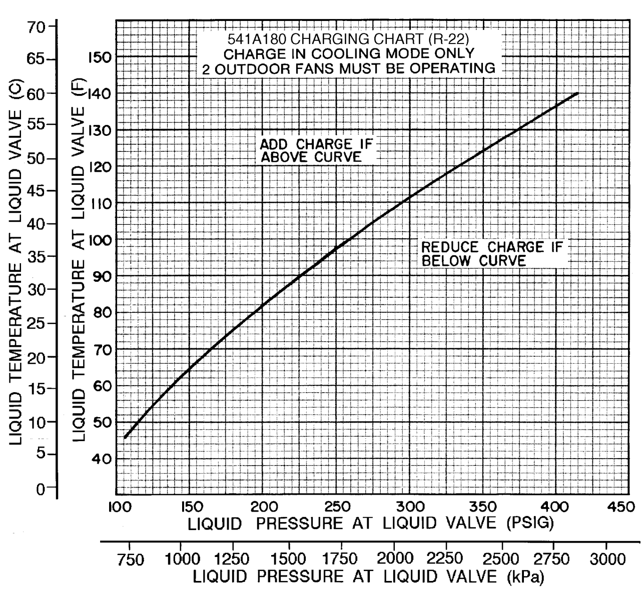


Fig. 19C — 541A180 Charging Chart

SEQUENCE OF OPERATION

I. 575B072 UNITS

When power is supplied to unit, the transformer (TRAN) and crankcase heater (CCH) are energized.

A. Cooling

On a call for cooling, the thermostat completes the following circuits: R-G, R-Y, and R-O. If the compressor recycle delay of 3 minutes is complete, the compressor and outdoor fan start. The reversing valve is energized for cooling and the indoor-fan motor starts.

When the thermostat is satisfied, the circuits are opened, and the compressor, outdoor-fan motor, and indoor-fan motor stop. The reversing valve is deenergized.

B. Heating

On a call for heating, the thermostat completes the following circuits: R-G and R-Y. If the compressor recycle delay of 3 minutes is complete, the compressor and outdoor fan start. The indoor-fan motor will also start.

If room temperature continues to fall, the thermostat completes circuit R-W. If the optional electric heat package is used, the heat relay is energized, and the electric heaters are energized.

When the thermostat is satisfied, the circuits are opened, and the compressor, outdoor-fan motor, heaters, and indoor-fan motor stop.

C. Defrost

Defrost board (DB) is a time and temperature control, which includes a field-selectable time period between checks for frost (30, 50, and 90 minutes). Electronic timer and defrost cycle start only when contactor is energized and defrost thermostat (DFT) is closed (below 28 F).

Defrost mode is identical to Cooling mode, except outdoor-fan motor (OFM) stops and a bank of supplemental electric heat turns on to warm air supplying the conditioned space. Defrost mode is terminated when the DFT reaches 65 F.

D. Air Circulation

When the fan switch is at FAN ON, the indoor-air fans operate continuously to provide ventilation. The thermostat operates the other components as described above.

E. Emergency Heat Cycle

If the compressor is inoperative due to a tripped safety device, the second stage of the thermostat automatically energizes the indoor-air fan and the electric resistance heaters (if equipped).

II. 575C090,120 UNITS

When power is supplied to unit, the transformer (TRAN) is energized. The crankcase heater is also energized.

A. Cooling

With the thermostat subbase in the cooling position, and when the space temperature comes within 2° F of the cooling set point, the thermostat makes circuit R-O. This energizes the reversing valve solenoid (RVS) and places the unit in standby condition for cooling.

As the space temperature continues to rise, the second stage of the thermostat makes, closing circuit R-Y. When compressor time delay (5 ± 2 minutes) is completed, a circuit is made to contactor (C), starting the compressor (COMP) and outdoor-fan motor (OFM). Circuit R-G is made at the same time, energizing the indoor-fan contactor (IFC) and starting the indoor-fan motor (IFM) after one-second delay.

When the thermostat is satisfied, contacts open, deenergizing C. The COMP, IFM, and OFM stop.

B. Heating

On a call for heat, thermostat makes circuits R-Y and R-G. When compressor time delay (5 ± 2 minutes) is completed, a circuit is made to C, starting COMP and OFM. Circuit R-G also energizes IFC and starts IFM after a 1-second delay.

III. 541A180 UNITS

A. Heating

Place thermostat selector at HEAT and set temperature selector above room ambient.

B. Cooling

Place thermostat selector at COOL and set temperature selector below room ambient.

When thermostat calls for unit operation (either heating or cooling), the indoor-fan motor starts immediately. The outdoor-fan motors and compressor start within 3 seconds to 5 minutes depending on when unit was last shut off by thermostat, because unit contains a compressor time delay circuit. When first-stage cooling is required, thermostat (TC1) closes, causing the heat pump to start with an unloaded compressor. When TC2 closes, demanding additional cooling, the compressor loads to full load operation.

During heating, compressor is always fully loaded. When TH1 demands first-stage heating, the heat pump starts within 3 seconds to 5 minutes depending on when unit was last shut off by thermostat, because unit contains a compressor time delay circuit. (The defrost board has speed terminals to shorten this cycle.) When TH2 of the thermostat closes, auxiliary heat supply (electric strip heat) is energized in 1 or 2 stages depending on number of stages available and whether outdoor thermostats are closed.

Defrost is achieved by reversal from heating to cooling cycle and deenergization of outdoor-fan motors, allowing hot refrigerant gas to defrost outdoor coil. Defrost is achieved with a timer set to initiate defrost every 30, 50, or 90 minutes (factory set at 30 minutes).

Defrost is initiated when refrigerant temperature leaving the outdoor coil is measured below 27 F, (typically when the outdoor ambient temperature is below 45 F as sensed by the defrost thermostat [DFT]).

Defrost is terminated when: The refrigerant temperature rises to 80 F at the DFT location on the liquid line; or the refrigerant pressure rises to 280 psig at the HPS2 location on the liquid line; or the defrost timer completes the 10-minute cycle.

IV. DUPLEX UNITS

A. Duplex 575C120 Units with 524A-H240 (See Fig. 12)

Cooling

When the thermostat is set for cooling, and the space temperature comes within 2° F of the cooling set point, the thermostat completes the circuit from R to O and the reversing valves in both units are energized. If the space temperature continues to rise, the circuit from R to Y1 is completed. If the time delays and safeties are satisfied, the compressor contactor closes, starting the compressor and outdoor-fan motors of Heat Pump A. At the same time the circuit is completed from R to G, starting the indoor-fan motor. If the space temperature continues to rise, the circuit is completed from R to Y2 and the Cooling mode is initiated in Heat Pump B in a similar manner.

When the thermostat is satisfied, the contacts open, deenergizing first the Heat Pump B and then Heat Pump A.

Heating

When the thermostat calls for heating, the circuit from R to Y1 is completed. If the time delays and safeties are satisfied, the compressor contactor closes, starting the compressor and outdoor-fan motors of Heat Pump A and Heat Pump B. At the same time the circuit is completed from R to G, starting the indoor-fan motor. If the second stage of heating is required, the circuit from R to W2 will be completed and the electric resistance heaters will be energized.

When the thermostat is satisfied, the contacts open, deenergizing Heat Pump A and Heat Pump B.

B. Duplex 575C120 and 541A180 Units With 524A-H300 (See Fig. 13)

Cooling

When the thermostat calls for cooling, the circuit from R to Y1 is completed. If the time delays and safeties are satisfied, the compressor contactor closes, starting the compressor and outdoor-fan motors of Heat Pump A (541A180). At the same time the circuit is completed from R to G, starting the indoor-fan motor. If the space temperature continues to rise, the circuit is completed from R to Y2 and the Cooling mode is initiated in Heat Pump B (575C120).

When the thermostat is satisfied, the contacts open, deenergizing first the Heat Pump B and then Heat Pump A.

Heating

When the thermostat calls for heating, the circuit from R to W1 is completed. If the time delays and safeties are satisfied, the compressor contactor closes, starting the compressor and outdoor-fan motors of Heat Pump A and Heat Pump B. At the same time the circuit is completed from R to G, starting the indoor-fan motor. If the second stage of heating is required, the circuit from R to W2 will be completed and the electric resistance heaters will be energized.

When the thermostat is satisfied, the contacts open, deenergizing Heat Pump A and Heat Pump B.

C. Safeties

The high-pressure switch, loss-of-charge switch, oil pressure safety switch, and compressor overtemperature safety are located in a CLO circuit that prevents heat pump operation if these safety devices are activated. A light at the thermostat energizes when CLO circuit is affected. The lockout system can be reset by adjusting the thermostat to open the contacts (down for Heating mode, up for Cooling mode), deenergizing the CLO circuitry. Compressor overcurrent protection is achieved with a circuit breaker which requires manual resetting at the outdoor unit control box.

The unit is equipped with an oil pressure safety switch that protects the compressor if oil pressure does not develop on start-up or is lost during operation. The oil pressure switch is of the manual reset type and therefore must be reset at the outdoor unit. DO NOT RESET MORE THAN ONCE.

If oil pressure switch trips, determine cause and correct. DO NOT JUMPER OIL PRESSURE SAFETY SWITCH.

To reset the oil pressure switch:

1. Disconnect power to the unit.
2. Press the RESET button on the oil pressure switch.
3. Reconnect power to the unit.

Unit is equipped with a no-dump reversing valve circuit. When unit is in Cooling mode, reversing valve remains in cooling position until a call for heating is requested by thermostat. When unit is in Heating mode, reversing valve remains in heating position until there is a call for cooling.

The crankcase heater is in a lockout circuit. If crankcase heater is defective, compressor is locked off. Heat pump remains off until corrective action is taken. The lockout circuit cannot be reactivated by adjusting the thermostat. To reset the crankcase heater lockout, disconnect and then reconnect power to unit.

D. Check Operation

Ensure operation of all safety controls. Replace all service panels. *Be sure that control panel cover is closed tightly.*

V. RESTART

Manual reset of the 24-v control circuit is necessary if unit shutdown is caused by automatic reset devices (including IP [internal compressor overcurrent protection], HPS [high-pressure switch], and LCS [loss-of-charge switch]) or if shutdown is caused by manual reset devices (including OPS [oil pressure switch] and compressor circuit breaker protection). To restart the unit when IP, HPS, or LCS has tripped (*after device has reset automatically*), open and then close the thermostat contacts. Opening and then closing thermostat contacts interrupts and restores 24-v power to the compressor lockout (CLO), which resets the circuit.

It is necessary to manually reset the compressor circuit breaker and OPS at the unit if either of these safeties should shut down the unit.

IMPORTANT: If OPS trips, it must be reset **first** before making and breaking the thermostat contacts to reset CLO. If this procedure is not followed, the CLO cannot reset.

VI. CAUSES OF COMPLETE UNIT SHUTDOWN:

- interruption of supplied power
- open compressor overtemperature protection (IP)
- compressor electrical overload protection (CB)
- open high-pressure or loss-of-charge safety switches
- open oil pressure switch
- open crankcase heater lockout (CLO2)
- open control circuit fuse (FU1 or FU2)
- open discharge gas thermostat (575C only)

SERVICE

I. COMPRESSOR REMOVAL

See Table 1 for compressor information. Follow safety codes and wear safety glasses and work gloves.

1. Shut off power to unit. Remove unit access panel.
2. Recover refrigerant from system using refrigerant recovery methods, and in accordance with local and national standards.
3. Disconnect compressor wiring at compressor terminal box.
4. Disconnect refrigerant lines from compressor.
5. Remove screws from compressor mounting plate.

> ⚠ **CAUTION:** Excessive movement of copper lines at compressor may cause higher levels of vibration when unit is restored to service.

6. Remove or disconnect crankcase heater from compressor base.
7. Remove compressor from unit.
8. On 541A180 unit remove compressor holddown bolts and lift compressor off mounting plate.
9. Clean system. Add new liquid line filter drier.
10. Install new compressor on compressor mounting plate and position in unit. Connect suction and discharge lines to compressor. Secure mounting plate with compressor to unit. Ensure that compressor holddown bolts are in place. Connect wiring. Install crankcase heater.
11. Evacuate and recharge unit.
12. Restore unit power.

II. 575C090,120 COOLING MODE OPERATION (See Fig. 20)

1. High pressure, high temperature refrigerant vapor from the compressor flows through the reversing valve and is directed to the vapor headers of both outdoor coils.
2. At the outdoor coil vapor header, the high pressure, high temperature refrigerant vapor flows up to check valve “A” that blocks the flow. All the refrigerant is then directed to flow into the coil circuits.
3. Subcooled refrigerant liquid leaves the coil circuits through the side outlet on the liquid headers. The liquid refrigerant from each coil flows through check valves “B” which are open, enters the liquid line and goes to the indoor coil.
4. The liquid refrigerant is expanded and evaporated in the indoor coil resulting in low pressure vapor. This low pressure vapor returns to the outdoor unit through the system vapor line, reversing valve, and accumulator, reentering the compressor at the suction connection.

III. 575C090,120 HEATING MODE OPERATION (See Fig. 21)

1. High pressure, high temperature refrigerant vapor from the compressor flows through the reversing valve and is directed through the system vapor line to the indoor coil. Refrigerant is condensed and subcooled in the indoor coil and returns to the outdoor unit through the system liquid line.
2. Check valve “B” blocks the flow of liquid and the liquid refrigerant must flow through the filter driers, through check valve “C”, and into the liquid header assembly.
3. The liquid refrigerant is expanded as it passes through the fixed orifice metering devices into outdoor coil circuits. The refrigerant evaporates as it passes through the coil circuits resulting in low pressure vapor.
4. The low pressure vapor leaves the coil circuits and enters the vapor headers, check valves “A” are open, and returns to the compressor through the vapor line, reversing valve, and accumulator, reentering the compressor at the suction connection.

IV. 541A180 COOLING MODE OPERATION (See Fig. 22)

1. High pressure, high temperature refrigerant vapor from the compressor flows through the reversing valve and is directed to the outdoor coil vapor header.
2. At the outdoor coil vapor header, the high pressure, high temperature refrigerant vapor flows up to check valve "A" that blocks the flow. All the refrigerant is then directed to flow into the coil circuits.
3. Subcooled refrigerant liquid leaves the coil circuits entering the portion of the vapor header which is above check valve "A". Check valve "C" is closed, therefore, the liquid refrigerant passes through check valve "B," which is open, and enters the liquid line and goes to the indoor coil.
4. The liquid refrigerant is expanded and evaporated in the indoor coil resulting in low pressure vapor. This low pressure vapor returns to the outdoor unit through the system vapor line, reversing valve, and accumulator, reentering the compressor at the suction connection.

V. 541A180 HEATING MODE OPERATION (See Fig. 23)

1. High pressure, high temperature refrigerant vapor from the compressor flows through the reversing valve and is directed through the system vapor line to the indoor coil. Refrigerant is condensed and subcooled in the indoor coil and returns to the outdoor unit through the system liquid line.
2. Check valve "B" blocks the flow of liquid and the refrigerant is then directed to flow through check valve "C" (which is open), through the filter drier, and into the liquid header assembly.
3. The liquid refrigerant is expanded as it passes through the capillary tubes into outdoor coil circuits. The refrigerant evaporates as it passes through the coil circuits resulting in low pressure vapor.
4. The low pressure vapor leaves the coil circuits and enters the vapor header, check valve "A" is open, and returns to the compressor through the vapor line, reversing valve, and accumulator, reentering the compressor at the suction connection.

VI. CRANKCASE HEATER

The crankcase heater prevents refrigerant migration and compressor oil dilution during shutdown when compressor is not operating.

Close both compressor service valves when crankcase heater is deenergized for more than 6 hours.

VII. OUTDOOR UNIT FANS

Each fan is supported by a formed-wire mount bolted to the fan deck and covered with a wire guard. On the 541A180, the exposed end of the motor shaft is covered with a rubber boot. In case a fan motor must be repaired or replaced, be sure the rubber boot is put back on when the fan is reinstalled and be sure the fan guard is in place before starting the unit.

VIII. LUBRICATION

Fan motors have permanently sealed bearings. No further lubrication is required.

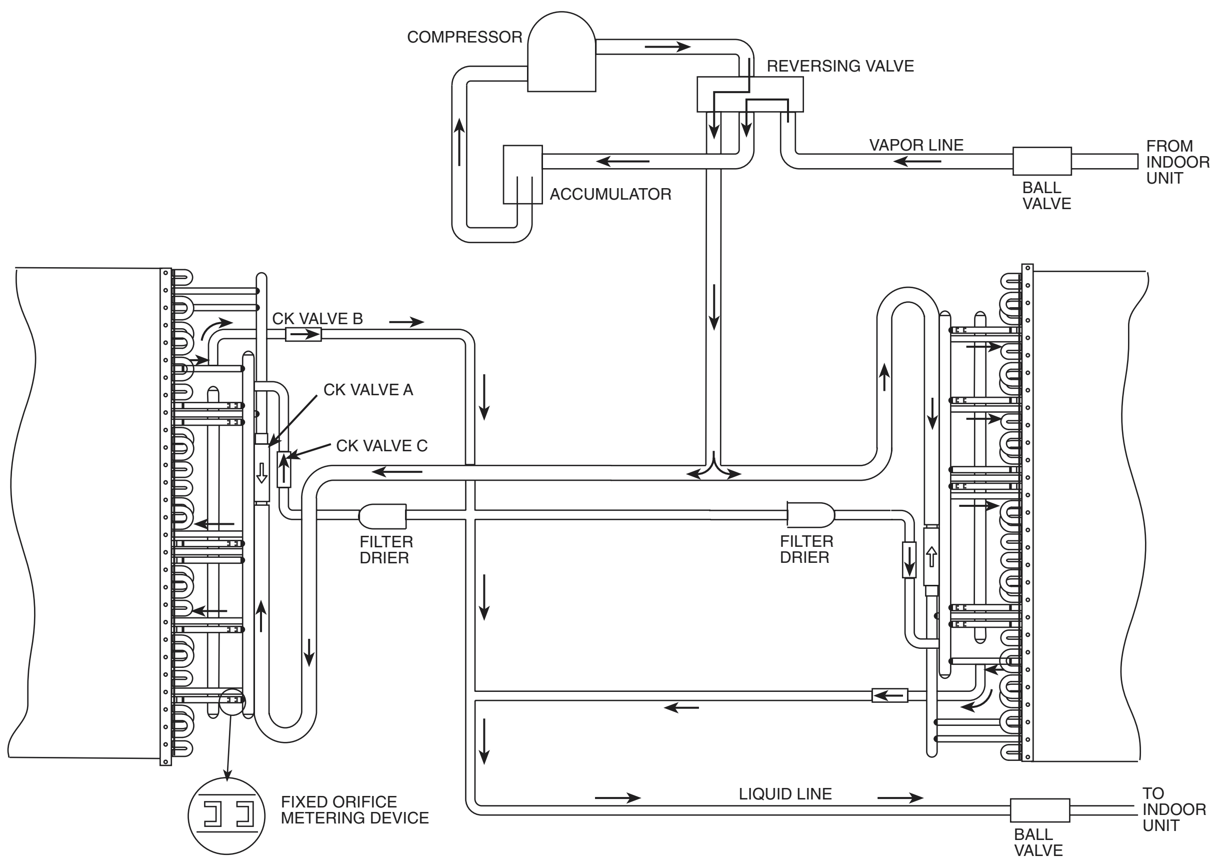


Fig. 20 — 575C090,120 Cooling Mode (Size 090 Shown)

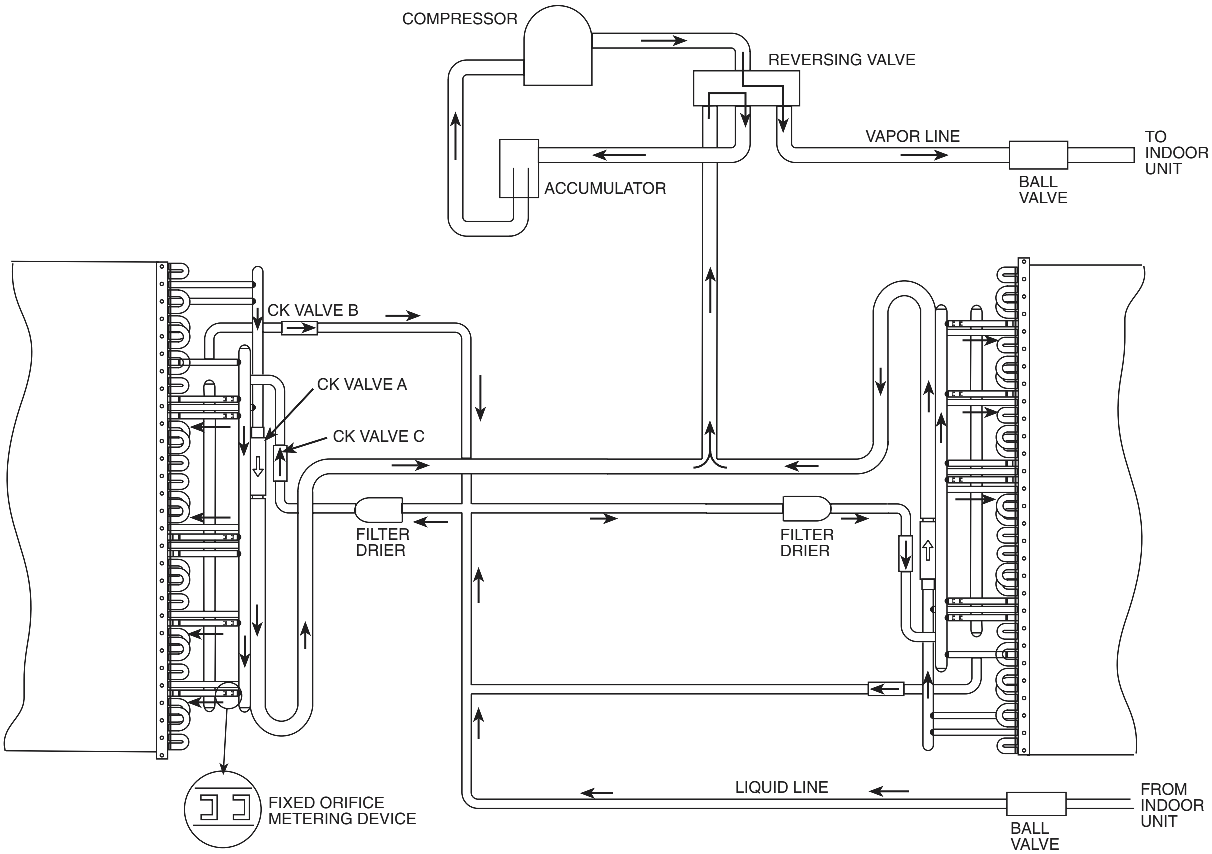


Fig. 21 — 575C090,120 Heating Mode (Size 090 Shown)

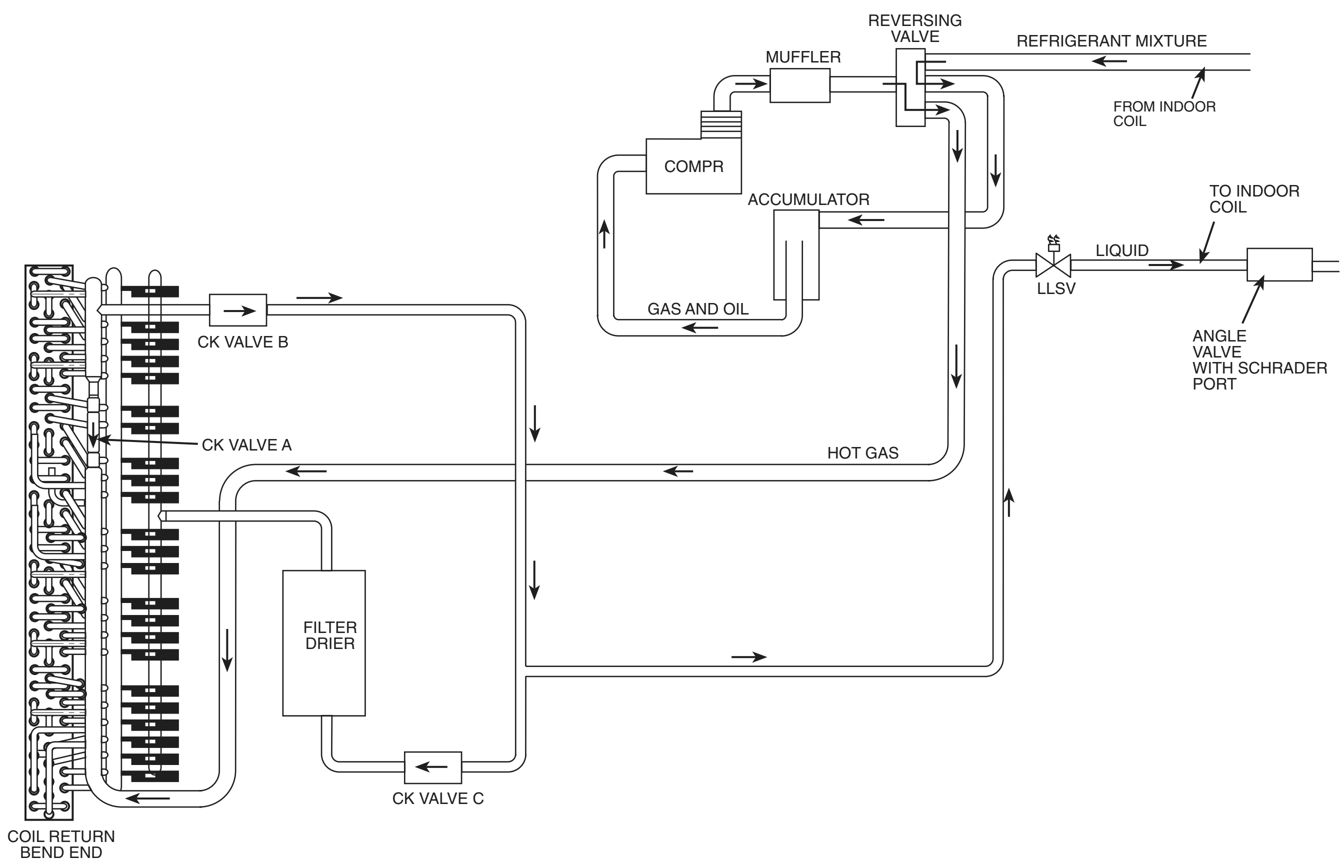


Fig. 22 — 541A180 Cooling Mode

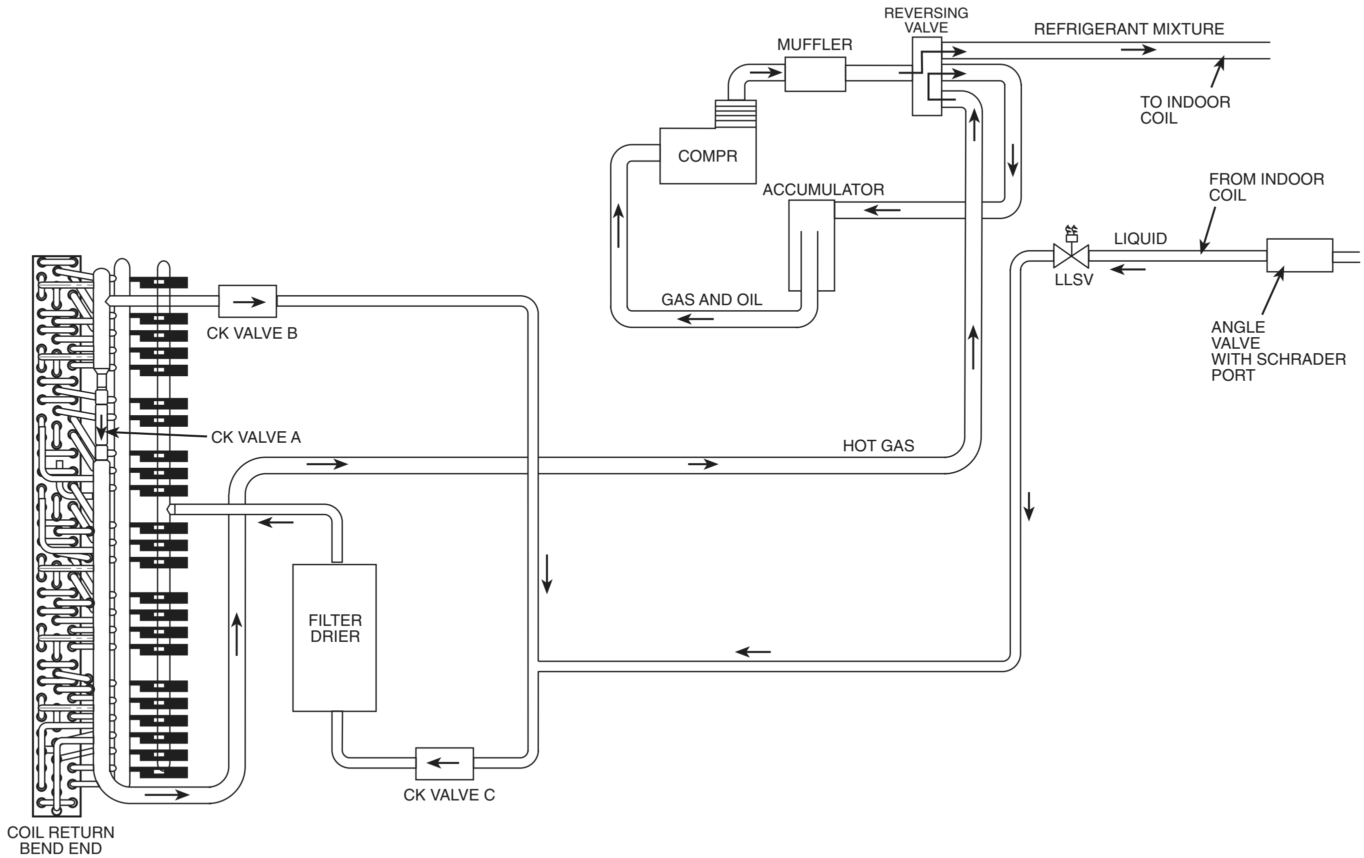


Fig. 23 — 541A180 Heating Mode

IX. COIL CLEANING AND MAINTENANCE

This section discusses the cleaning and the maintenance of standard coils and E-Coated coils. Routine cleaning of coil surfaces is essential to minimize contamination build-up and remove harmful residue. Inspect coils monthly and clean as required.

A. Cleaning Standard Coils

Standard coils can be cleaned with a vacuum cleaner, washed out with low velocity water, blown out with compressed air, or brushed (*do not use wire brush*). Fan motors are dripproof but not waterproof. Do not use acid cleaners.

Clean coil annually or as required by location or outdoor air conditions. Inspect coil monthly and clean as required. Fins are not continuous through coil sections. Dirt and debris may pass through first section and become trapped, restricting airflow. Use a flashlight to determine if dirt or debris has collected between coil sections.

Clean coils as follows:

1. Turn off unit power.
2. Remove screws holding rear corner posts and top cover in place. Pivot top cover up 12 to 18 in. and support with a board or other adequate rigid support. See Fig. 24.
3. Remove clips securing tube sheets together at the return bend end of the coil. Carefully spread the ends of the coil rows apart by moving the outer sections. See Fig. 25.
4. Using a water hose or other suitable equipment, flush down between the sections of coil to remove dirt and debris.
5. Clean the remaining surfaces in the normal manner.
6. Reposition outer coil sections. Reinstall clips which secure tube sheets, and replace top cover and rear corner posts.
7. Restore unit power.

B. Cleaning and Maintaining E-Coated Coils

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residue will greatly increase the life of the coil and extend the life of the unit. The following maintenance and cleaning procedures are recommended as part of the routine maintenance activities to extend the life of the coil.

<u>Remove Surface Loaded Fibers</u>

Debris such as dirt and fibers on the surface of the coil should be removed with a vacuum cleaner. If a vacuum cleaner is not available, a soft brush may be used. The cleaning tool should be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges bent over) if the tool is applied across the fins.

NOTE: Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface debris must be completely removed prior to using low velocity clean water rinse.

<u>Periodic Clean Water Rinse</u>

A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with very low velocity water stream to avoid damaging the fin edges. Monthly cleaning is recommended.

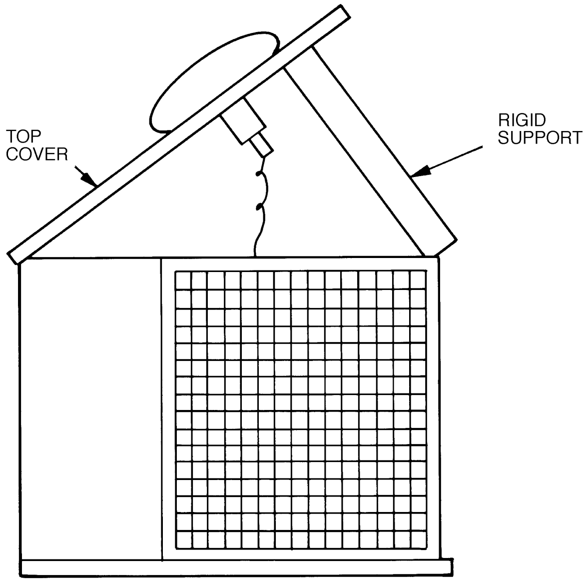


Fig. 24 — Pivot and Support Top Cover

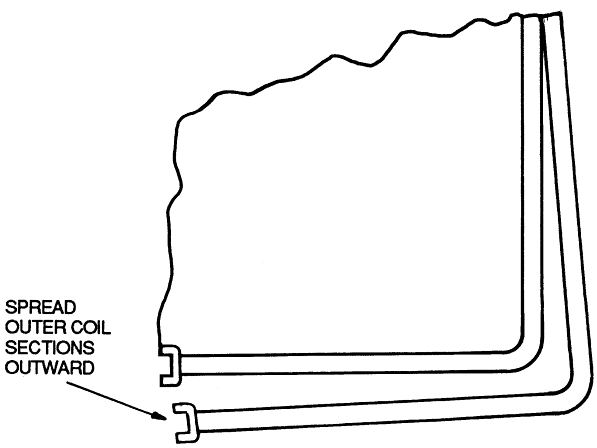


Fig. 25 — Coil Cleaning (Typical)

Routine Cleaning of E-Coated Coil Surfaces

Monthly cleaning with Environmentally Sound Coil Cleaner is essential to extend the life of coils. It is recommended that all coils including standard aluminum, pre-coated, copper/copper, or E-coated coils be cleaned with the Environmentally Sound Coil Cleaner as described below. Coil cleaning should be part of the regularly scheduled maintenance procedures of the unit to ensure long life of the coil. Failure to clean the coils may result in reduced durability in the environment.

Environmentally Sound Coil Cleaner is non-bacterial, biodegradable and will not harm the coil or surrounding components such as electrical wiring, painted metal surfaces or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

The following field supplied equipment is required for coil cleaning:

- $2^1/_2$ gallon garden sprayer
- water rinse with low velocity spray nozzle

Environmentally Sound Coil Cleaner Application Instructions

Perform the following procedure to clean the coil.

NOTE: Wear proper eye protection such as safety glasses during mixing and application.

1. Remove all surface debris and dirt from the coil with a vacuum cleaner.
2. Thoroughly wet finned surfaces with clean water and a low velocity garden hose, being careful not to bend fins.
3. Mix Environmentally Sound Coil Cleaner in a $2^1/_2$ gallon garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100 F.

> ⚠ **CAUTION:** DO NOT USE water in excess of 130 F. Enzymes in coil cleaner will be destroyed and coil cleaner will not be effective.

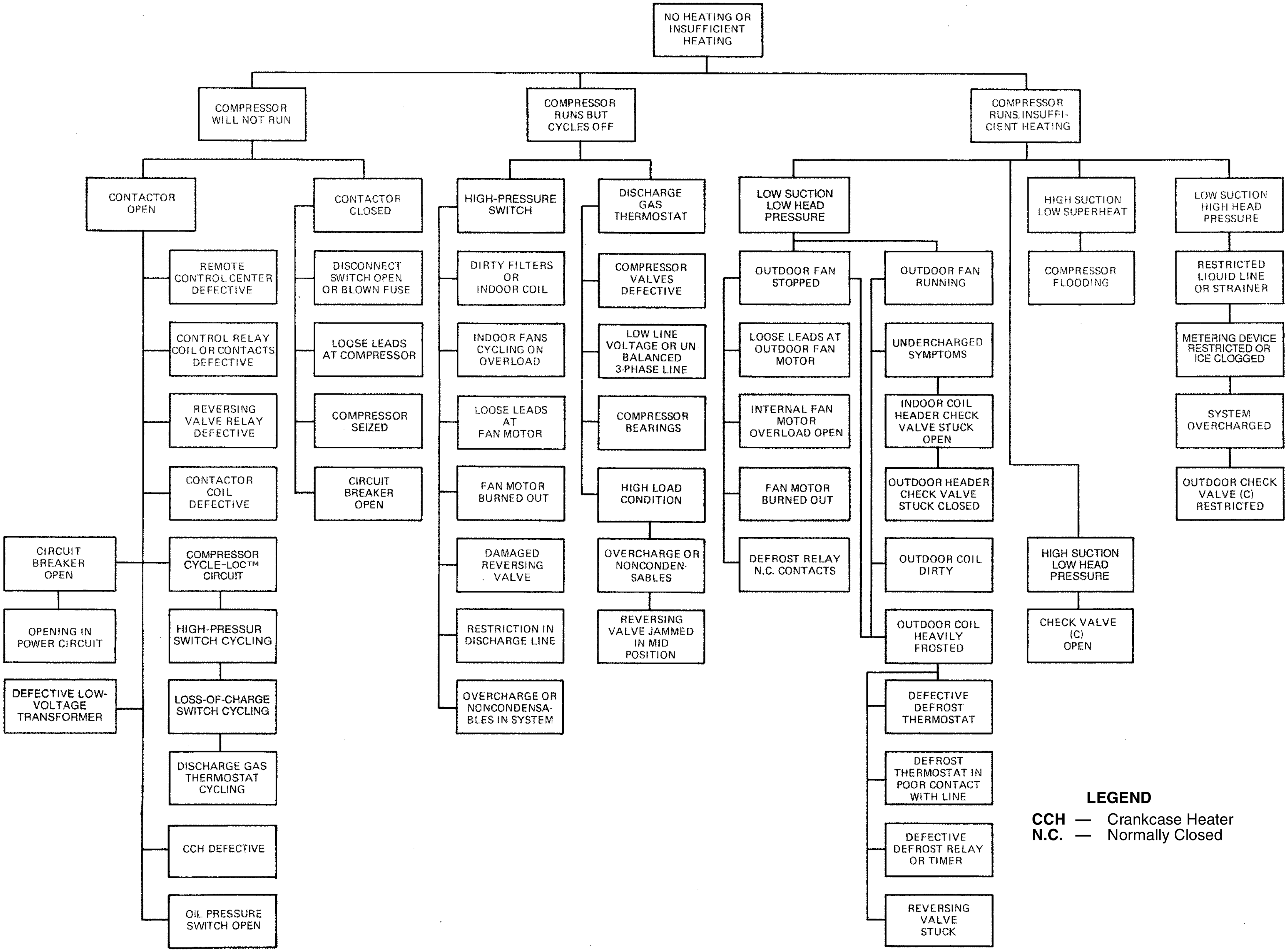
4. Thoroughly apply Environmentally Sound Coil Cleaner solution to all coil surfaces including finned area, tube sheets, and coil headers. Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion. Avoid spraying in horizontal pattern to minimize potential for fin damage. Ensure cleaner thoroughly penetrates deep into finned areas. Interior and exterior finned areas must be thoroughly cleaned.
5. Allow finned surfaces to remain wet with cleaning solution for 10 minutes. Ensure surfaces are not allowed to dry before rinsing. Reapply cleaner as needed to ensure 10-minute saturation is achieved.
6. Thoroughly rinse all surfaces with low velocity clean water using downward rinsing motion of water spray nozzle. Protect fins from damage from the spray nozzle.

> ⚠ **CAUTION:** Do not use bleach, harsh chemicals, or acid cleaners on outdoor or indoor coils of any kind. These types of cleaners are difficult to rinse, and they promote rapid corrosion of the fin collar — copper tube connection. Only use the Environmentally Sound Coil Cleaner.
>
> Never use high pressure air or liquids to clean coils. High pressures damage coils and increase the airside pressure drop. To promote unit integrity, follow cleaning and maintenance procedures in this document.

X. REPLACEMENT PARTS

A complete list of replacement parts is available from your Bryant dealer.

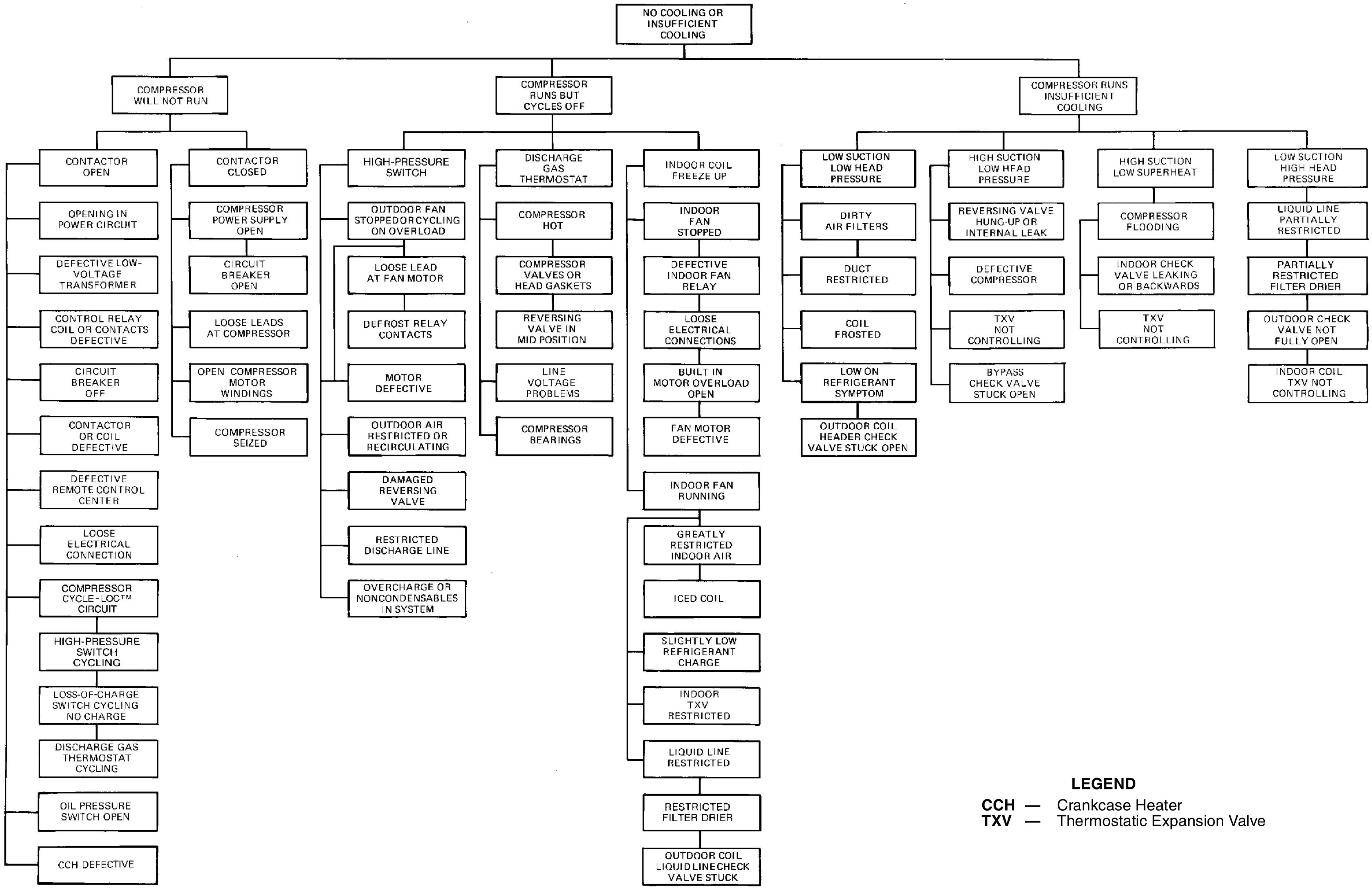
TROUBLESHOOTING CHART — HEATING CYCLE



LEGEND

CCH — Crankcase Heater
N.C. — Normally Closed

TROUBLESHOOTING CHART — COOLING CYCLE



LEGEND

CCH — Crankcase Heater
TXV — Thermostatic Expansion Valve

START-UP CHECKLIST

I. PRELIMINARY INFORMATION

OUTDOOR UNIT: MODEL NO. ______________________________ SERIAL NO.: ________________________________

INDOOR UNIT: MODEL NO. ________________________________ SERIAL NO.: ________________________________

ADDITIONAL ACCESSORIES ____

II. PRE-START-UP

OUTDOOR UNIT

IS THERE ANY SHIPPING DAMAGE? (Y/N)___________

IF SO, WHERE:____

____

WILL THIS DAMAGE PREVENT UNIT START-UP? (Y/N) ____________

CHECK POWER SUPPLY. DOES IT AGREE WITH UNIT? (Y/N) ____________

HAS THE GROUND WIRE BEEN CONNECTED? (Y/N) ___________

HAS THE CIRCUIT PROTECTION BEEN SIZED AND INSTALLED PROPERLY? (Y/N) __________

ARE THE POWER WIRES TO THE UNIT SIZED AND INSTALLED PROPERLY? (Y/N) __________

HAVE COMPRESSOR HOLDDOWN BOLTS BEEN LOOSENED (Washers are snug, but not tight)?
(Y/N) ______________

CONTROLS

ARE THERMOSTAT AND INDOOR FAN CONTROL WIRING
CONNECTIONS MADE AND CHECKED? (Y/N) ______________

ARE ALL WIRING TERMINALS (including main power supply) TIGHT? (Y/N) _____________

HAS CRANKCASE HEATER BEEN ENERGIZED FOR 24 HOURS? (Y/N) _____________

INDOOR UNIT

HAS WATER BEEN PLACED IN DRAIN PAN TO CONFIRM PROPER DRAINAGE? (Y/N) ___________

ARE PROPER AIR FILTERS IN PLACE? (Y/N)_____________

HAVE FAN AND MOTOR PULLEYS BEEN CHECKED FOR PROPER ALIGNMENT? (Y/N) ___________

DO THE FAN BELTS HAVE PROPER TENSION? (Y/N) _______________

HAS CORRECT FAN ROTATION BEEN CONFIRMED? (Y/N)_______________

PIPING

HAVE LEAK CHECKS BEEN MADE AT COMPRESSOR, OUTDOOR UNIT, INDOOR UNIT,
TXVs (Thermostatic Expansion Valves), SOLENOID VALVES, FILTER DRIERS, AND FUSIBLE
PLUGS WITH A LEAK DETECTOR? (Y/N)_______________

LOCATE, REPAIR, AND REPORT ANY LEAKS. ____

HAVE ALL COMPRESSOR SERVICE VALVES BEEN FULLY OPENED (BACKSEATED)? (Y/N)__________

HAS LIQUID LINE SERVICE VALVE BEEN OPENED? (Y/N)__________

IS THE OIL LEVEL IN COMPRESSOR CRANKCASE VISIBLE IN THE COMPRESSOR SIGHT GLASS?
(Y/N) ______________

CHECK VOLTAGE IMBALANCE

LINE-TO-LINE VOLTS: AB__________V AC__________ V BC __________V

(AB + AC + BC)/3 = AVERAGE VOLTAGE = _______________V

MAXIMUM DEVIATION FROM AVERAGE VOLTAGE =______________V

VOLTAGE IMBALANCE = 100 X (MAX DEVIATION)/(AVERAGE VOLTAGE) = ______________ %

IF OVER 2% VOLTAGE IMBALANCE, DO NOT ATTEMPT TO START SYSTEM!
CALL LOCAL POWER COMPANY FOR ASSISTANCE.

III. START-UP

CHECK INDOOR FAN SPEED AND RECORD. ______________

CHECK OUTDOOR FAN SPEED AND RECORD. ______________

AFTER AT LEAST 10 MINUTES RUNNING TIME, RECORD THE FOLLOWING MEASUREMENTS:

	COOLING	HEATING
OIL PRESSURE	______________	______________
SUCTION PRESSURE	______________	______________
SUCTION LINE TEMP	______________	______________
DISCHARGE PRESSURE	______________	______________
DISCHARGE LINE TEMP	______________	______________
ENTERING OUTDOOR AIR	______________	______________
LEAVING OUTDOOR AIR TEMP	______________	______________
INDOOR ENTERING-AIR DB (dry bulb) TEMP	______________	______________
INDOOR ENTERING-AIR WB (wet bulb) TEMP	______________	______________
INDOOR LEAVING-AIR DB TEMP	______________	______________
INDOOR LEAVING-AIR WB TEMP	______________	______________

COMPRESSOR AMPS (L1/L2/L3) _______ / _______ / _______ _______ / _______ / _______

CHECK THE COMPRESSOR OIL LEVEL SIGHT GLASSES; ARE THE SIGHT GLASSES SHOWING OIL LEVEL IN VIEW? (Y/N)

NOTES:

____

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CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE