Installation, Start–Up, and Service Instructions

SPLIT SYSTEM
3 PHASE
6 to 10 TON
HEAT PUMP

Save This Manual for Future Reference

Ref:
CHE072/091/120

506 01 1903 00
11/26/07

Installation/ Startup Information

These instructions must be read and understood completely before attempting installation.

⚠ WARNING

FIRE, AND ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury, death and/or property damage.

Before performing service or maintenance operations on unit, turn off unit main power switch and install lockout tag.

After uncrating unit, inspect thoroughly for hidden damage. If damage is found, notify the transportation company immediately and file a concealed damage claim.

Top skid assembly should be left in place until after the unit is rigged into its final location.

⚠ WARNING

FIRE, AND ELECTRICAL SHOCK HAZARD

Failure to carefully read and follow all instructions in this manual could result in personal injury, death and/or property damage.

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation MUST conform with local building codes or, in the absence of local codes, with the National Electrical Code NFPA70-2005 or in Canada the CSA C.22.1 - Canadian Electrical Code Part 1.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

Safety Precautions

1. Always wear safety eye wear and work gloves when installing equipment.
2. Never assume electrical power is disconnected. Check with meter and disconnect.
3. Keep hands out of fan areas when power is connected to equipment.
4. R-22 causes frost-bite burns.
5. R-22 is toxic when burned.

Locating The Outdoor Unit:

Check local codes covering zoning, noise, platforms.

If practical, avoid locating next to fresh air intakes, vent or windows. Noise may carry into the openings and disturb people inside.

Placement of the unit should be in a well drained area or unit must be supported high enough so runoff will not enter the unit.

Do not locate where heat, lint or exhaust fumes will be discharged on unit (as from dryer vents).

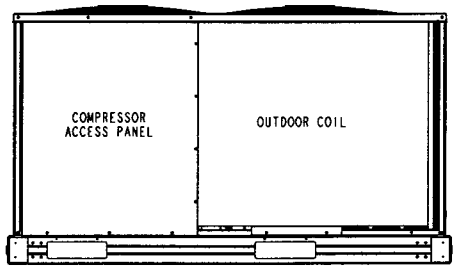
Roof top installations are acceptable providing the roof will support the unit and provisions are made for water drainage and the noise or vibration through the structure.

Do not install the unit in a recessed or confined area where recirculation of discharge air may occur.

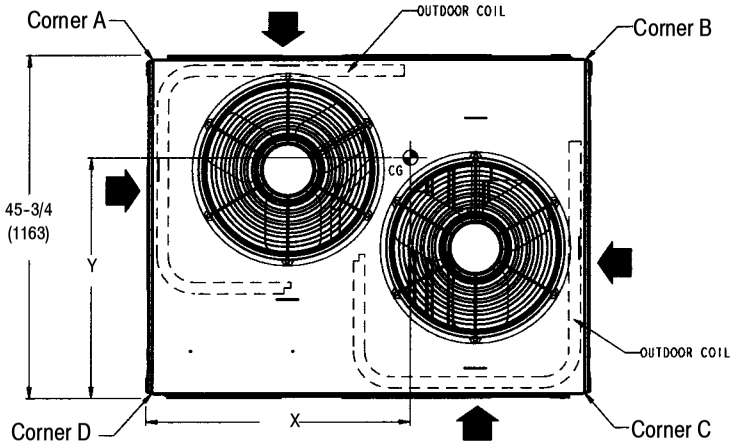
Allow sufficient space for airflow clearance, wiring, refrigerant piping, and servicing unit.

Figure 1 Dimensions & Weight

Unit	Weights, lb. (kg) Weight	Corner A	Corner B	Corner C	Corner D	Center of Gravity, in. (mm) X	Y	Service Valve Connections Vapor	Liquid
CHE072	454(206)	118(53)	136(62)	108(49)	94(43)	32(813)	26(660)	1-1/8	1/2
CHE091	464(210)	120(54)	142(64)	108(49)	94(43)	32(813)	26(660)	1-1/8	1/2
CHE120	506(230)	120(54)	168(76)	127(58)	91(42)	35(889)	26(667)	1-3/8	1/2



REAR VIEW



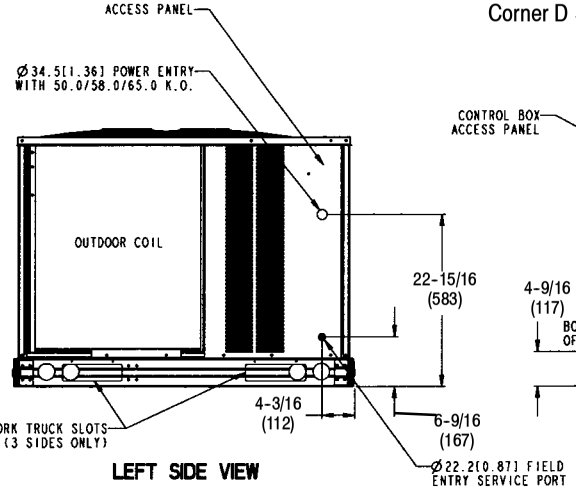
TOP VIEW

Notes:
1. Minimum clearance (Local Codes or jurisdiction may prevail).
   A. Bottom to combustible surfaces: 0 inches
   B. Outdoor Coil: For proper airflow: 36 inches (914)
      Side: 12 inches (305)
   C. Overhead: 60 inches (1524) for proper outdoor fan operation.
   D. Between Units: 42 inches (1067) per NEC.
   E. Between unit and ungrounded surfaces: contol box side:
      36 inches (914) per NEC.
   F. Between unit and block or concrete walls and other grounded
      surfaces: control box side, 42 inches (1067) 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.

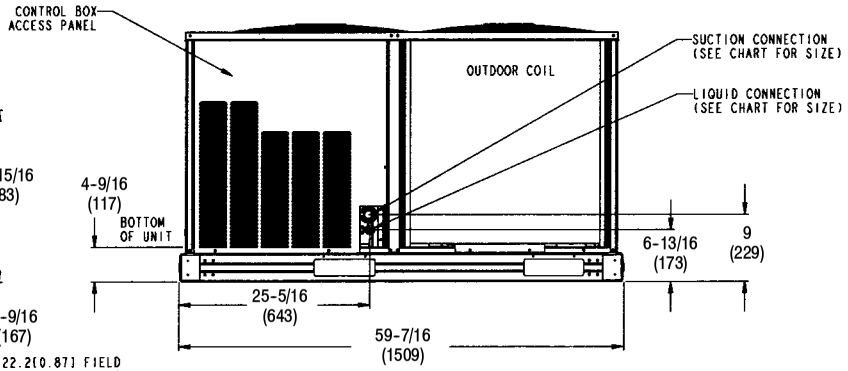
CG CENTER OF GRAVITY

DIRECTION OF AIR FLOW

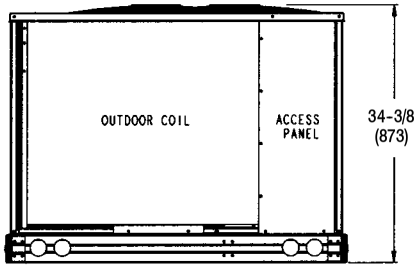
DIMENSIONS IN [ ] ARE IN INCHES



LEFT SIDE VIEW



FRONT VIEW



RIGHT SIDE VIEW

Rig and Mount the Unit:

⚠ CAUTION

REDUCED EQUIPMENT LIFE HAZARD

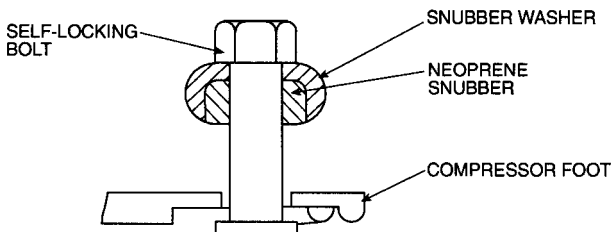
Failure to follow these precautions could result in damage to the unit being installed.

Be sure unit panels are securely in place prior to rigging.

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.

COMPRESSOR MOUNTING – As shipped, compressor is held down by 4 bolts. After unit is installed, loosen each bolt using locknut until flat washer or snubber (3 /8 in.) can be moved with finger pressure. Be sure compressor floats freely on the mounting springs and that upper flat washers can be moved with finger pressure. See Fig. 2.

Figure 2 **Compressor Mounting**



Clearances:

Locate unit so that outdoor coil (condenser) airflow is unrestricted on all sides and above. See Figure 1 for unit clearances, weight, and clearance data.

Unit Support:

The unit must be level, and supported above grade by beams, platform or a pad. Platform or pad can be of open or solid construction but should be of permanent materials such as concrete, bricks, blocks, steel or pressure treated timbers approved for ground contact. Refer to Unit Clearances and weights to help determine size of supports etc. Soil conditions should be considered so the platform or pad does not shift or settle excessively and leave the unit only partially supported.

⚠ CAUTION

REDUCED EQUIPMENT LIFE HAZARD

Failure to follow these precautions could result in damage to the unit being installed.

Inadequate support could cause excessive vibration and noise or binding and stress on refrigerant lines resulting in equipment failure.

To minimize vibration or noise transmission, it is recommended that supports not be in contact with the building structure. However, slabs on grade constructions with an extended pad are normally acceptable.

A. Ground Level Installation:

If beams or an open platform are used for support it is recommended that the soil be treated or area be graveled to retard the growth of grasses and weeds.

B. Roof Top Installation:

This type of installation is not recommended on wood frame structures where low noise levels are required.

Supporting structure or platform for the unit must be level. If installation is on a flat roof the unit should be 4 inches (10cm.) above roof level. Four by four posts placed over a load bearing wall make a suitable mounting platform.

If possible, place the unit over one or more load bearing walls. If there are several units, mount them on platforms that are self–supporting and span load bearing walls. These suggestions are to minimize noise and vibration transmission through the structure.

Installing Refrigerant Lines

Complete Refrigerant Piping Connections

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

SIZE REFRIGERANT LINES – Consider the length of the piping required between the outdoor and indoor units. The maximum allowable line length is 100 ft (30.5 m). See Table 1. Refrigerant suction piping should be insulated.

NOTE: Use the piping data in Table 1 as a general guide only. For CHE072/091/120 applications with liquid lift greater than 20 ft, use 5/8 –in. liquid line. Maximum lift is 60 ft.

Table 1 - Refrigerant Piping Sizes

Unit	Length of Piping - Ft. (m)						Maximum Liquid Line* (in. OD)
	0 - 25 (0 - 7.5)		26 - 60 (7.8 - 18)		61 - 100 (18.3 - 30)		
	Line Size (in. OD)						
	L	S	L	S	L	S	
CHE072	3/8	1-1/8	1/2	1-1/8	1/2	1-1/8	5/8
CHE091	3/8	1-1/8	1/2	1-1/8	1/2	1-1/8	5/8
CHE120	1/2	1-3/8	1/2	1-3/8	1/2	1-3/8	5/8

* L = Liquid S = Suction
Field–supplied suction accumulator required for pipe length 75–100 ft.

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. 3. Or, 2 filter driers and sight glasses may be installed at B locations.

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 suction lines at the outdoor unit.

WARNING

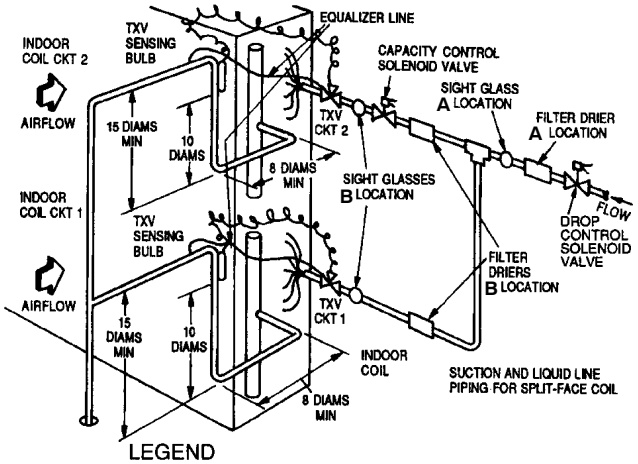
Recover R–22 holding charge before removing runaround liquid piping loop. Failure to recover holding charge before removing piping loop could result in equipment damage and severe injury.

INSTALL LIQUID LINE SOLENOID VALVE – Addition of a liquid solenoid valve (LLSV) is required. The LLSV must be a bi–flow type suited for use in heat pump systems. The recommended valve is ALCO model 200RB5T5–BF (5/8–in. ODF). Wire the solenoid valve in parallel with the compressor contactor coil. See Fig. 3.

MAKE PIPING CONNECTIONS – Do not remove run around loop from suction and liquid line stubs in the compressor compartment until piping connections are ready to be made. Pass nitrogen or other inert gas through piping while brazing to prevent formation of copper oxide.

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.
5. Connect system liquid line from liquid connection of outdoor unit to indoor unit liquid line connections. Select proper field–supplied bi–flow filter driers and install in the liquid line. See Fig. 3. 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.)

Figure 3 Location of Sight Glass(es) & Filter Driers



Electrical Wiring

WARNING

Electrical Shock Hazard.

Shut off electric power at fuse box or service panel before making any electrical connections.

Failure to shut off electric power can result in, property damage, personal injury and/or death.

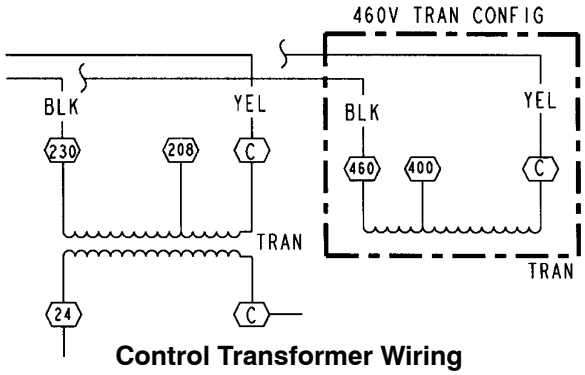
POWER WIRING – Unit is factory wired for voltage shown on nameplate. Provide adequate fused disconnect switch within sight from unit and readily accessible from unit, but out of the reach of children. Lock switch open (off) to prevent power from being turned on while unit is being serviced. Disconnect switch, fuses, and field wiring must comply with national and local code requirements.

Route power wires through opening in unit end panel to connection in unit control box as shown on unit label diagram. Unit must be grounded.

If unit will be operating at 208–3–60 power, remove the wire from the transformer primary connection labelled "230" and move it to the connection labelled "208". See Fig. 4.

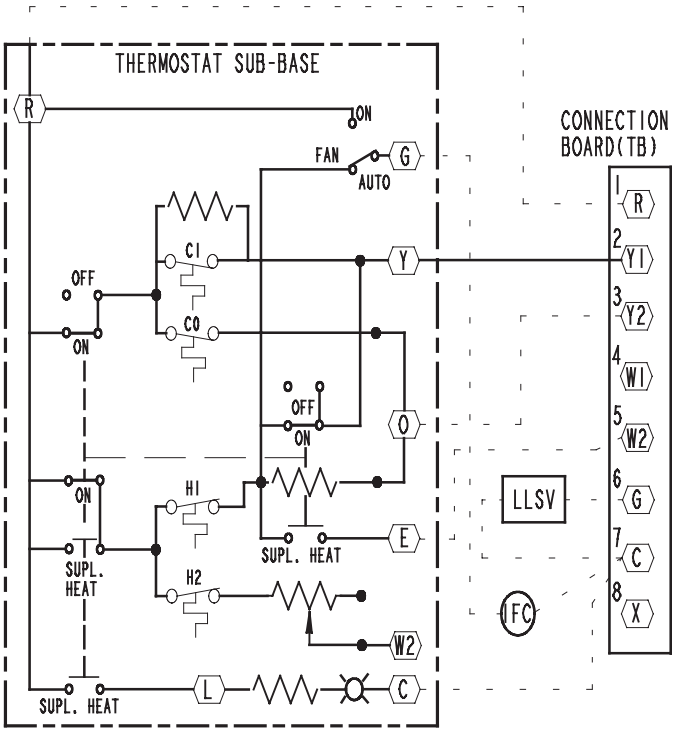
CONTROL CIRCUIT WIRING – Control voltage is 24 v. See unit label diagram for field–supplied wiring details. Route control wires through opening in unit end panel to connection in unit control box. See Figure 5 and page 11 for unit wiring.

Figure 4 **Wiring Connections**



Control Transformer Wiring

Figure 5 **Thermostat Wiring Diagram**



LEGEND:
IFC – Indoor Fan Contactor
LLSV – Liquid Line Solenoid Valve
TB – Terminal Block

Use copper conductors only.

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 a unit and provides a record of unit condition, application requirements, system information, and operation at initial start-up.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in shorten life of unit components.

Do not attempt to start the condensing unit, even momentarily, until the following steps have been completed. Compressor damage may result.

System Check

1. Check all air handler(s) and other equipment auxiliary components. Consult the manufacturer's instructions regarding any other equipment connected to the condensing unit. If unit has field-installed accessories, be sure all are properly installed and correctly wired. If used, airflow switch must be properly installed.
2. Backseat (open) compressor suction and discharge valves. Now close valves one turn to allow refrigerant pressure to reach test gages.
3. Open liquid line service valve.
4. Check tightness of all electrical connections.
5. Be sure unit is properly leak checked, dehydrated, and charged.
6. Electrical power source must agree with nameplate rating.
7. Be sure compressor floats freely on the mounting springs and that snubber washers can be moved with finger pressure. See Compressor Mounting Section on page 4.

Leak Test - Leak test the entire refrigerant system using soap bubbles and/or an electronic leak detector.

Turn On Crankcase Heater - Turn on crankcase heater for 24 hours before starting the unit to be sure all the refrigerant is out of the oil. To energize the crankcase heater, proceed as follows:

1. Set the space thermostat set point above the space temperature so there is no demand for cooling.
2. Close the field disconnect.
3. Turn the fan circuit breaker on. Leave the compressor circuit breakers off. The crankcase heater is now energized.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in shorten life of unit components.

Prior to starting compressor refrigerant equal to operating charge must be added to avoid possible compressor damage.

PRELIMINARY CHARGE - Charge with R-22 by the liquid charging method (through liquid service valve) on the high side. See approximate refrigerant charge in Table 2. Charge according to the values in the Charging Charts. See Fig. 6.

LIQUID LINE SOLENOID - To minimize refrigerant migration to the compressor during the heat pump OFF cycle, the unit features a bi-flow liquid line solenoid valve. The valve opens when the compressor is energized, and closes when the compressor is deenergized. This feature reduces compressor flooded starts, significantly increasing compressor life.

Start-Up

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.

COMPRESSOR ROTATION - 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.

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 may require up to 60 minutes (or longer) to reset. 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.

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.

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in shorten life of unit components.

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.

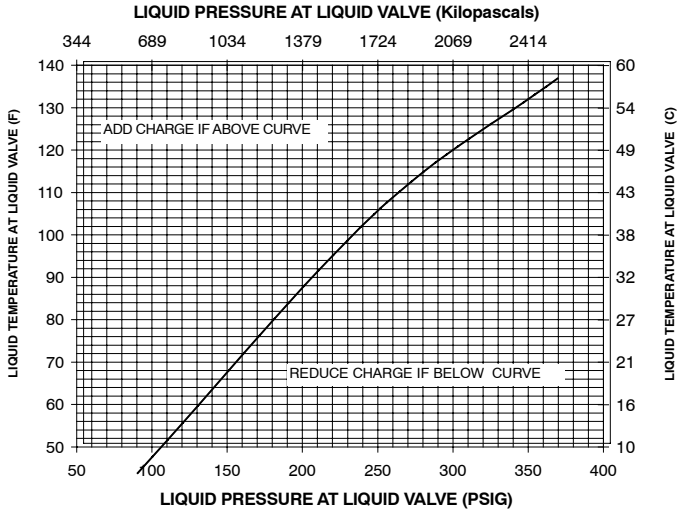
ADJUST REFRIGERANT CHARGE – Unit must be charged in Cooling mode only. Refer to Cooling Charging Charts, Fig. 6 and to Table 2 for maximum charge level. Do not exceed maximum refrigerant charge. For applications with line lengths greater than 100 ft, contact your distributor. Vary refrigerant until the 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 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.

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

Table 2 – Maximum Refrigerant Charge

	R-22	
	(lb)	(kg)
CHE072/091/120	34.2	15.5

Figure 6 **CHE072 / 091 / 120 Charging Chart**



Operating Sequence

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

Cooling

With the thermostat subbase in the cooling position, and when the space temperature comes within 2° F (1° C) 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.

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.

Service

Crankcase Heater – The heater prevents refrigerant migration and compressor oil dilution during shutdown whenever compressor is not operating. It is wired to cycle with the compressor; the heater is off when compressor is running, and on when compressor is off.

Both compressor service valves must be closed whenever the crankcase heater is deenergized for more than 6 hours. The crankcase heater is operable as long as the control circuit is energized.

Compressor Protection

COMPRESSOR OVERTEMPERATURE PROTECTION (IP) – A thermostat installed on compressor motor winding reacts to excessively high winding temperatures and shuts off the compressor.

CRANKCASE HEATER – Heater minimizes absorption of liquid refrigerant by oil in crankcase during brief or extended shutdown periods. The control circuit is maintained if compressor fan motor circuit breakers are turned off. The main disconnect must be on to energize crankcase heater.

High–Pressure Switches – Switches have fixed, nonadjustable settings. Switches are mounted on the compressors.

Low–Pressure Switches – Switches have fixed, non–adjustable settings. Switches are mounted on the compressors.
TO CHECK – Slowly close liquid shutoff valve and allow compressor to pump down. Do not allow compressor pumpdown below 2 psig (13.8 kPa). Compressor should shut down when suction pressure drops to cutout pressure in specification sheet tables, and should restart when pressure builds up to cut–in pressure shown.

Outdoor Fans – Each fan is supported by a formed–wire mount bolted to the fan deck and covered with a wire guard. Fan motors have permanently lubricated bearings.

Lubrication

FAN MOTORS have sealed bearings. No provisions are made for lubrication.

COMPRESSOR has its own oil supply. Loss of oil due to a leak in the system should be the only reason for adding oil after the system has been in operation.

Coil Cleaning and Maintenance – Routine cleaning of coil surfaces is essential to minimize contamination build-up and remove harmful residue. Inspect coils monthly and clean as required.

CLEANING COILS – Coils can be cleaned with a vacuum cleaner, washed out with low velocity water, blown out with low-pressure compressed air, or brushed (do not use wire brush). Fan motors are drip-proof but not waterproof. Do NOT use acid cleaners.

Clean outdoor 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, become trapped between 2nd and 3rd rows of fins and restrict outdoor airflow. Use a flashlight to determine if dirt or debris has collected between coil sections. Clean coil 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. (305 to 457 mm) and support with a rigid support. See Fig. 7.
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. 8.
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.
7. Reinstall clips which secure tube sheets.
8. Replace top cover and rear corner posts.

Figure 7 **Pivot and Support Top Cover**

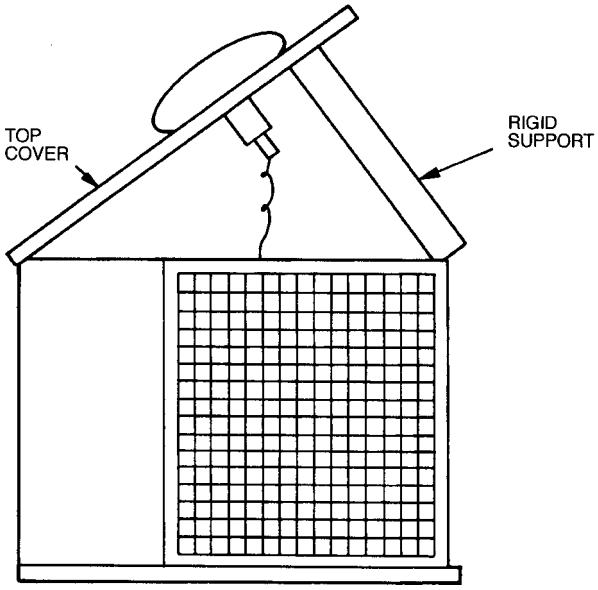
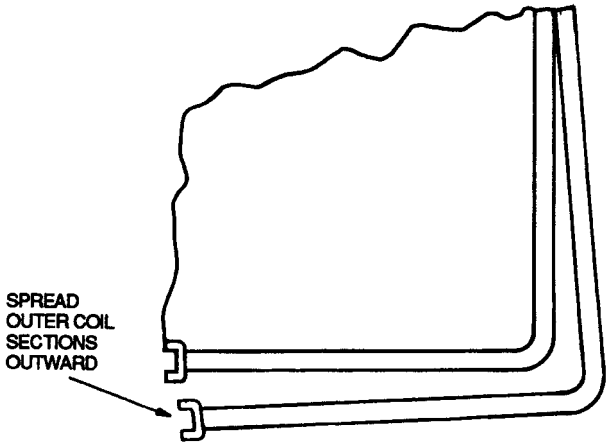
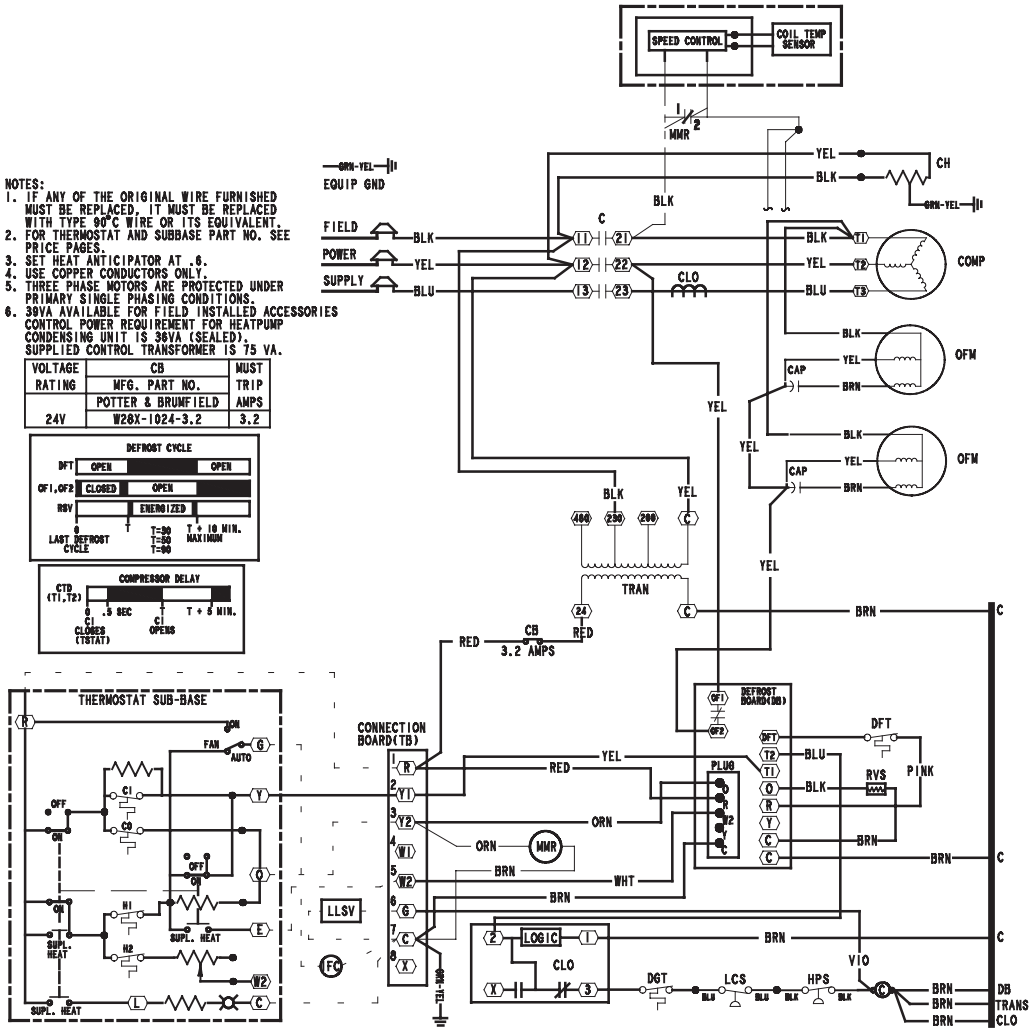


Figure 8 **Coil Cleaning (Typical)**

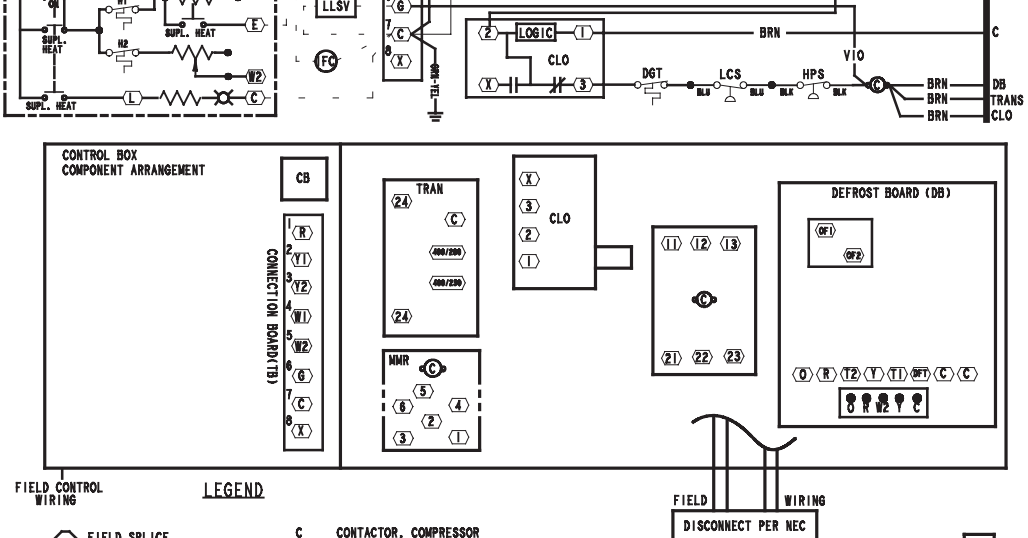


Typical CHE072 / 091 / CHE120 Wiring Diagram (208/230-3-60 Shown)

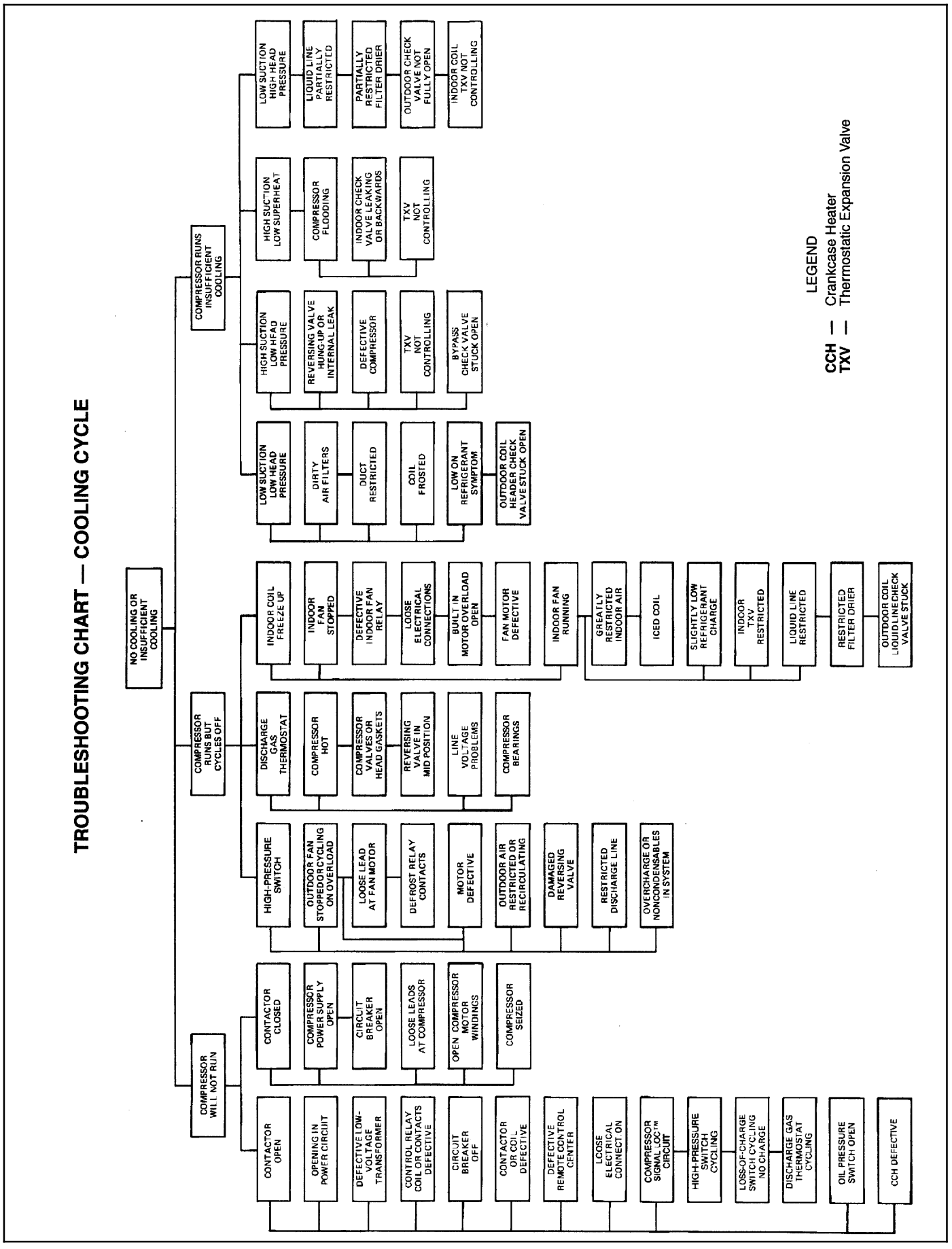


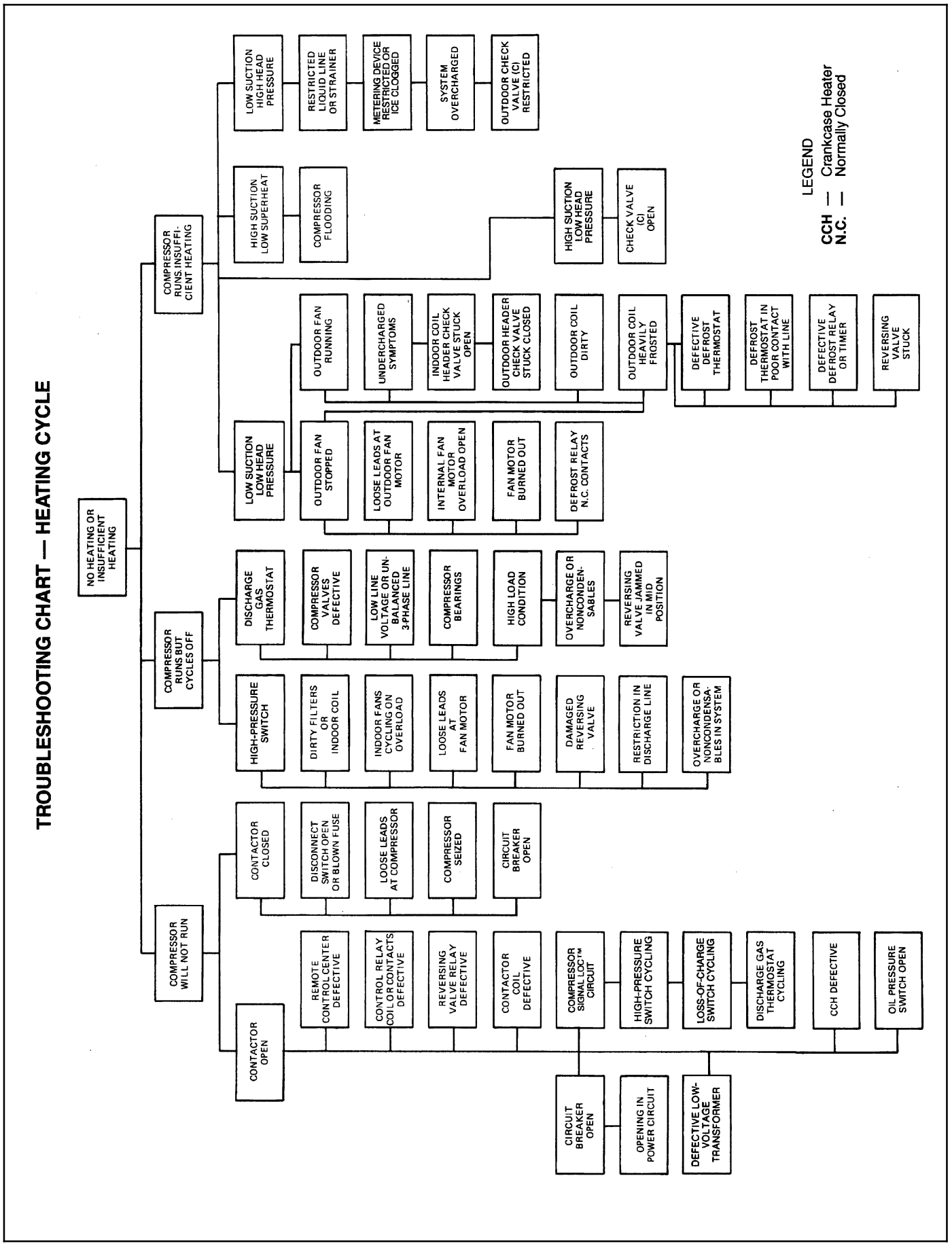
NOTES:
1. IF ANY OF THE ORIGINAL WIRE FURNISHED MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 90°C WIRE OR ITS EQUIVALENT.
2. FOR THERMOSTAT AND SUBBASE PART NO. SEE PRICE PAGES.
3. SET HEAT ANTICIPATOR AT .6.
4. USE COPPER CONDUCTORS ONLY.
5. THREE PHASE MOTORS ARE PROTECTED UNDER PRIMARY SINGLE PHASING CONDITIONS.
6. 30VA AVAILABLE FOR FIELD INSTALLED ACCESSORIES CONTROL POWER REQUIREMENT FOR HEATPUMP CONDENSING UNIT IS 36VA (SEALED). SUPPLIED CONTROL TRANSFORMER IS 75 VA.

VOLTAGE RATING	CB MFG. PART NO.	MUST TRIP AMPS
	POTTER & BRUMFIELD	
24V	W28X-1024-3.2	3.2



C	CONTACTOR, COMPRESSOR
CAP	CAPACITOR
CB	CIRCUIT BREAKER
CH	CRANKCASE HEATER
CLO	COMPRESSOR LOCKOUT
COMP	COMPRESSOR MOTOR
DB	DEFROST BOARD
DFT	DEFROST THERMOSTAT
DGT	DISCHARGE GAS THERMOSTAT
EQUIP	EQUIPMENT
GND	GROUND
HPS	HIGH PRESSURE SWITCH
IFC	INDOOR FAN CONTACTOR
LLSV	LIQUID LINE SOLENOID VALVE
LCS	LOSS OF CHARGE SWITCH
MMR	MOTORMASTER RELAY
OFM	OUTDOOR FAN MOTOR
QT	QUADRUPLE TERMINAL
RVS	REVERSING VALVE SOLENOID
TB	TERMINAL BLOCK
TC	THERMOSTAT-COOLING
TH	THERMOSTAT-HEATING
TRAN	TRANSFORMER


TROUBLESHOOTING CHART — COOLING CYCLE
NO COOLING OR INSUFFICIENT COOLING
COMPRESSOR WILL NOT RUN
CONTACTOR OPEN
OPENING IN POWER CIRCUIT
DEFECTIVE LOW-VOLTAGE TRANSFORMER
CONTROL RELAY COIL OR CONTACTS DEFECTIVE
CIRCUIT BREAKER OFF
CONTACTOR OR COIL DEFECTIVE
DEFECTIVE REMOTE CONTROL CENTER
LOOSE ELECTRICAL CONNECTION
COMPRESSOR SIGNAL LOC™ CIRCUIT
HIGH-PRESSURE SWITCH CYCLING
LOSS-OF-CHARGE SWITCH CYCLING NO CHARGE
DISCHARGE GAS THERMOSTAT CYCLING
OIL PRESSURE SWITCH OPEN
CCH DEFECTIVE
CONTACTOR CLOSED
COMPRESSOR POWER SUPPLY OPEN
CIRCUIT BREAKER OPEN
LOOSE LEADS AT COMPRESSOR
OPEN COMPRESSOR MOTOR WINDINGS
COMPRESSOR SEIZED
COMPRESSOR RUNS BUT CYCLES OFF
HIGH-PRESSURE SWITCH
OUTDOOR FAN STOPPED OR CYCLING ON OVERLOAD
LOOSE LEAD AT FAN MOTOR
DEFROST RELAY CONTACTS
MOTOR DEFECTIVE
OUTDOOR AIR RESTRICTED OR RECIRCULATING
DAMAGED REVERSING VALVE
RESTRICTED DISCHARGE LINE
OVERCHARGE OR NONCONDENSABLES IN SYSTEM
DISCHARGE GAS THERMOSTAT
COMPRESSOR HOT
COMPRESSOR VALVES OR HEAD GASKETS
REVERSING VALVE IN MID POSITION
LINE VOLTAGE PROBLEMS
COMPRESSOR BEARINGS
INDOOR COIL FREEZE UP
INDOOR FAN STOPPED
DEFECTIVE INDOOR FAN RELAY
LOOSE ELECTRICAL CONNECTIONS
BUILT-IN MOTOR OVERLOAD OPEN
FAN MOTOR DEFECTIVE
INDOOR FAN RUNNING
GREATLY RESTRICTED INDOOR AIR
ICED COIL
SLIGHTLY LOW REFRIGERANT CHARGE
INDOOR TXV RESTRICTED
LIQUID LINE RESTRICTED
RESTRICTED FILTER DRIER
OUTDOOR COIL LIQUID LINE CHECK VALVE STUCK
COMPRESSOR RUNS INSUFFICIENT COOLING
LOW SUCTION LOW HEAD PRESSURE
DIRTY AIR FILTERS
DUCT RESTRICTED
COIL FROSTED
LOW ON REFRIGERANT SYMPTOM
OUTDOOR COIL HEADER CHECK VALVE STUCK OPEN
HIGH SUCTION LOW HEAD PRESSURE
REVERSING VALVE HUNG UP OR INTERNAL LEAK
DEFECTIVE COMPRESSOR
TXV NOT CONTROLLING
BYPASS CHECK VALVE STUCK OPEN
HIGH SUCTION LOW SUPERHEAT
COMPRESSOR FLOODING
INDOOR CHECK VALVE LEAKING OR BACKWARDS
TXV NOT CONTROLLING
LOW SUCTION HIGH HEAD PRESSURE
LIQUID LINE PARTIALLY RESTRICTED
PARTIALLY RESTRICTED FILTER DRIER
OUTDOOR CHECK VALVE NOT FULLY OPEN
INDOOR COIL TXV NOT CONTROLLING
LEGEND
CCH — Crankcase Heater
TXV — Thermostatic Expansion Valve


TROUBLESHOOTING CHART — HEATING CYCLE
NO HEATING OR INSUFFICIENT HEATING
COMPRESSOR WILL NOT RUN
CONTACTOR OPEN
CONTACTOR CLOSED
REMOTE CONTROL CENTER DEFECTIVE
CONTROL RELAY COIL OR CONTACTS DEFECTIVE
REVERSING VALVE RELAY DEFECTIVE
CONTACTOR COIL DEFECTIVE
COMPRESSOR SIGNAL LOC™ CIRCUIT
HIGH-PRESSURE SWITCH CYCLING
LOSS-OF-CHARGE SWITCH CYCLING
DISCHARGE GAS THERMOSTAT CYCLING
CCH DEFECTIVE
OIL PRESSURE SWITCH OPEN
CIRCUIT BREAKER OPEN
OPENING IN POWER CIRCUIT
DEFECTIVE LOW-VOLTAGE TRANSFORMER
DISCONNECT SWITCH OPEN OR BLOWN FUSE
LOOSE LEADS AT COMPRESSOR
COMPRESSOR SEIZED
CIRCUIT BREAKER OPEN
COMPRESSOR RUNS BUT CYCLES OFF
HIGH-PRESSURE SWITCH
DIRTY FILTERS OR INDOOR COIL
INDOOR FANS CYCLING ON OVERLOAD
LOOSE LEADS AT FAN MOTOR
FAN MOTOR BURNED OUT
DAMAGED REVERSING VALVE
RESTRICTION IN DISCHARGE LINE
OVERCHARGE OR NONCONDENSABLES IN SYSTEM
DISCHARGE GAS THERMOSTAT
COMPRESSOR VALVES DEFECTIVE
LOW LINE VOLTAGE OR UNBALANCED 3-PHASE LINE
COMPRESSOR BEARINGS
HIGH LOAD CONDITION
OVERCHARGE OR NONCONDENSABLES
REVERSING VALVE JAMMED IN MID POSITION
COMPRESSOR RUNS INSUFFICIENT HEATING
LOW SUCTION HIGH HEAD PRESSURE
RESTRICTED LIQUID LINE OR STRAINER
METERING DEVICE RESTRICTED OR ICE CLOGGED
SYSTEM OVERCHARGED
OUTDOOR CHECK VALVE (C) RESTRICTED
HIGH SUCTION LOW SUPERHEAT
COMPRESSOR FLOODING
LOW SUCTION LOW HEAD PRESSURE
OUTDOOR FAN STOPPED
LOOSE LEADS AT OUTDOOR FAN MOTOR
INTERNAL FAN MOTOR OVERLOAD OPEN
FAN MOTOR BURNED OUT
DEFROST RELAY N.C. CONTACTS
OUTDOOR FAN RUNNING
UNDERCHARGED SYMPTOMS
INDOOR COIL HEADER CHECK VALVE STUCK OPEN
OUTDOOR HEADER CHECK VALVE STUCK CLOSED
OUTDOOR COIL DIRTY
OUTDOOR COIL HEAVILY FROSTED
HIGH SUCTION LOW HEAD PRESSURE
CHECK VALVE (C) OPEN
DEFECTIVE DEFROST THERMOSTAT
DEFROST THERMOSTAT IN POOR CONTACT WITH LINE
DEFECTIVE DEFROST RELAY OR TIMER
REVERSING VALVE STUCK
LEGEND
CCH — Crankcase Heater
N.C. — Normally Closed

I. START-UP CHECKLIST

Outdoor: Model No.	Serial No.
INDOOR: Air Handler Manufacturer –	
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 (Snubber 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 AND INDOOR COILS, 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) _____

HAVE LIQUID LINE SERVICE VALVES BEEN OPENED? (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 UNIT FAN SPEED AND RECORD.
	CHECK OUTDOOR UNIT FAN SPEED AND RECORD.
	AFTER AT LEAST 10 MINUTES RUNNING TIME, RECORD THE FOLLOWING MEASUREMENTS: SUCTION PRESSURE _____ SUCTION LINE TEMP _____ DISCHARGE PRESSURE _____ DISCHARGE LINE TEMP _____ ENTERING OUTDOOR UNIT AIR TEMP _____ LEAVING OUTDOOR UNIT AIR TEMP _____ INDOOR UNIT ENTER-AIR DB (dry bulb) TEMP _____ INDOOR UNIT ENTER-AIR WB (wet bulb) TEMP _____ INDOOR UNIT LEAVING-AIR DB TEMP _____ INDOOR UNIT LEAVING-AIR WB TEMP _____
	COMPRESSOR AMPS - L1 _____ L2 _____ L3 _____
	NOTES