installation — operation — maintenance instructions

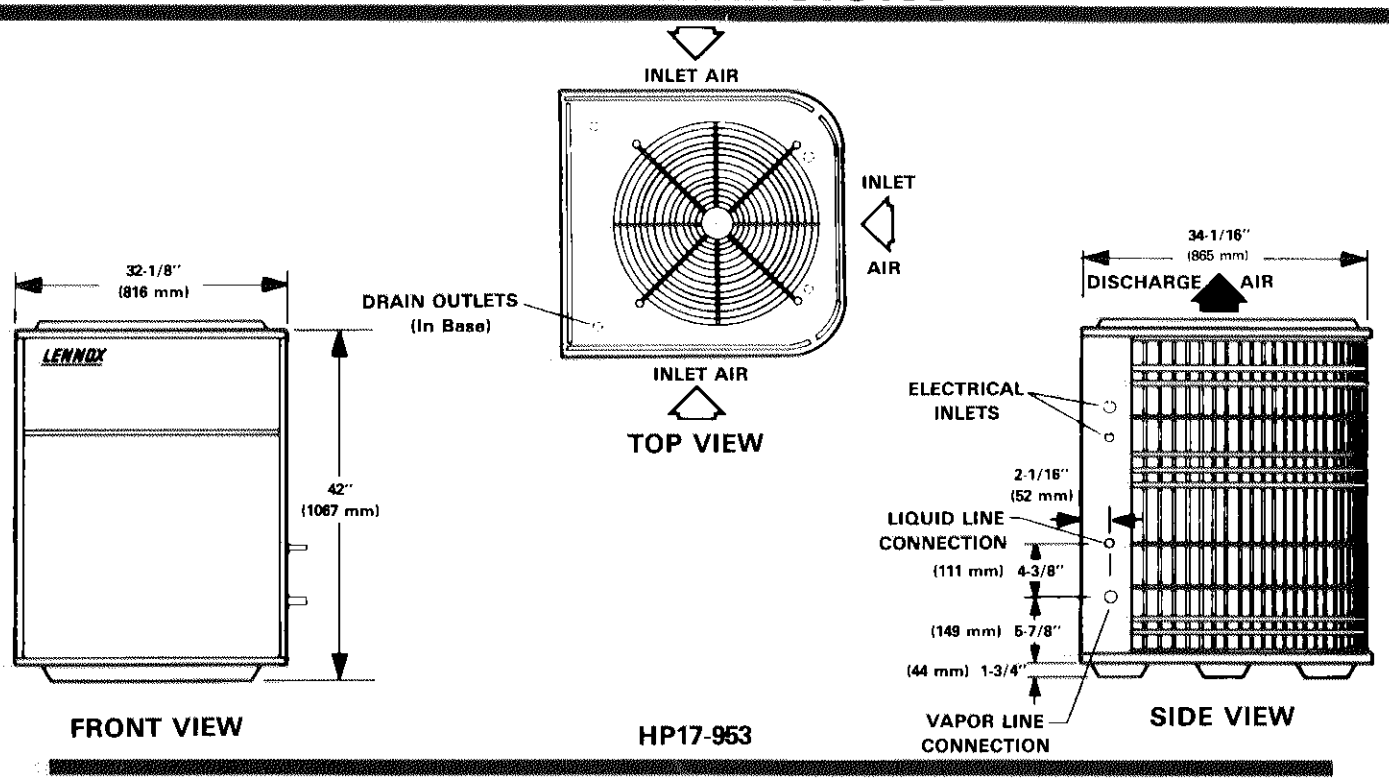
HP17-953 and 1353 SERIES UNITS

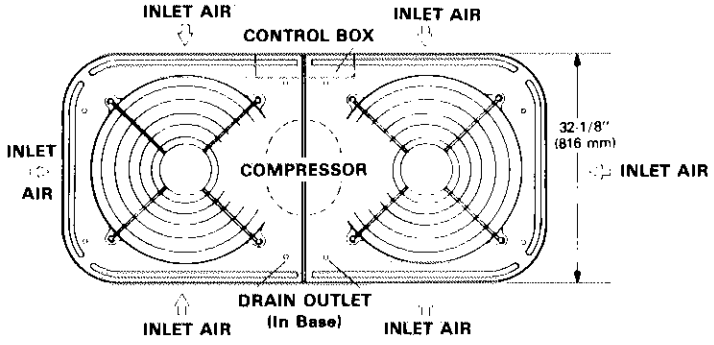
502,345M 7.5 and 10 ton units
8/89
Supersedes 502,258

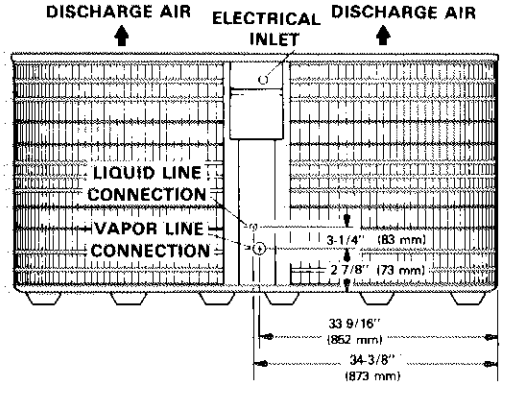
LENNOX Industries Inc.

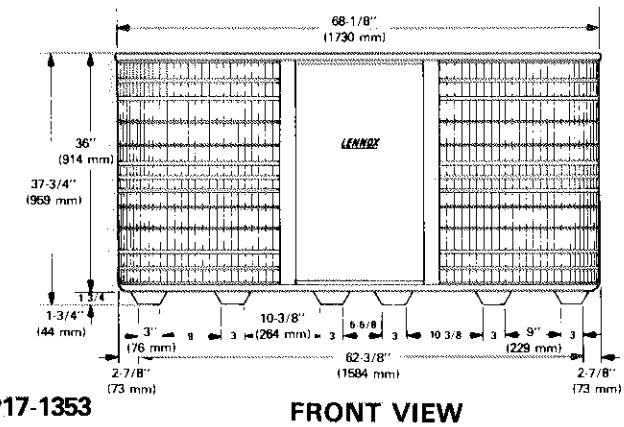
Litho U.S.A.

UNIT DIMENSIONS









CHECK POINTS

START-UP AND PERFORMANCE CHECK LIST

Job Name _____ Job No. _____ Date _____
Job Location _____ City _____ State _____
Installer _____ City _____ State _____
Unit Model No. _____ Serial No. _____ Serviceman _____
Nameplate Voltage _____
Minimum Circuit Ampacity _____
Maximum Fuse Size _____
Electrical Connections Tight?
Supply Voltage (Unit Off) _____

HEAT PUMP SECTION

Refrigerant Lines:
Leak Checked? ☐ Properly Insulated? ☐
Service Valves Backseated? ☐
Outdoor Fan Checked? ☐
Voltage With Compressor Operating _____

Amps:
Supply _____ Outdoor Fan _____
Compressor _____
Indoor Filter Clean? ☐ Indoor Blower RPM _____
S.P. Drop Over Evaporator (Dry) _____
Outdoor Entering Air Temperature _____
Discharge Pressure _____ Suction Pressure _____
Refrigerant Charge Checked? ☐

THERMOSTAT

Calibrated? ☐ Properly Set? Level? ☐

INSTALLATION

PACKAGE 1 OF 1 CONTAINS:

1 - Assembled Unit

Check unit for shipping damage. Consult last carrier immediately if damage is found. These instructions are intended as a general guide and do not supersede local codes. Authorities having jurisdiction should be consulted before installation.

INSTALLATION

HP17 heat pump units are approved and warranted only for installation with specially matched indoor coils, recommended line sizes and refrigerant control devices as designated by Lennox. Refer to the "Lennox Engineering Handbook" for approved systems.

SETTING THE UNIT

Heat pump units operate under a wide range of weather conditions, therefore, several factors must be considered when positioning the outdoor unit.

1 - A sound-absorbing material, such as Isomode, should be used under a unit if it will be installed in a location or position that will transmit sound or vibration to the living area or adjacent buildings.

2 - Mount unit high enough above ground or roof to allow adequate drainage of defrost water and prevent ice build-up.

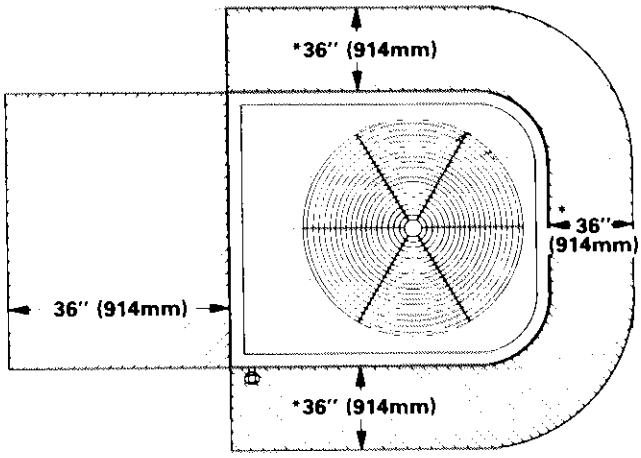
CAUTION - If unit is installed in areas where extended low temperatures are anticipated, the coil guards may prevent ice which has been separated from coils during defrost from falling from unit, acting as an air shield or barrier and thickening over several cycles. It is recommended that the coil guards be removed when units are installed in this type of enviroment.

3 - In heavy snow areas do not locate unit where drifting will occur. The unit base should be elevated above the depth of average snows.

NOTE - Elevation of the unit may be accomplished by constructing a frame using suitable materials. If a support frame is constructed, it must not block drain holes in unit base.

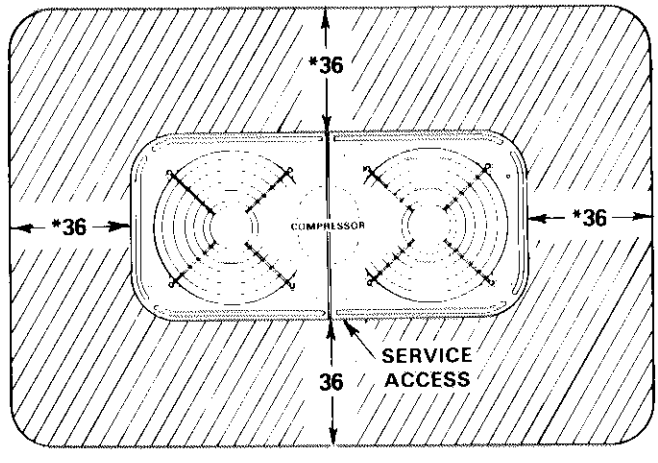
4 - When installed in areas where low ambient temperatures

INSTALLATION CLEARANCES



NOTE - 48" (1219 mm) clearance required on top of unit.
**One side may be 24" (710 mm).*

HP17-953



NOTE - 48" (1219 mm) clearance required on top of unit.
**One side may be 24" (710 mm).*

HP17-1353

INSTALLATION CONT.

exist, unit should be located so winter prevailing winds do not blow directly into outdoor coil.

5 - Locate unit away from overhanging roof lines which would allow water or ice to drop on, or in front of, coil or into unit.

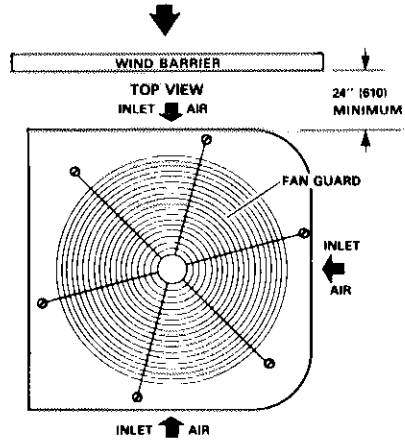
A - Slab Mounting

When installing unit at grade level, top of slab should be high enough above grade so that water from higher ground will not collect around unit. Care should be taken to ensure that all drain holes in base are free from obstructions. Ground around slab should be graded in such a way as to drain water away from unit during defrost cycles. Refer to roof mounting section for barrier construction if unit must face prevailing winter winds.

B - Roof Mounting

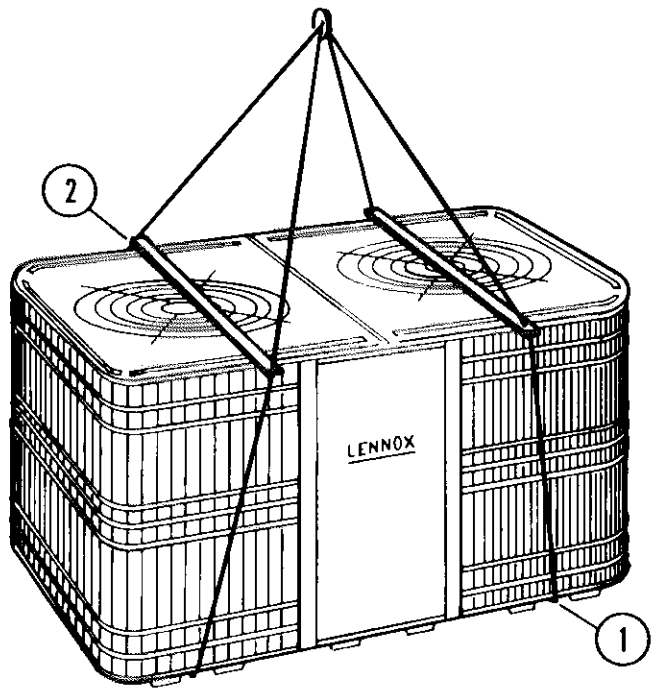
If unit coil cannot be mounted away from prevailing winter winds, a wind barrier should be constructed. Size barrier at least the same height and width as outdoor unit. Mount barrier 24 inches (610 mm) from sides of unit in the direction of prevailing winds.

DIRECTION OF WINTER PREVAILING WINDS



ROOFTOP APPLICATION

RIGGING AND HOISTING HP17-1353



UNIT	WEIGHT	
	lbs.	kg
HP17-1353	580	264

LIFTING INSTRUCTIONS

1 - Run hoisting sling underneath unit as shown.

2 - Use spreader bars to avoid damaging top of unit.

ELECTRICAL

Wiring must conform to the National Electric Code (NEC) and local codes. Refer to the furnace or blower/coil instructions for additional wiring application diagrams and refer to unit rating plate for minimum circuit ampacity and maximum fuse size.

1 - Provide line voltage power supply to unit from a properly sized disconnect switch.

2 - Install room thermostat (ordered separately) in the conditioned area. Locate where it will not be affected by sunlight, drafts or vibration. Do not install on an outside wall. A position approximately 5 feet (1524 mm) from the floor and near the center of the conditioned area is most desirable.

3 - Provide low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit as indicated on application diagram in this instruction.

4 - Ground unit either through supply wiring or with an earth ground.

5 - Mount compressor warning sticker on unit disconnect box.

ELECTRICAL CONT.

LINE VOLTAGE

HP17-953-To facilitate conduit, knock-outs are provided in cabinet panel that line up with a wiring hole in the control box. Route conduit through hole in cabinet and connect to hole in control box with proper conduit fitting.

NOTE - Units are approved for use with copper conductors only.

HP17-1353-To facilitate conduit, holes are provided in control box. Connect conduit directly to control box with proper conduit fitting.

NOTE - Units are approved for use with copper conductors only.

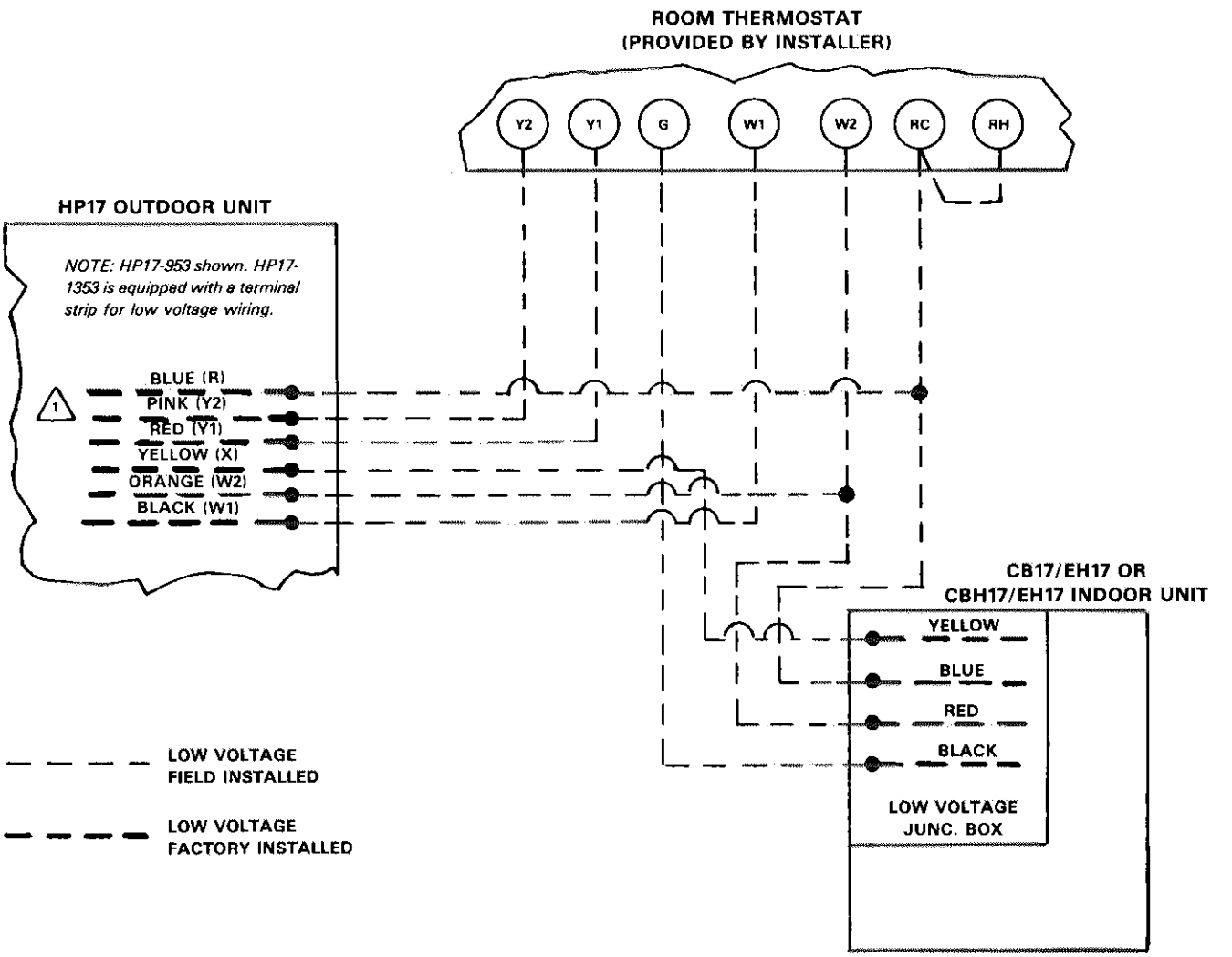
LOW VOLTAGE

HP17-953-Low voltage connections are made just below control box.

HP17-1353-Low voltage connections are made at terminal block in splice box.

NOTE - A complete unit wiring diagram is located on the inside of the unit control box cover.

APPLICATION WIRING FOR HP17 AND CB17/EH17 OR CBH17/EH17



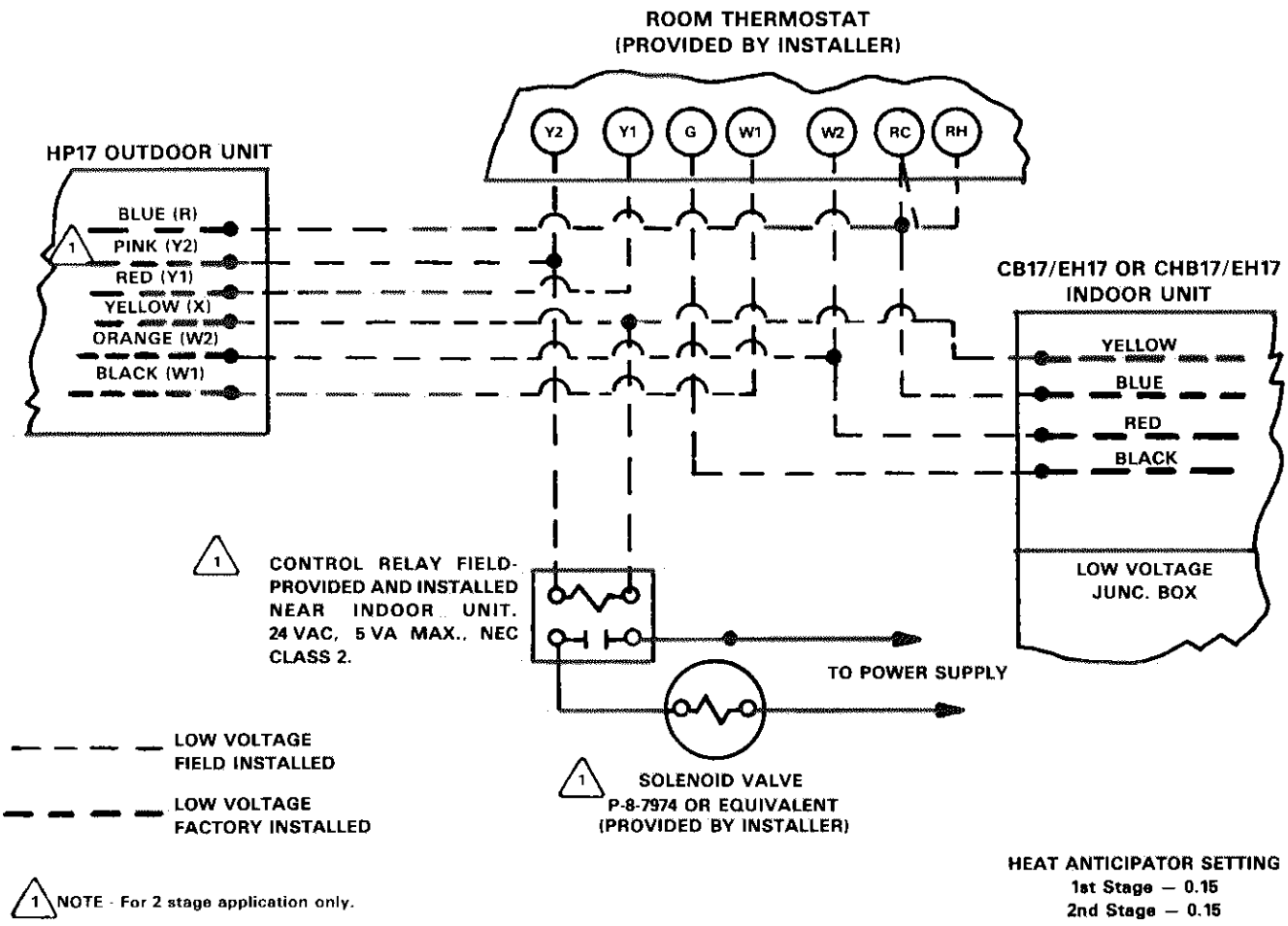
1 NOTE - Pink wire is for 2 stage application only.

NOTE — For 1 stage cooling operation (No. Y2 terminal in room thermostat), connect Y2 (pink) and Y1 (red) in heat pump together. See unit wiring diagram for power supply connections.

HEAT ANTICIPATOR SETTING
1st Stage — 0.15
2nd Stage — 0.15

ELECTRICAL CONT.

APPLICATION WIRING FOR HP17 AND CB17/EH17 OR CBH17/EH17 WITH TWO STAGES COOLING OF INDOOR UNIT



PIPING

REFRIGERANT PIPING GUIDELINES

Special considerations must be given to refrigerant piping due to the capacity reduction capability of the HP17 with two stage two speed compressor and the dual-circuit CB17 indoor coil. To ensure system efficiency and provide safe compressor operating conditions, the following piping guidelines must be followed.

I - PIPING OBJECTIVES

All refrigerant piping systems must meet the following objectives to ensure unit efficiency and to provide safe operating conditions for the compressor.

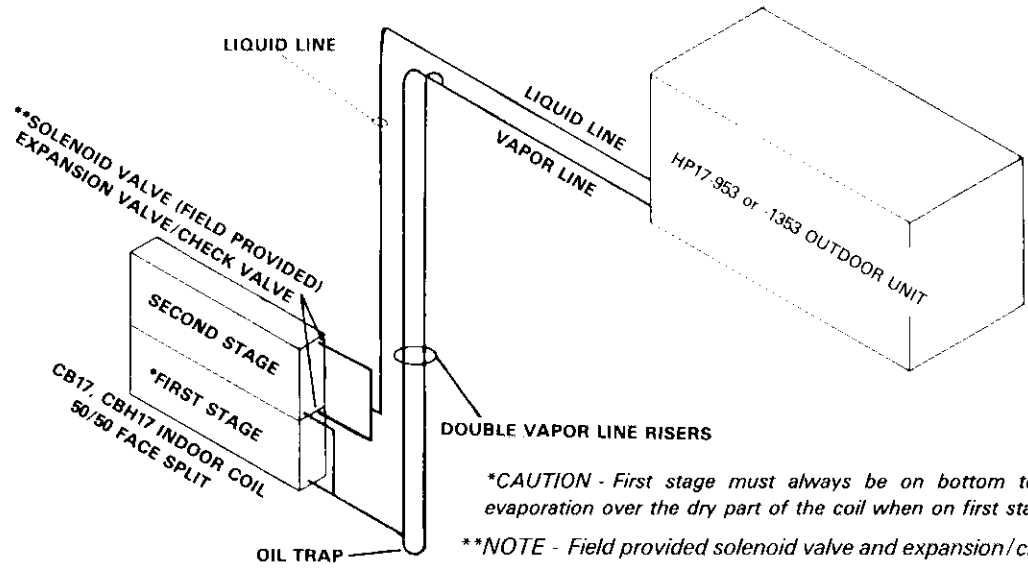
1 - Ensure proper liquid refrigerant feed to evaporators.
2 - Provide practical line sizes without excessive pressure drop.
3 - Prevent an excessive amount of lubricating oil from being trapped in any part of system.
4 - Minimize loss of lubricating oil from compressor by returning oil at the same rate it leaves.
5 - Prevent liquid refrigerant from entering compressor during operation and shutdown.

II - FIELD PIPING

The field piping consists of single liquid and vapor lines between the HP17 and the CB17 indoor coil (Refer to illustrations). The CB17 has two liquid connections for the dual circuit coil. A single common vapor line connection is provided. A field-provided solenoid is required in the top (second stage) liquid line to shut off the circuit during first stage compressor operation (cooling mode). When humidity control is not a factor, the solenoid is not used and the full evaporator is used with both first and second stage compressor operation. Stage modulation applies to the cooling cycle only. Refer to application wiring for further details.

PIPING CONT.

REFRIGERANT PIPING DIAGRAM



**CAUTION - First stage must always be on bottom to prevent re-evaporation over the dry part of the coil when on first stage operation.*

***NOTE - Field provided solenoid valve and expansion/check valve kits are installed inside the CB17/CBH17 cabinet. Solenoid valve used on 2 stage units only.*

III - UNIT CAPACITY AND PIPE SIZING TABLES

TABLE 1 UNIT CAPACITY

UNIT	COMPRESSOR	NOMINAL TONS	
		STAGE 1	STAGE 2
HP17-953	Single Stage	7-1/2	----
HP17-1353	Single Stage	10	----
HP17-953	Two Stage	3-3/4	7-1/2
HP17-1353	Two Stage	5	10

NOTE - It is not recommended to install refrigerant line sets over 60 ft. (18 m). Refrigerant line losses deduct from the net capacity of the complete system. The additional refrigerant charge required may also upset the refrigerant and oil ratio.

TABLE 2
FIELD-INSTALLED PIPE SIZING
AIR CONDITIONING SYSTEMS (Refrigerant 22)

Nominal Tons	LENGTH OF RUN IN FEET			
	Up to 30 Feet		30 - 60 Feet	
	Liquid	Suction	Liquid	Suction
1-1/2	3/8	3/4	3/8	3/4
2	3/8	3/4	3/8	3/4
2-1/2	3/8	7/8	3/8	7/8
3	3/8	7/8	3/8	7/8
4	1/2	7/8	1/2	7/8
5	1/2	1-1/8	1/2	1-1/8
7-1/2	5/8	1-1/8	5/8	1-3/8
10	5/8	1-3/8	5/8	1-3/8

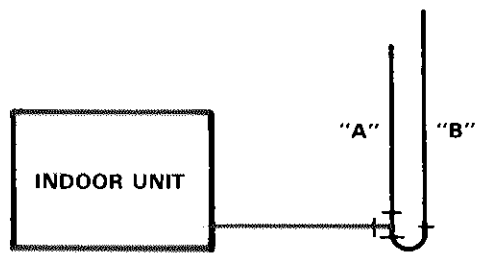
Table is based on pressure drop of eight elbows in addition to the length of the line.

TABLE 3
SIZING FOR DOUBLE VAPOR LINE RISERS
(REQUIRED FOR HP17-953 AND HP17-1353)

Relationship of Load		Total Tons in Risers			
Smallest Load	Balance of Load	7.5		10	
A*	B*	A*	B*	A*	B*
50%	50%	7/8	7/8	1-1/8	1-1/8

HP17-953/1353 has 50% reduction.

**Letters refer to pipes.*



PIPING CONT.

IV - LIQUID LINES

Liquid lines offer only two points that must be kept in mind to prevent serious capacity loss in the system. Firstly, the high pressure drops — due either to friction or to head loss in the high riser — should be avoided. Secondly, all Lennox heat pumps are rated 10°F, or more, subcooling. Any reduction in this degree of subcooling will reduce the capacity of the system. Liquid lines should always be well-insulated when run through areas in which they can encounter high ambient conditions.

NOTE - A strainer or strainer-drier may be installed in the liquid line of any welded system to protect the expansion valve and compressor. The proper place to install this strainer is in the liquid line as close to the expansion valve as possible.

Table 2 can be used to size the liquid lines of any system unless the liquid line has more than eight elbows, is unusually long, or rises over 30 ft. (9144 mm). Special applications should be referred to your Lennox division service department. For better performance, line lengths should be kept to a minimum.

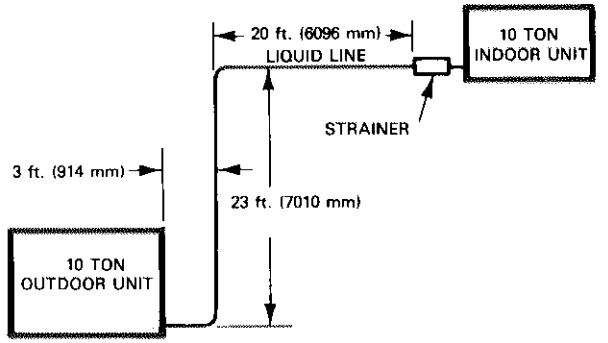
LIQUID LINE SIZING

EXAMPLE 1—LIQUID LINE SIZING

Given: 10 ton indoor unit
10 ton outdoor unit

Find: Liquid line size
Length of line: 46 ft. (14 m)
Size of pipe from Table 2 — 5/8" (15.8 mm)

Answer: 5/8" (15.8 mm) o.d. copper tubing



LIQUID LINE SIZING

V - VAPOR LINES

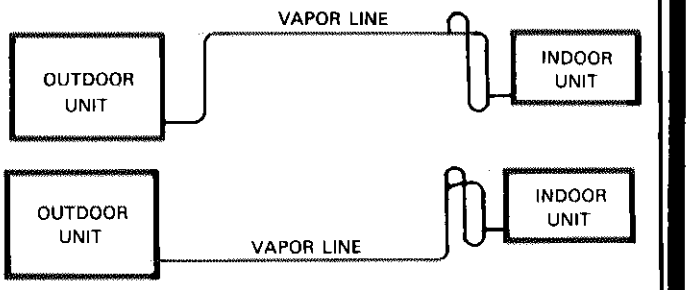
Vapor lines must be designed to return oil from the evaporator to the compressor under minimum load conditions. Oil which leaves the compressor and continues through the evaporator separates from the refrigerant vapor. A distillation process occurs within the evaporator. This separated oil can only be returned to the compressor by entrainment with the returning gas.

Oil entrainment is dependent upon proper velocity, which in turn is dependent upon correct vapor line design and size. Horizontal vapor lines require a minimum of 600 fpm velocity for oil entrainment while risers require approximately 1,000 fpm or greater velocity. Velocity must be below 3,000 fpm for satisfactory noise levels.

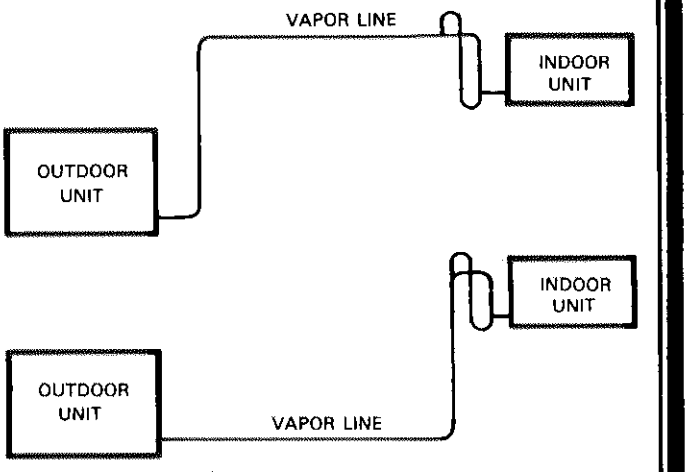
IMPORTANT - Due to the capacity reduction capability of the Lennox two-stage compressor, double vapor risers must be used in all vapor riser lines to assure proper oil return to the compressor (See Section VI).

A - PIPING FOR COMPRESSOR PROTECTION

To prevent liquid from migrating to the compressor during an off cycle when the indoor unit is located above or on the same level as the outdoor unit, it is necessary to pipe the unit as shown with the vapor line rising to approximately the height of the evaporator.



VAPOR LINE PIPING—INDOOR AND OUTDOOR UNIT ON SAME LEVEL

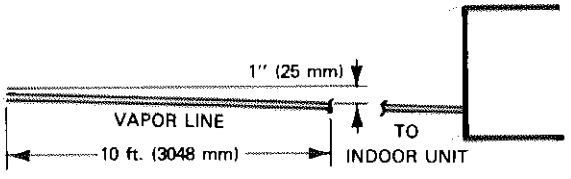


VAPOR LINE PIPING—INDOOR UNIT ABOVE OUTDOOR UNIT

B - DESIGNING THE VAPOR LINE FOR PROPER OIL RETURN

To ensure proper oil return to the compressor, there are four elements of vapor line design which must be carefully followed:

1 - All horizontal vapor lines or mains must be pitched toward the indoor unit at a rate of 1 in. (25 mm) for every 10 ft. (3048 mm) of run (See figure).



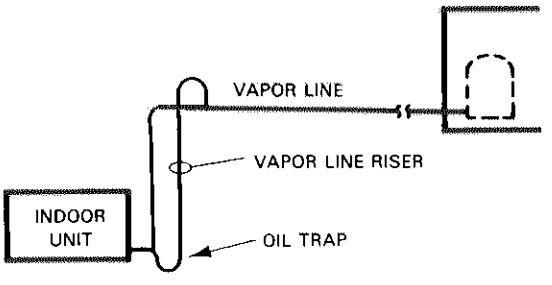
SLOPE HORIZONTAL LINES TOWARD INDOOR UNIT

PIPING CONT.

2 - Refrigerant velocities in all horizontal vapor lines must be above a 600 fpm minimum for the refrigerant vapor to properly sweep the oil toward the compressor.

3 - The vapor line from each evaporator must have an oil trap before rising into an overhead main or looping above the indoor unit to guard against the gravity draining of liquid refrigerant to the compressor. When enough oil collects to seal the trap, a hydraulic head will be developed which will help force the oil up the riser. (See figure).

4 - Refrigerant velocities in vapor line risers must be a minimum of 1,000 fpm to ensure oil return. When indoor unit is below compressor, vapor line must be trapped at the bottom of each vertical riser. Refer to Section VI — Double Vapor Line Risers.



INDOOR UNIT WITH OIL TRAP

C - SIZING VAPOR LINES

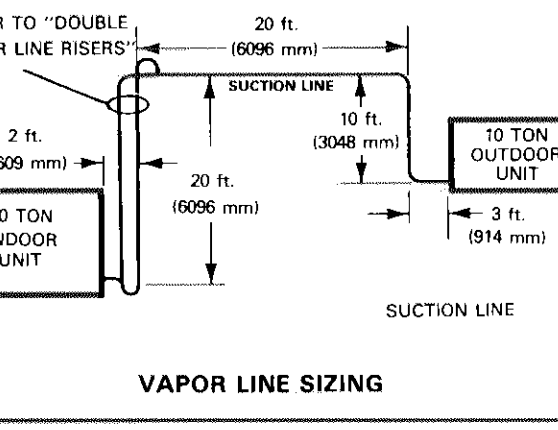
All vapor lines can be sized from Table 2. Refer to the following example:

EXAMPLE 2–VAPOR LINE SIZING

Given: 10 ton outdoor unit
10 ton indoor unit

Find: Vapor line size
Length of horizontal and down-flow vapor line in feet — 45 ft. (13.7 m)
Pipe size from Table 2 — 1-3/8" (34.9 mm) o.d.

Answer: 1-3/8" (34.9 mm) o.d. copper



VAPOR LINE SIZING

VI - DOUBLE VAPOR LINE RISERS

During partial load operation when gas velocity is not sufficient to return oil through both risers, the trap gradually fills with oil until the second riser is sealed off. When this occurs, the vapor travels up the first riser only and there is enough velocity to carry the oil. This trap must be close-coupled to limit the oil holding capacity to a minimum. Otherwise, the trap could accumulate enough oil on a partial load to seriously lower the compressor crankcase oil level.

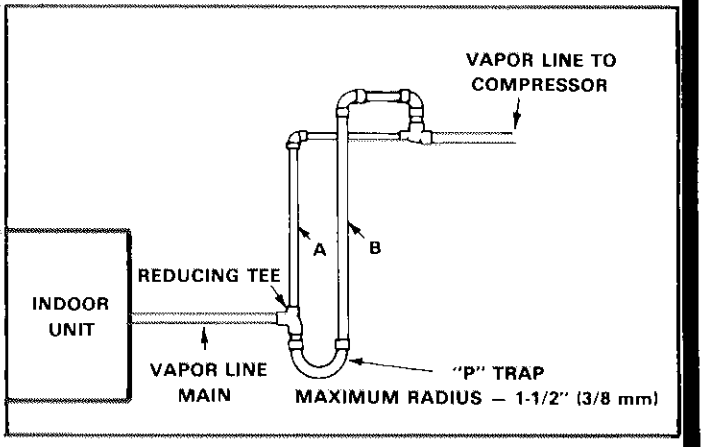
A - SIZING

Size double riser from Table 2, in the 50 percent column. Total tons for the HP17-953 = 7-1/2 tons and HP17-1353 = 10 tons.

B - CONSTRUCTION

Install a trap between the two risers as illustrated. The trap must be close-coupled. A vapor line "P" trap is recommended. Part numbers 62F7601 (7/8") and 62F7701 (1-1/8") are available from Lennox. The second riser must enter the main vapor line from the top to avoid oil draining down the second riser during partial load operation.

VAPOR LINE RISER SIZES		
UNIT	PIPE A	PIPE B
HP17-953	7/8" (22 mm)	7/8" (22 mm)
HP17-1353	1-1/8" (29 mm)	1-1/8" (29 mm)



VII - BRAZING REFRIGERANT LINES

Proper brazing techniques must be used for field-fabricated refrigerant piping to prevent compressor failure, plugged expansion valves, etc. Piping must be kept clean and free of copper shavings, flux and oxidation scale. Keep the following items in mind:

1 - When cutting and deburring piping, remove all filing and shavings.

2 - Do not allow flux inside piping (start the connection, apply flux, then push connection together).

3 - Flood system with nitrogen to prevent oxidation while brazing. Copper has a very high affinity for oxygen and will oxidize very rapidly when heated. This oxidation takes the form of scale and forms inside the piping during the brazing process. *CAUTION - When using dry nitrogen, a pressure-reducing regulator must be used to prevent excessive pressure.*

4 - A strainer or strainer-drier should always be installed in the liquid line to each evaporator ahead of the liquid line solenoid valve and expansion valve.

PIPING CONT.

VIII - REFRIGERANT LINE INSULATION AND HANGERS

1 - Always insulate all vapor lines with an approved refrigeration insulation, such as Armaflex. Refer to manufacturer's recommendation for thickness.

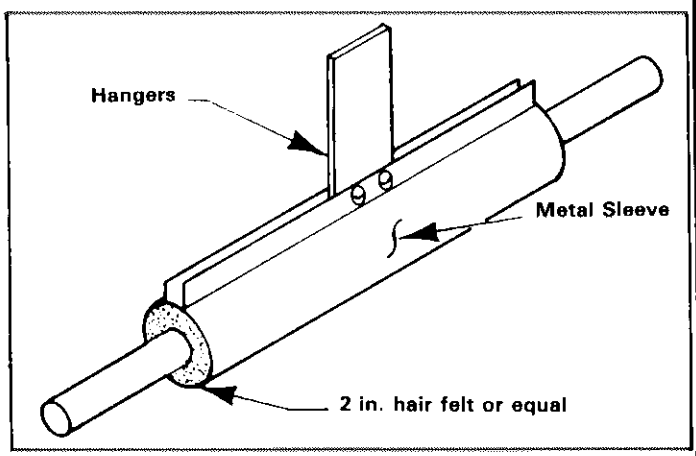
2 - To prevent any abnormal loss in subcooling, liquid lines should always be insulated when run in areas exposed to high ambient conditions, such as rooftops or attics.

3 - All vapor, liquid or hot gas refrigerant lines located underground must be properly insulated and completely waterproofed. Failure to do so can result in erratic operation and compressor damage.

4 - Support refrigerant lines with an approved type of hangers to prevent line vibration from being transferred to the structure. Isolate lines where they pass through roofs, walls and floors, or where they come in contact with ductwork (See illustration). Table 4 lists recommended hanger spacing.

TABLE 4

RECOMMENDED HANGER SPACING FOR COPPER TUBING	
O.D. PIPE SIZE	CENTER TO CENTER
5/8 in. (16 mm)	6 ft. (1828 mm)
7/8 in. - 1-1/8 in. (22mm - 29 mm)	8 ft. (2438 mm)
1-3/8 in. - 2-1/8 in. (35 mm - 54 mm)	10 ft. (3048 mm)



REFRIGERATION

CAUTION TO SERVICEMAN

Due to fluorocarbon damage to the ozone layer in the stratosphere, Lennox recommends strict refrigeration procedures that prevent venting R-22 refrigerant into the atmosphere during installation and service of Lennox refrigeration systems.

PROCESSING PROCEDURE

HP17 units are shipped from the factory with a holding charge only. The installer should follow the procedure below for evacuating and charging.

Service Valves and Gauge Manifold Attachment

The liquid line and vapor line service valves have gauge ports that are used for leak testing, evacuating and charging. Gauge ports provided on the compressor discharge and suction lines are used for checking charge.

IMPORTANT - Service valves are closed to heat pump unit and open to line set connections. Do not open until refrigerant lines have been leak tested and evacuated. All precautions should be exercised in keeping the system free from dirt, moisture and air.

Leak Testing

1 - Attach gauge manifold and connect a drum of dry nitrogen to center port of gauge manifold.
CAUTION - When using dry nitrogen, a pressure-reducing regulator must be used to prevent excessive pressure in gauge manifold, connecting hoses, and within the system. Regulator setting must not exceed 150 psig (1034 kPa).

2 - Open high pressure valve on gauge manifold and pressurize line set and indoor coil to 150 psig (1034 kPa).

3 - Check lines and connections for leaks.
NOTE - If electronic leak detector is used, add a trace of refrigerant to the nitrogen to make detection possible.

4 - Release nitrogen pressure from the system, correct any leaks and recheck.

Evacuating the System

1 - Attach gauge manifold as shown in Figure 1, "Gauge Manifold Connections." Connect vacuum pump (with vacuum gauge) to center port of gauge manifold. With both manifold service valves open, start pump and evacuate indoor coil and refrigerant lines.
NOTE - A temperature vacuum gauge, mercury vacuum (u-tube), or thermocouple gauge should be used. The usual Bourdon tube gauges are not accurate enough in the vacuum range.

2 - Evacuate the system to 29 inches (737 mm) vacuum. During the early stages of evacuation, it is desirable to stop the vacuum pump at least once to determine if there is a rapid loss of vacuum. A rapid loss of vacuum would indicate a leak in the system and a repeat of "Leak Testing" would be necessary.

3 - After system has been evacuated to 29 inches (737 mm), close gauge manifold valves to center port, stop vacuum pump and disconnect from gauge manifold. Attach an upright nitrogen drum to center port of gauge manifold and open drum valve slightly to purge line at manifold. Break vacuum in system with nitrogen pressure by opening manifold high pressure valve. Close manifold high pressure valve to center port.

4 - Close nitrogen drum valve and disconnect from gauge manifold center port. Release nitrogen pressure from system.

5 - Reconnect vacuum pump to gauge manifold center port. Evacuate system through manifold service valves until vacuum in system does not rise above 29.7 inches (754 mm) mercury (5 mm absolute pressure) within a 20-minute period after stopping vacuum pump.

6 - After evacuation is completed, close manifold service valves, disconnect vacuum pump from gauge manifold center port, and connect refrigerant drum. Pressurize system slightly with refrigerant to break vacuum.

TABLE 5

UNIT MODEL NO.	LINE SET DIA.* LIQUID	SUCTION	R22 FOR 25 FT. (7620 mm) OF LINE	ADJUSTMENT PER FT. (305 mm) OF LINE
HP17-953V	5/8" (16mm)	1-3/8" (35mm)	20 lbs. 4 oz. (9.2 kg)	2-1/2 oz. (229 g)
HP17-1353V	5/8" (16mm)	1-3/8" (35mm)	28 lbs. 11 oz. (13 kg)	2-1/2 oz. (229 g)

**Field fabricated*

CHARGING AND START-UP

It is desirable to charge the system in the cooling cycle if weather conditions permit. However, if the unit must be charged in the heating season, one of the following procedures must be followed to ensure proper system charge.

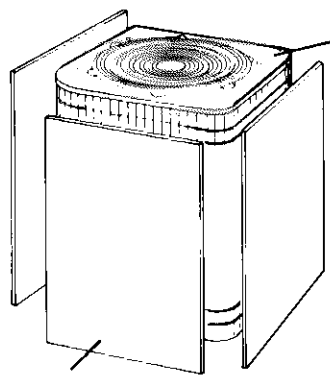
A - If the system is completely void of refrigerant, such as in new installations, the recommended and most accurate method of charging is to weigh the refrigerant into the unit according to Table 5, provided the difference in elevation between the HP17 unit and the indoor unit does not exceed 20 ft. (6096 mm). Add 12 ozs. (340 g) for the next 10 ft. (3048 mm) increase in elevation. For elevation differences of more than 30 ft. (9144 mm), consult your Lennox service department. Refer to the Lennox Service Manual for charging procedures.

1 - Rotate fan to check for frozen bearings or binding.
2 - Inspect all factory and field-installed wiring for loose connections.
3 - For new installations, open liquid line and suction line service valves to release refrigerant charge (contained in heat pump unit) into the system.
4 - Check voltage supply at the disconnect switch. The voltage must be within the range listed on unit nameplate. If not, do not start the equipment until the power company has been consulted and the voltage condition corrected.
5 - Set the thermostat for a cooling demand, turn on power to indoor coil blower and close heat pump unit disconnect to start unit. Be certain that both stages are on.
6 - Recheck unit voltage with unit running. Power must be within range shown on unit nameplate. Check amperage draw of unit. Refer to unit nameplate for correct running amps.

B - If weighing facilities are not available, or if unit is just low on charge, use the following procedure:

1 - Follow steps 1 through 4 described in section "A" above.
2 - Connect gauge manifold as shown in Figure 1 "Gauge Manifold Connections." Connect an upright R-22 drum to center port of gauge manifold.
3 - If necessary, set room thermostat to 74°F (23°C) in HEATING position and allow unit to run until heating demand is satisfied. This will create the necessary load for proper charging of system in cooling. Change thermostat setting to 60°F (15°C) in COOLING position. Allow unit to run in cooling until system pressures stabilize. Both stages must be on.
4 - To ensure proper system charge, it is necessary to maintain liquid line pressures in a range from 240 psig (1655 kPa) to 270 psig (1862 kPa). In order to obtain this pressure range, block off outdoor coil using a sheet of plastic or cardboard as shown in illustration. If vapor bubbles are present in sight glass, slowly add refrigerant through suction port until sight glass clears. System charge should be correct. This procedure must be followed to prevent overcharging of system.

BLOCKING OUTDOOR COIL



OUTDOOR COIL SHOULD BE BLOCKED ONE SIDE AT A TIME WITH CARDBOARD OR PLASTIC SHEET UNTIL PROPER TESTING PRESSURES ARE REACHED.

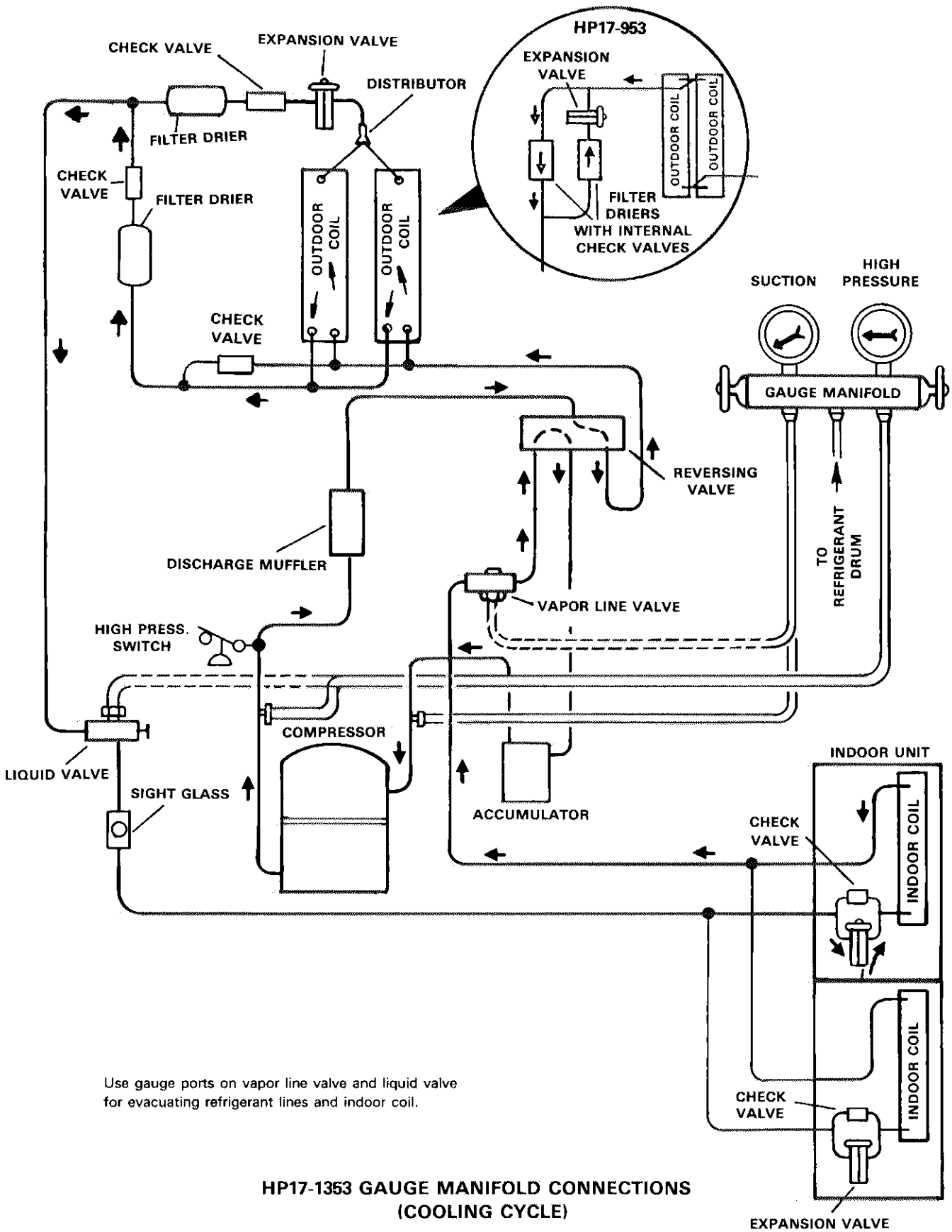
5 - When charging procedure has been completed, close valve on refrigerant container. Switch thermostat to HEATing position and double check pressures using charging curves. Vapor bubbles might be present in sight glass at low ambients.
6 - Charge should be rechecked in cooling season.

CHECKING CHARGE

Refrigerant charge is checked by use of "charging curves" mounted in each unit. Both cooling and heating cycle curves are provided. Gauge readings within the white area of these charging curves indicate a properly charged unit.

When system is operating properly, make sure all service valves are open and disconnect gauge manifold. Replace all gauge port caps and tighten. Set thermostat (ordered separately) at desired setting.

REFRIGERATION CONT.



Use gauge ports on vapor line valve and liquid valve for evacuating refrigerant lines and indoor coil.

HP17-1353 GAUGE MANIFOLD CONNECTIONS (COOLING CYCLE)

FIGURE 1

OPERATION

HIGH PRESSURE SWITCH

All units are equipped with a high pressure switch (manual reset type) mounted on the compressor discharge line. This switch has a "cut-out" point of 410 psig (2827 kPa) and must be manually reset when discharge pressure drops below 180 psig (1241 kPa).

LOSS OF CHARGE SWITCH

The units are equipped with a loss of charge switch (automatic reset type) mounted on the compressor discharge line. This switch cuts out at 15 psig (103kPa) and automatically resets at 25 psig (172kPa).

CRANKCASE HEATER

Compressor is equipped with an external belly-band crankcase heater.

IMPORTANT - All units are provided with a crankcase heater which should be energized 24 hours before unit start-up. This heater must always be energized before start-up to prevent compressor damage as a result of slugging.

FILTER DRIER

The filter drier system consists of two filter driers mounted in a parallel flow arrangement in the liquid line of the system. One drier is for the cooling cycle, the other is for the heating cycle. HP17-953 driers are equipped with an internal check valve for correct refrigerant flow. If replacement is necessary, order another of like design and capacity.

THERMOSTAT OPERATION

HP17 units use a standard heating/cooling thermostat (field provided). Cooling cycle can be operated in two stages or a single stage. However, the heating cycle of the heat pump can operate in one stage only.

COMPRESSOR TIMED-OFF CONTROL

A compressor timed-off control is used for prevention of compressor fast cycling. At the end of the first stage, the control de-energizes the compressor for a minimum off cycle of 5 minutes.

DEFROST THERMOSTAT

A defrost thermostat is mounted on the liquid line between a drier and the distributor. The unit will not defrost unless this thermostat senses the liquid line to be 35°F (2°C) or colder.

DEFROST TERMINATION SWITCH

A high pressure switch is mounted on the coil. It terminates defrost cycles when coil pressure reaches 325 psig.

DEFROST TIMER

This control asks for a defrost every 90 minutes. If the defrost thermostat is below 35°F (2°C), the unit will defrost. The timer will not allow a defrost to last for more than 10 minutes. The defrost timer can be field-adjusted from a 90-minute to a 30-minute defrost interval if warranted by climatic conditions. See wiring diagram on outdoor unit for sequence of operations.

TIMER CONVERSION FROM 90-MINUTE TO 30-MINUTE DEFROST INTERVAL

1 - Turn off power to unit.
2 - Disconnect wires to timer and remove timer from unit.
3 - Remove mounting screws and timer cover as shown in figure 2.

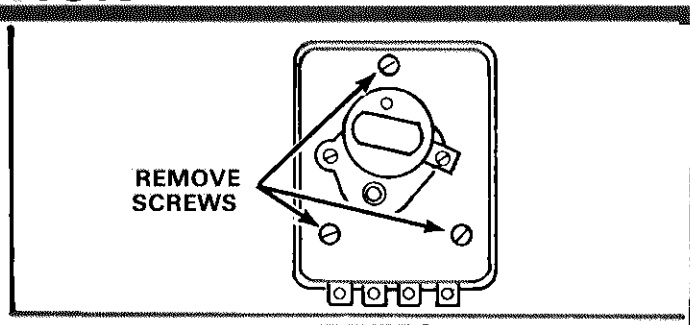


FIGURE 2

4 - Loosen allen screw and remove both cams as shown in figure 3.
5 - Install 30 min. cam only (cam with allen screw).

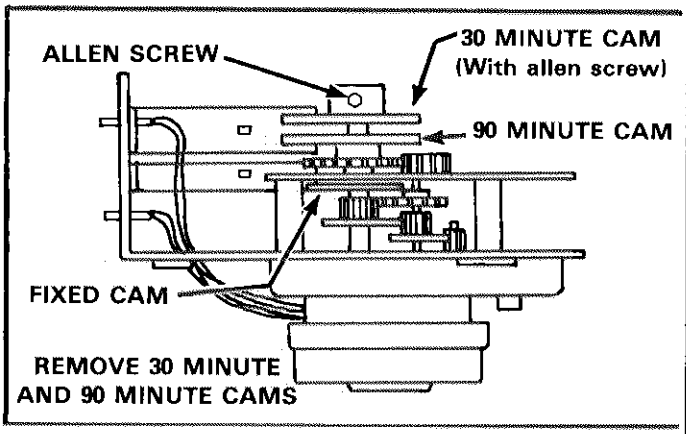


FIGURE 3

6 - Align the allen screw on the 30 min. cam with the 45° edge of the fixed cam as shown in figure 4 and tighten allen screw.

NOTE - Proper cam alignment is critical to assure defrost termination after 10 minutes of defrost cycle time.

7 - Install timer cover and secure with mounting screws.
8 - Install timer in unit and connect wires to timer terminals. Refer to unit wiring diagram on the outdoor unit for proper wiring connections.
9 - Restore power to unit.
10 - Unit willl follow the same sequence of operation shown on wiring diagram except defrost interval will be every 30 minutes.

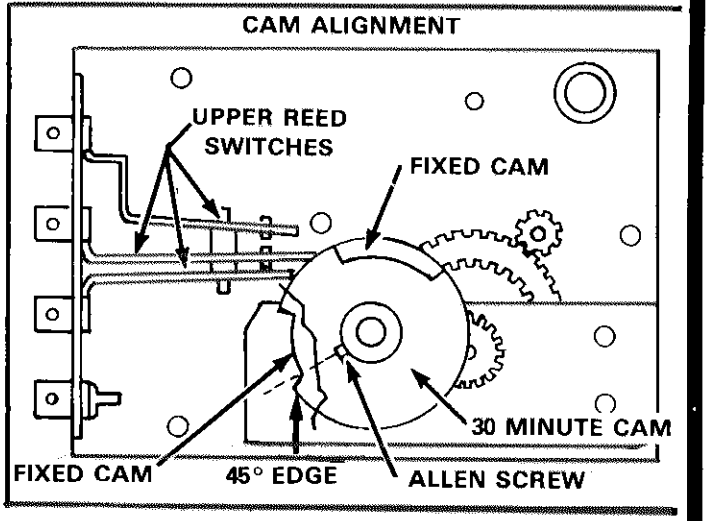


FIGURE 4

MAINTENANCE

At the beginning of each heating or cooling season, the system should be cleaned as follows:

HEAT PUMP UNIT

1 - Clean and inspect condenser coil. (May be flushed with a water hose).
2 - Condenser fan motor is prelubricated and sealed. Always relubricate motor according to the instructions on the motor manufacturer's nameplate.
3 - Visually inspect all connecting lines, joints and coils for evidence of oil leaks.
4 - Check all wiring for loose connections.
5 - Check for correct voltage at unit (unit operating).
6 - Check amp-draw on heat pump fan motor.
Unit nameplate _____ Actual _____
7 - Inspect drain holes in coil compartment base and clean if necessary.

NOTE - If insufficient heating or cooling occurs, the unit should be gauged and refrigerant charge checked.

INDOOR COIL

1 - Clean coil if necessary.
2 - Check connecting lines, joints and coil for evidence of oil leaks.
3 - Check condensate line and clean if necessary.

INDOOR UNIT

1 - Clean or change filters.
2 - Lubricate blower motor:
Always relubricate motor according to manufacturer's lubrication instructions on motor. If no instructions are provided, use the following as a guide:
a - Motors Without Oiling Ports-Prelubricated and sealed. No further lubrication required.
b - Direct Drive Motors with Oiling Ports-Prelubricated for an extended period of operation. For extended bearing life, relubricate with a few drops of SAE No. 10 non-detergent oil once every two years. It may be necessary to remove blower assembly for access to oiling ports.
3 - Adjust blower speed for cooling. The pressure drop over the coil should be checked to determine the correct blower CFM. Refer to the "Lennox Cooling Service Handbook" for pressure drop tables and procedures.
4 - Check all wiring for loose connections.
5 - Check for correct voltage at unit.
6 - Check amp draw on blower motor.
Motor nameplate _____ Actual _____