

installation and start-up instructions

SPLIT-SYSTEM HEAT PUMP

693C

Cancels: II 693C-18-2 II 693C-18-3
2-1-93

NOTE: Read the entire manual instruction before starting the installation.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local building codes and the National Electrical Code (NEC) for special installation requirements.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit or in instructions and manuals, be alert to the potential for personal injury.

Understand the signal word DANGER, WARNING, or CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards that could result in personal injury or death. CAUTION is used to identify unsafe practices which would result in minor personal injury or product and property damage.



WARNING: Before installing or servicing system, always turn off main power to system. There may be more than 1 disconnect switch. Turn off accessory heater power if applicable. Electrical shock can cause personal injury or death.

INSTALLATION

I. CHECK EQUIPMENT AND JOBSITE

A. UNPACK UNIT

Move to final location. Remove carton taking care not to damage unit.

B. INSPECT EQUIPMENT

For a damaged or incomplete shipment, file claim with shipping company prior to installation of equipment. Locate unit rating plate on unit corner panel. (See Fig. 2.) It contains information needed to properly install unit. Check rating plate to be sure unit matches job specifications.

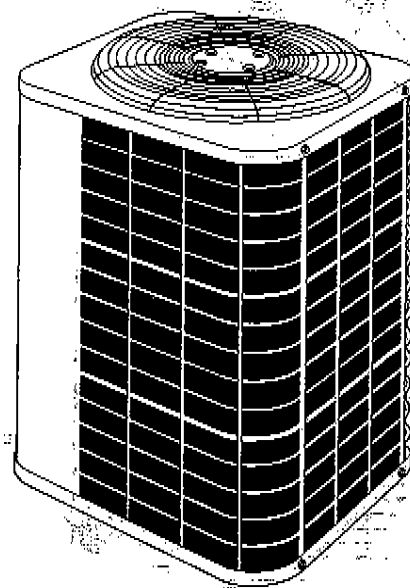


Fig. 1—Model 693C

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II. INSTALL ON A SOLID, LEVEL MOUNTING PAD

If conditions or local codes require the unit be attached to pad, tie-down bolts should be used and fastened through knockouts provided in unit base pan. Refer to unit mounting pattern in Fig. 2 to determine base pan size and knockout hole location.

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping and service. Allow 30-in. clearance to service end of unit and 48 in. above unit. For proper airflow, a 6-in. clearance on 1 side of unit and 12 in. on all remaining sides must be maintained. Maintain a distance of 24 in. between units. Position so water, snow or ice from roof or eaves cannot fall directly on unit.

On rooftop applications, locate unit at least 6 in. above roof surface. Place unit above a load-bearing wall and isolate unit and tubing set from structure.

Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Consult local codes governing rooftop applications.

III. ELEVATE UNIT

For proper drainage the heat pump must be raised off the mounting surface. Fig. 4 shows unit with accessory heat pump feet installed. Use accessory heat pump snow rack in areas where prolonged subfreezing temperatures or heavy snow occur. Refer to separate Installation Instructions packaged with the accessories.

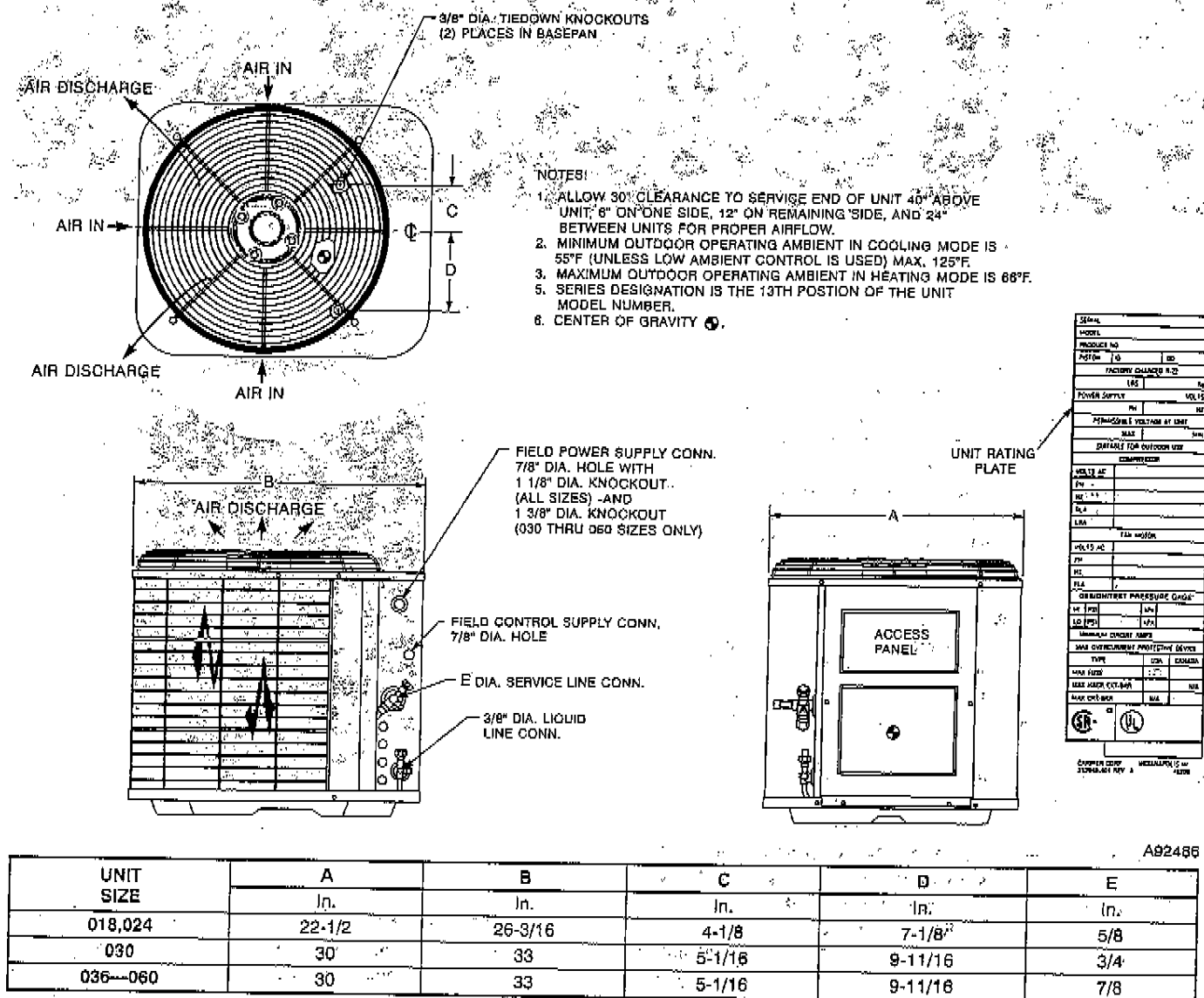


Fig. 2—Unit Reference Drawing

IV. REPLACE INDOOR CHECK-FLO-RATER® PISTON (IF REQUIRED)

Check indoor coil piston to see if it matches the required piston shown on unit rating plate. (See Fig. 2.) If it does not match, replace indoor coil piston with piston shipped with this unit. The piston shipped with outdoor unit is correct for any approved indoor coil combination.

TABLE 1—REFRIGERANT CONNECTIONS AND RECOMMENDED LIQUID AND VAPOR TUBE DIAMETERS (IN.)

UNIT SIZE	LIQUID		VAPOR	
	Connect Diameter	Tube Diameter	Connect Diameter	Tube Diameter
018,024	3/8	3/8	5/8	5/8
030	3/8	3/8	3/4	3/4
036	3/8	3/8	7/8	3/4
042,048	3/8	3/8	7/8	7/8
060	3/8	3/8	7/8	1-1/8

Note: Tube diameters are for lengths up to 50 ft. For tubing lengths greater than 50 ft, consult Long-Line Application Guideline.

CAUTION: DO NOT BURY MORE THAN 36 IN. OF REFRIGERANT TUBING IN GROUND. If any section of tubing is buried, there must be a 6-in. vertical rise to the valve connections on the outdoor unit. If more than the recommended length is buried, refrigerant may migrate to cooler buried section during extended periods of unit shutdown, causing refrigerant slugging and possible compressor damage at start-up.

→ V. MAKE PIPING CONNECTIONS

Outdoor units may be connected to indoor sections using accessory tubing package or field-supplied refrigerant grade tubing of correct size and condition. For tubing requirements beyond 50 ft, consult Long-Line Application Guideline which is available at your local distributor.

NOTE: In some cases noise in the living area has been traced to gas pulsations from improper installation of equipment.

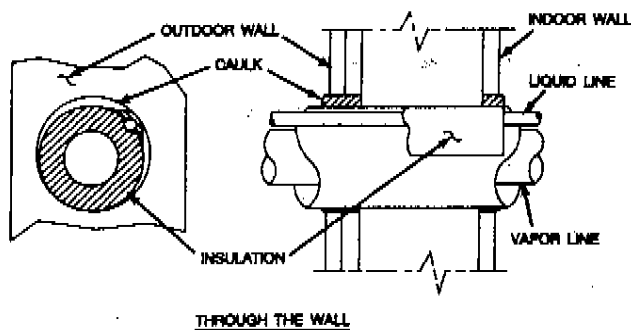
A. Installation Recommendations

1. Locate the unit away from windows.
2. Ensure that vapor and liquid line diameters are appropriate to the capacity of the unit. (See Table 1.)

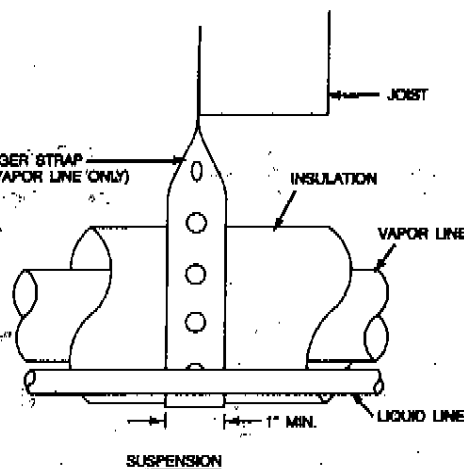
3. Run refrigerant tubes as directly as possible by avoiding unnecessary turns and bends.
4. Leave some slack between the structure and the unit to absorb vibration.
5. When passing refrigerant tubes through the wall, seal the opening with RTV or other pliable silicon-based caulk. (See Fig. 3.)
6. Avoid direct lineset contact with water pipes, ductwork, floor joists, wall studs, floors, and walls.
7. Do not suspend refrigerant tubing from joists and studs with a rigid wire or strap which comes in direct contact with the tubing. (See Fig. 3.)
8. Ensure that tubing insulation is pliable and it completely surrounds the vapor line.
9. When necessary, use hanger straps which are 1 in. wide and conform to the shape of the tubing insulation. (See Fig. 3.)
10. Isolate the hanger straps from the insulation by using metal sleeves bent to conform to the shape of the insulation.

If refrigerant tubes or indoor coil is exposed to atmospheric conditions for longer than 5 minutes, it must be evacuated to 500 microns to eliminate contamination and moisture in the system.

NOTE: AVOID CONTACT BETWEEN TUBING AND STRUCTURE



THROUGH THE WALL



SUSPENSION

Fig. 3—Piping Installation

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B. OUTDOOR UNIT CONNECTED TO FACTORY-APPROVED INDOOR UNIT

Outdoor unit contains correct system refrigerant charge for operation with indoor unit noted in ARI directory as tested combination when connected by 25 ft of field-supplied or factory accessory tubing. Check refrigerant charge for maximum efficiency. (See Section IX—Checking Charge.)

C. REFRIGERANT TUBING

Connect tubing to fittings on outdoor unit vapor and liquid service valves. (See Fig. 2 and 5.)

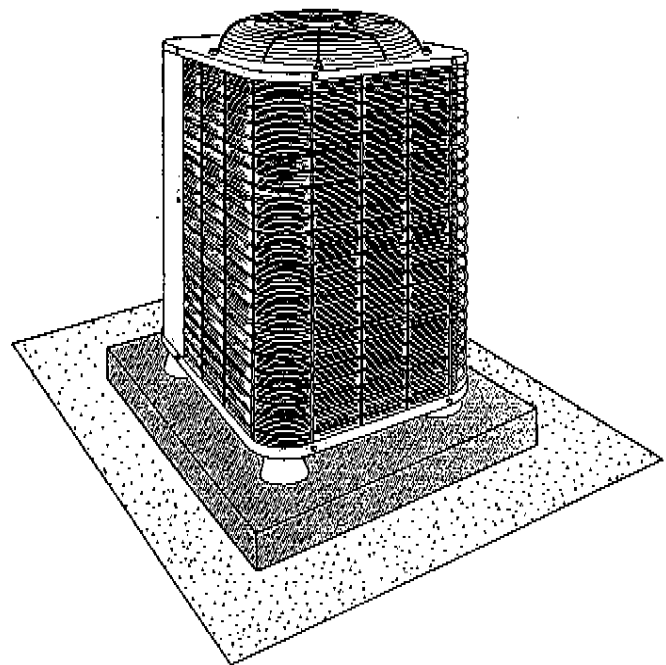


Fig. 4—Accessory Heat Pump Feet

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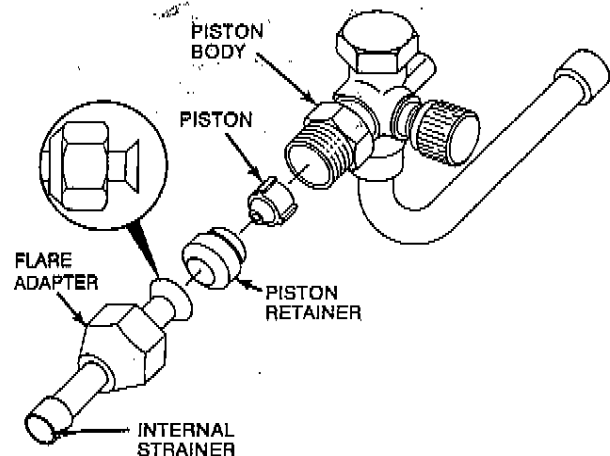


Fig. 5—Service Valve with Sweat Adapter Tube

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D. SWEAT CONNECTION

Use refrigerant grade tubing. Service valves are closed from factory and ready for brazing. After wrapping the service valve with a wet cloth, the tubing set can be brazed to the service valve using either silver bearing or non-silver bearing brazing material. Remove plastic retainer covering threads of liquid service valve and connect flare adapter provided to valve. (See Fig. 5.) Consult local code requirements. Refrigerant tubing and indoor coil are now ready for leak testing. This check should include all field and factory joints.



WARNING: Relieve pressure and recover all refrigerant before system repair or final unit disposal to avoid personal injury or death. Use all service ports and open all flow-control devices, including solenoid valves.



CAUTION: Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

CAUTION: A brazing shield **MUST** be used when tubing sets are being brazed to the service valves to prevent damage to the painted unit surface.

CAUTION: To avoid valve damage while brazing, service valves must be wrapped with a heat-sinking material such as a wet cloth.

VI. MAKE ELECTRICAL CONNECTIONS

Be sure field wiring complies with local and national fire, safety and electrical codes, and voltage to system is within limits shown on unit rating plate. Contact local power company for correction of improper voltage. See unit rating plate for recommended circuit protection device.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. See unit rating plate. Do not install unit in system where voltage may fluctuate above or below permissible limits.

NOTE: Use copper wire only between disconnect switch and unit.

CAUTION: It is imperative to connect 3-phase field power to unit with correct phasing. Incorrect phasing will cause reverse rotation of scroll compressor which will result in reduced current draw, elevated noise level and improper operation.

NOTE: If rotation is reversed in 3-phase application with scroll compressor, interchange any 2 of the 3 power connections on the field side.

NOTE: Install branch circuit disconnect per NEC of adequate size to handle unit starting current. Locate disconnect within sight from and readily accessible from unit per Section 440-14 of NEC.

WARNING: To avoid personal injury or death, do not supply power to unit with compressor terminal box cover removed.

A. ROUTE GROUND AND POWER WIRES

Remove access panel and control box cover to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box. (See Fig. 2.)

B. CONNECT GROUND AND POWER WIRES

Connect ground wire to ground connection in control box for safety. Connect power wiring to contactor as shown in Fig. 6.

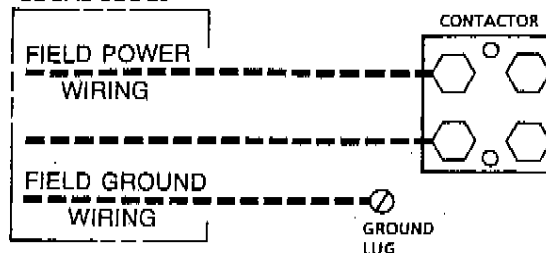
WARNING: According to NEC, ANSI/NFPA 70, and local codes, the cabinet must have an uninterrupted or unbroken ground, to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes. Failure to follow this warning could result in an electric shock, fire, or death.

C. CONNECT CONTROL WIRING

Route 24-v control wires through control wiring grommet and connect leads to control wiring terminal board. (See Fig. 7.)

Use No. 18 AWG color-coded, insulated (35° C minimum) wires. If thermostat is located more than 100 ft from unit (as measured along the control voltage wires), use No. 16 AWG color-coded wires to avoid excessive voltage drop.

DISCONNECT
PER N.E.C AND/OR
LOCAL CODES



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Fig. 6—Line Power Connections

Use furnace- or fan-coil transformer 24-v supply or use accessory transformer. Most systems require minimum 40 va. Use 60-v transformer on units installed with liquid line solenoid and multiple stage electric heaters.

NOTE: The defrost timer is factory set for 90-minute cycles. The timer can be field-set for 30- and 50-minute cycles depending on defrost conditions in your geographic location.

VII. INSTALL ELECTRICAL ACCESSORIES

Refer to the individual instructions packaged with the kits or accessories when installing.

CAUTION: Damage may occur to the scroll compressor if operated at a negative suction pressure during a system pumpdown.

VIII. START-UP

1. If equipped with a crankcase heater, energize a minimum of 24 hrs before starting unit. To energize heater only, set thermostat at OFF position and close electrical disconnect to outdoor unit.
2. Fully open liquid and vapor service valves.
3. Unit is shipped with valve stem(s) front seated, and caps installed. Replace stem caps after system is opened to refrigerant flow. Replace caps finger tight and tighten additional 1/6 turn using a backup wrench on valve body flats to prevent distortion of sheet metal.
4. Close electrical disconnects to energize system.
5. Set room thermostat at desired temperature.
6. Set room thermostat at HEAT or COOL and fan switch at ON or AUTO, as desired. Operate unit for 15 minutes. Check system refrigerant charge. (See Section IX.)

A. SEQUENCE OF OPERATION

With power supplied to indoor and outdoor units, transformer is energized.

COOLING

On a call for cooling, the thermostat makes circuits R-O, R-Y, and R-G. Circuit R-O energizes the reversing valve, switching it to cooling position. Circuit R-Y energizes the contactor, starting outdoor fan motor and compressor circuit. R-G energizes the indoor unit blower relay, starting the indoor blower motor on high speed.

When the thermostat is satisfied, its contacts open, de-energizing the contactor and blower relay. Compressor and motors should stop.

HEATING

On a call for heating, the thermostat makes circuits R-Y and R-G. Circuit R-Y energizes contactor, starting outdoor fan motor and compressor. Circuit R-G energizes the indoor blower relay, starting the blower motor on high speed.

Should the temperature continue to fall, R-W2 is made through the second-stage room thermostat bulb. Circuit R-W2 energizes a sequencer, bringing on the first bank supplemental electric heat and providing electrical potential to the second heater sequencer (if used). If the outdoor temperature falls below the setting of the outdoor thermostat (field-installed option), the contacts close to complete the circuit and bring on the second bank of supplemental electric heat.

When the thermostat is satisfied, its contacts open, de-energizing the contactor and sequencer. All heaters and motors should stop.

DEFROST

The defrost control is a time/temperature control which includes a field-selectable (quick connects located at board edge) time period between defrost cycles (30, 50, and 90 minutes), factory set at 90 minutes.

The electronic timer and the defrost cycle will start offly when the contactor is energized and the defrost thermostat is closed.

The defrost mode is identical to the cooling mode except that the outdoor fan motor stops and a second-stage heat is turned on to continue warming the conditioned space.

IX. CHECKING CHARGE

Factory charge is shown on unit rating plate. (See Fig. 2.)

Adjust charge in cooling mode by following procedure shown on the subcooling charge tables located on unit information plate. Check charge in heating by following procedure shown on heating check chart located on unit information plate.



WARNING: Service valve gage ports are equipped with Schrader valves. To prevent personal injury wear safety glasses and gloves when handling refrigerant.



CAUTION: Compressor damage may occur if system is overcharged.



CAUTION: Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

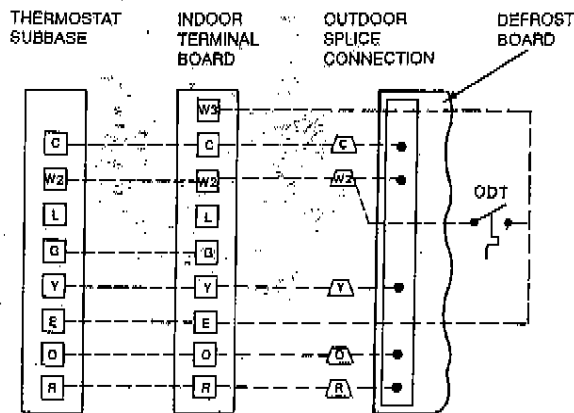
CARE AND MAINTENANCE

For continuing high performance, and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. Consult your servicing contractor or users manual for the proper frequency of maintenance. Frequency of maintenance may vary depending upon geographic areas, such as coastal applications.

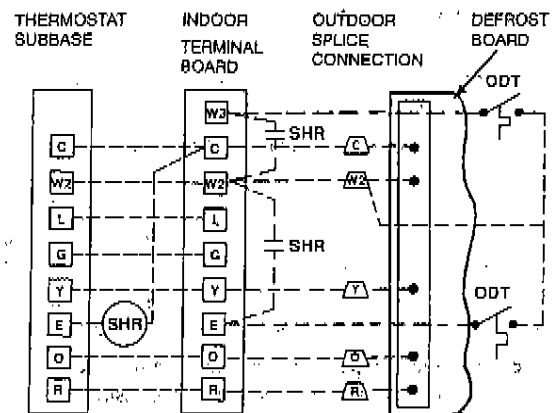
I. LEAVE USER'S MANUAL WITH HOMEOWNER

Explain system-operation and maintenance procedures outlined in User's Manual.

SYSTEMS WITH ONE OUTDOOR THERMOSTAT



SYSTEMS WITH TWO OUTDOOR THERMOSTATS



— FACTORY WIRING
 --- FIELD WIRING
 ODT OUTDOOR THERMOSTAT
 SHR SUPPLEMENTAL HEAT RELAY
 △ FIELD SPLICE

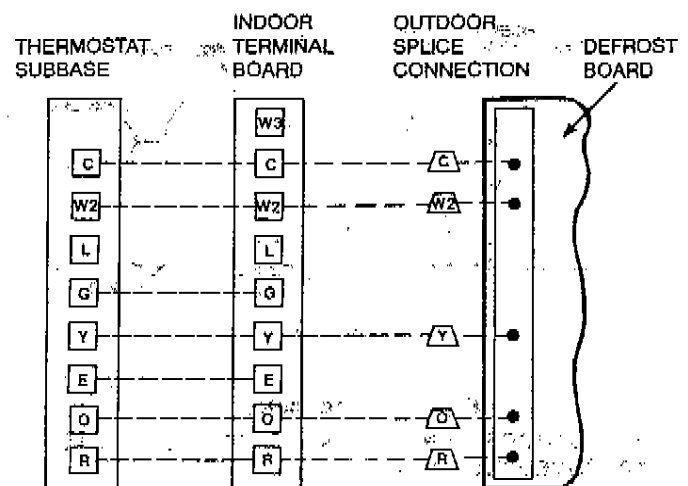
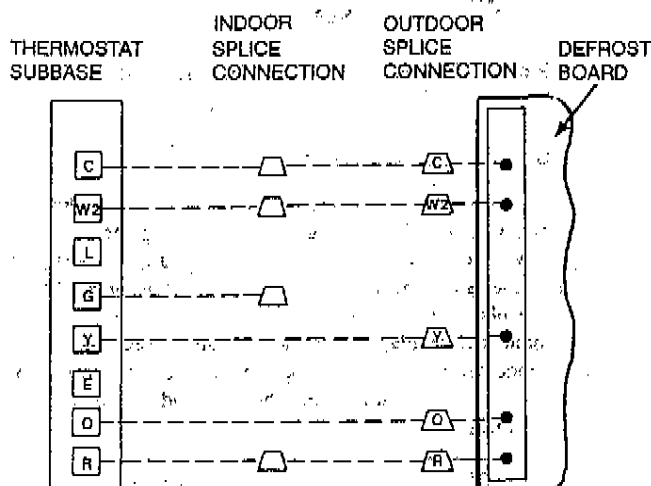
USED WITH FB4, FB5, FC4, FA4, FH4, FK4 FAN COILS

USED WITH FB4, FB5, FC4, FA4, FH4, FK4 FAN COILS

REMOVE BREAK-OFF JUMPERS ON INDOOR FAN COIL CIRCUIT BOARD WHEN INSTALLING OUTDOOR THERMOSTATS

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SYSTEMS WITHOUT OUTDOOR THERMOSTATS



— FACTORY WIRING
 --- FIELD WIRING
 △ FIELD SPLICE

USED WITH FD3, FF1 FAN COILS

USED WITH FB4, FB5, FC4, FA4, FH4, FK4 FAN COILS

Fig. 7—Typical Circuit Connections

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