

Common Installation and Start-Up Practices

NOTE: Read the entire instruction manual before starting the installation. Refer to Model Specific Instructions included in this packet.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, 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, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or 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 which **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, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label. Electrical shock can cause personal injury or death.

INSTALLATION RECOMMENDATIONS

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

1. Locate the unit away from windows.
2. Ensure that vapor and liquid tube diameters are appropriate to the capacity of the unit.
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. 1.)
6. Avoid direct tubing 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. 1.)
8. Ensure that tubing insulation is pliable and completely surrounds the vapor tube.
9. When necessary, use hanger straps which are 1 in. wide and conform to the shape of the tubing insulation. (See Fig. 1.)
10. Isolate the hanger straps from the insulation by using metal sleeves bent to conform to the shape of the insulation.

NOTE: Avoid contact between tubing and structure

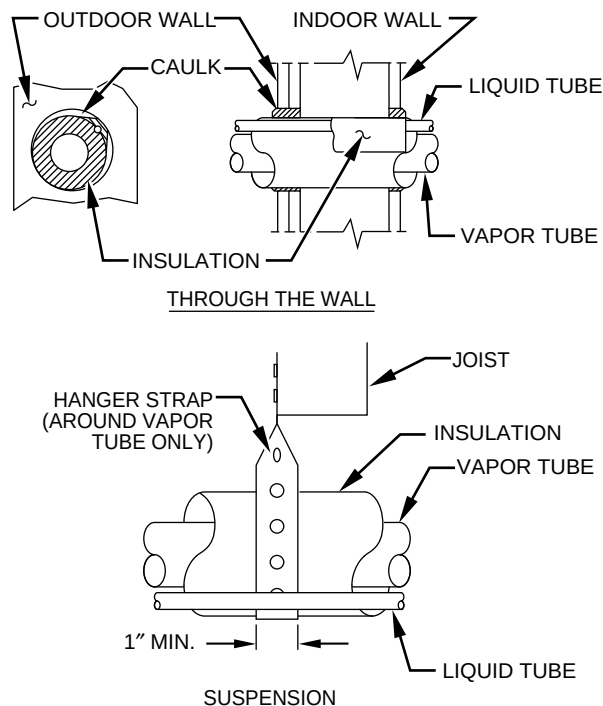


Fig. 1—Connecting Tubing Installation

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When outdoor unit is connected to factory-approved indoor unit, outdoor unit contains system refrigerant charge for operation with indoor unit of the same size when connected by 15 ft of field-supplied or factory accessory tubing. For proper unit operation, check refrigerant charge using charging information located on control box cover.

INSTALLATION

Step 1—Check Equipment and Jobsite

INSPECT EQUIPMENT—File claim with shipping company prior to installation if shipment is damaged or incomplete. Locate unit rating plate on unit service panel. It contains information needed to properly install unit. Check rating plate to be sure unit matches job specifications.

Step 2—Install on a Solid, Level Mounting Pad

If conditions or local codes require the unit be attached to pad, tiedown bolts should be used and fastened through knockouts provided in unit base pan. Refer to Model Specific Instructions to determine base pan size and knockout hole location.

Step 3—Clearance Requirements

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Common clearances are 6 in. on 1 side, 12 in. on 2 sides, and 30 in. on service side of unit. Allow 24 in. between units. Discharge air must be unobstructed and must not recirculate.

Position so snow, ice, or water 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.

Step 4—Operating Ambients

The minimum outdoor operating ambient in cooling mode is 55°F, and the maximum outdoor operating ambient in cooling mode is 125°F. The maximum outdoor operating ambient in heating mode is 66°F.

Step 5—Elevate Unit

⚠ CAUTION

Accumulation of water and ice in base pan may cause equipment damage.

In areas where prolonged freezing temperatures are encountered, elevate unit per local climate and code requirements to provide clearance above estimated snowfall level and ensure adequate drainage of unit.

Step 6—Metering Device

Some units require a thermostatic expansion valve (TXV) be installed on indoor unit. Refer to Model Specific Instructions for TXV installation.

⚠ CAUTION

Remove indoor coil piston if unit is to be installed on system with a TXV metering device.

If unit is being installed with piston, check indoor coil piston to see if it matches the required piston shown on unit rating plate. If it does not match, replace indoor coil piston with piston shipped with outdoor unit. The piston shipped with outdoor unit is correct for any approved indoor coil combination.

Step 7—Make Tubing Connections

⚠ 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

To prevent compressor damage DO NOT bury more than 36 in. of refrigerant tubing. If ANY tubing is buried, provide 6 in. vertical rise at service valve.

⚠ CAUTION

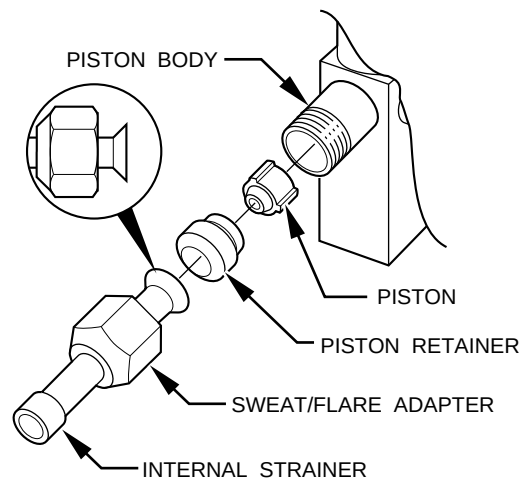
To prevent damage to unit or service valves observe the following:

- Use a brazing shield.
- Wrap service valves with wet cloth or use a heat sink material.

Connect outdoor unit to indoor sections using accessory tubing package or field-supplied tubing of refrigerant grade, correct size, and condition. For tubing requirements beyond 50 ft, consult your local distributor or the Long-Line Application Guideline.

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

SWEAT CONNECTION — Remove plastic retainer holding outdoor piston in the liquid service valve and connect sweat/flare adapter provided to valve. (See Fig. 2.) Connect refrigerant tubing to fittings on outdoor unit vapor and liquid service valves. 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. Consult local code requirements. Refrigerant tubing and indoor coil are now ready for leak testing. This check should include all field and factory joints.



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Fig. 2—Liquid Service Valve

Step 8—Make Electrical Connections

⚠ WARNING

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

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 or phase imbalance (3 phase) may fluctuate above or below permissible limits.

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

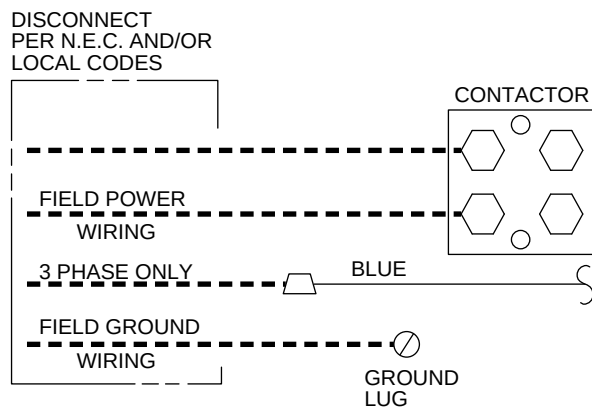
NOTE: Install branch circuit disconnect per NEC of adequate size to handle unit starting current. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC.

ROUTE GROUND AND POWER WIRES — Remove access panel to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box.

⚠ WARNING

The unit 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 can result in an electric shock, fire, or death.

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. 3.



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Fig. 3—Line Power Connections

CONNECT CONTROL WIRING — Route 24-v control wires through control wiring grommet and connect leads to control wiring. (See Fig. 4.)

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

Use furnace transformer, fan coil transformer, or accessory transformer for control power, 24-v/40va minimum.

NOTE: Use of available 24-v accessories may exceed the minimum 40-v power requirement. Determine total transformer loading and increase the transformer capacity or split the load with an accessory transformer as required.

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 geographical location.

Step 9—Compressor Crankcase Heater

When equipped with a crankcase heater, energize heater a minimum of 24 hrs before starting unit. To energize heater only, set thermostat to OFF position and close electrical disconnect to outdoor unit.

A crankcase heater is required if the refrigerant tubing is longer than 50 ft.

NOTE: The Seasonal Energy Efficiency Ratio (SEER) and Heating Seasonal Performance Factor (HSPF) is obtained with the crankcase heater de-energized. To de-energize the crankcase heater, disconnect the black crankcase heater wires at the contac-

tor. After disconnecting, make sure wires are isolated from all other electrical connections and components to prevent electrical shorting.

Step 10—Install Electrical Accessories

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

Step 11—Start-up and Check Charge

⚠ CAUTION

To prevent compressor damage or personal injury, observe the following:

- Do not overcharge system with refrigerant.
- Do not operate unit in a vacuum or at negative pressure.
- Do not disable low-pressure switch

In scroll compressor applications:

- Dome temperatures may be hot.
- In 3 phase application, incorrect phasing will cause reverse rotation, resulting in elevated noise levels, equalized pressures and reduced current draw. Correct by reversing power connection L1 and L2 on contactor.

⚠ CAUTION

To prevent personal injury wear safety glasses, protective clothing, and gloves when handling refrigerant and observe the following:

- Back seating service valves are not equipped with Schrader valves. Fully back seat (counter clockwise) valve stem before removing gage port cap.
- Front seating service valves are equipped with Schrader valves.

⚠ CAUTION

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

Follow these steps to properly charge a system.

1. Fully back seat (open) liquid and vapor tube service valves.
2. Unit is shipped with valve stem(s) front seated (closed) and caps installed. Replace stem caps after system is opened to refrigerant flow. Replace caps finger-tight and tighten with wrench an additional 1/6 turn for front seating valves (female hex stem) or 1/12 turn for back seating valves (male square stem).
3. Close electrical disconnects to energize system.
4. Set room thermostat at desired temperature.
5. Set room thermostat to HEAT or COOL and fan switch to ON or AUTO, as desired. Operate unit for 15 minutes. Check system refrigerant charge.
6. Factory charge is shown on unit rating plate. Adjust charge in cooling mode by following procedure shown on the charging table. Check charge in heating mode by following procedure shown on heating check chart. Both are located on unit.

SEQUENCE OF OPERATION

NOTE: Defrost control board may be equipped with 5-minute lockout timer which may be initiated upon any interruption of power.

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 the 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.

NOTE: If indoor unit is equipped with a time-delay relay circuit, the blower will run an additional 90 sec to increase system efficiency.

Heating

On a call for heating, the thermostat makes circuits R-Y and R-G. Circuit R-Y energizes contactor, starting the 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 of 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.

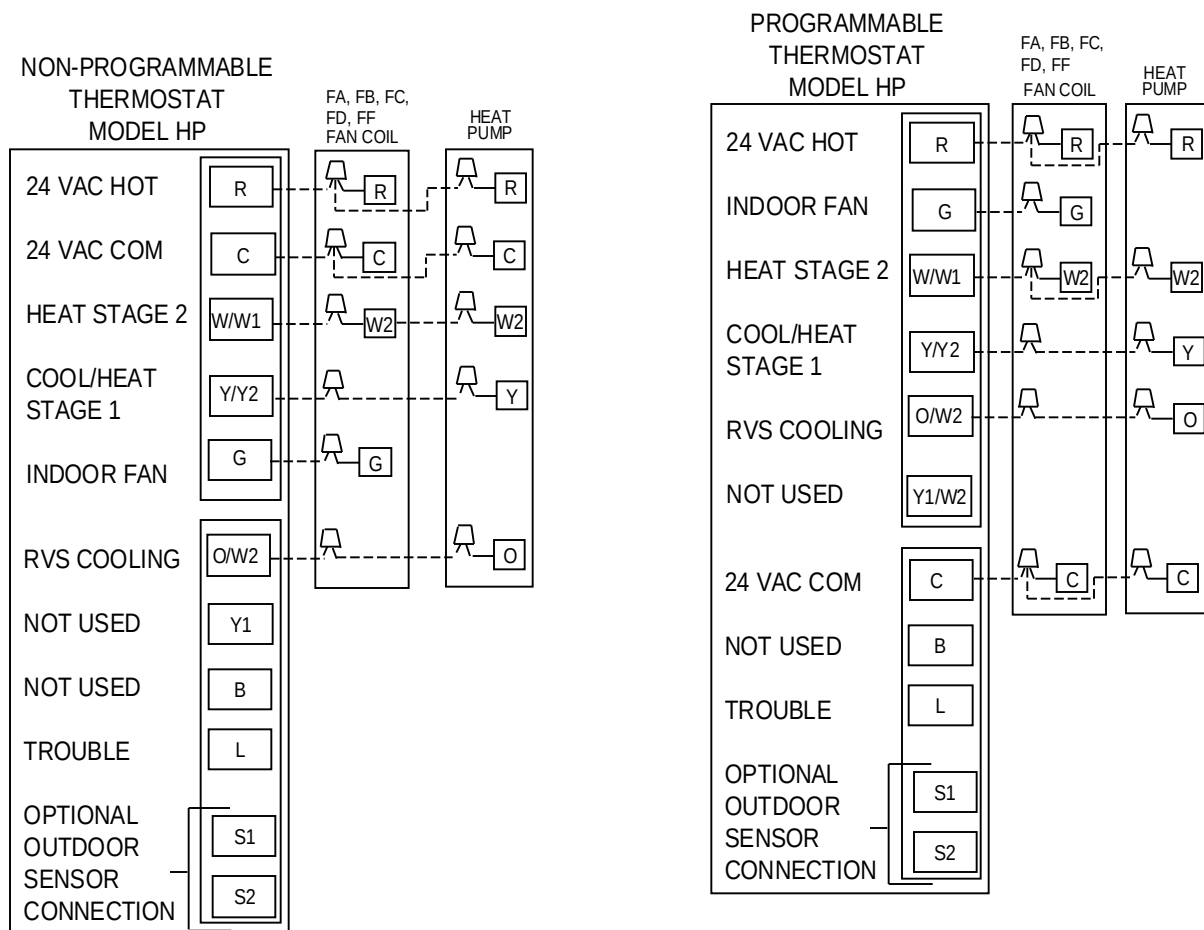
The electronic timer and the defrost cycle start only when the contactor is energized and the defrost thermostat is closed.

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

CARE AND MAINTENANCE

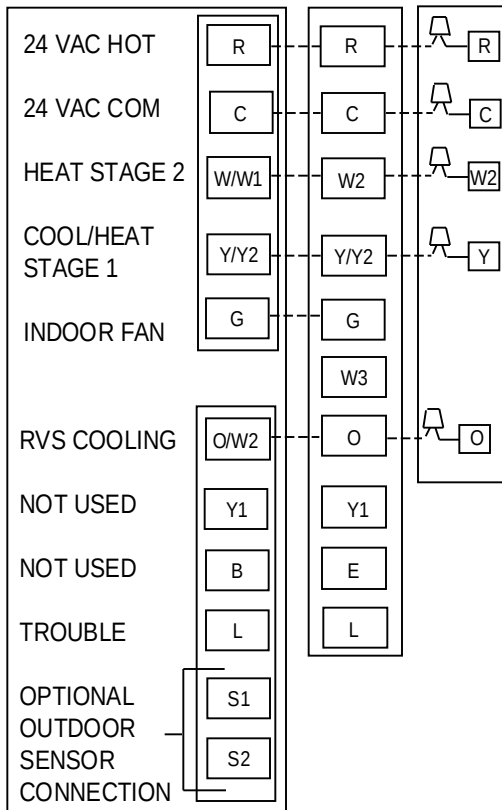
For continuing high performance and to minimize possible equipment failure, it is essential that periodic maintenance **must** be performed on this equipment.

Leave User's Manual with homeowner. Explain system operation and periodic maintenance requirements outlined in manual. Frequency of maintenance may vary depending upon geographic areas, such as coastal applications which require more frequent maintenance.

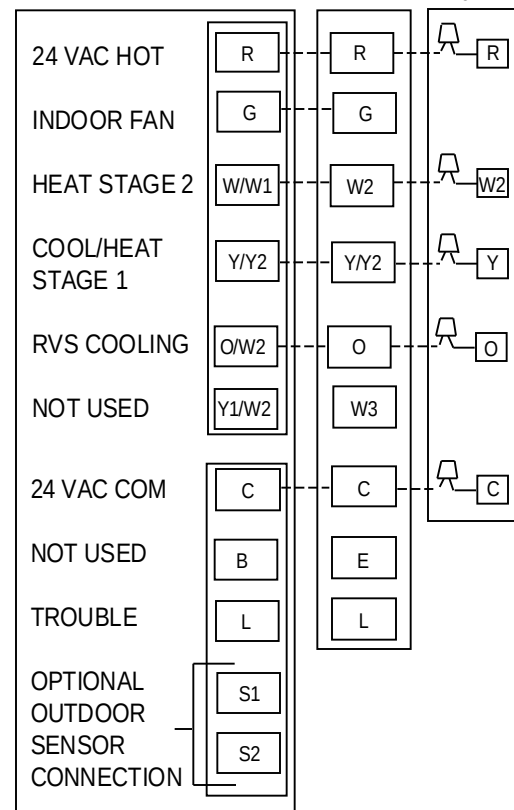


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Fig. 4—Typical 24-v Circuit Connections

NON-PROGRAMMABLE
THERMOSTAT
MODEL HP



PROGRAMMABLE
THERMOSTAT
MODEL HP



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Fig. 4—Typical 24-v Circuit Connections (continued)

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NOTES:

1. WIRING MUST CONFORM TO NEC OR LOCAL CODE.
2. SOME UNITS ARE EQUIPPED WITH PRESSURE SWITCH(ES), TEMPERATURE SWITCH, OR 5 MINUTE COMPRESSOR CYCLE PROTECTION. CONNECT 24 VOLT FIELD WIRING TO FACTORY PROVIDED STRIPPED LEADS.
3. A LIQUID LINE SOLENOID VALVE IS REQUIRED ON SOME UNITS. SEE SPECIFIC UNIT INSTRUCTIONS.
4. THERMOSTATS ARE FACTORY CONFIGURED WITH 5 MINUTE COMPRESSOR CYCLE PROTECTION AND 4 CYCLES PER HOUR LIMIT. SEE THERMOSTAT INSTRUCTIONS FOR DETAILS.
5. TO STAGE THE ELECTRIC RESISTANCE HEAT, CONSULT OUTDOOR THERMOSTAT INSTALLATION INSTRUCTIONS.

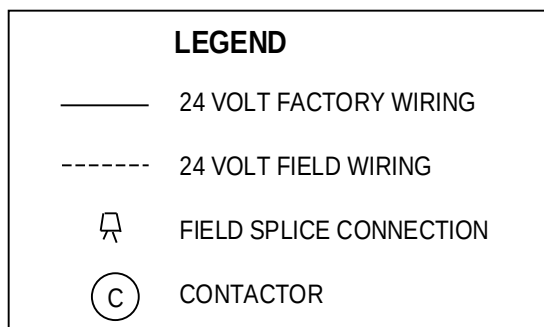


Fig. 4—Typical 24-v Circuit Connections (continued)

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SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

A large selection of product, theory, and skills programs is available, using popular video-based formats and materials. All include video and/or slides, plus companion book.

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