TTA-**IOM**-3
18-AC60D7

INSTALLATION
OPERATION
MAINTENANCE

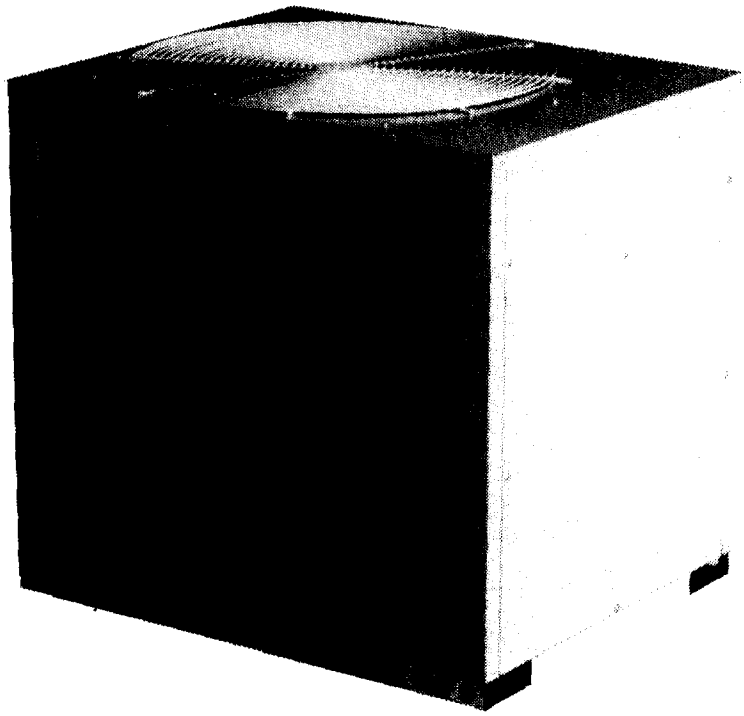
Library	Service Literature
Product Section	Unitary
Product	Split System
Model	TTA
Literature Type	Installation/Operation/Maintenance
Sequence	3
Date	November 1991
File No.	SV-UN-S/S-TTA-IOM 3 11/91
Supersedes	New

Models:

TTA090A_____B TTA150B_____B TTA120C_____B
TTA120A_____B TTA180B_____B TTA180C_____B
TTA120B_____B TTA240B_____B

Split System Cooling Condenser
7½, 10, 12½, 15, and 20 Ton

IMPORTANT— This Document is customer property and is to remain with this unit. Please return to service information pack upon completion of work.



All phases of this installation must comply with the NATIONAL, STATE & LOCAL CODES. In the absence of local codes, the installation must conform with National Electric Code—ANSI/NFPA NO. 70 LATEST REVISION.

Unit Model Number Description

Products are identified by a multiple-character model number that precisely identifies a particular type of unit. An explanation of this multiple-character number is shown below. It will enable the owner or Service Engineer to define operation, components and applicable accessories for a specific unit.

Unit Model Nomenclature

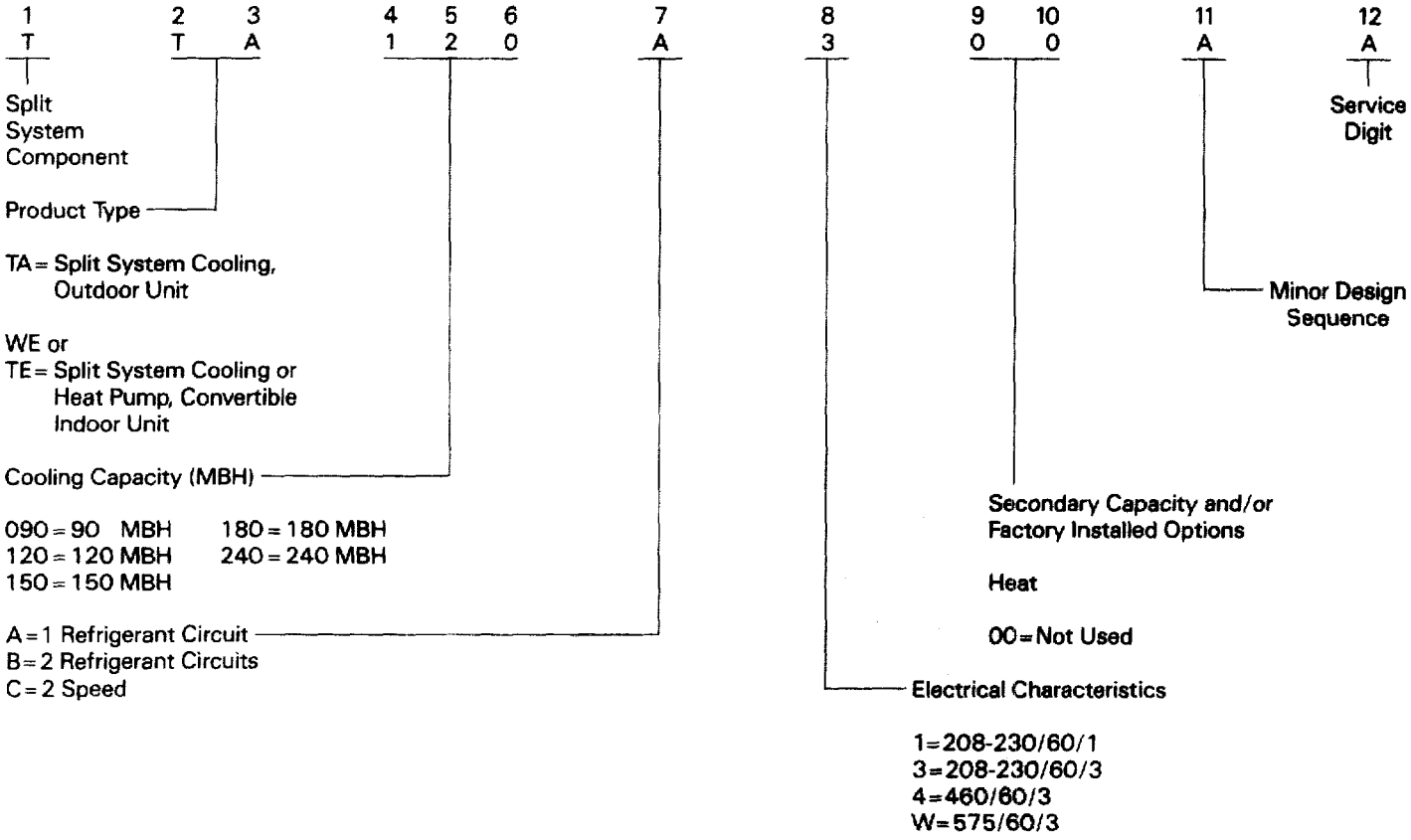


Table of Contents

Figure 1 Dimensional Data, Connection Locations & Clearances

MODEL NUMBER	DIMENSIONS								
	A	B	C	D	E	F	G	H	J
TTA090A	41 3/16	33 15/16	38 3/4	34 25/32	21 11/16	29 11/16	30 11/64	9 3/16	9 29/32
TTA120A,C	51 3/16	37 15/16	38 3/4	44 25/32	25 11/16	33 3/4	34 13/64	9 17/64	9 63/64
TTA120B & 150B	51 3/16	37 31/32	38 3/4	44 25/32	25 11/16	33 3/4	34 13/64	N/A*	N/A*

*See dimensional drawings; alternate hole pattern dual circuit units only.

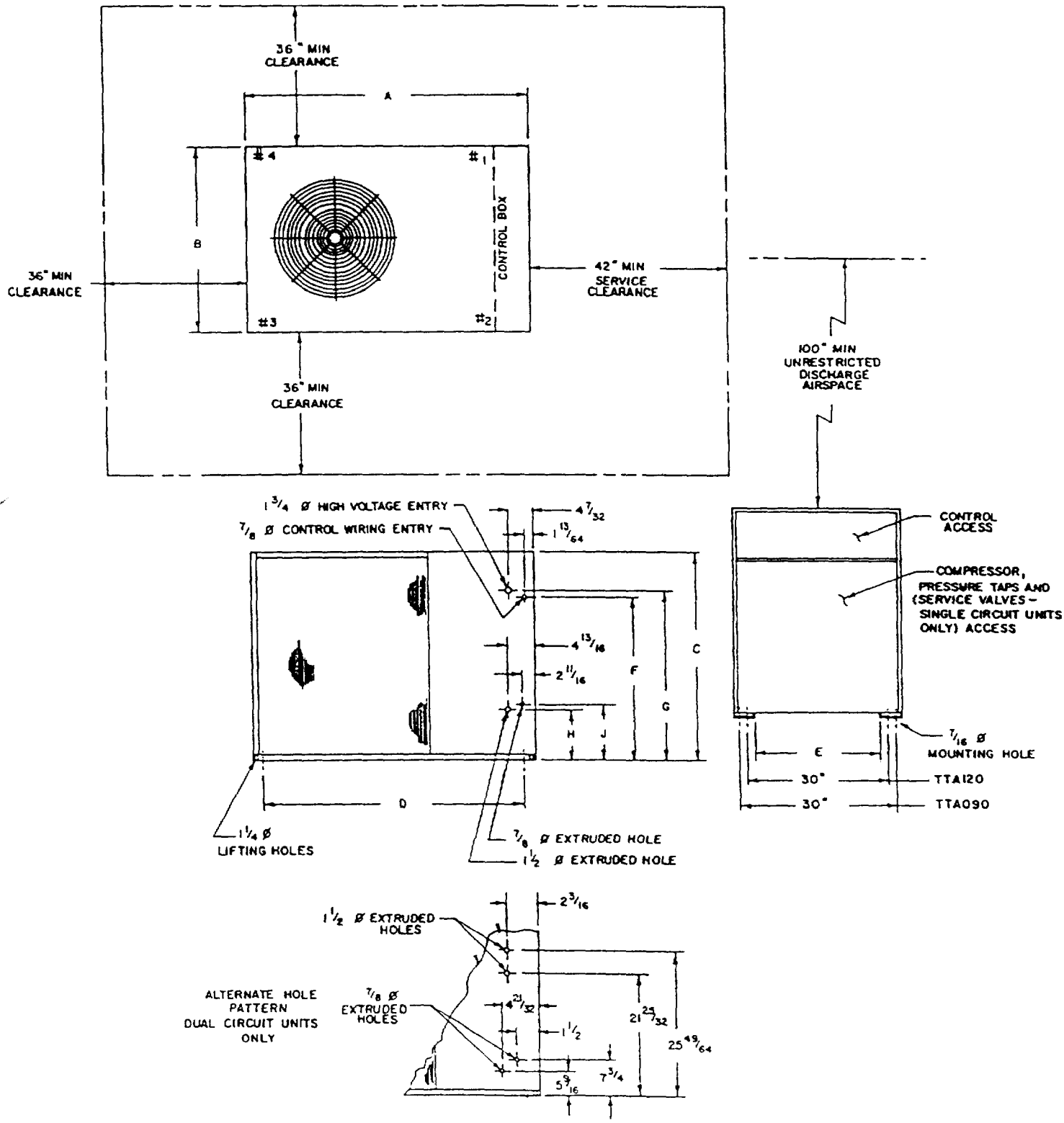
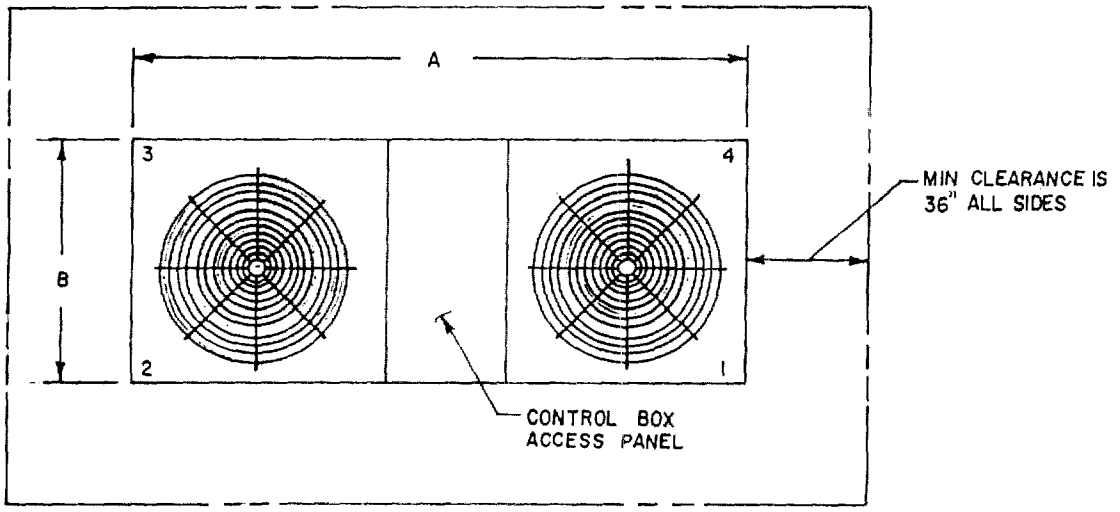
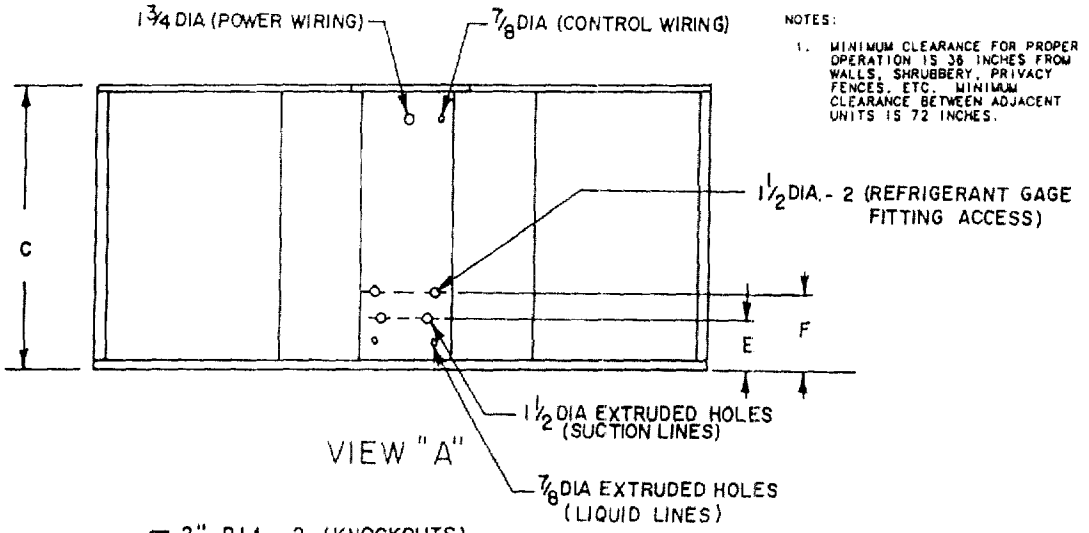
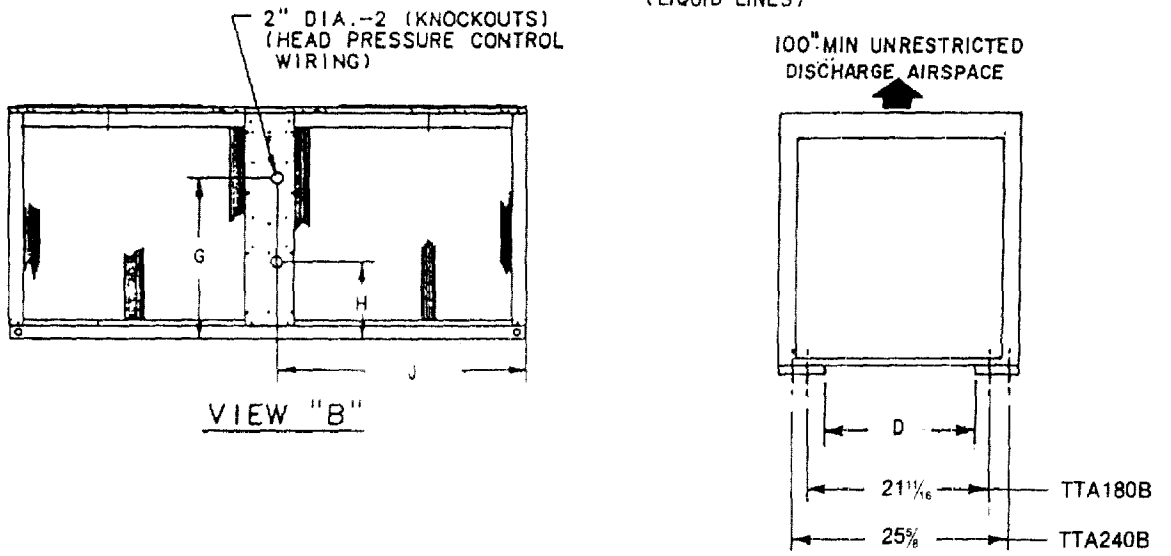


Figure 1a Dimensional Data, Connection Locations & Clearances

MODEL NUMBER	DIMENSIONS								
	A	B	C	D	E	F	G	H	J
TTA180B,C	88 3/16	33 15/16	38 11/16	21 11/16	10 15/16	13 7/16	26 7/8	12 7/8	31 11/32
TTA240B	93 1/2	44	44 3/4	25 5/8	8 13/16	10 1/16	32 13/16	18 13/16	45 5/16







General Information

This manual covers the installation of the TTA090 and 120A (single circuit), the TTA120, 150, 180, and 240B (dual circuit), and the TTA120, 180C (two speed scroll compressor) split system outdoor units. Installation procedures should be performed in the sequence that they appear in this manual. Do not destroy or remove the manual from the unit. The manual should remain weather-protected with the unit until all installation procedures are complete.

Note: *It is not the intention of this manual to cover all possible variations in systems that may occur or to provide comprehensive information concerning every possible contingency that may be encountered during an installation. If additional information is required or if specific problems arise that are not fully discussed in this manual, contact your local Sales office.*

Note: *"Warnings" and "Cautions" appear at appropriate places in this manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The Company assumes no liability for installations or servicing performed by unqualified personnel.*

Installation Checklist

An "Installation Checklist" is provided at the end of the installation section of this manual. Use the checklist to verify that all necessary installation procedures have been completed. Do not use the checklist as a substitute for reading the information contained in the manual. Read the entire manual before beginning installation procedures.

Unit Inspection

Inspect material carefully for any shipping damage. If damaged, it must be reported to, and claims made against the transportation company. Compare the information that appears on the unit nameplate with ordering and submittal data to insure the proper unit was shipped. Available power supply must be compatible with electrical characteristics specified on component nameplates. Replace damaged parts with authorized parts only.

Inspection Checklist

To protect against loss due to damage incurred in transit, complete the following checklist upon receipt of the unit.

☐ Inspect individual pieces of the shipment before accepting the unit. Check for obvious damage to the unit or packing material.

☐ Inspect the unit for concealed damage before it is stored and as soon as possible after delivery. Concealed damage must be reported within 15 days. If concealed damage is discovered, stop unpacking the shipment. Do not remove damaged material from the receiving location. Take photos of the damage if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.

☐ Notify the carrier's terminal of damage immediately by phone and by mail. Request an immediate joint inspection of the damage by the carrier and the consignee.

☐ Notify the sales representative and arrange for repair. Do not repair the unit until the damage is inspected by the carrier's representative.

Initial Leak Test

All TTA units are shipped with a holding charge of R-22 in each circuit. Remove the compressor access panel(s) shown in Figure 1 and Figure 1a. Locate the liquid line or suction line gauge port for each circuit. Momentarily crack open the charging port to determine if the circuits are still pressurized. If refrigerant escapes, the holding charge is intact. If not, the charge has escaped. Leak test and repair as required to obtain a leak-free circuit.

Table 1 Total Unit Weight and Corner Weights (lbs)

Model	Shipping Maximum	Net Maximum	corner weights #1	#2	#3	#4
TTA090A	416	365	120	99	66	80
TTA120A	461	406	141	111	68	86
TTA120B	514	460	153	145	79	83
TTA150B	542	488	153	156	90	89
TTA180B	801	722	210	204	152	156
TTA240B	947	848	173	251	174	250
TTA120C	490	435	156	113	70	96
TTA180C	824	745	164	202	209	170

⚠ WARNING: OPEN AND LOCK UNIT DISCONNECT TO PREVENT INJURY OR DEATH FROM ELECTRIC SHOCK OR CONTACT WITH MOVING PARTS BEFORE ATTEMPTING ANY INSTALLATION OR MAINTENANCE.

Installation

Lifting Recommendations

Before preparing the unit for lifting, estimate the approximate center of gravity for lifting safety. Because of placement of internal components, the unit weight may be unevenly distributed. Approximate unit weights are given in Table 1.

⚠ WARNING: ON-SIGHT LIFTING EQUIPMENT MUST BE CAPABLE OF LIFTING THE UNIT WEIGHT WITH AN ADEQUATE SAFETY FACTOR. THE USE OF UNDER-CAPACITY LIFTING DEVICES MAY RESULT IN SEVERE PERSONAL INJURY OR DEATH AND CAN SERIOUSLY DAMAGE THE UNIT.

The crated unit can be moved using a forklift of suitable capacity. For lifting the unit, attach lifting straps or slings securely to the lifting holes at each corner. Use spreader bars to protect the unit casing from damage. Test lift the unit to determine proper balance and stability.

CAUTION: *Use spreader bars to prevent lifting straps from damaging the unit. Install bars between lifting straps. This will prevent the straps from crushing the unit cabinet or damaging the unit finish.*

Clearances

Provide enough space around the unit to allow unrestricted access to all service points. Refer to Figure 1 and 1a for unit dimensions and minimum required service and free air clearances. Observe the following points to insure proper unit operation.

A. Do not install the unit under a low overhang. Condenser discharge must not be restricted. See Figure 1 and 1a.

Important: *Do not obstruct condenser discharge air. This can result in warm air re-circulation through the coil.*

B. Do not locate the unit in a position where runoff water can fall into the fan discharge openings.

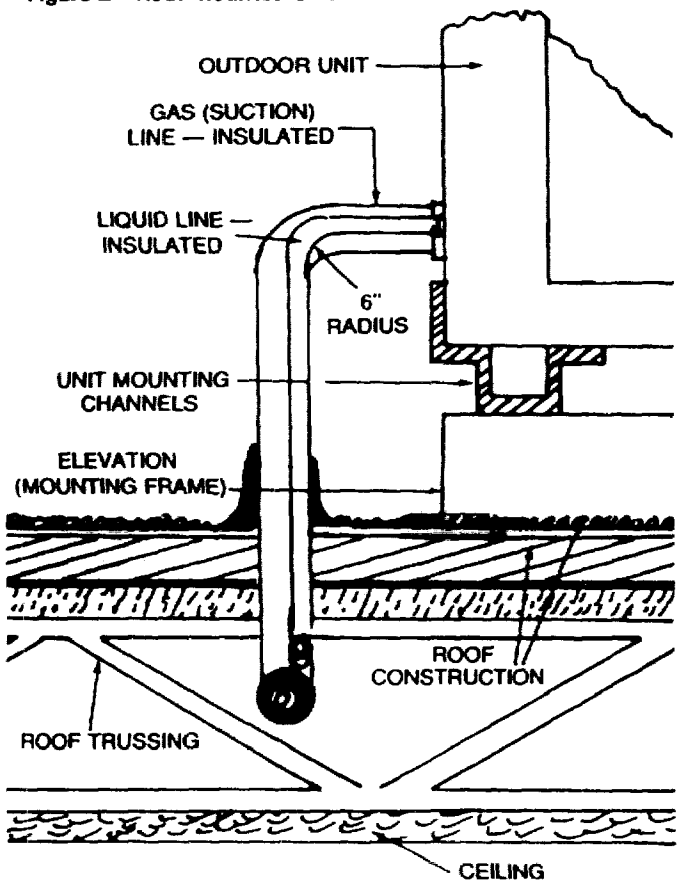
C. Condenser intake air is supplied from three sides of the unit. Adhere to the minimum required clearances given in Figure 1 and 1a.

Unit Mounting

Rooftop Mounting

If the unit will be roof mounted, determine for certain that the structure is strong enough to support the unit and any required accessories. Unit weights are given in Table 1.

Figure 2 Roof Mounted Unit



⚠ WARNING: ENSURE THAT THE ROOF STRUCTURAL SUPPORTS ARE STRONG ENOUGH TO SUPPORT THE WEIGHT OF THE UNIT AND ANY ACCESSORIES. FAILURE TO DO THIS CAN RESULT IN PERSONAL INJURY OR DEATH DUE TO STRUCTURAL FAILURE AND CAN SERIOUSLY DAMAGE THE UNIT AND THE BUILDING.

The unit should be elevated on a level, field-fabricated four-inch steel or wood 4" x 4" mounting frame. Complete the frame and secure it into position before lifting the unit to the roof. The mounting frame must support a minimum of three of the unit's four sides and should span roof supports to distribute the load on the roof.

Ground Level Mounting

"For ground level installation, the unit base should be adequately supported and hold the unit near level. The installation must meet the guidelines set forth in local codes." The support should extend two inches beyond the unit base channels at all points. The unit and support must be isolated from any adjacent structure to prevent possible noise or vibration problems. Any ground level location must comply with required clearances given in Figure 1 and 1a.

Refrigerant Piping

Structural Preparation

Holes must be made in the structure to run refrigerant lines. For the majority of ground-level installations, the holes can be made in the header that rests on top of the foundation. Alternatively, these holes may also be made in the foundation itself. On roof-mounted units, refrigerant lines should enter the building as close to the unit as possible; preferably within three to four inches of the refrigerant connection on the unit, plus a six-inch (long radius) 90 degree ell entering the building. (See Figure 2)

Refrigerant Piping Guidelines

A. Maximum recommended line lengths: (per circuit)

Maximum linear length	80 Ft. (w/o accumulator)
Maximum suction line lift	60 Ft.
Maximum liquid line lift	60 Ft.

B. Maximum allowable pressure drops (R-22):

Suction line	6 psi
Liquid line (without subcooler)	35 psi

Route refrigerant piping for minimum linear length, minimum number of bends and fittings (no reducers) and minimum amount of line exposed to outdoor ambients.

C. Recommended line sizes:

	TTA090A & TTA120A (single circuit) TTA150B, TTA180B and TTA240B (dual circuit) TTA120C (two speed)
Suction line	1⅜ inch sealed type L refrigerant tubing.
Liquid line	½ inch sealed type L refrigerant tubing.

D. Recommended line sizes: TTA120B, (dual circuit)

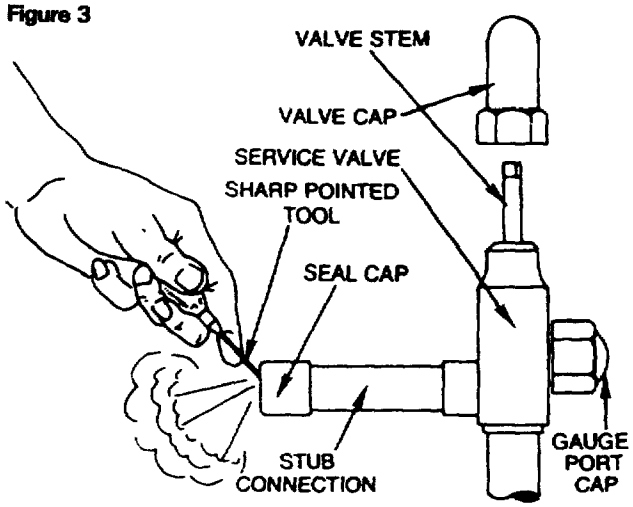
Suction line	1⅛ inch sealed type L refrigerant tubing.
Liquid line	⅜ inch sealed type L refrigerant tubing.

E. Recommended line sizes: TTA180C, (two speed)

Suction line	1⅝ inch sealed type L refrigerant tubing.
Liquid line	⅝ inch sealed type L refrigerant tubing.

Note: *Insulate all refrigerant piping and connections.*

Figure 3



Refrigerant Piping Procedures (Outdoor Units)

Each TTA unit ships with a holding charge (approximately ½ pound) of R-22 in each circuit. Due to this minimal amount, we recommend that it be removed and the entire system evacuated (at the proper time) to avoid possible contamination.

1. Remove the compressor service access panel.
2. Locate the liquid and suction line gauge ports.

Important Note: *The TTA090A, 120A, 120C, 180B, 180C and 240B units have standard service valves, shipped 1/4 turn off front seat.*

The TTA120B and 150B units have a 1/4 turn ball valve on the suction line and a multi-turn valve on the liquid line. They are shipped closed.

3. The holding charge must be disposed of properly before removing the seal caps on the connection stubs.

⚠ WARNING: DO NOT HEAT THE SEAL CAPS UNLESS THEY HAVE BEEN PUNCTURED. IF CAPS ARE INTACT, APPLICATION OF HEAT MAY GENERATE EXCESSIVE PRESSURE IN THE CONNECTION STUB, CAUSING PERSONAL INJURY OR DEATH DUE TO RUPTURING OF COMPONENTS AND DAMAGE TO THE SERVICE VALVE, IF APPLICABLE.

4. On units with service valves, back seat the valve, remove the gauge port cap and attach suitable hose and recovery equipment to the gauge port. Turn the valve stem approximately ¼ turn clockwise to release refrigerant.
5. On units without service valves, connect hose and recovery equipment to the gauge port to release refrigerant.
6. Heat and remove the seal caps.

CAUTION: *Do not remove the seal caps from refrigerant connections until prepared to braze refrigerant lines to the connections. Excessive exposure to atmosphere may allow moisture or dirt to contaminate the system, damaging valve seats and causing ice formation in system components.*

7. Cut, fit and braze tubing, starting at the outdoor unit and work toward the indoor unit.

Note: *Use long radius ells for all 90 degree bends.*

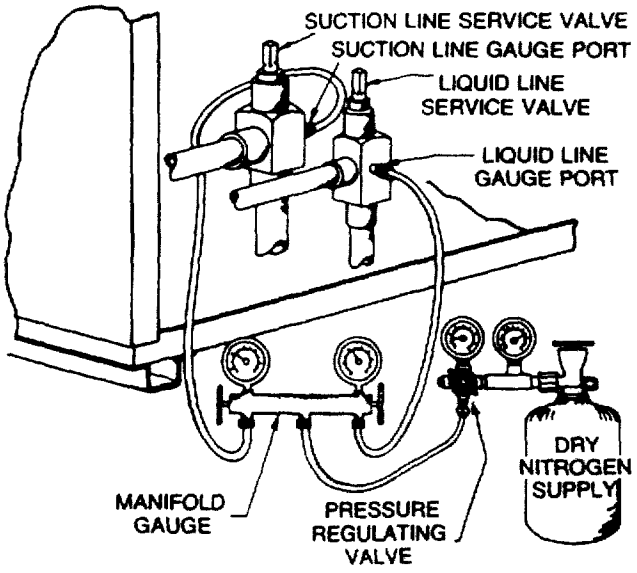
All brazing should be done using a 2 to 8 psig dry nitrogen purge flowing through the pipe being brazed (See Figure 4).

CAUTION: *Install a regulating valve between the nitrogen source and the gauge manifold (See Figure 4). Unregulated pressures can damage system components.*

CAUTION: *Wet-wrap all valves and protect painted surfaces from excessive heat. Heat can damage system components and the unit finish.*

8. Shut off nitrogen supply.
9. Shut off the manifold valve for the line that is connected to the suction line gauge port. Disconnect the line from the gauge port.

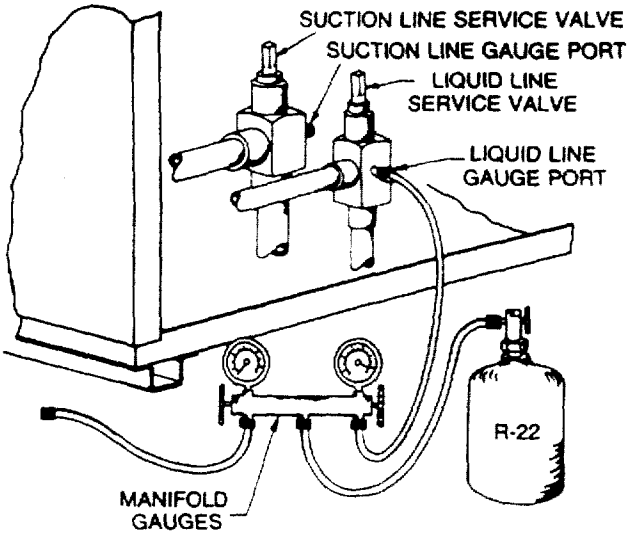
Figure 4



Refrigerant Piping Procedure (Indoor Unit)
Once liquid and suction lines are complete as far as the refrigerant connections on the indoor unit, puncture the seal caps on the indoor unit connection stubs.

CAUTION: *Do not apply heat to remove the seal caps until they have been punctured. If seal caps are intact, application of heat may generate excessive pressure in the unit and result in damage to the coil or expansion valve.*

Figure 5



DO NOT USE THIS ARRANGEMENT TO CHARGE THE UNIT. USE SCHRADER VALVES LOCATED IN COMPRESSOR COMPARTMENT.

1. Remove both seal caps from the indoor unit connection stubs.

CAUTION: *Do not remove seal caps until prepared to braze refrigerant lines to the connections. Extended exposure to atmosphere may allow moisture or dirt to contaminate the system, damaging valve seats and causing ice formation in system components.*

2. Turn nitrogen supply on. Nitrogen enters through the liquid line gauge port.
3. Braze the liquid line connections.
4. Open the gauge port on the suction line and then braze suction line to the connection stub. Nitrogen will bleed out the open gauge port on the suction line.
5. Shut off nitrogen supply and disconnect from the gauge manifold.
6. Connect an R-22 drum to the gauge manifold (Figure 5) and purge nitrogen from the circuit with 12 to 15 psig R-22. Place a leak detector at the open suction gauge port. When R-22 begins flowing from the gauge port, replace the gauge port cap. A gauge manifold set-up for purging nitrogen from the circuit after brazing is shown in Figure 5.
7. Allow system refrigerant pressure to build up to about 40 psig.

Leak Testing
Leak test the entire system. Using proper procedures and caution, repair any leaks found and repeat the leak test.

Evacuation Procedure

1. Connect vacuum pump to both the liquid and suction line gauge ports.
2. Evacuate the circuit to hold a 350 micron vacuum.

Important: *If unable to continue into the charging procedure, a holding charge should be placed in the system at this time.*

3. Open the liquid and suction line service valves.

Refrigerant Charging Procedure

Recommended refrigerant charges are given in Table 2. Calculate any required additional refrigerant, using Table 3, and charge by weight through the gauge port on the liquid line. Once the charge enters the system, back-seat (open) the liquid line service valve, if applicable, and disconnect the charging line and replace the cap on the gauge port.

Table 2 TTA Refrigerant Charge (R-22)[1]

Model Number	Refrigerant Charge
TTA090A	15 lbs. 9.6 ozs.
TTA120A	17 lbs. 0.0 ozs.
TTA120B	9 lbs. 6.0 ozs. (ea. ckt.)
TTA150B	12 lbs. 9.6 ozs. (ea. ckt.)
TTA180B	15 lbs. 8.0 ozs. (ea. ckt.)
TTA240B	18 lbs. 14.4 ozs. (ea. ckt.)
TTA120C	18 lbs. 6.4 ozs.
TTA180C	28 lbs. 8.0 ozs.

[1] Sufficient operating charge for outdoor unit and 25 feet of nominally sized refrigerant piping.

Table 3 Additional Required Refrigerant

Tubing Sizes		Additional	Additional	See
Suction	Liquid	Tubing Length	Refrigerant	Note
1⅛"	⅜"	15 ft.	0 lb. 11.5 oz.	(1)
1⅛"	⅜"	25 ft.	1 lb. 3.0 oz.	(1)
1⅛"	⅜"	32 ft.	1 lb. 8.0 oz.	(1)
1⅛"	⅜"	40 ft.	1 lb. 14.0 oz.	(1)
1⅜"	½"	15 ft.	1 lb. 4.0 oz.	(2)
1⅜"	½"	25 ft.	2 lb. 1.0 oz.	(2)
1⅜"	½"	32 ft.	2 lb. 11.0 oz.	(2)
1⅜"	½"	40 ft.	3 lb. 5.0 oz.	(2)
1⅝"	⅝"	15 ft.	1 lb. 15.5 oz.	(3)
1⅝"	⅝"	25 ft.	3 lb. 4.5 oz.	(3)
1⅝"	⅝"	32 ft.	4 lb. 3.2 oz.	(3)
1⅝"	⅝"	40 ft.	5 lb. 4.0 oz.	(3)

[1] Amounts shown are based on .75 ounces of refrigerant per foot of 1⅛" and ⅜" lines.

[2] Amounts shown are based on 1.33 ounces of refrigerant per foot of 1⅜" and ½" lines.

[3] Amounts shown are based on 2.1 ounces of refrigerant per foot of 1⅝" and ⅝" lines.

Note: *For tubing over 40 ft. calculate the additional refrigerant needed, based on notes above.*

Insulating and Isolating Refrigerant Lines
Insulate the entire suction line with refrigerant piping insulation. Also insulate any portion of the liquid line exposed to temperature extremes. Insulate and isolate liquid and suction lines from each other. Isolate refrigerant lines from the structure and any duct work.

Note: *To prevent possible noise or vibration problems, be certain to isolate refrigerant lines from the building.*

Gaseous Charging
This procedure is accomplished with the unit operating. Electrical connections must be complete. Do not proceed until the system is ready to operate.

Procedure:
1. Connect R-22 drum with gauge manifold to the Schrader valves (pressure taps) on the compressor discharge and suction lines (Figure 5).

Note: *On the TTA090A, TTA120A, TTA120B and TTA120C the compressor access panel must be installed when the unit is running and being charged. The control box access panel must be removed, and the manifold hoses must be routed through a opening located in the bottom front of the control box. The opening has a pivotal cover plate.*

On the TTA150B, 180B, 240B and 180C there is a 1½" diameter refrigerant gage access hole(s) with a removable silver cap located adjacent to the refrigerant line openings.

⚠ WARNING: USE EXTREME CAUTION WHILE SERVICING THE UNIT WHEN THE CONTROL BOX ACCESS PANEL IS REMOVED AND POWER IS APPLIED TO THE UNIT. FAILURE TO OBSERVE ALL SAFETY PRECAUTIONS COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH.

2. Turn on power to the unit. Allow the system to run for five to ten minutes to stabilize operating conditions.
3. Measure airflow across the indoor coil. Compare the measurements with the fan performance data in the Data/Submittal or Service Facts. Once proper airflow is established, observe the suction and head pressure gauges on the gauge manifold. Pressure readings should fall approximately at the points shown by the pressure curves in Service Facts. Add or remove refrigerant (gas only) as required to obtain correct head and suction pressures. Check suction line superheat and condenser subcooling to ensure the unit is operating properly.
4. Disconnect all power to the unit.
5. Remove the charging system from the unit and close the opening in the bottom of the control box, with the pivotal cover before attempting to replace access panel.
6. Replace all panels.

Electrical Wiring

TTA field wiring consists of providing power supply to the unit, installing the system indoor thermostat and providing low voltage system interconnecting wiring. Access to electrical connection locations is shown in Figure 1 and 1a.

Unit Power Supply
The installer must provide line voltage circuit(s) to the unit main power terminals as shown by the unit wiring diagrams in Service Facts or field wiring. Power supply must agree with electrical data specified on the unit nameplate. Power supply must include a disconnect switch in a location convenient to the unit. Ground the unit according to local codes and provide flexible conduit if codes require and/or if vibration transmission may cause noise problems.

Important: *All wiring must comply with applicable local and national (NEC) codes. Type and location of disconnect switches must comply with all applicable codes.*

CAUTION: *Use copper conductors only. Unit terminals are not designed for use with aluminum conductors. Use of improper wiring materials can result in equipment damage.*

⚠ WARNING: OPEN THE ELECTRICAL DISCONNECT SWITCH AND LOCK IN OPEN POSITION TO PREVENT ACCIDENTAL POWER APPLICATION. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH DUE TO ELECTRICAL SHOCK.

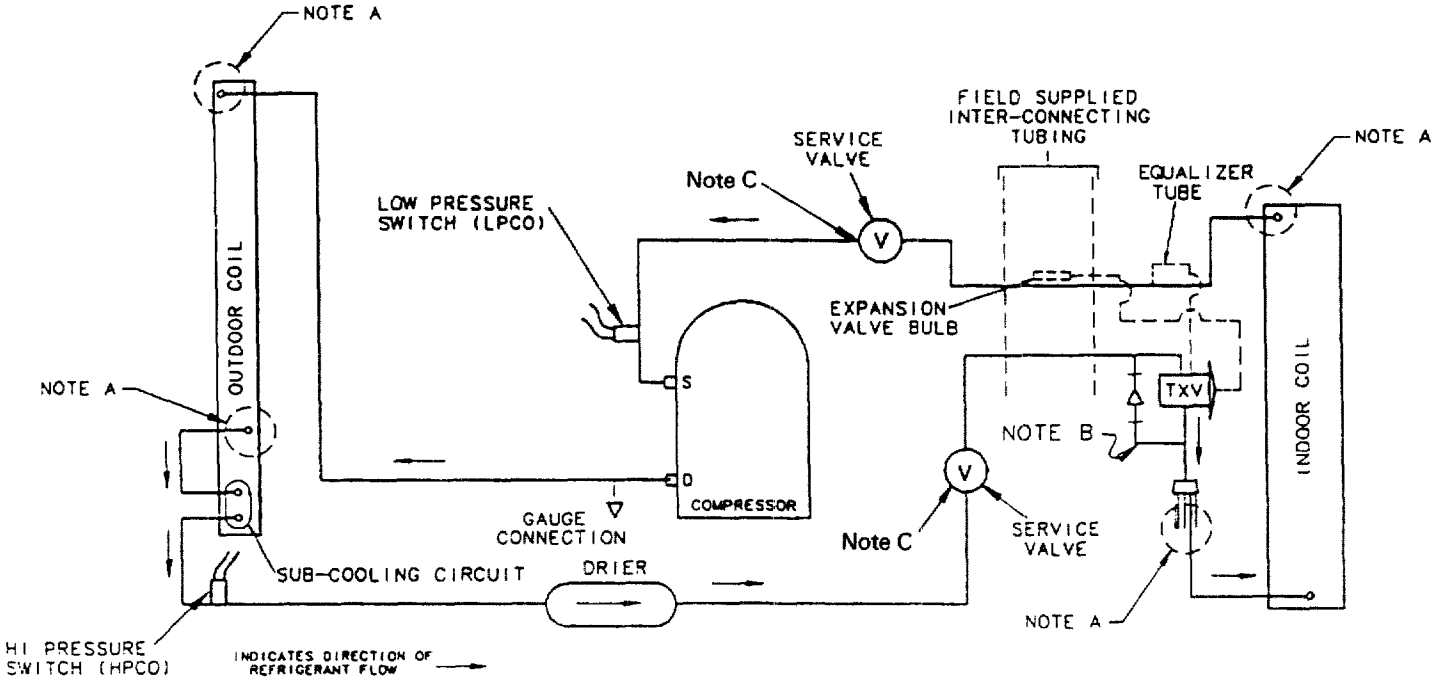
Determine proper wire sizes and unit protective fusing requirements by referring to the unit nameplate and/or the unit Service Facts. Field wiring diagrams for accessories are shipped with the accessory.

Low Voltage Wiring
Mount the indoor thermostat in accordance with the thermostat installation instructions. Install color-coded, weatherproof, multi-wire cable according to the Interconnecting Wiring diagrams, in the Air Handler IOM.

Low Voltage Wiring

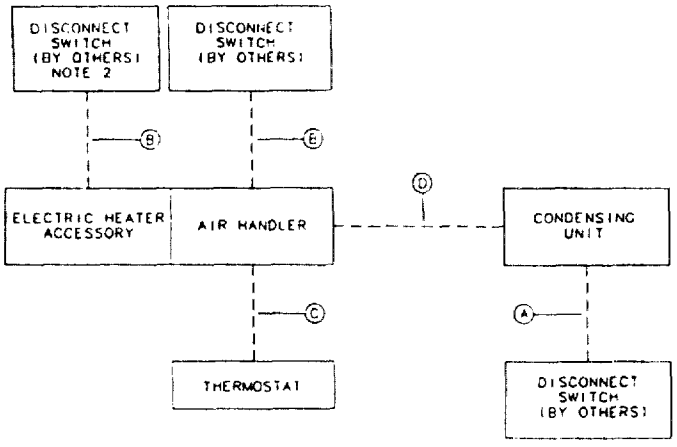
Mount the indoor thermostat in accordance with the thermostat installation instructions. Install color-coded, weatherproof, multi-wire cable according to the Interconnecting Wiring diagrams, in the Air Handler IOM.

Figure 6 Typical Split System Cooling Refrigerant Circuit



NOTE A: ONLY ONE OUTDOOR AND INDOOR COIL REFRIGERANT ENTRY AND EXIT CIRCUIT IS SHOWN; ALL MODELS HAVE MULTIPLE ENTRY AND EXIT CIRCUITS.

Figure 7 Typical Field Wiring



TTA090A/TWE090A
TTA120A/TWE120A

FIELD WIRING:
A-3 POWER WIRES, LINE VOLTAGE
B-3 POWER WIRES, LINE VOLTAGE FOR 3 PHASE, 2 WIRES FOR SINGLE PHASE
C-COOLING ONLY THERMOSTAT: 3 WIRES, 24 VOLTS
- ONE-STAGE ELECTRIC HEAT: ADD 1 ADDITIONAL WIRE, 24 VOLTS
- TWO-STAGE ELECTRIC HEAT: ADD 2 ADDITIONAL WIRES, 24 VOLTS
D-4 WIRES, 24 VOLTS

TTA120B/TTE120B

FIELD WIRING:
A-3 POWER WIRES, LINE VOLTAGE
B-3 POWER WIRES, LINE VOLTAGE FOR 3 PHASE; 2 WIRES FOR SINGLE PHASE
C-COOLING ONLY THERMOSTAT: 4 WIRES, 24 VOLTS
- ONE-STAGE ELECTRIC HEAT: ADD 1 ADDITIONAL WIRE, 24 VOLTS
- TWO-STAGE ELECTRIC HEAT: ADD 2 ADDITIONAL WIRES, 24 VOLTS
D-5 WIRES, 24 VOLTS

NOTES:
1. WIRING SHOWN WITH DASHED LINES IS TO BE FURNISHED AND INSTALLED BY THE CUSTOMER. ALL CUSTOMER-SUPPLIED WIRING MUST BE COPPER ONLY AND MUST CONFORM TO NEC AND LOCAL ELECTRICAL CODES. CODES MAY REQUIRE LINE OF SIGHT BETWEEN DISCONNECT SWITCH AND UNIT.
2. WHEN ELECTRIC HEATER ACCESSORY IS USED SINGLE POINT POWER ENTRY OR DUAL POINT POWER ENTRY IS FIELD OPTIONAL. SINGLE POINT POWER ENTRY OPTION IS THROUGH ELECTRIC HEATER ONLY.

Table 4 TTA Unit Electrical Data

Model Number	Basic Unit Characteristics: Electrical Characteristics	Allowable Voltage Range	Minimum Circuit Ampacity	Maximum Fuse Size	Compressor Motor: Qty.	Amps: RLA	Amps: LRA	Outdoor Fan Motor[1]: Qty.	HP	Amps: FLA	Amps: LRA
TTA090A3	208/230/60/3	187-253	37.0	60	1	26.9	164	1	½	3.1	8.1
TTA090A4	460/60/3	414-506	18.0	30	1	13.3	79	1	½	1.6	3.7
TTA090AW	575/60/3	518-632	15.0	25	1	10.7	63	1	½	1.2	3.0
TTA120A3	208/230/60/3	187-253	55.0	80	1	39.2	224	1	1	6.0	17.5
TTA120A4	460/60/3	414-506	26.0	40	1	18.7	98	1	1	2.7	7.0
TTA120AW	575/60/3	518-632	21.0	35	1	15.0	78	1	1	2.0	5.7
TTA120B3	208/230/60/3	187-253	48.0	60	2	18.7	118	1	1	6.0	17.5
TTA120B4	460/60/3	414-506	26.0	35	2	10.5	71	1	1	2.7	7.0
TTA120BW	575/60/3	518-632	19.0	25	2	7.5	43	1	1	2.0	5.7
TTA150B3	208/230/60/3	18-253	56.0	70	2	22.0	124	2	½	6.0	17.5
TTA150B4	460/60/3	414-506	27.0	35	2	11.0	64	2	½	2.7	7.0
TTA150BW	575/60/3	518-632	22.0	30	2	8.8	51	2	½	2.0	5.7
TTA180B3	208/230/60/3	187-253	64.0	80	2	25.7	164	2	½	3.1	8.1
TTA180B4	460/60/3	414-506	32.0	45	2	12.8	79	2	½	1.6	3.7
TTA180BW	575/60/3	518-632	26.0	35	2	10.3	63	2	½	1.2	3.0
TTA240B3	208/230/60/3	187-253	93.0	125	2	35.9	224	2	1	6.0	17.5
TTA240B4	460/60/3	414-506	36.0	50	2	13.6	98	2	1	2.7	7.0
TTA240BW	575/60/3	518-632	29.0	35	2	10.9	78	2	1	2.0	5.7
TTA120C3	208/230/60/3	187-253	59.0	90	1	42.1	257	1	1	6.0	17.5
TTA120C4	460/60/3	414-506	25.0	40	1	17.9	97	1	1	2.7	7.0
TTA180C3	208/230/60/3	187-253	83.0	125	1	61.6	382	2	½	3.1	8.1
TTA180C4	460/60/3	414-506	36.0	60	1	26.4	144	2	½	1.6	3.7
TTA180CW	575/60/3	518-632	29.0	50	1	21.0	115	2	½	1.2	3.0

[1] Electrical characteristics of fan motor is same voltage as unit, 60 cycle, single phase.

Sequence of Operation

General
Operation of the system cooling (and optional heating) cycles is controlled by the position of the system switch on the room thermostat. Once the system switch is placed in either the HEAT or COOL position, unit operation is automatic. The optional automatic changeover thermostat, when in the AUTO position, automatically changes to heat or cool with sufficient room temperature change.

Evaporator Fan (Indoor Supply Air)
The evaporator fan is controlled by an ON/AUTO switch on the room thermostat. With the switch positioned at AUTO and the system operating in the cooling mode, fan operation coincides with the cooling run cycles. If the system is equipped with heat and is operating in the heating mode while the fan switch is at AUTO, fan operation coincides with the heating run cycles. When the fan switch is positioned at ON, fan operation is continuous.

Cooling Mode
With the disconnect switch in the "ON" position, current is supplied to the compressor crankcase heater(s) and control transformer. The crankcase heater(s) supplies heat to the compressor(s) during the "OFF" cycle. The transformer steps down the voltage fron 208/230V, 460V or 575V to 24V for the low voltage control circuit. With the room thermostat system switch positioned at COOL and the fan switch at AUTO, the compressor contactor energizes on a call for cooling. When the contacts of the compressor contactor close, operation of the compressor and condenser fan begins. The evaporator fan contactor also energizes on a call for cooling and initiates evaporator fan operation.

On dual circuit units, when second stage cooling is required, Y2 from the indoor thermostat will energize 2nd compressor.

On 2 speed scroll compressor units, when 2nd stage cooling is required, Y2 will switch the compressor to high speed.

NOTE: *With the thermostat fan switch in the ON position, the evaporator fan will operate continuously, regardless of compressor or condenser fan operation.*

Low Outdoor Ambient Cooling
The Evaporator Defrost Control is standard equipment on Air Handlers and will permit low ambient cooling down to 35 DEG F. For cooling operation down to 0 DEG F, use an Accessory Head Pressure Control on the outdoor unit.

Safety Controls
Note: *All of these controls may not be installed on your unit, check electrical schematic.*

Evaporator Defrost Control (EDC)
This control is located in the Air Handler of Split Units. The control's sensing tube is imbedded vertically in the evaporator coil, near the center. This device will stop the compressor if the indoor coil temperature drops below its setting. The indoor air will still circulate across the coil bringing the temperature of the coil back up to the cut-in temperature of the evaporator defrost control.

Low Pressure Cut-Out (LPCO)
This control's sensor is located in the suction (gas) line, near the compressor. This control will stop the compressor and the outdoor fans in suction pressure drops below the Low Pressure Cut-Out setting. Once the suction pressure has returned to normal, the compressor and outdoor fans will cycle back on.

High Pressure Cut-Out (HPCO)
This control's sensor is located in the liquid line. This device will shut off the compressor and the outdoor fan(s) if the discharge pressure exceeds the High Pressure Cut-Out's setting. Once the discharge pressure has returned to normal, the compressor will cycle back on.

Internal Overload Protector (IOL)
This device is a current/thermal actuated warp switch, imbedded in the compressor motor windings. It will shut off

the compressor if the temperature or current of the compressor motor windings exceeds its design trip temperature.

Note: *The IOL will put the compressor back in operation once the compressor motor heat has dropped below the trip setting; however, a check of the refrigerant and electrical systems should be made to determine the cause and be corrected.*

Installation Checklist

Complete this checklist once the unit is installed to verify that all recommended procedures have been accomplished before starting the system. Do not operate the system until all items covered by this checklist are complete.

☐ Inspect unit location for proper required service clearances.
☐ Inspect unit location for proper free air clearances.
☐ Inspect unit location for secure, level mounting position.

Refrigerant Piping
☐ Performed initial leak test?
☐ Connected properly sized and constructed liquid and suction lines to the connection stubs at both the indoor and outdoor units?
☐ Insulated the entire suction line?
☐ Insulated portions of liquid line exposed to extremes in temperature?
☐ Evacuated each refrigerant circuit to 350 microns?
☐ Charge each circuit with proper amount of R-22?

Electrical Wiring
☐ Provided unit power wiring (with disconnect) to proper terminals in the unit control section?
☐ Installed system indoor thermostat?
☐ Installed system low voltage interconnecting wiring to proper terminals of outdoor unit, indoor unit and system thermostat?

Unit Start-Up

Once the unit is properly installed and pre-start procedures are complete, start the unit by turning the System Switch on the indoor thermostat to either HEAT, COOL or AUTO. The system should operate normally.

CAUTION: *Ensure the disconnect for the indoor air handler is closed before operating the system. Operating the outdoor unit without the indoor fan energized, can cause unit trip-out on high pressure control and/or liquid flood-back to the compressor.*

Maintenance
Perform all of the indicated maintenance procedures at the intervals scheduled. This will prolong the life of the unit and reduce the possibility of costly equipment failure.

Monthly
Conduct the following maintenance inspections once per month.

⚠ WARNING: OPEN AND LOCK UNIT DISCONNECT TO PREVENT INJURY OR DEATH FROM ELECTRICAL SHOCK OR CONTACT WITH MOVING PARTS.

- Inspect air filters and clean if necessary.
- Check unit wiring to ensure all connections are tight and that the wiring insulation is intact.
- Check drain pans and condensate piping to insure they are free of obstacles.
- Manually rotate the outdoor fan to insure proper operation. Inspect the fan mounting hardware for tightness.
- Inspect the evaporator and condenser coils for dirt and debris. If the coils appear dirty, clean them.
- With the unit operating in the cooling mode, check the suction and discharge pressures and compare them with the values provided in "Pressure Curves". Record these readings on the "Maintenance Log".
- Observe indoor fan operation and correct any unusual or excessive vibration. Clean blower wheels as needed.

Annually (Cooling Season)
The following maintenance procedures must be performed at the beginning of each cooling season to insure efficient unit operation.

⚠ WARNING: OPEN AND LOCK UNIT DISCONNECT TO PREVENT INJURY OR DEATH FROM ELECTRICAL SHOCK OR CONTACT WITH MOVING PARTS.

- Perform all of the monthly maintenance inspections.
- With the unit operating, check unit superheat and record the reading in the "Maintenance Log".
- Remove any accumulation of dust and/or dirt from the unit casing.
- Remove corrosion from any surface and re-paint. Check the gasket around the control panel door to insure it fits correctly and is in good condition to prevent water leakage.
- Inspect the evaporator fan belt. If it is worn or frayed, replace it.
- Inspect the control panel wiring to insure that all connections are tight and that the insulation is intact.

Lubricate the indoor fan motor bearings with a non-detergent, 20-weight oil. (To insure good bearing lubrication, condenser fan motor bearings should be lubricated once every six months.)

Note: *Some motors are permanently lubricated.*

- Check refrigerant piping and fittings for leaks.

Maintenance Log[1]

DATE	AMBIENT TEMP. (F)	EVAPORATOR ENTERING AIR		COMPRESSOR		SUPERHEAT	SUBCOOLING
		DRY BULB	WET BULB	SUCTION PRESSURE	DISCHARGE PRESSURE	CIRCUIT NO. 1 (F)	CIRCUIT NO. 1 (F)

NOTES:
1. Perform each inspection once per month (during cooling season) while unit is operating.

Limited Warranty

And Warranty Liability For Commercial Unitary Equipment Rated Under 20 Tons And Related Accessories

Products Covered

This warranty is extended by American Standard Inc., and applies to the following products:

- All packaged and split system air conditioners and heat pumps have a rated capacity of less than 20 tons.
- All packaged combinations gas/electric air conditioners having a rated capacity of less than 20 tons.
- All packaged combination gas/electric air conditioners having a rated capacity of 1½ through 5 tons single phase electric power and used for commercial applications. (As used in this warranty, a commercial application is any application where the end purchaser uses the product for other than personal, family or household purposes.)
- All accessories for the above products which are sold by American Standard Inc. and applied in accordance with American Standard Inc. specifications.

Basic Warranty

The warrantor warrants for a period of twelve (12) months from the initial start-up or eighteen (18) months from date of shipment, whichever is sooner, that the products covered by this warranty (1) are free from defects in material and manufacture, and (2) have the capacities and ratings set forth in the warrantor's catalogs and bulletins.

Extended Four-Year Warranty On Compressors

The warrantor warrants for a period of four (4) years commencing twelve (12) months from date of installations or eighteen (18) months from date of shipment, whichever is sooner, that the compressor in any product covered by this warranty (1) is free from defects in material and manufacture, and (2) has the capacities and ratings set forth in the warrantor's catalogs and bulletins.

Extended Four-Year Warranty On Heat Exchangers

The warrantor warrants for a period of four (4) years commencing twelve (12) months from date of installations or eighteen (18) months from date of shipment, whichever is sooner, that the gas-fired heat exchanger in any products covered by this warranty (1) is free from defects in material and manufacture, and (2) has the capacities and ratings set forth in the warrantor's catalogs and bulletins.

Exclusions And Limitations

The warrantor's obligations and liabilities under this warranty are limited to furnishing F.O.B. factory or warehouse at the warrantor-designated shipping point, freight allowed to Buyer's city (or port of export for shipments outside the conterminous United States) a replacement product or, at the option of the warrantor, parts for the repair of the product not conforming to this warranty and which have been returned to the warrantor. The warrantor's warranty is conditional on the Customer providing written notice to the warrantor within thirty (30) days of the discovery of the defect. No product shall be returned to the warrantor without the warrantor's written permission. No liability whatever shall attach to warrantor until said products have been fully paid for and then said liability shall be limited to the purchase price of the equipment shown to be defective.

The warranty does not apply to any compressor or gas-fired heat exchanger which has been repaired or altered in such manner as, in the in the judgement or the warrantor, affects its stability or reliability. This warranty does not cover (1) any heat exchanger which has been fired with an improper type of fuel (2) a heat exchanger which is installed in a beauty parlor, dry cleaning establishment, de-greasing plant or in any corrosive atmosphere; or (3) any heat exchanger which is not shown to be defective by the warrantor's inspection.

This warranty does not cover damage due to accident, abuse, improper use, external causes, freezing, corrosion, erosion or deterioration.

Local transportation, related service labor, air filters, diagnosis calls, refrigerant and related items are not covered.

THE WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM THE COURSE OF DEALING OR TRADE. IN NO EVENT SHALL THE WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

The warrantor makes certain further warranty protection available on an optional, extra-cost basis. Any further warranty must be in writing. If you wish further help or information concerning this warranty, contact:

American Standard Inc.—Warrantor
P.O. Box 1008
Guthrie Highway
Clarksville, TN 37040