

INSTALLATION INSTRUCTIONS

For NAHA004WK - Twinning Kit

This kit is designed for 80% N8MPN/L, *8MPN/L, *8MPT Series B (or later) and 90% N9MP1, N9MP2, *9MPD, *9MPT Series C (or later) furnace models.

* Denoted Brand (T, H or C)


Please read these instructions completely before attempting installation.

SAFETY CONSIDERATIONS

Installing and servicing of heating equipment can be hazardous due to gas and electrical components. Only trained personnel should install or service heating equipment.

Untrained personnel can perform basic maintenance such as cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on heating equipment, observe precautions in the literature, on tags, and on labels attached to the unit.

Follow all safety codes. Wear safety glasses and work gloves. Have a fire extinguisher available.

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

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. 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 a hazard 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. NOTE is used to highlight suggestions which **may** result in enhanced installation, reliability, or operation.

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INTRODUCTION

IMPORTANT: Only the furnace models listed in below can be twinned. Both furnaces must have the same product number, including heating and cooling sizes, to achieve correct operation.

This furnace twinning kit NAHA004WK permits connection to the following furnaces to operate as a single unit on the same duct work:

- a. Multipoise Condensing Models
 - i. Single-Stage: N9MP2, N9MP1, *9MPD Series C or later.
 - ii. Two-Stage: *9MPT (PSC Blower) Series C or later.
- b. Multipoise Non-Condensing Models
 - i. Single-Stage: N8MPN/L, *8MPN/L Series B or later.
 - ii. Two-Stage: *8MPT (PSC Blower) Series B or later.
- c. Kit Contents

Table 1	Kit Contents	
DESCRIPTION	PART NO.	QUANTITY
External Extension Harness	327962-701	1
Main Twinning Harness	330738-701	1
Secondary Twinning Harness	330739-701	1
Two Stage Furnace Wiring Diagram	330740-101	1
Single Stage Wiring Diagram	330742-101	1
Single Stage Furnace/Two-Stage Wiring Diagram	330741-101	1
Label	330743-101	1
Bag Assembly Includes:	330744-701	
Snap Bushing	HY93069	2
Screws (HEX HD 6B x 3/4)	AL76AZ128	8
Wire Tie	HY76TB125	4
Clamps	KA66AB088	2
Installation Instructions	44106107100	1

NOTE: Multipoise units can be installed in UPFLOW, DOWNFLOW, or HORIZONTAL configurations

⚠ WARNING

FIRE, AND OPERATION HAZARD

Failure to follow this warning could result in death, or property damage.

A non-condensing furnace shall NOT be twinned with a condensing furnace. Two stage condensing or non-condensing furnaces shall not be twinned with any single stage furnace. *8DNL furnaces shall not be twinned. Furnaces shall only be twinned in the positions shown. Variable-speed furnaces shall not be twinned.

ELECTROSTATIC DISCHARGE (ESD) PRECAUTION

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to unit components.

Electrostatic discharge can affect electronic components. Take precautions during furnace installation and servicing to protect the furnace electronic control. Precautions will prevent electrostatic discharges from personnel and hand tools which are held during the procedure. These precautions will help to avoid exposing the control to electrostatic discharge by putting the furnace, the control, and the person at the same electrostatic potential.

1. Use this procedure for installed and uninstalled (ungrounded) furnaces.
2. Disconnect all power to the furnace. DO NOT TOUCH THE CONTROL OR ANY WIRE CONNECTED TO THE CONTROL PRIOR TO DISCHARGING YOUR BODY'S ELECTROSTATIC CHARGE TO GROUND.

3. Firmly touch a clean, unpainted, metal surface of the furnace chassis which is close to the control. Tools held in a person's hand during grounding will be satisfactorily discharged.
4. After touching the chassis you may proceed to service the control or connecting wires as long as you do nothing that recharges your body with static electricity (for example; DO NOT move or shuffle your feet, DO NOT touch ungrounded objects, etc.).

5. If you touch ungrounded objects (recharge your body with static electricity), firmly touch furnace again before touching control or wires.

NOTE: Before removing a new control from its container, discharge your body's electrostatic charge to ground to protect the control from damage. If the control is to be installed in a furnace, follow items 1 through 4 before bringing the control or yourself into contact with the furnace. Put all used AND new controls into containers before touching ungrounded objects.

6. An ESD service kit (available from commercial sources) may also be used to prevent ESD damage.

FURNACE INSTALLATION

NOTE: Refer to the Installation Instructions supplied with each furnace for information on venting, clearances, start-up, maintenance, and other information not covered in this kit instruction.

NOTE: Throughout these instructions, when the furnaces are installed side-by-side, the left-hand side will be referred to as the LH furnace, and the furnace installed on the right-hand side as the RH furnace. When the furnaces are installed back-to-back, the left-hand side will be referred to as the LH furnace, and the furnace installed on the right-hand side as the RH furnace when viewed from the side with the extension harness installed.

Duct Connections

The twinned furnaces must have a common supply plenum attached to the furnaces or evaporator coils prior to any branch supply trunk or take-off. The height of the plenum should be at least as high (upflow/downflow) or as long (horizontal) as the width of one furnace. Supply air dampers, when used should be installed in the branch ducts, not in the common plenum. Fire or smoke dampers, when required by code may be installed in the common plenum. Refer to the damper manufacturer's ratings installation instructions for proper application. The damper should not create undue restriction in the open position.

Furnaces must be installed to ensure sufficient return air to both furnaces:

- a. **For upflow furnaces:** A combination of 1 full side of each and bottom inlet plenum (see **Figure 1 Example 2a**) or bottom only inlet plenum (see **Figure 1 Example 1**) shall be used for return air to each furnace. The preferred method is to have all return air brought into the bottom of the furnaces through a common bottom plenum. The bottom return-air plenum shall be at least as high as the width of the furnace bottom return-air opening. When there are height limitations, the bottom return-air plenum height can be reduced to 8 in. minimum if 1 entire side return-air opening of each furnace is used in conjunction with the bottom return opening. Rear inlet plenums shall not be used. (See **Figure 1, Example 2b**) Connect all return trunks or branch return ducts to common return plenum.

- b. **For downflow and horizontal furnaces:** All return air must be brought into the bottom opening of the furnace through a common return air plenum. The return-air plenum shall be at least as long (horizontal) or tall (downflow) as the width of the furnace return-air opening. (See **Figure 2 Example 3** and **Example 4**) Connect all return trunks or branch return ducts to common return plenum.

⚠ WARNING

FIRE OPERATION HAZARD

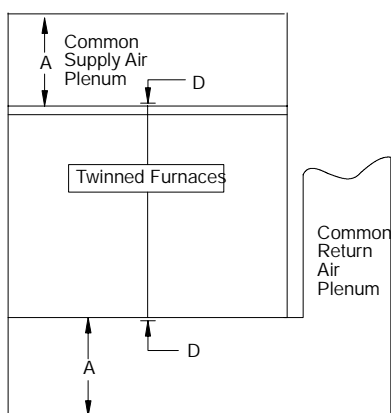
Failure to follow this warning could result in improper auxiliary limit operation and cause death, personal injury or property damage.

Do not remove the center return-air partitions between the furnaces.

Staged heating operation is permissible with this twinning kit. With the single-stage, non-condensing, and condensing furnaces, the left-hand furnace is used for first-stage (low) heat, and both furnaces are used for second-stage (high) heat. With the 2-stage, non-condensing and condensing furnaces, low-gas heat in both furnaces is used for first-stage heat, and high-gas heat in both furnaces is used for second-stage heat. This kit ensures both furnace blowers operate simultaneously so air flows through the duct work rather than re-circulates in a loop between the furnaces.

NOTE: As a result of staged heating with single-stage furnaces, the air temperature distribution in the supply plenum may be uneven when only 1 furnace is heating.

Figure 1 Upflow Ductwork Connections

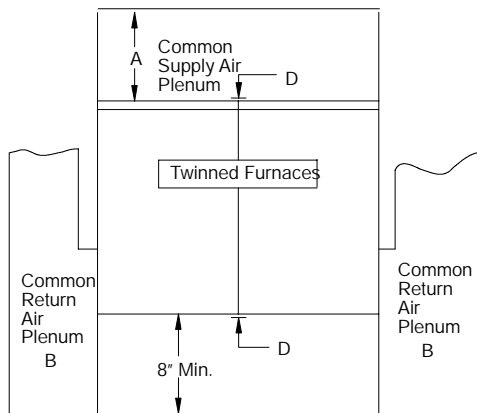


Example 1

Example 1 Notes:

Return duct cannot obstruct access to either furnace. Return Air can enter thru:

- Bottom only
 - Back of platform when height of platform equal Dimensions "A" as shown
- Install $1\frac{3}{4}$ " wide block-off plate between furnace (item D)

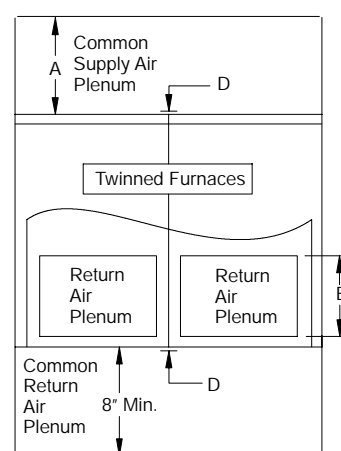


Example 2a

Example 2a Notes:

When furnaces are installed side-by-side, return duct **MUST** connect to the common return plenum and side inlet of **BOTH** furnaces.

Return duct cannot obstruct access to either furnace
Install $1\frac{3}{4}$ " wide block-off plate between furnaces (item D)



Example 2b

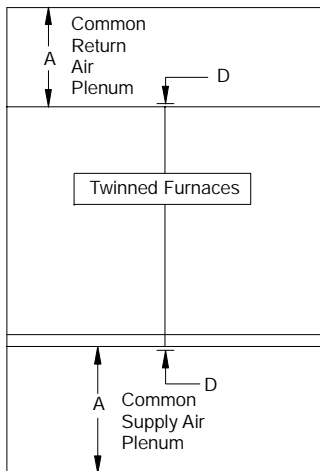
Example 2b Notes:

When furnaces are installed Back-to-Back, return duct **MUST** connect to the common return plenum and side inlet of **BOTH** furnaces

Return duct cannot obstruct access to either furnace
Install $1\frac{3}{4}$ " wide block-off plate between furnaces (item D)

NOTE: Block-off plate must be entire depth or width of furnace and should be made from 20 through 26 gauge sheet metal.

Figure 2 Downflow/Horizontal Ductwork Connections

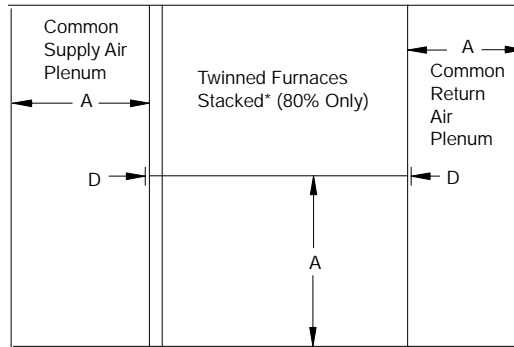


Example 3 Downflow Applications

Example 3 Notes:

Do not connect return air to any side of the furnace
 Connect return air plenum as shown
 Install $1\frac{3}{4}$ " wide block-off plate between furnaces (item D)

NOTE: Block-off plate must be entire depth or width of furnace and should be made from 20 through 26 gauge sheet metal.

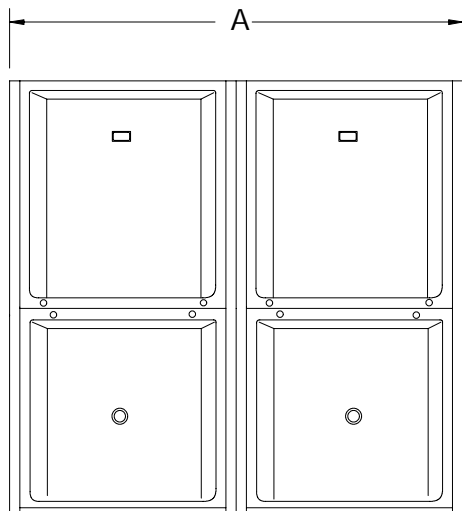


Example 4 Horizontal Application (non-condensing models ONLY)

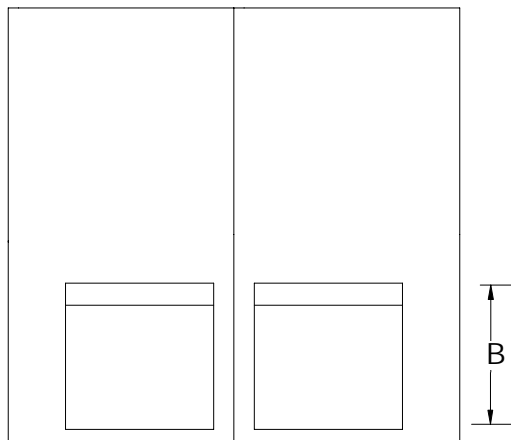
Example 4 Notes:

Do not connect return air to any side of furnace.
Do not stack condensing furnaces on top of each other.
 When furnaces are installed Back-by-Back (not shown), return connection is similar.
 Depth of plenum Dimensions "A" must equal to the front width of one furnace.
 Install $1\frac{3}{4}$ " wide block-off plate between furnaces (item D)

Figure 3 Dimensional Drawing



SIDE-TO-SIDE

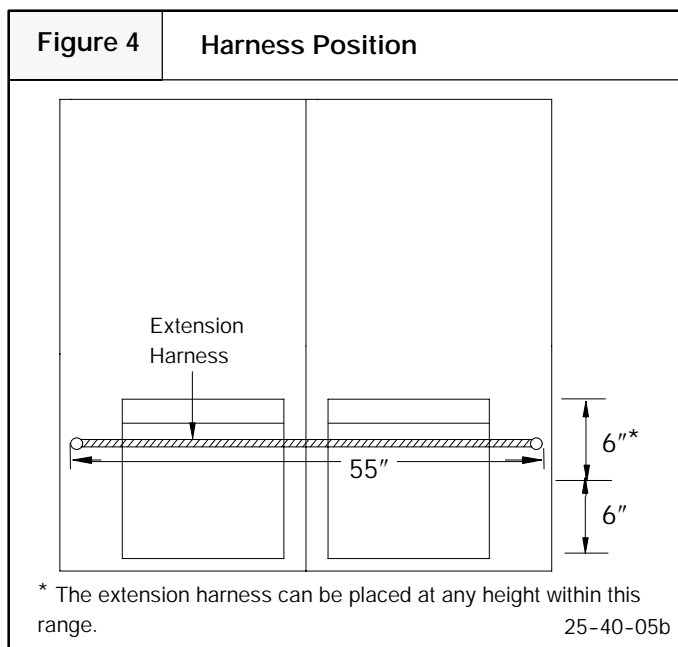


BACK-TO-BACK

25-40-05b

Table 2	DIMENSIONAL INFORMATION	
Furnace Models	A	B
050B12 - 075B12	15 ¹ / ₂	13 ¹ / ₄
050F12 - 075F12 075F14 - 075F16 080F16 - 100F14 100F20	19 ¹ / ₈	15 ¹ / ₂
080J16 - 100J14 100J20 - 100J22 125J20 - 125J22 150J20	22 ³ / ₄	
125L20	24 ¹ / ₂	

(See Figure 3)



Furnace Mounting and Ductwork: all orientations, all configurations

Refer to **Figure 4** and **Table 2** for appearance and dimensional drawings of twinned furnaces and their connection locations.

1. Select 2 identical heating size and cooling airflow furnaces. (See **Table 2**)
2. Remove blower access door.
3. For side-by-side and back-to-back configurations.
 - a. **For upflow applications:** Bottom return air usage is required as part of any upflow return air configuration. If additional return air is to enter 1 side of each furnace, in addition to bottom return air, cut open 1 entire return air opening in appropriate side of each furnace. (See **Figure 1**)
 - b. **For downflow applications:** Return air can only be connected to bottom opening of furnace. A common return air plenum is required for proper auxiliary limit switch operation. (See **Figure 2**)
 - c. **For horizontal applications:** Return air can only be connected to bottom opening of furnace. (See **Figure 2**) A common return air plenum is required for proper auxiliary limit switch operation. See Special Construction for Horizontal Installations section for direction on building a platform or suspending furnaces.

⚠ WARNING

FIRE AND UNIT OPERATION HAZARD

Failure to follow this warning could cause a fire, personal injury or death.

DO NOT use the back of the furnace for return-air duct connections in upflow/horizontal/downflow position, as limit cycling will occur.

4. Remove bottom closure panels from both furnaces.
 - a. Lay furnaces on back or sides
 - b. Cut out bottom return opening using corner notches as a guide.
5. Cut out a ⁷/₈" diameter accessory hole in blower compartment on mating sides of furnaces. (See **Figure 4**) For back-to-back configurations, determine which side of furnace will be used to route external extension harness first.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to unit components.

Ensure nothing is behind the accessory hole that may be damaged when cutting the hole. Protect furnace control from metal shavings.

NOTE: External extension harness cannot be used on the same side of the furnace that the return air ducts connect to. Locate harness on opposite side of furnace which side return air is used.

NOTE: DO NOT lay furnace down flat on the side that the external extension harness is installed. Raise furnace up a minimum of 1¹/₂" above the deck so harness does not rub on casing or deck.

6. Insert a plastic snap bushing through the ⁷/₈" hole from the outside of the casing on both furnaces.
 7. Supply Flanges
 - a. For downflow applications: Bend or remove supply flanges as required. Refer to unit Installation Instructions for complete details.
 8. Position furnaces near each other on return air plenum, supply air plenum, or evaporator coil casing. In a stacked horizontal configuration, insert field supplied non-flammable spacers between furnaces to allow proper alignment, screw head clearance and support.
- NOTE:** Follow all clearance to combustible material guidelines. If furnaces are installed closer than 12" above a deck made of combustible material, provide roll-out protection as shown in the furnace installation instructions. The bottom closure panel may be used for this purpose.
9. Connect return and supply air ducts and block-off plate (**Figure 1** & **Figure 2**, item D to furnaces using field supplied screws. Seal to prevent air leakage.
 10. Move 115 V junction box in RH furnace (as viewed from upflow position) from left-hand to right-hand side. Refer to Installation Instructions for complete details.
 11. For condensing furnaces, follow Installation Instructions for upflow/downflow applications. This includes, but not limited to: condensate trap, condensate/combustion blower tubing, pressure switch tubing, and electrical connections.

Special Construction for Horizontal Installations

1. Horizontal: Back-to-Back and Stacked Positions

⚠

CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to unit components.

Stacking condensing furnaces is not permitted.

When twinning furnaces in the horizontal position, consideration must be made to the type of building construction. Attic floors should be constructed to support normal live and dead loads of the furnaces and the person(s) servicing them.

Trusses, wood and metal are engineered for specific applications, and may not support the weight of two (2) furnaces suspended from the top chords or the bottom chords of the trusses. Long horizontal spans may

flex or sag, resulting in damage to the building. Contact the truss manufacturer for additional design and engineering assistance.

Do not suspend furnaces with straps or suspend furnaces from roof decking.

For attic installations on a platform (See Figure 5, Figure 6 or Figure 7):

1. Construct a platform from 3/4" (nominal plywood), extending out 30" from the front of each furnace.
2. Maintain all clearances to combustibles per the furnace Installation Instructions.
3. Follow all additional building codes.
4. Long truss spans may require additional support along the bottom chord of the truss. Consult the truss manufacturer's guidelines for engineering assistance.
5. Long rafter or attic joist spans may require additional support along the bottom of the rafter or joist. Consult local or regional building codes for design and loading requirements.

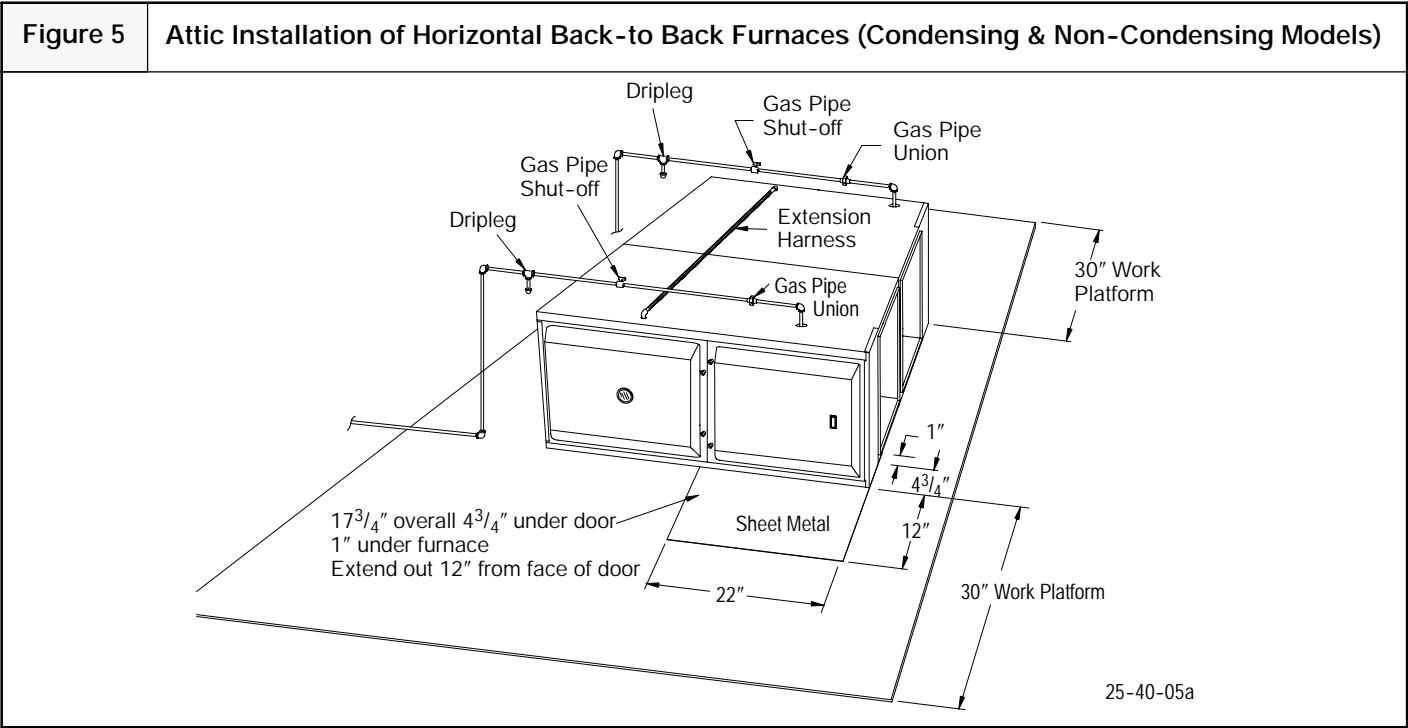


Figure 6 Attic Installation of Horizontal Furnace Stacked Together (Non-Condensing Furnace Models ONLY)

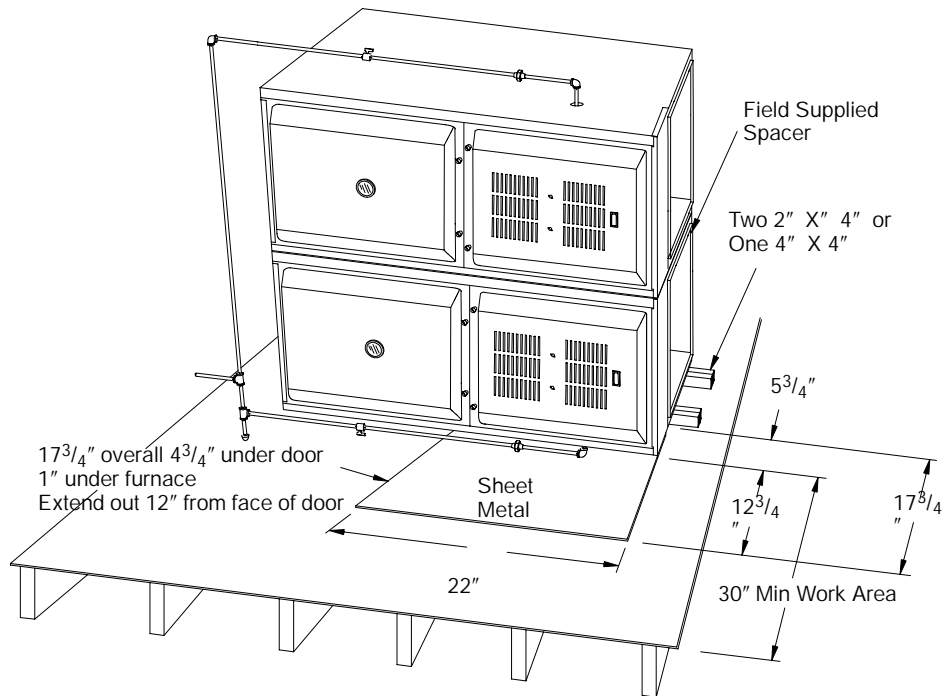


Figure 7 Attic Installation of Condensing Furnaces Back-to-Back

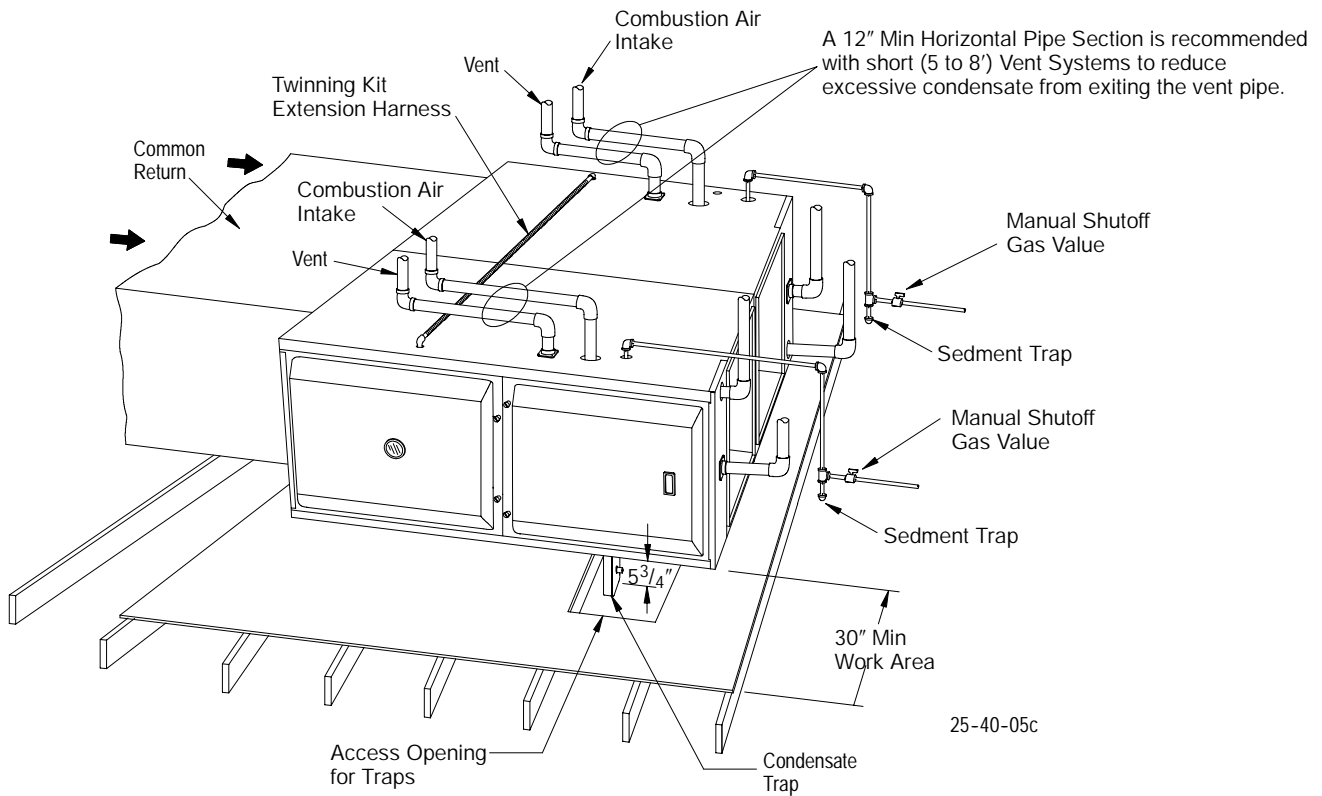
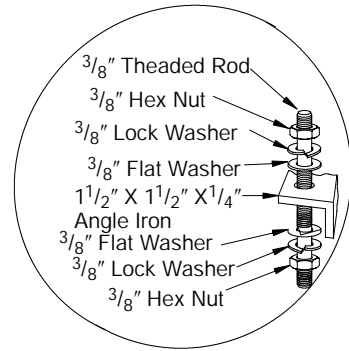
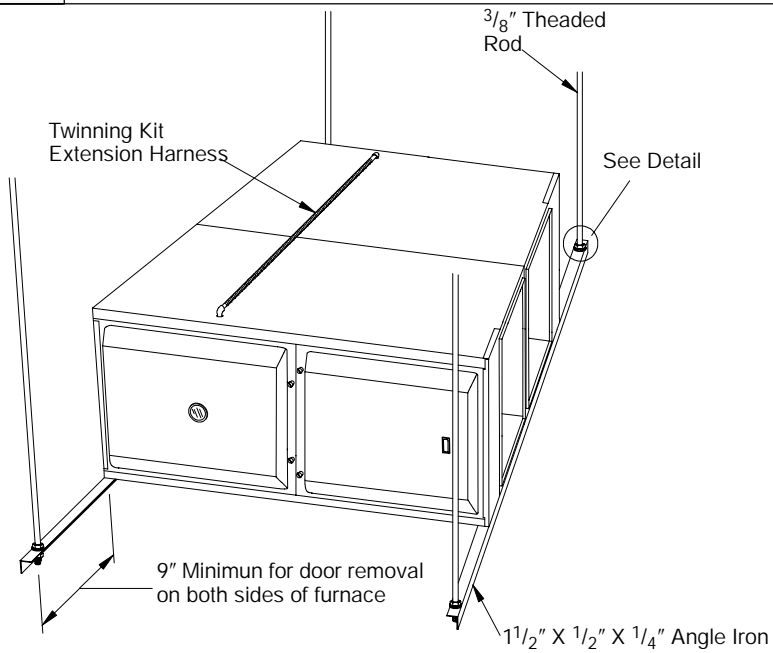
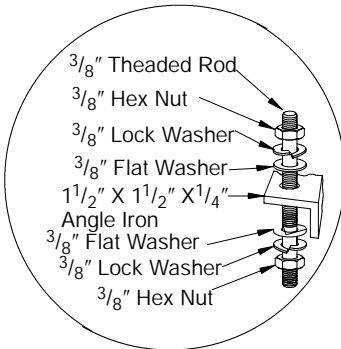
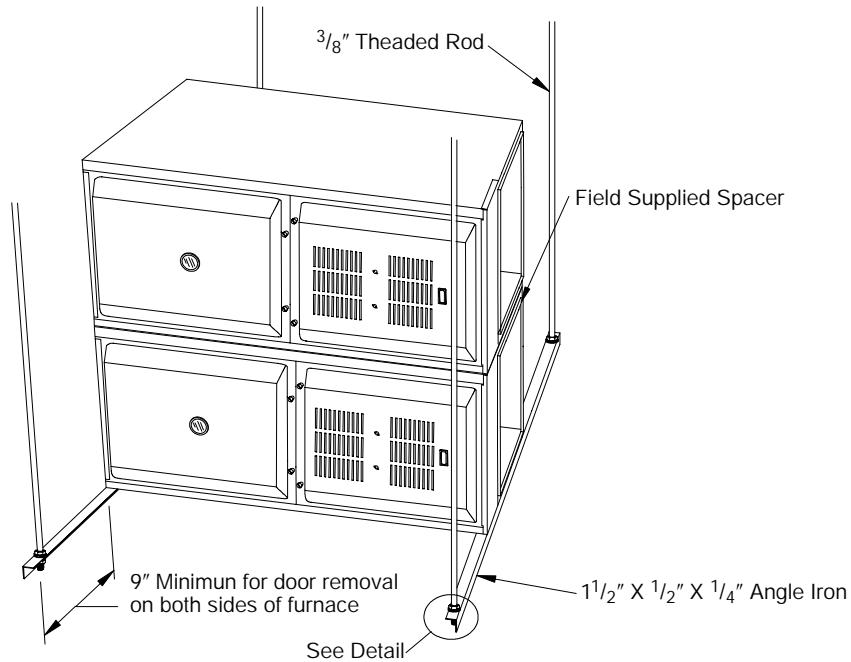


Figure 8 **Suspended Installation for Horizontal Furnaces Back-to-Back**



Secure angle iron to bottom of furnace with at least (2) # 8 X 3/4" sheet metal screws in each furnace

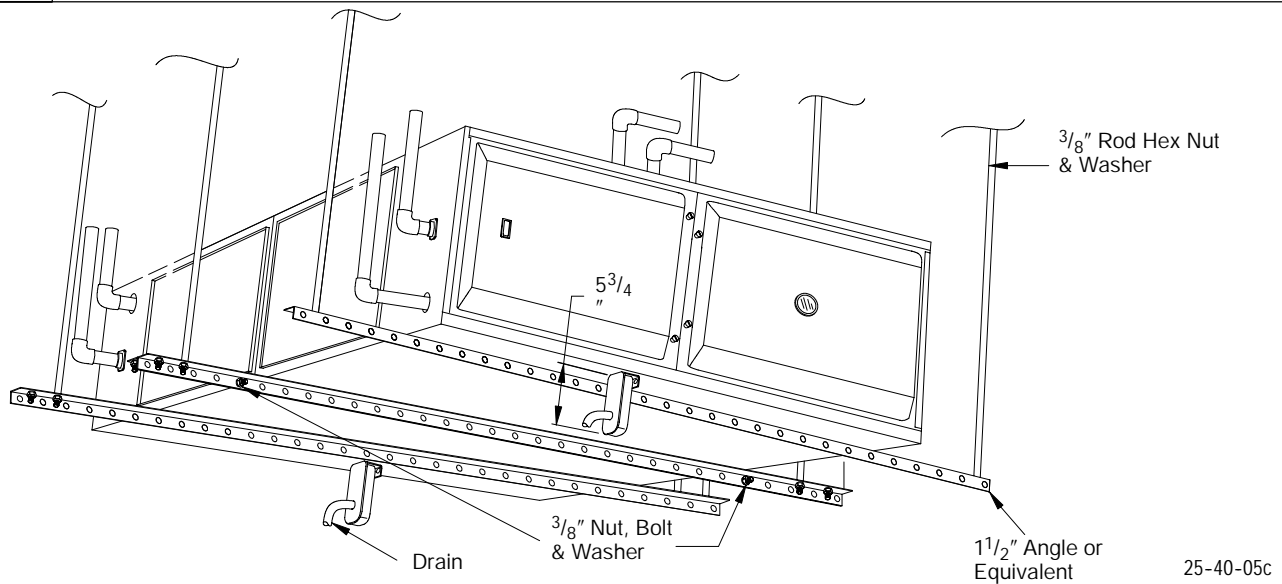
Figure 9 **Suspended Installation for Horizontal Furnaces Stacked Together (Non-Condensing Models ONLY)**



Secure angle iron to bottom of furnace with at least (2) # 8 X 3/4" sheet metal screws in each furnace

Figure 10

Suspended Installation for Horizontal Condensing Furnaces Back-to-Back



For suspended installations (See **Figure 8**, **Figure 9** or **Figure 10**.) Not recommended for wood trusses unless approved by the truss manufacturer or other approved engineering methods):

1. Furnaces may be suspended using two (2) pieces of $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{4}$ " thick cold rolled angle iron underneath the furnaces and four (4) $\frac{3}{8}$ " diameter threaded rods.
2. Allow for at least nine (9") in front of each door for door removal.
3. Each piece of angle iron must be secured to the bottom of each furnace with at least two (2) #8 x $\frac{3}{4}$ " sheet metal screws.
4. Maintain all clearances to combustibles per the furnace Installation Instructions.
5. Unistrut or similar material may be used, provided that the furnaces do not sag in the middle or bend or twist at the support ends. The support material must be secured to the bottom of each furnace in a manner similar to securing angle iron to the furnace.

CONNECT ELECTRICAL COMPONENTS FOR HEATING

⚠ WARNING

FIRE AND OPERATION HAZARD

Failure to follow this warning could cause a fire, personal injury, or death.

Make no connections between the R 24-vac connector in Left hand furnace and the R 24-vac connector in Right hand furnace.

See electronic discharge precautions on page 2.

The twinning kit can be used for single-stage or 2-stage heating operation. There are 3 harness assemblies included in this kit. If the furnaces are side-by-side, only 2 harness assemblies are required. If the furnaces are installed back-to-back, all three harness assemblies included in the kit must be used.

See **Figure 11**, **Figure 12**, and **Figure 13** for the twinning kit wiring diagrams. See **Figure 14** and **Figure 15** for the furnace control.

Figure 11

Wiring Diagram for Single Stage Furnace and A/C-Single Stage Thermostat

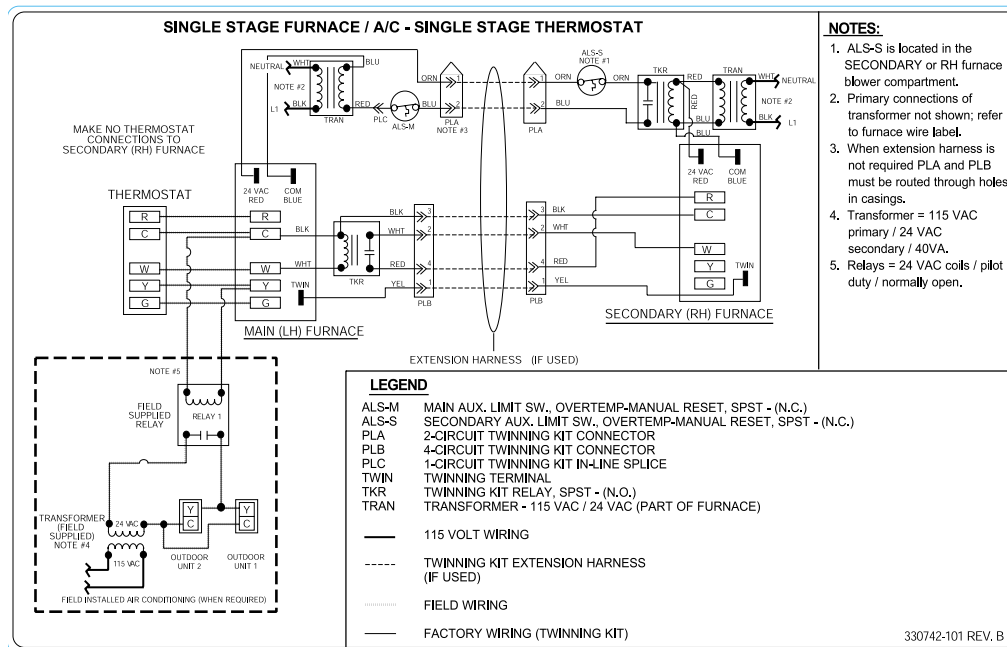


Figure 12

Wiring Diagram for Single Stage Furnaces and A/C-Two Stage Thermostat

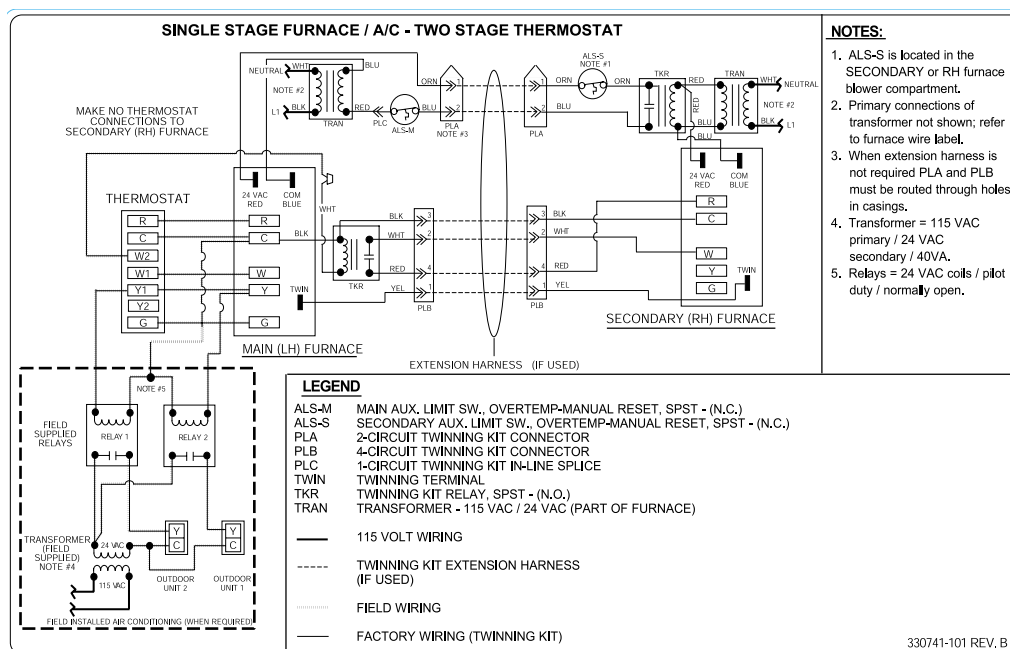


Figure 13

Wiring Diagram for Two Stage Furnaces and 1 Stage A/C Unit - One or Two-Stage Thermostat

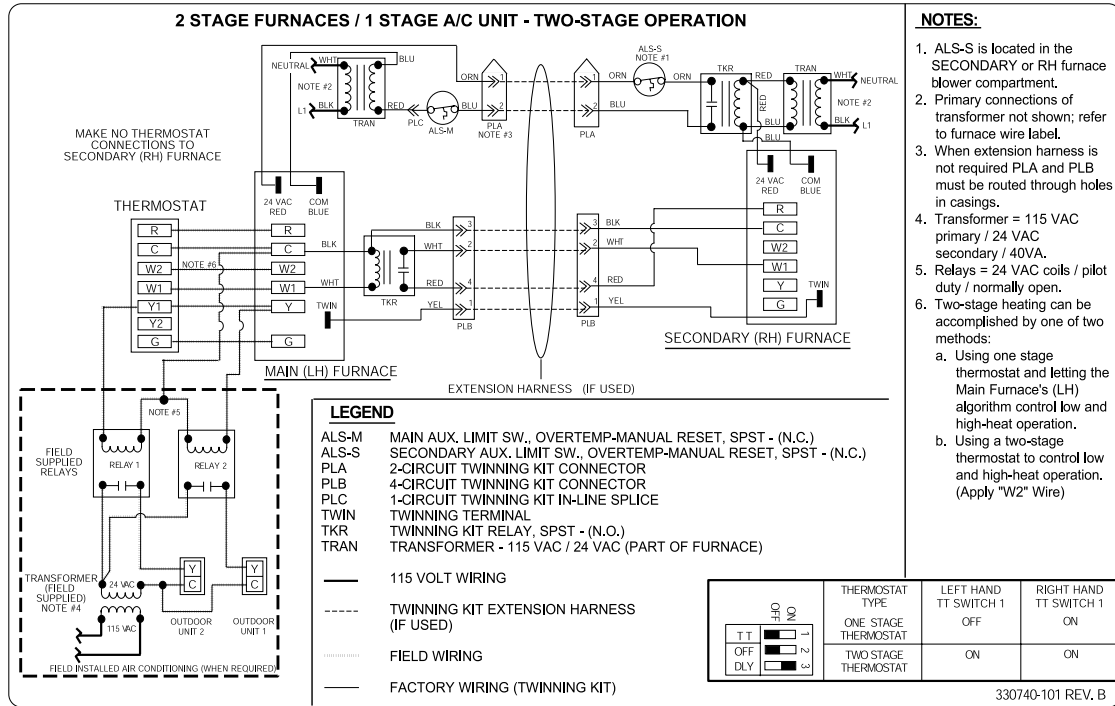
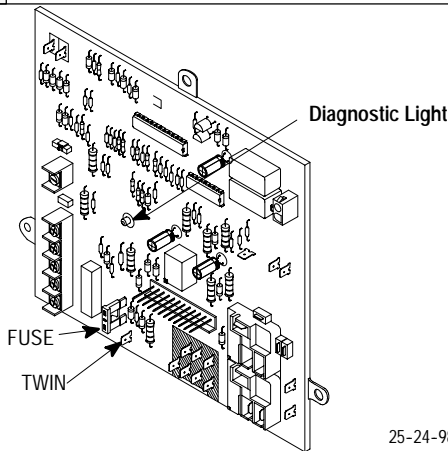


Figure 14

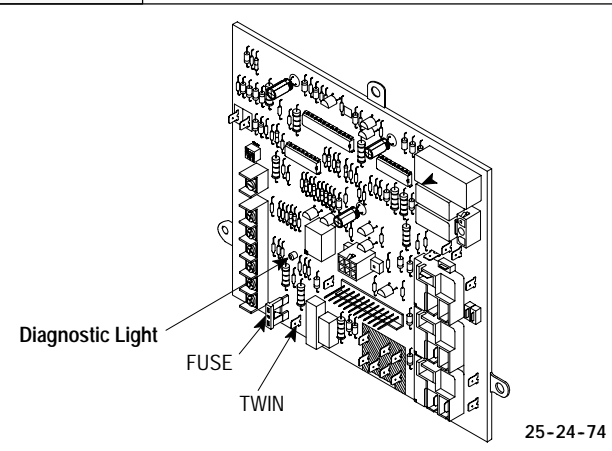
Single Stage Furnace Control



- Remove blower access door from both furnaces.
- If furnaces are installed back-to-back in any orientation, the external Extension Harness must be used. The harness consists of:
 - 54 $\frac{1}{2}$ " of $\frac{1}{2}$ " flexible steel conduit
 - (2) 90° conduit connectors
 - (1) 4 wire polarized wiring harness
 - (1) 2 wire polarized wiring harness
- Install the Extension Harness as follows:
 - Remove the lock nuts from the end of each conduit connector.
 - Route the end of the harness, labeled "Twinning Kit Harness", that mates to the TKR relay harness from the outside of the furnace through the $\frac{7}{8}$ " hole in the casing to the blower compartment.

Figure 15

Two-Stage Furnace Control

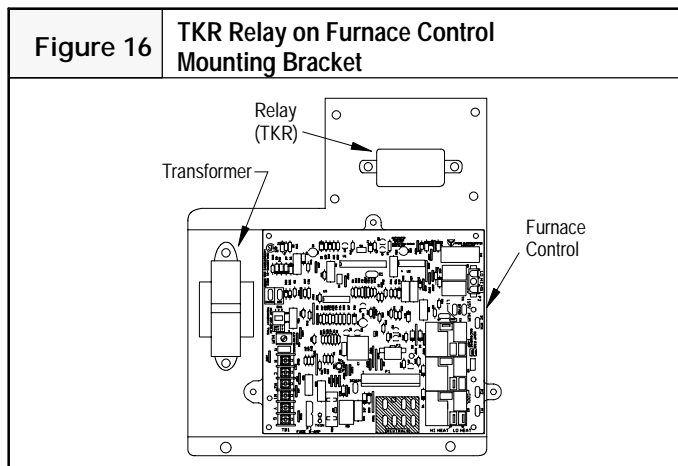


- Route the end of the harness that mates to the 4-wire harness through the outside of the furnace through the $\frac{7}{8}$ " hole in the casing to the blower compartment.
- Install the lock nuts on the 90° conduit connectors.
- Install two kit-supplied straps approximately 18" from each end of harness.

NOTE: This application allows both furnaces to operate as one furnace in gas heat mode as determined by single-stage thermostat operation. Both furnaces operate in heating mode simultaneously. See furnace Installation Instructions for further details on this heating mode.

- Install harness labeled "Main Furnace" on LH furnace:
 - Secure relay TKR to LH furnace control mounting bracket using 2 factory-supplied screws. (See Figure 16)

- b. Connect TKR white wire labeled W to LH furnace control thermostat connection W for a single-stage furnace, W1 for a 2-stage furnace.
- c. Connect TKR black wire labeled C to LH furnace control thermostat connection C.
- d. Connect yellow wire labeled TWIN to LH furnace control TWIN terminal.
- e. If Extension Harness was used, connect 4-wire harness to Extension Harness.



5. For two-stage heat with single-stage gas-heat thermostat (field supplied).

- a. Turn TT set-up switch on LH control board to "OFF". (See Table 3)
- b. Turn TT set-up switch on RH control board to "ON".

Table 3 TT Switch Settings		
Thermostat Type	Left Hand TT Switch 1	Right Hand TT Switch 1
Single Stage Thermostat	OFF	ON
Two Stage Thermostat	ON	ON

6. For two-stage heat with two-stage gas-heat thermostat (field supplied)

NOTE: This application allows both furnaces to operate in low heat for first-stage heat mode or both furnace to operate in high heat for second-stage heat mode as determined by a 2-stage thermostat. See furnace Installation Instructions for further details on this heating mode.

- a. Turn TT set-up switch on LH control board to "ON".
- b. Turn TT set-up switch on RH control board to "ON".

NOTE: If Extension Harness will not plug in to LH or RH furnaces, Extension Harness is installed backward. Remove Extension Harness and re-install in correct orientation.

7. Install Auxiliary Limit Switch (ALS-M) on LH furnace:

- a. Drill $\frac{1}{8}$ " hole in blower housing 12" below blower shelf. (See Figure 17)
- b. Position ALS-M so reset button faces front of furnace.
- c. Secure bracket to blower housing using a factory-supplied screw and spacer. (See Figure 18)

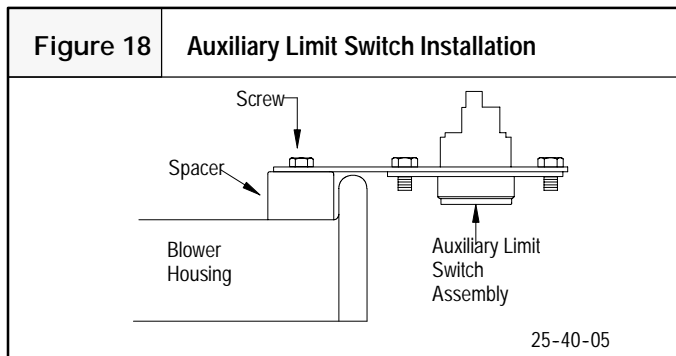
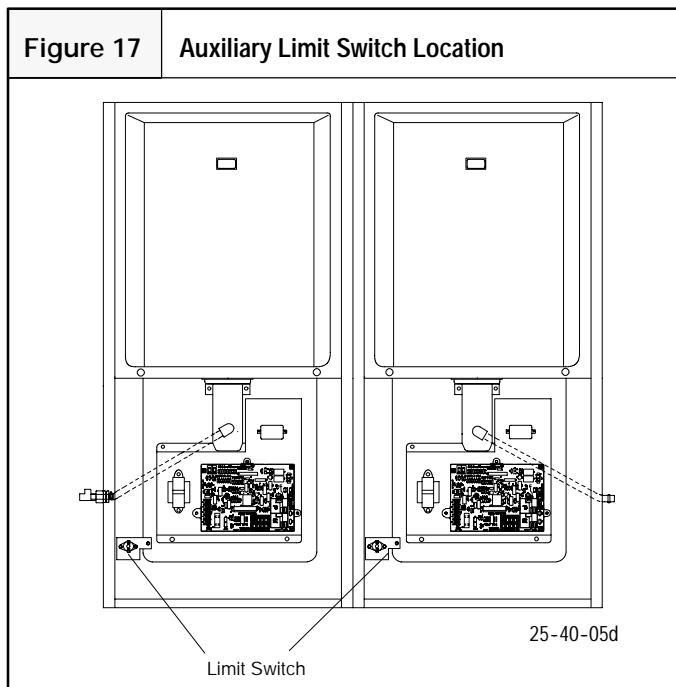
⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to unit components.

Protect furnace control from metal shavings and debris.

- d. Disconnect red transformer wire from LH furnace control 24 VAC RED terminal.
- e. Connect red transformer wire to ALS-M wire connector labeled TRAN.
- f. Connect orange ALS-M wire connector labeled RED to LH furnace control 24 VAC RED terminal.
- g. If Extension Harness is used, connect 2-wire-harness to Extension Harness.



8. Install harness labeled "Secondary Furnace" on RH furnace:

- a. Secure relay TKR to RH furnace control mounting bracket using two factory-supplied screws. (See Figure 17.)
- b. Connect relay TKR red wire to red wire from RH furnace transformer TRAN.

- c. Connect relay TKR blue wire to blue wire from RH furnace transformer TRAN.
 - d. Connect relay TKR red wire to the 24 VAC RED terminal on RH furnace control.
 - e. Connect relay TKR blue wire to the COM BLUE terminal on RH furnace control.
 - f. Connect red wire labeled R-Secondary to RH furnace control thermostat connection R.
 - g. Connect white wire labeled W-Secondary to RH furnace control thermostat connection W for a single-stage furnace, W1 for a 2-stage furnace.
 - h. Connect black wire labeled C-Secondary to RH furnace control thermostat connection C.
 - i. Connect yellow wire labeled TWIN-SECONDARY to RH furnace control TWIN terminal.
 - j. If the furnaces are side-by-side, route loose ends of 4-wire harness from Secondary furnace to Main furnace through snap bushings previously installed between furnaces.
 - k. Connect Secondary 4-wire harness into 4-wire Main harness.
 - l. If Extension harness was installed, connect 4-wire Secondary harness to Extension harness.
9. Install Auxiliary Limit Switch ALS-S on Secondary furnace:
- a. Drill $\frac{1}{8}$ " hole in blower housing 12" below blower shelf. (See Figure 17)

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in damage to unit components.

Protect furnace control from metal shavings and debris.

- b. Position ALS-S so reset button faces front of furnace.
- c. Secure bracket to blower housing using a factory-supplied screw and spacer. (See Figure 18)

CONNECT ELECTRICAL COMPONENTS: COOLING

⚠ WARNING

FIRE AND OPERATION HAZARD

Failure to follow this warning could cause a fire, personal injury, or death.

Make no connections between the R 24-vac connector in Left Hand furnace and the R 24-vac connector in Right Hand furnace.

When installing twinned outdoor units with twinned gas furnaces, it is necessary to use a field-supplied 24-vac pilot-duty relay and a field-supplied 24/115-vac transformer as shown in Figure 11, Figure 12 or Figure 13 to prevent overloading furnace 24/115-vac transformer.

VENTING

Refer to Installation Instructions supplied with each furnace for venting information. Only single-stage non-condensing furnaces with a single-stage thermostat can be common vented or breach vented. Venting each furnace individually is required in ALL condensing installations. (See Table 4)

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow safety warnings exactly could result in serious injury or death.

Do NOT common vent single-stage non-condensing furnaces with a two-stage thermostat. Dedicated vents must be used.

⚠ CAUTION

PROPERTY AND UNIT DAMAGE HAZARD

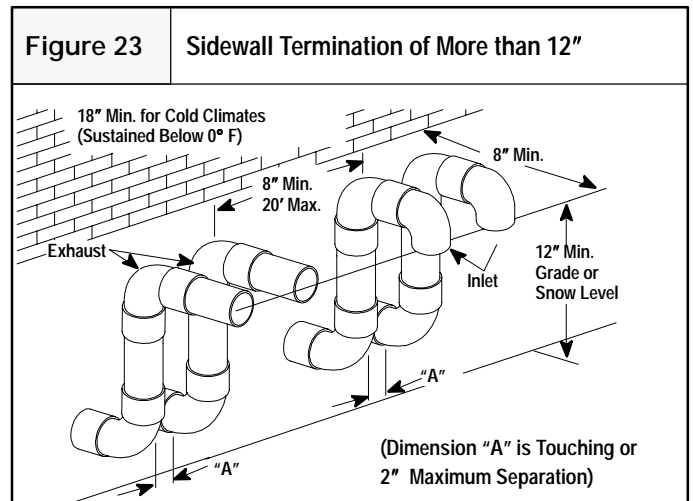
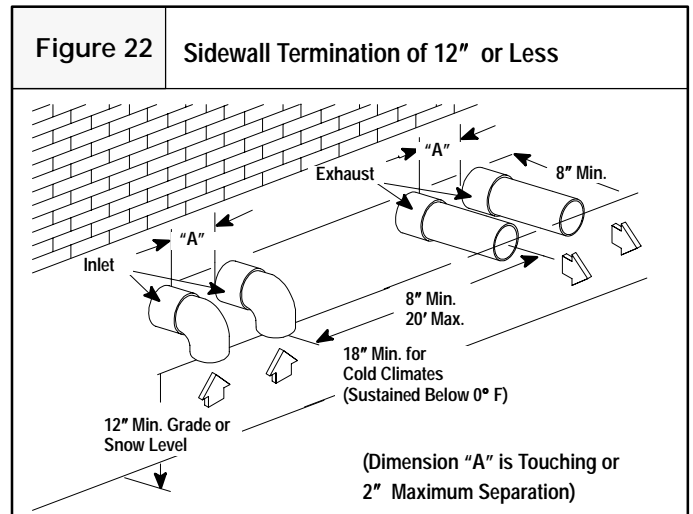
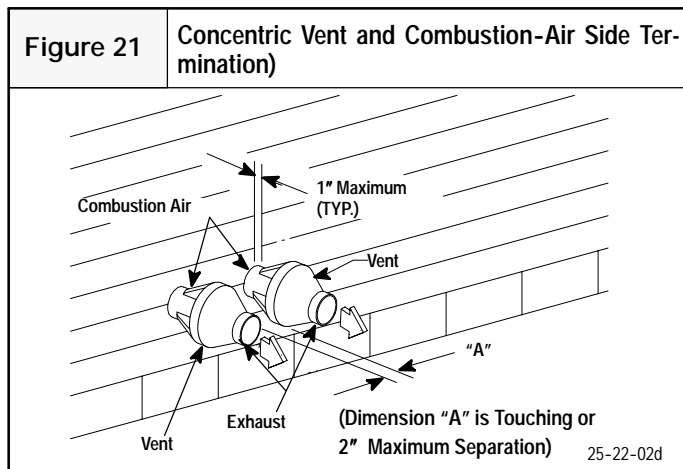
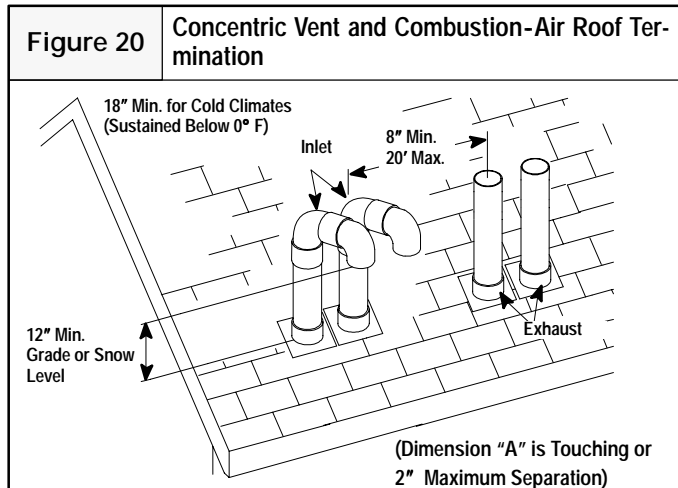
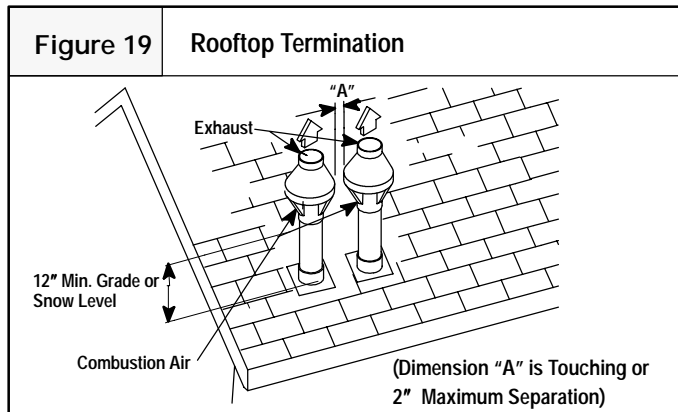
Failure to follow this caution may result in property and/or unit damage.

When common-venting twinned, Category I (negative-pressure venting), non-condensing furnaces, excessive condensate may occur as a result of oversized vent systems. Dedicated vents and/or proper vent sizing, per the current edition of the National Fuel Gas Code, will reduce the potential for condensation.

Table 4	Allowable Venting	
Furnace Type	Thermostat Type	Vent
Single Stage, Non-condensing	Single Stage	Common or Dedicated
	Two Stage	Dedicated ONLY
Two Stage, Non-condensing	Single Stage Two Stage	Common or Dedicated
Single Stage, Condensing	Single Stage Two Stage	Dedicated ONLY
Two Stage, Condensing	Single Stage Two Stage	Dedicated ONLY

For condensing furnaces using **direct vent installations**, refer to Figure 19, Figure 20, Figure 21, Figure 22, or Figure 23 for proper ter-

mination. It is important that vent terminations be made as shown to avoid recirculation of flue gases.



GAS SUPPLY PIPING

NOTE: All gas connections must be made through exposed outer side of each furnace.

Furnaces are recommended to be provided with a single shutoff valve. However, individual shutoff valves may be required by local codes or jurisdictions. Refer to Installation Instructions provided with each furnace for additional gas supply information.

CONDENSATE DRAIN CONNECTION (Condensing Furnace Models only)

The condensate trap is factory installed in blower shelf and factory connected for UPFLOW applications. Install condensate trap extension drain such that field drain connections are on the left side for LH (MAIN) furnace and on right side for RH (SECONDARY) furnace. The condensate trap must be relocated for downflow and horizontal applications.

See furnace Installation Instructions for details on attaching field drain for downflow and horizontal applications.

ELECTRICAL SUPPLY CONNECTIONS

NOTE: All electrical power connections must be made through exposed outer side of each furnace.

1. Each furnace shall be connected to its own 115-vac power supply. The twinning kit installation interconnects the furnaces, allowing them to operate as a single furnace. The L1 (black) connection to each furnace must be connected to circuit breakers connected to the same service panel 115-vac phase leg.

On single-phase (residential) systems, each furnace circuit breaker should be located directly across from each other in service panel, or each furnace circuit breaker should be located on the same side of service panel, but must skip 1 space to be connected to the same leg of the 1-phase power supply. On 3-phase (commercial) systems, each furnace circuit breaker should be located directly across from each other in service panel, or each furnace circuit breaker should be located on the same side of service panel, but must skip 2 spaces to be connected to the same leg of the 3-phase power supply. The proper 115-vac phasing of furnace connections permits 24-vac transformer phasing as described below.

2. Phasing of the connected 24-vac transformer secondary circuits can be determined with the LED status of both furnaces. See furnace Installation Instructions and status code labels on blower doors. The furnaces' transformers' black leads should be connected to XFMR connector and white leads to NEUTRAL connector on control. If 1 or both LEDs are flashing code 10, disconnect lead at TWIN terminal of LH furnace and observe LED at each furnace. To verify that the furnaces are in phase, check from Main furnace L1 to Secondary furnace L1 with a voltmeter. If the furnaces are in phase, the voltage between both furnaces will be ZERO.

IF:

- a. Both LEDs are flashing on and off steadily (heartbeat) the system phasing is okay.
- b. One or both LEDs are flashing code 10:
 - 1) Line voltage polarity is reversed
 - 2) Reverse 24 VAC RED and COM BLUE in furnace flashing code 10.
- c. One LED is off, 1 LED is flashing on and off steadily (heartbeat):
 - 1) The 24-vac circuit is inoperative on furnace with LED light off.
 - 2) Check transformers and auxiliary limits in both furnaces and correct problem.
- d. One or both LEDs are dim or flickering.

Furnaces are on different phase legs. Disconnect TWIN lead. If both LEDs are on flashing on and off (heartbeat) when TWIN is disconnected, furnace line voltage power supply is out of phase.

3. Reconnect lead at TWIN terminal of LH furnace and observe LED at each furnace. The LEDs will flash on and off steadily (heartbeat) for proper phasing.

START-UP AND ADJUSTMENT

Refer to Installation Instructions supplied with furnaces for detailed information.

1. Shut off all power and gas to both furnaces.

2. Position blower off delay switches on controls in BOTH furnaces to SAME desired gas heat blower off delay. (See **Figure 14** and **Figure 15**.) See furnace Installation Instructions for further details.

3. Attach twinning connection wiring label over the existing furnace wiring label on the inside of the LH furnace blower access door. Use the following labels for the following applications:

Single Stage furnaces with single-stage thermostat, 330742-101

Single Stage furnaces with two-stage thermostat, 330741-101

Two Stage furnaces with single-stage or 2-stage thermostat, 330740-101

4. Attach twinning reference label 330743-101 on outside of blower access door of RH furnace blower door.
5. Turn on power and gas to both furnaces.
6. Reinstall blower access doors on both furnaces.
7. Operate furnaces through 2 cycles in each mode to confirm correct operation by operating only thermostat.
 - a. Single-stage gas heating thermostat R-to-W operates both furnaces gas heat mode. First stage of a 2-stage thermostat causes LH furnace to operate in gas-heat mode. Second stage of a 2-stage thermostat causes both furnaces to operate in gas-heat mode.
 - b. Single stage thermostat operates first or second stage of a two stage furnace, based on the furnace control board algorithm. 2-stage heating thermostat R-to-W1 will operate both furnaces in low gas-heat mode. Thermostat R to W1 and-W2 causes both furnaces to operate in high gas-heat mode.
 - c. Thermostat R-to-G for continuous fan.
 - d. Cooling thermostat R-to-G-and-Y for single-speed cooling blower.
8. Reinstall control doors on both furnaces.
9. Instruct user in operation of furnace and thermostat.

SEQUENCE OF OPERATIONS

See **Figure 11** or **Figure 12** for single-stage non-condensing furnace twinning connection and schematic wiring diagrams while reviewing the sequence of operation.

Twinning operation is controlled by LH furnace. The TWIN and C connection wires ensure the 2 furnaces coordinate their blower operation. When either furnace requires blower operation, both furnaces operate their blowers at the same speed. Both furnaces operate simultaneously in the same mode: heat, cool, or continuous fan. Exceptions can occur if a safety switch on either furnace is activated (such as pressure switch, flame roll-out switch, main limit switch, twinning kit auxiliary limit switch, or flame-proving sensor). In such a case, the other furnace continues to operate unless open switch is the flame roll-out, main limit, or twinning kit auxiliary limit switch, in which case both furnaces respond.

Single-Stage Heat with Single-Stage Gas-Heat Thermostat

1. Single-stage thermostat causes both furnaces to operate in heating mode.
2. Operation in ALL modes is the same for twinned furnaces as for an individual furnace. See furnace Installation, Start-Up, and Operating Instructions for more information on sequence of operation.

Two-Stage Heat with 2-Stage Gas-Heat Thermostat

1. The 2-stage thermostat causes the furnaces to operate in first-stage heat (LH furnace operates in heat while RH furnace blower operates but RH furnace is not heating) or causes the furnaces to operate in second-stage heat (both furnaces operate in heat), depending on whether 1 or 2 thermostat stages are calling for heat.

2. Operation in ALL modes is the same for twinned furnaces as for an individual furnace. See furnace Installation, Start-Up, and Operating Instructions for more information on sequence of operation.

Table 5	Single Stage Heating with Single Stage Thermostat Using 2 Single Stage Furnaces (See Figure 11)		
THERMOSTAT CONNECTIONS		CONTROL BOARD CONNECTION	ACTION
R		R	Power from control board to thermostat
W		W	Starts LH and RH furnaces for heating

Table 6	Two Stage Heating with Two Stage Thermostat Using 2 Single Stage Furnaces (See Figure 13)		
THERMOSTAT CONNECTIONS		CONTROL BOARD CONNECTION	ACTION
R		R	Power from control board to thermostat
W1		W	Starts LH furnace for first stage heating
W2		None	Thermostat W2 wired directly to RH accessory relay to start RH Furnace for second stage heating

Table 7	Two Stage Heating with Single Stage Thermostat Using 2 Two Stage Furnaces (See Figure 13)		
THERMOSTAT CONNECTIONS		CONTROL BOARD CONNECTION	ACTION
R		R	Power from control board to thermostat
W		W1	Starts LH and RH furnaces in low heat or high heat, as determined by LH furnace control board*

* TT switches must be in correct configuration

Table 8	Two Stage Heating with Two Stage Thermostat Using 2 Two Stage Furnaces (See Figure 13)		
THERMOSTAT CONNECTIONS		CONTROL BOARD CONNECTION	ACTION
R		R	Power from control board to thermostat
W1		W1	Starts both furnaces in low heat for first stage heating*
W2		W2	Starts both furnaces in high heat for second stage heating*

* TT switches must be in correct configuration

Table 9	Single Stage Cooling with Single Stage Thermostat Using 2 Single Stage A/C units (See Figure 11)		
THERMOSTAT CONNECTIONS		CONTROL BOARD CONNECTION	ACTION
R		R	Power from control board to thermostat
Y		Y	Energizes accessory cooling relay to start both A/C units for cooling
G		G	Starts both indoor fans on cooling speed (With Y energized)

* Do not remove ACRDJ from furnace control boards

Table 10	Two Stage Cooling with Two Stage Thermostat Using 2 Single Stage A/C units (See Figure 12)		
THERMOSTAT CONNECTIONS		CONTROL BOARD CONNECTION	ACTION
R		R	Power from control board to thermostat
Y1		Y	Energizes accessory cooling relay to start L/H and A/C for first stage cooling and cooling speed blower
Y2		None	Thermostat Y2 wired directly to RH accessory relay to start RH A/C
G		G	Starts both indoor fans on cooling speed (With Y energized)

Table 11	Continuous Fan Operation	
THERMOSTAT CONNECTIONS	CONTROL BOARD CONNECTION	ACTION
R	R	Power from control board to thermostat
G	G	Starts both fans in heating speed*

* Staged Continuous Fan operation is not available