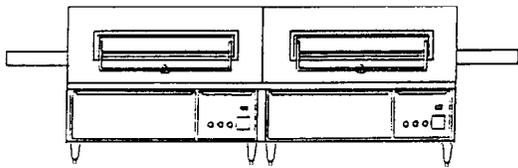
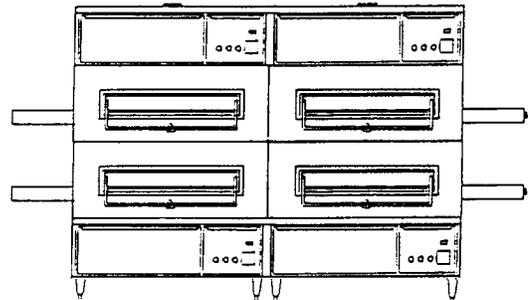


owner's operating & installation manual

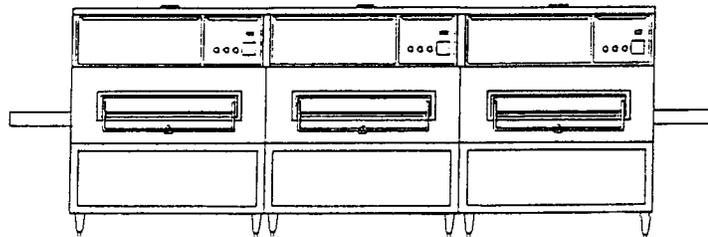
SERIES PS360/360WB TANDEM GAS OVEN MODELS



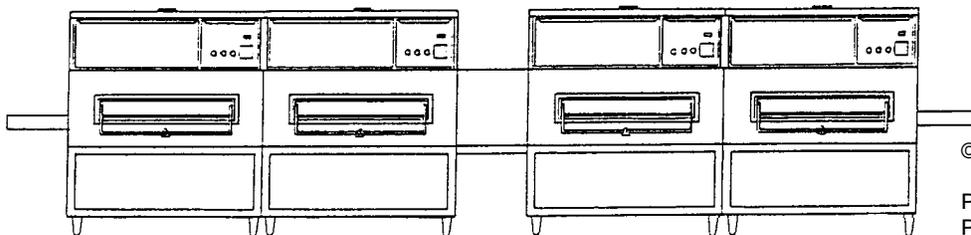
PS360L/PS360WB-L Tandem



PS360/PS360WB Double Tandem



PS360U/PS360WB-U Tri Tandem



PS360U/PS360WB-U Quad Tandem

© 1998 Middleby Marshall Inc.

Part No. 38615

Price US \$30.00

R. Aug. 98, Rev. B, Ver. 3

NOTICE:

This Operating and Installation Manual should be given to the user. The operator of the oven should be familiar with the functions and operation of the oven.

This manual must be kept in a prominent, easily reachable location near the oven.

The oven has a combustion system suitable for use with all natural gases and can be converted by a qualified service agent for use with liquified gas.

It is suggested to obtain a service contract with a manufacturer's certified service agent.

WARNING

POST, IN A PROMINENT LOCATION, THE EMERGENCY TELEPHONE NUMBER OF YOUR LOCAL GAS SUPPLIER AND INSTRUCTIONS TO BE FOLLOWED IN THE EVENT YOU SMELL GAS.

Instructions to be followed in the event the user smells gas shall be obtained by consulting the local gas supplier. If the smell of gas is detected, immediately call the emergency phone number of your local Gas Company. They will have personnel and provisions available to correct the problem.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

WARNING:

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

NOTICE

CONTACT YOUR LOCAL SERVICE COMPANY TO PERFORM MAINTENANCE AND REPAIRS. A SERVICE AGENT DIRECTORY IS SUPPLIED IN YOUR INSTALLATION KIT.

NOTICE

Using any parts other than genuine Middleby Marshall factory manufactured parts relieves the manufacturer of all warranty and liability.

NOTICE

Middleby Marshall (Manufacturer) reserves the right to change specifications at any time.

NOTICE

The equipment warranty is not valid unless the oven is installed, started and demonstrated under the supervision of a factory certified installer.

Retain This Manual For Future Reference

MIDDLEBY MARSHALL INC.
OVEN LIMITED WARRANTY
(Non U.S.A.)

The seller warrants equipment manufactured by it to be free from defects in material and workmanship for which it is responsible. The Seller's obligation under this warranty shall be limited to replacing or repairing at Seller's option, without charge, F.O.B. Seller's factory, any part found to be defective and any labor and material expense incurred by Seller in repairing or replacing such part, such warranty to be limited to a period of one year from date of original installation or 15 months from date of shipment from Seller's factory, whichever is earlier, provided that terms of payment have been fully met. All labor shall be performed during regular working hours. Overtime premium will be charged to the Buyer.

This warranty is not valid unless equipment is installed, started, and demonstrated under the supervision of a factory certified installer.

Normal maintenance functions, including lubrication, adjustment of airflow, thermostats, door mechanisms, microswitches, burners and pilot burners and replacement of light bulbs, fuses and indicating lights, are not covered by warranty.

Any repairs or replacements of defective parts shall be performed by Seller's authorized service personnel. Seller shall not be responsible for any costs incurred if the work is performed by other than Seller's authorized service personnel.

When returning any part under warranty, the part must be intact and complete, without evidence of misuse or abuse, freight prepaid.

Seller shall not be liable for consequential damages of any kind which occur during the course of installation of equipment, or which result from the use or misuse by Buyer, its employees or others of the equipment supplied hereunder, and Buyer's sole and exclusive remedy against Seller for any breach of the foregoing warranty or otherwise shall be for the repair or replacement of the equipment or parts thereof affected by such breach.

The foregoing warranty shall be valid and binding upon Seller if and only if Buyer loads, operates and maintains the equipment supplied hereunder in accordance with the instruction manual provided to Buyer. Seller does not guarantee the process of manufacture by Buyer or the quality of product to be produced by the equipment supplied hereunder and Seller shall not be liable for any prospective or lost profits of Buyer.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER. SPECIFICALLY THERE ARE NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

The foregoing shall be Seller's sole and exclusive obligation and Buyer's sole and exclusive remedy for any action, whether in breach of contract or negligence. In no event shall seller be liable for a sum in excess of the purchase price of the item.

Middleby Marshall Inc. • 1400 Toastmaster Drive • Elgin, IL 60120 • USA • (847) 741-3300 • FAX (847) 741-4406

Middleby Corporation 24-hour Service Hotline 1-800-238-8444
www.middleby.com

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NOTE

Wiring Diagrams Are Contained In This Manual
And Are Also Located Inside The Control Box Door.

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NOTES:

SECTION 1 DESCRIPTION

OVEN INFORMATION (per oven section)

	<i>PS360</i>	<i>PS360WB</i>
Weight, Single Oven	1350 lbs. (612kg)	1400 lbs. (634kg)
Shipping Weight, Single Oven	1675 lbs. (760 kg)	1750 lbs. (780kg)
Shipping Cube, Single Oven	Approx. 104.5 ft ³ (3.0 m ³)	Approx. 122 ft. ³ (3.5m ³)
Rated Heat Input	135,000 BTU (34,020 kcal, 40 kW/hr)	170,000 BTU (42,840 kcal, 50 kW/hr)
Maximum Operating Temperature	550°F (288°C)	
Flue Vent	1.08" (27mm) D x 3" (76mm) W	
Exhaust Flow, Single Oven	80 ft. ³ /min. (2.1 m ³ /min.)	
Warm Up Time	10 min.	

For oven dimensions, gas information, and electrical information, refer to the Installation section.

CHART OF ORIFICE SIZES, GAS PRESSURES, NOMINAL INPUT RATINGS AND GAS FLOW

IMPORTANT: This chart is not for use in Germany.

Oven Model	Category	Gas Type	Orifice Diameter (mm)			Gas Pressures (mbar)		Nominally Input (kW)	Low Flame (kW)	Gas Supply Volume	Gas Flow (liter/min.)
			Main (Full Flame)	By-Pass (Low Flame)	Pilot	Supply (Inlet)	Orifice (Manifold)				
PS360L & PS360U	I _{2E+}	Natural, E(H)	5.5	1.65	0.64	20	8	40	4.4	4.2 m ³ /h	70.0
		Natural, LL(L)	5.5	1.65	0.64	20	12.5			4.9 m ³ /h	81.7
		Natural,E(H)/LL(L)	4.5	1.50	0.64	20/25	*			4.2/4.9	70.0/81.
PS360WB-L	II _{2E+3+}	Liquid, G30	2.7	0.85	0.38	50	*	50	8.8	3.1 kg/h	—
		Liquid,G31/G30	3.1	0.95	0.38	30/37	*			3.1 kg/h	—
		Natural, H	6.3	2.30	0.64	20	8.7			5.3 m ³ /h	88.0
PS360WB-U	II _{2L3B/P}	Natural, L	6.3	2.30	0.64	20	12	50	8.8	6.1 m ³ /h	102.4
		Natural,G20/G25	5.4	2.00	0.64	20/25	17/22			5.3/6.1	88.0/102.4
		Liquid, G30	3.1	1.40	0.38	50	*			3.9 kg/h	—
		Liquid, G30/G31	3.5	1.40	0.38	30/37	*			3.9 kg/h	—

*Pressure regulator (Governor) not in operation, system at inlet (supply) pressure.
The orifice pressures apply to 15°C, 1.013 mbar, dry gas.

SECTION 1
DESCRIPTION

I. PRINCIPLE OF AIR FLOW

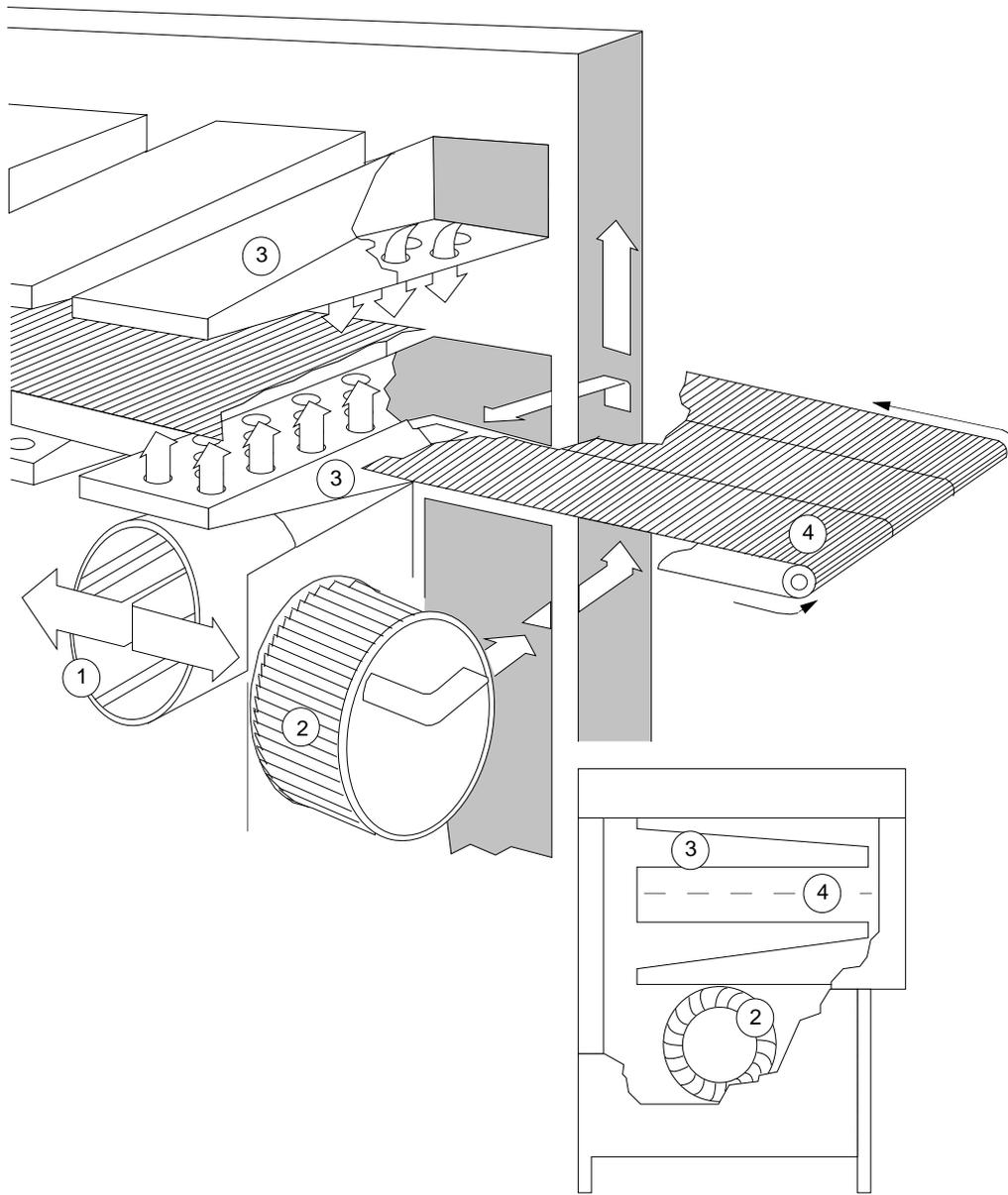


Figure 1-3 - AIR DELIVERY SYSTEM
(per oven section)

Air is heated in the heating chamber (1), then pulled into the impellers or blowers (2), which push the air into the oven plenum and delivers the heated air into the air fingers (3). The fingers contain an inner plate and outer plate which columnate the air and evenly distribute the heated air across the conveyor belt (4) on which the product rides. The air is then pulled back into the heating chamber (1) and the process continues.

Refer to next page for another illustration of the oven air fingers.

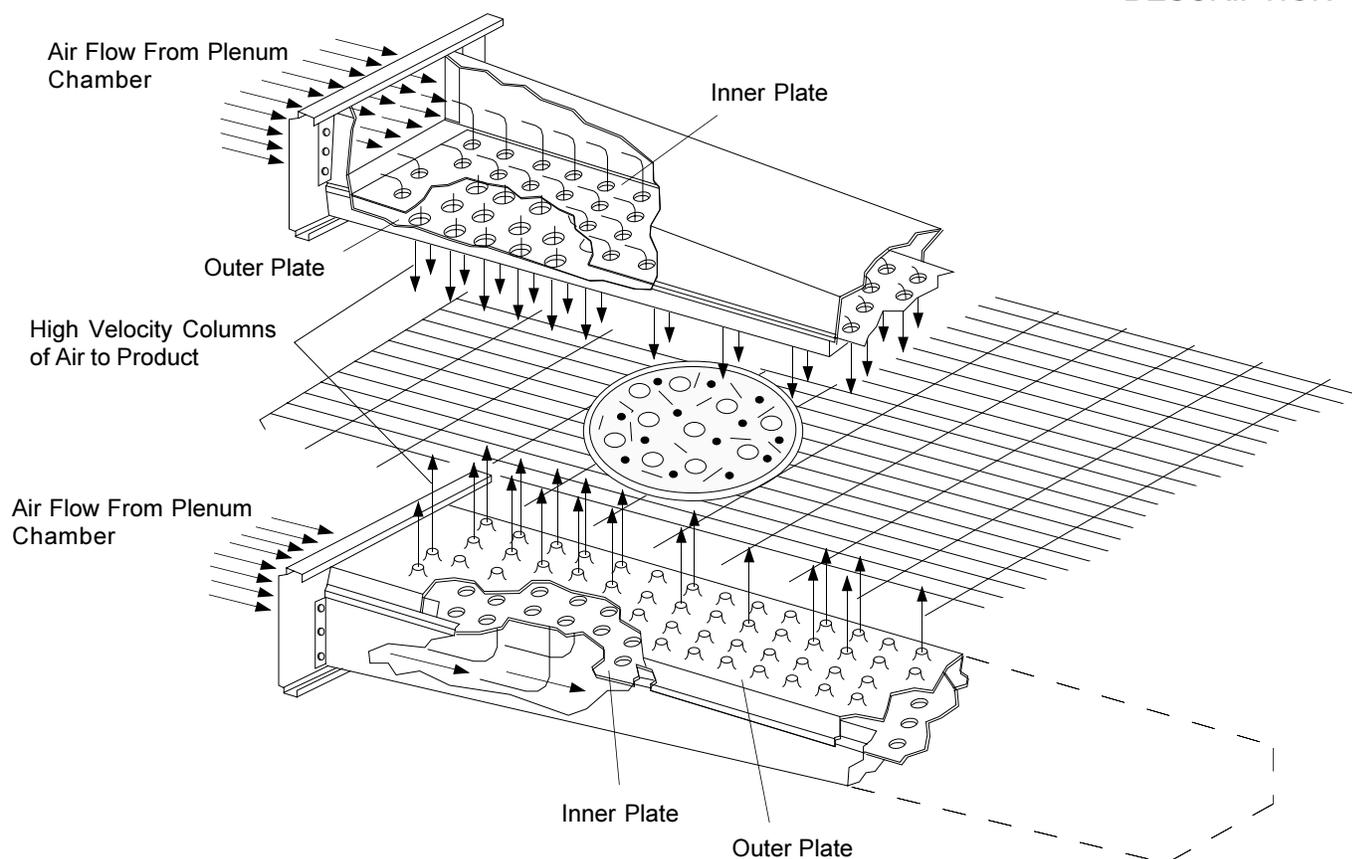


Figure 1-4. Air Fingers Showing Air Passing Through Inner Plate And Outer Plate Which Forms High Velocity Columns Of Air To Product.

A. Heat Transfer and How It Works

1. Heat constantly moves from a warm object to a cold object. Heat moves using three different paths which are conduction, radiation and convection.

Conduction: This path has to do with surface to surface contact. The pizza dough in contact with the pan is a good example of conduction.

Radiation: This path has to do with objects radiating heat. Dark objects absorb heat whereas light or shiny objects reflect more heat. Because of this, the inside of the oven is light in color, reflecting more heat back to the product.

Convection: This path has to do with moving amounts of air. It explains why hot air will rise and cooler air replaces hot air. An industrial application of this principle is to incorporate a fan to force the hot air movement which in turn will increase the heat transfer to the product.

The oven has two large blowers to move the hot air through the air fingers and onto the product so the most efficient bake is achieved.

Temperature is the intensity of heat at the point which it is sensed. As discussed above, heat flows by conduction, radiation and convection. The speed at which the heat flows is determined by the temperature difference between the oven and the food product. The larger the difference, the faster the heat flows to the item that is being baked.

SECTION 1 DESCRIPTION

B. AirFingers

The Middleby Marshall ovens are heavy duty conveyorized hot air ovens employing vertical air streams (Figure 1-3 and 1-4) to give uniform and intensive heating. The columnated vertical streams of hot air provide an exceptional heat transfer rate and generally bake faster and at lower temperatures than convection hot air or infrared heating ovens.

This is accomplished by the hot air fingers, (Figure 1-3 and 1-4) inside the oven. The oven can accommodate up to 6 bottom air fingers and 6 top air fingers. Standard ovens have 5 bottom fingers and 3 top fingers.

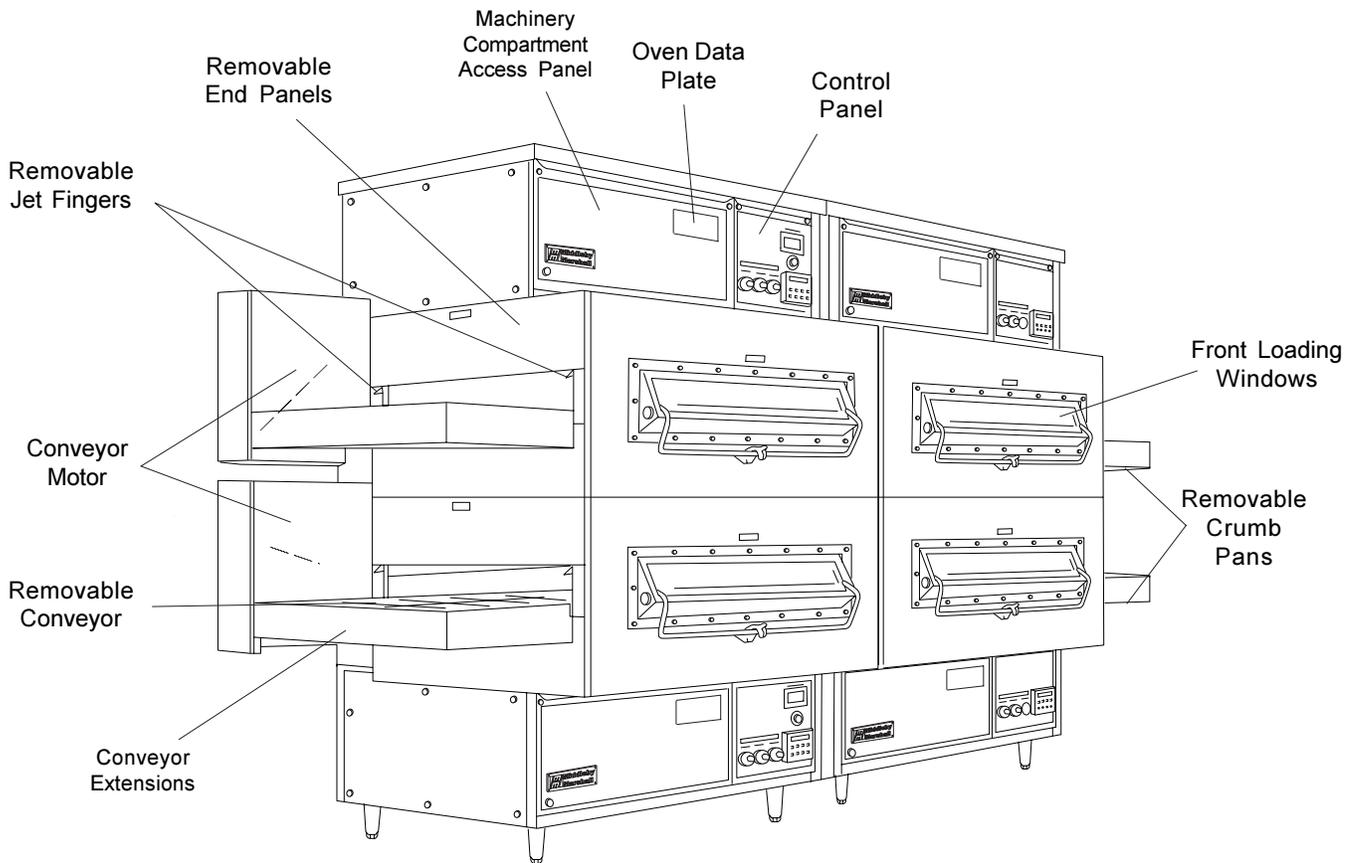


Figure 1-5. Component Location

II. COMPONENT FUNCTION

The components for the lower and upper ovens are identical. The following description covers the lower oven.

A. Conveyor

The conveyor is driven by a direct current electric motor operating through a gear reducer, (See Figure 1-6). The motor speed is controlled by a digital control. The stainless steel wire belt can travel in either direction and at variable speeds.

Note that only one oven section will control the speed of the conveyor (2 for a double tandem oven).

B. Gas Burner

Turning the heat switch to "I" will initially set up the oven purge circuit. After approximately 45 seconds, the solid-state ignition control lights a pilot by an electric spark.

After the pilot is lit, the main valve will open, permitting gas to go to the burner and heat the oven.

The main burner and pilot gas are extinguished when heat is off. This system permits the main gas valve to open only when the pilot burner is proven to be lit.

If the pilot flame does not light or a loss of flame occurs, the main valve closes and the red lamp is lit on the "RESET" switch. The "RESET" switch must be pushed to restart the ignition sequence.

Note that the gas burner of each oven section is independently controlled by that section's temperature controller.

C. Front Window

A front window provides access to each section of the oven for items which do not require full bake time, such as sandwiches, cookies, small items or cheese melting processes.

The window is also used for viewing items being baked and for cleaning.

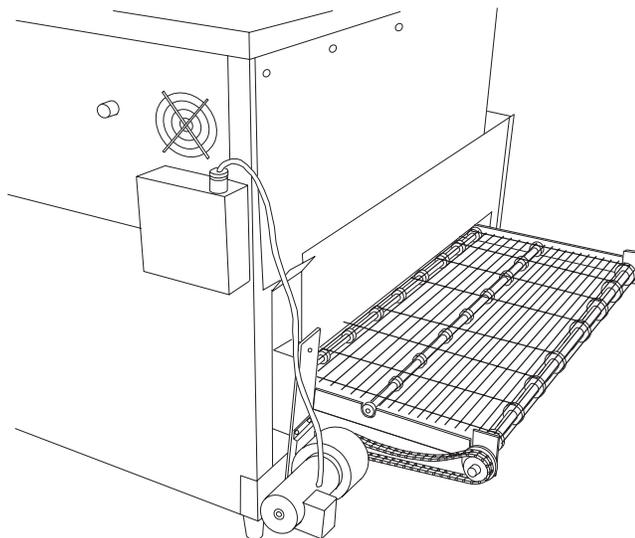


Figure 1-6. Conveyor Drive Motor

**SECTION 1
DESCRIPTION**

D. Cooling Fans -- See Figure 1-7

There are two cooling fans located in the back of each oven. These fans blow cool air in through the machinery compartment, across the blower motors, and out the rear of the top cover, or out the front bottom of the lower oven.

E. Blower

A blower is located in each end of each oven section. These blowers force heated air through the oven and fingers. The blower switch has two positions, and must be on for oven warmup and bake.

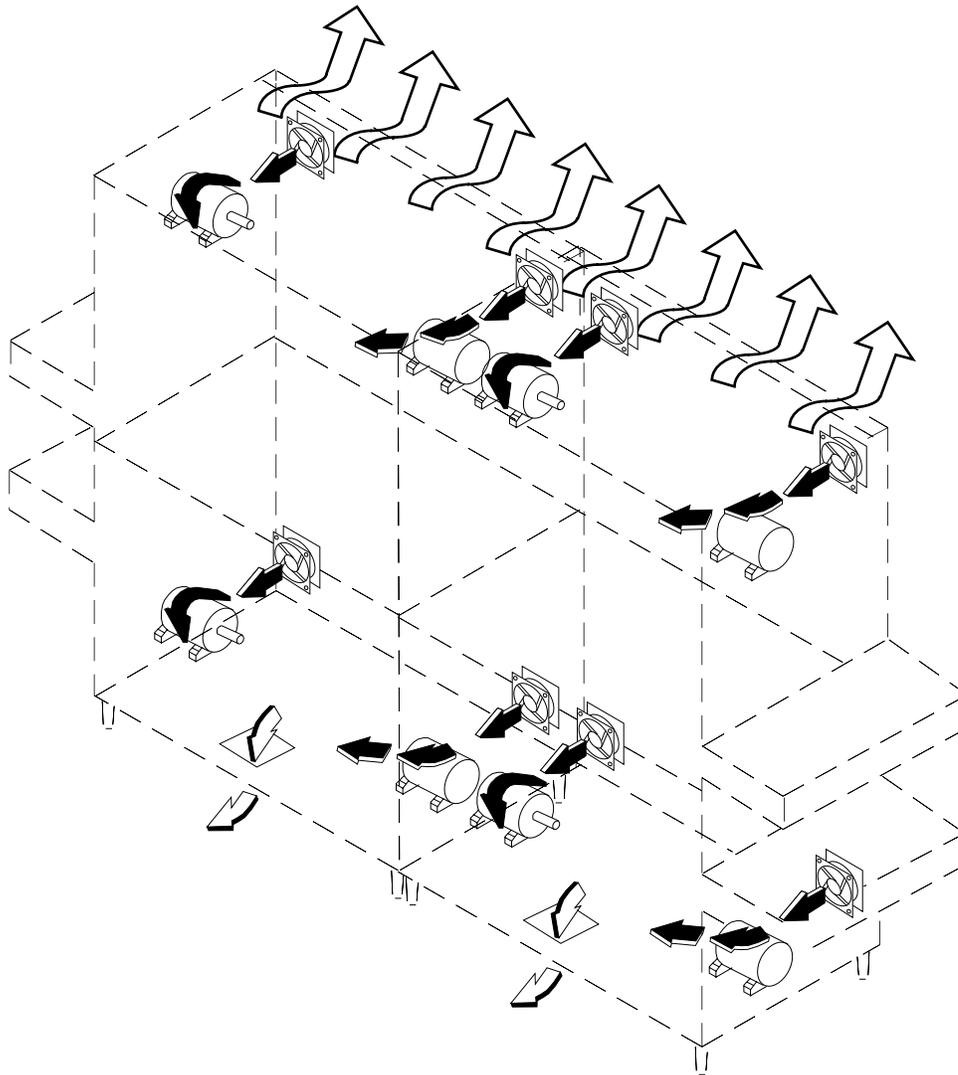


Figure 1-7. Cooling Fans

F. Air Fingers

The Air Finger Assemblies are made up of three parts as follows (See Figure 1-8):

1. **Outer Plate**-The Outer Plate is the removable covering with tapered holes, which directs the air stream onto the product to be baked. Outer plates are manufactured with 1 row of holes (L1 finger), 3 rows of holes (L3 finger), 6 rows of holes (L6 finger) or no holes (a radiant finger).

2. **Inner Plate** -The Inner Plate directs air through the air finger, and is vital to forming the unique air jets.

3. **Finger Manifold**-The Finger Manifold is the assembly which slides on tracks into the oven plenum. Blank plates are available to install on the plenum where an air finger is not required. The finger manifold contains one non-adjustable baffle, as shown in Figure 1-8.

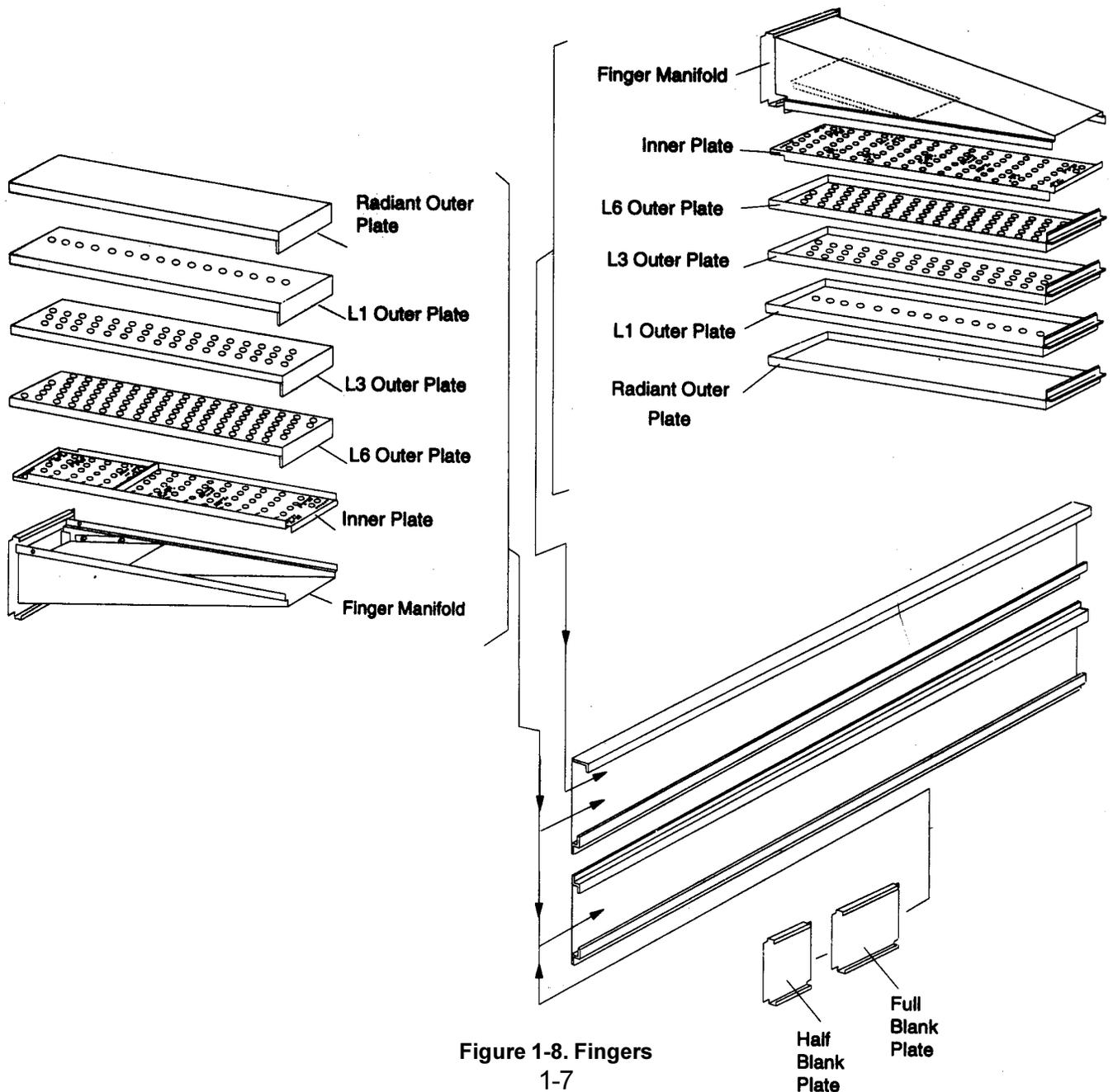


Figure 1-8. Fingers
1-7

SECTION 1
DESCRIPTION

NOTES:

SECTION 2 INSTALLATION

I. UNLOADING/UNPACKING

Your Middleby Marshall Ovens are shipped partially assembled. Each oven section will arrive in its own crate of the following size and weight:

	PS360U/PS360L	PS360WB-U/PS360WB-L
Length:	72" (183cm)	66" (167cm)
Width:	48" (122cm)	57" (144cm)
Height:	60" (152cm)	50" (127cm)
Weight:	1675 lbs. (760kg)	1750 lbs. (780kg)

If you ordered stands for your ovens, they are shipped in separate crates.

When your common carrier or truck line notifies you of delivery, you must have a forklift at the facility to unload the crate(s).

If you have a door that is wider than the ovens, simply move the ovens into your facility and set up an appointment with your Middleby Marshall Authorized Installer.

NOTE: *The width of each oven can be reduced by about 1" (25mm) by removing the window from the oven. Window disassembly instructions are in the **Cleaning** section of this Owners Manual.*

If the ovens are wider than your door opening, the oven will have to be dismantled according to the directions in the Pre-Installation Procedures Manual.

NOTE

There must be adequate clearance between the oven and combustible construction. Clearance must also be provided for servicing and for operation.

WARNING

Do not obstruct the flow of combustion and ventilation air to and from your oven. There must be no obstructions around or underneath the oven.

WARNING

This oven must be installed in accordance with the rules in force. Use only in a well ventilated area. Read the instructions before use.

II. INSTALLATION, PREPARATION, AND SUPPLY

When preparing the oven for installation at a location, the latest International, National or Local Requirements should be adhered to.

The ovens must be installed on an even (level) non-flammable flooring and any adjacent walls must be non-flammable. The minimum allowed distance from the rear of the oven to the wall is 12" (30cm).

The ovens can be supported only by legs. No casters are allowed. It should be made certain that there are no obstructions located around or underneath the oven that interfere with air circulation.

The ovens must be installed under a ventilating hood with electrical exhaust air sensing control.

The gas supply connection should be according to applicable ISO-228-1 or ISO-7-1 recommendations.

Normally, the oven is prepared and adjusted to the specific gas type used by the customer. Before operating the oven, check the label on the oven and also on the packaging that the gas type indicated matches the local supply at the installation. If not, refer to Section VI, **PREPARATION FOR VARIOUS GASES**, in this chapter and convert as directed.

All installations, conversions and service work must be performed by an Authorized Service Agent according to the instructions supplied by the manufacturer.

When converting from one gas type to a different type, the orifices supplied with the conversion kit must be checked for proper size as specified in this manual to assure that the oven is operating at the nominal rated input.

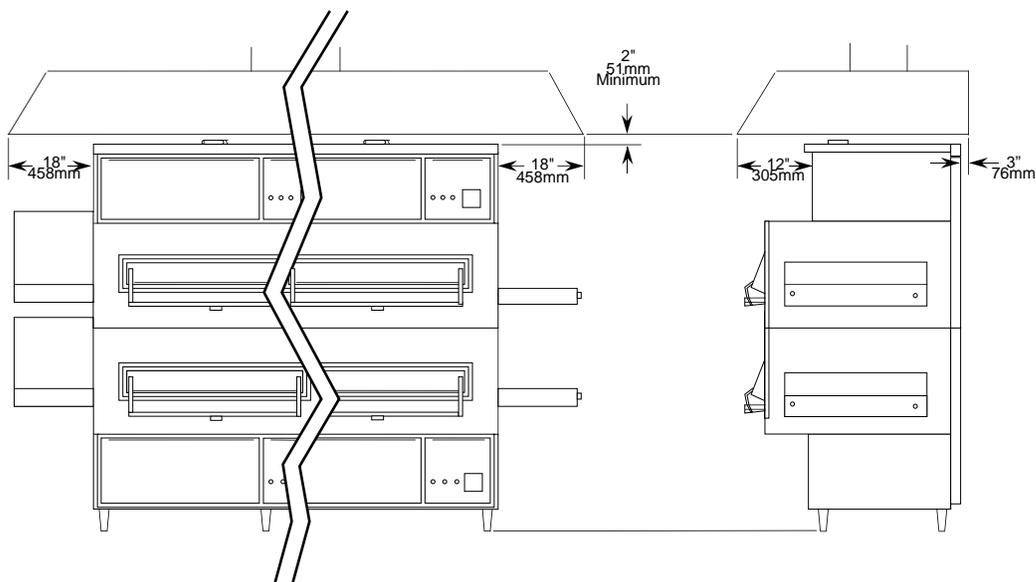


Figure 2-1 - Ventilation Hood Dimensions (RECOMMENDATIONS ONLY)

III. VENTILATION SYSTEM

IMPORTANT

Where international, national, or local codes require the installation of fire suppression equipment or other supplementary equipment, DO NOT mount the equipment directly to the oven.

MOUNTING SUCH EQUIPMENT ON THE OVEN MAY:

- ***VOID AGENCY CERTIFICATIONS***
- ***RESTRICT SERVICE ACCESS***
- ***LEAD TO INCREASED SERVICE EXPENSES FOR THE OWNER***

REQUIREMENTS

A mechanically driven ventilation system is required for the oven.

PROPER VENTILATION OF THE OVEN IS THE RESPONSIBILITY OF THE OWNER.

RECOMMENDATIONS

NOTE THAT THE HOOD DIMENSIONS SHOWN IN FIGURE 2-1 (PREVIOUS PAGE) ARE RECOMMENDATIONS ONLY. INTERNATIONAL, NATIONAL, AND LOCAL CODES WILL VARY, AND MUST BE FOLLOWED WHEN INSTALLING THE VENTILATION SYSTEM. ANY APPLICABLE INTERNATIONAL, NATIONAL, AND LOCAL CODES SUPERSEDE THE RECOMMENDATIONS SHOWN IN THIS MANUAL.

The rate of air flow exhausted through the ventilation system may vary depending on the oven configuration and hood design. Consult the hood manufacturer or ventilation engineer for these specifications.

To avoid a negative pressure condition in the kitchen area, return air must be brought back to replenish the air that was exhausted. A negative pressure in the kitchen can cause heat-related problems to the oven components as if there were no ventilation at all. The best method of supplying return air is through the heating, ventilation and air conditioning (HVAC) system. Through the HVAC system, the air can be temperature-controlled for summer and winter. Return air can also be brought in directly from outside the building, but detrimental affects can result from extreme seasonal hot and cold temperatures from the outdoors.

NOTE: Return air from the mechanically driven system must not blow at opening of bake chamber. Poor oven baking performance will result.

OTHER VENTILATION CONCERNS

- Special locations, conditions, or problems may require the services of a ventilation engineer or specialist.
- Inadequate ventilation can inhibit oven performance.
- It is recommended that the ventilation system and duct work be checked at prevailing intervals as specified by the hood manufacturer and/or HVAC engineer or specialist.

**SECTION 2
INSTALLATION**

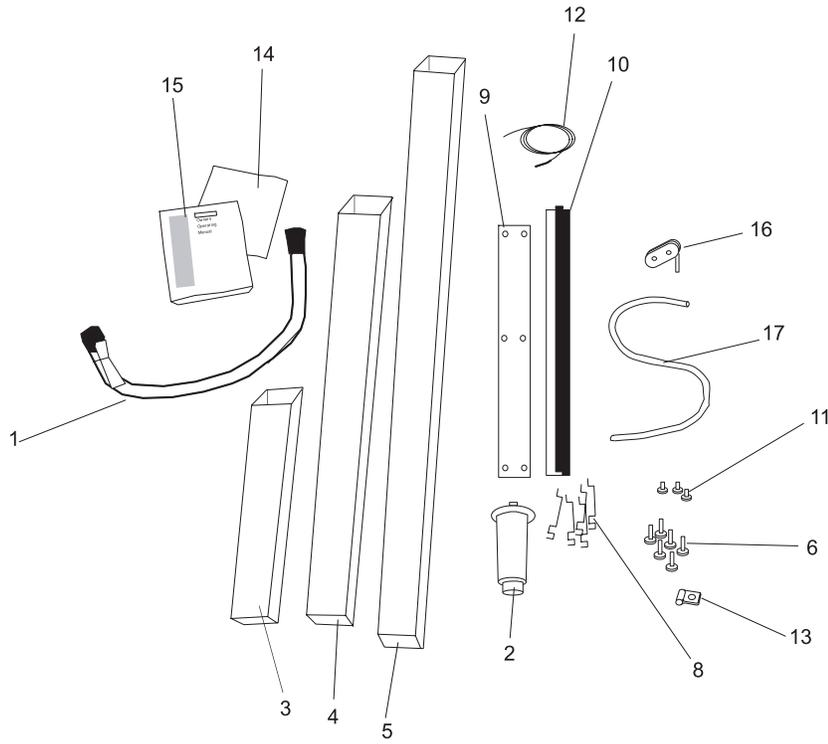


Figure 2-2 - INSTALLATION KIT

PS360L/WB-L Tandem

PS360/WB Double Tandem

PS360U/WB-U Tri Tandem

PS360U/WB-U Quad Tandem

Item	Part #	Description				
1	22361-0001	Flexible Gas Hose	2	4	3	4
2	22450-0028	Adjustable Legs	8	8	12	16
3	30773	Flue Vent, 14"Lg.	2	-	-	-
4	30759	Flue Vent, 29-1/2"Lg.	-	2	3	4
5	30758	Flue Vent, 50" Lg.	-	2	-	-
6	21256-0008	Screw, 10-32 x 3/8	A/R	A/R	A/R	A/R
8	42400-0089	Master Link Kit, PS360	2	4	3	4
8	42400-0598	Master Link Kit, PS360WB	-	-	-	-
9	35122-0049	Attachment Strip	-	4	-	-
10	35000-1103	Stop, End Conv., PS360	1	2	-	-
10	35000-1899	Stop, End Conv., PS360WB	-	-	-	-
11	21292-0001	Scr, #2PT 10-16 x 3/4 Hx Wsh	A/R	A/R	A/R	A/R
12	33984	Thermocouple	2	4	3	4
13	27276-0001	Cable Clamp	2	4	3	4
14	1002040	Warranty,Parts & Serv. Dist.List	1	1	1	1
15	38615	Owners Manual,English	1	1	1	1
16	27126-0238	11 Piece Hex Key Set	1	1	1	1
17	31389	Silicone Tubing, 36" (914mm) L x 5/16" (8mm) ID x 7/16" (11mm) OD	2	4	3	4
-	35000-1454	Machinery Compartment Trim Strip	1	2	2	2
-	35000-1456	Front Gasket Spacer	2	4	4	4
-	35000-1457	Rear Gasket Spacer	2	4	4	4
-	37200-0013	Baking Chamber Gasket and Frame	1	2	2	2
-	37000-0696	Transition Floor Panel	-	-	-	1
-	48009-0024	Transition Top Panel	-	-	-	1
-	48009-0025	Transition Side Wall	-	-	-	2
-	35000-1748	Transition Rear Support	-	-	-	1
-	35000-1749	Transition Front Support	-	-	-	2
-	37000-0697	Transition Top Support Channel	-	-	-	2

SECTION 2
INSTALLATION

Figure 2-5
Dimensions and Data: PS360 Double Tandem

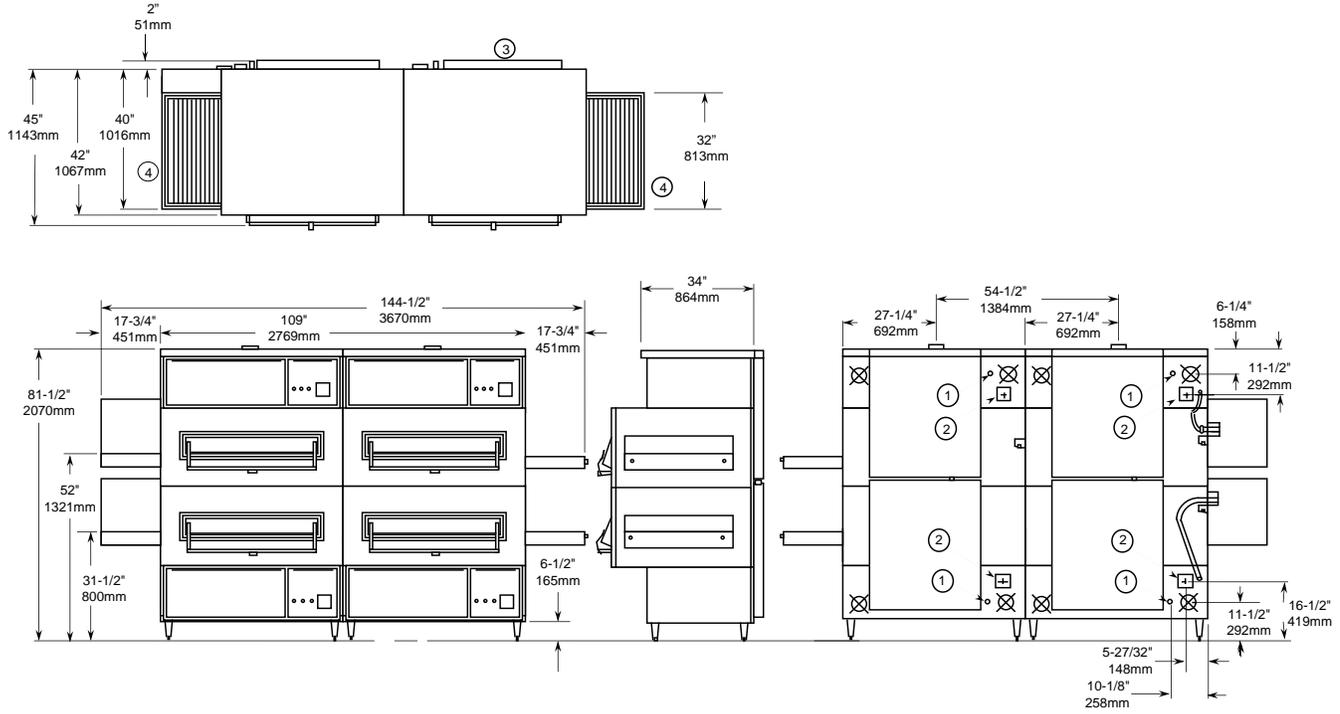


Figure 2-6
Dimensions and Data: PS360WB Double Tandem

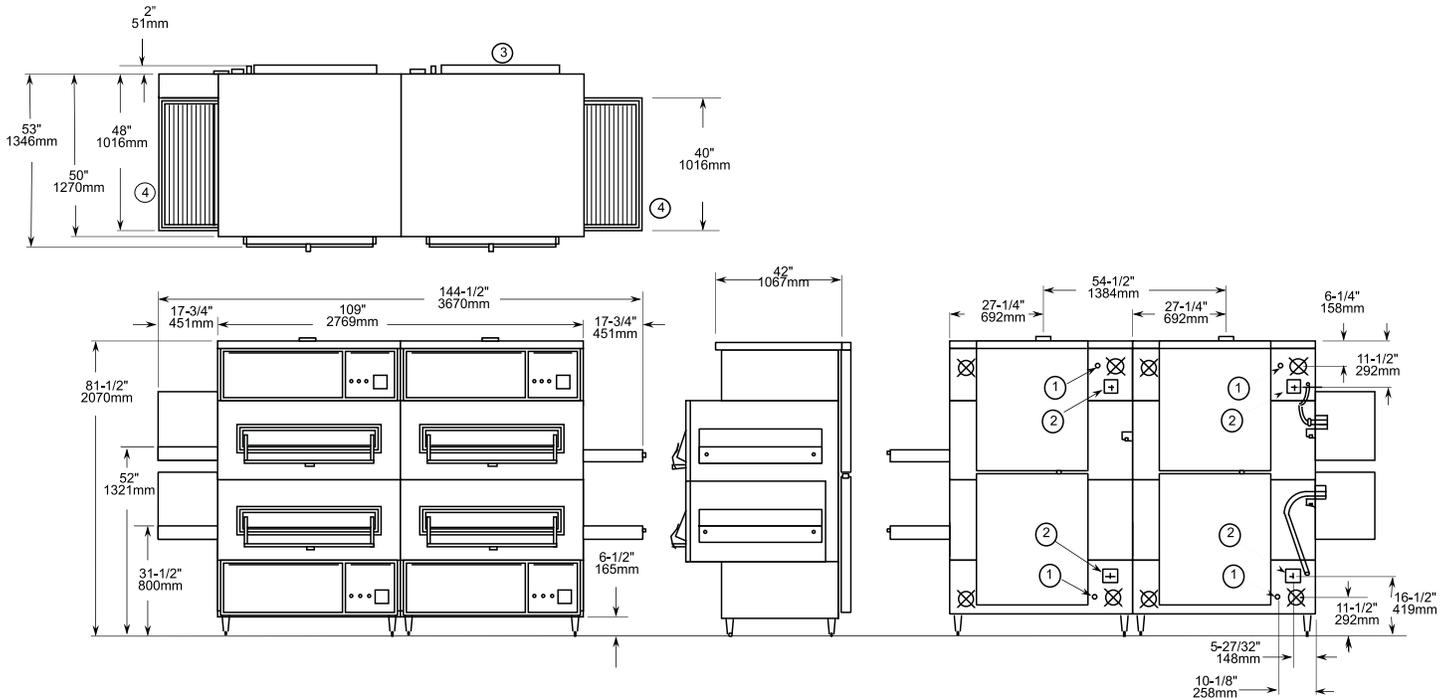
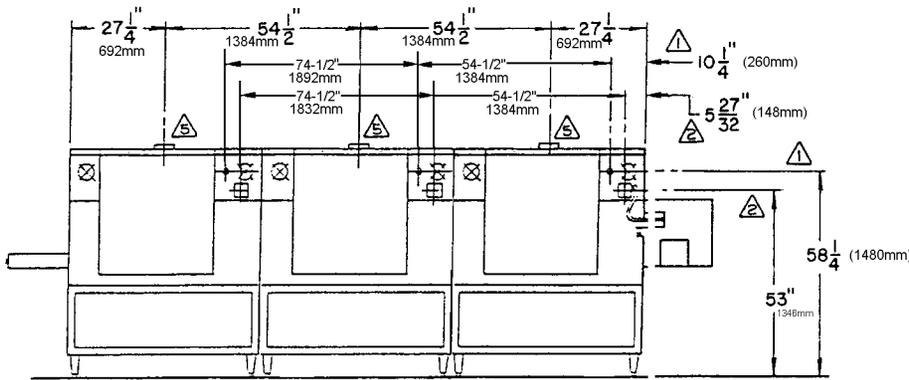
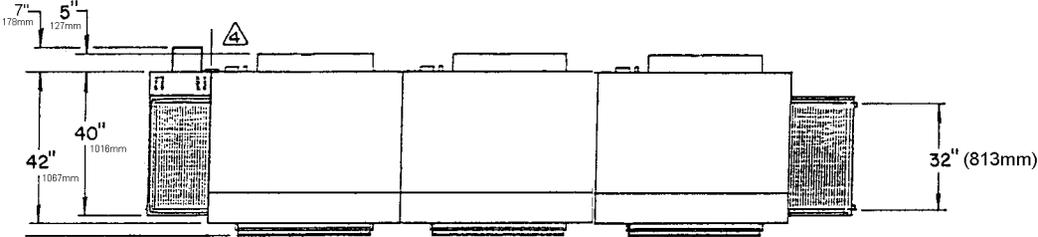


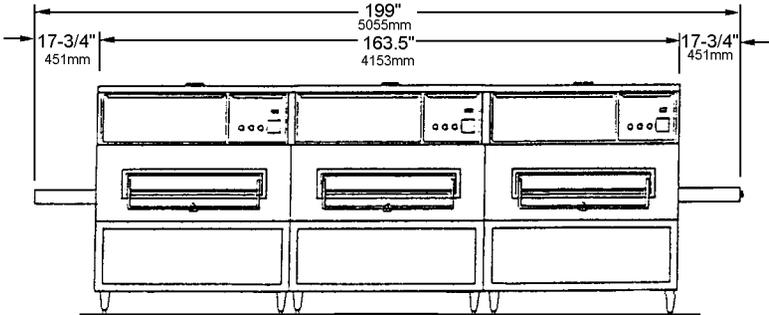
Figure 2-7
Dimensions and Data: PS360U Tri Tandem



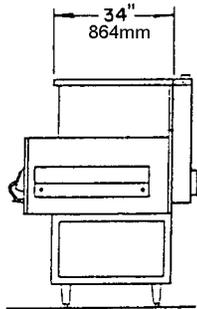
Rear View



Top View



Front View



Side View

DIRECT GAS FIRED:
 Gas rating - 135,000 BTU/HR (40KW) each oven.
 Total 405,000 BTU/HR (120KW)
 Required gas pressure - Natural: 20 - 30 mbar
 L.P.G.: 50 mbar

Recommended supply pipe size -
 Natural: 2-1/2" (64MM) N.P.T.
 LPG: 1-1/2" (38MM) N.P.T.
 Connections - 3/4" (19mm) N.P.T. inlet connection (4 total)
 3/4" (19mm) full-flow gas shut-off valves (4 total)
 Electrical Rating - 1PH 208-240V 2 Pole 3 Wires with ground 8 amps 50HZ.
 Separate electrical service required for each oven.

RECOMMENDED MINIMUM CLEARANCES: rear of oven to wall - 11-13/16" (300mm)

Oven Vent - Gas Oven Only

CONVEYOR SPEED expressed in bake time
 25 min. 0 sec. - maximum
 2 min. 0 sec. - minimum

2-7

Figure 2-8
Dimensions and Data: PS360WB-U Tri Tandem

DIRECT GAS FIRED:

Gas rating - 170,000 BTU/HR (50kW) each oven.
Total 510,000 BTU/HR (150kW)

Required gas pressure - Natural: 20 - 30 mbar
L.P.G.: 50 mbar

Recommended supply pipe size -

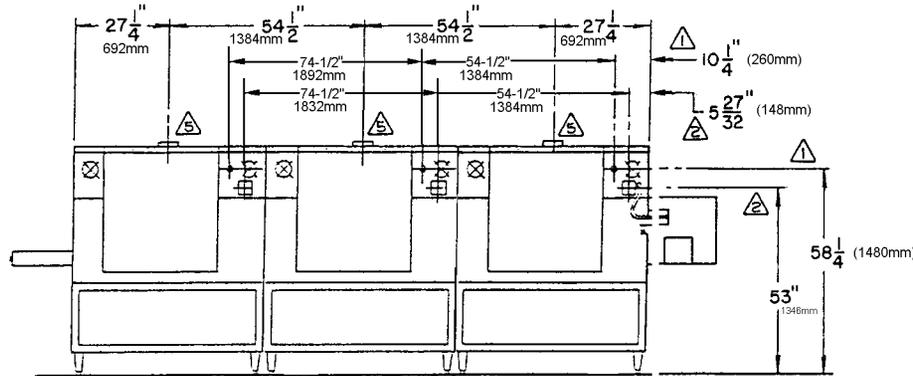
Natural: 2-1/2" (64MM) N.P.T.

LPG: 1-1/2" (38MM) N.P.T.

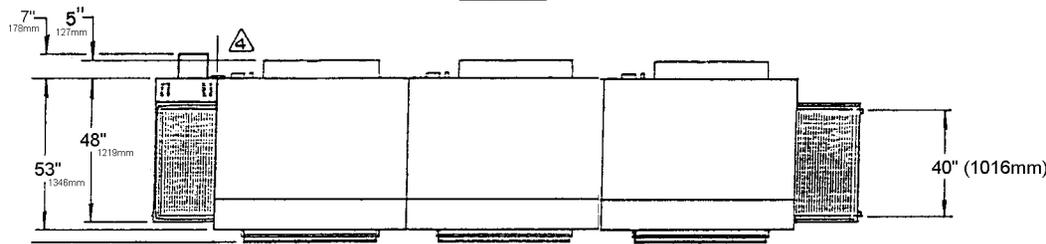
⚠ Connections - 3/4" (19mm) N.P.T. inlet connection
(4 total)

3/4" (19mm) full-flow gas shut-off valves (4 total)

⚡ Electrical Rating - 1PH 208-240V 2 Pole 3 Wires
with ground 8 amps 50HZ.
Separate electrical service
required for each oven.



Rear View



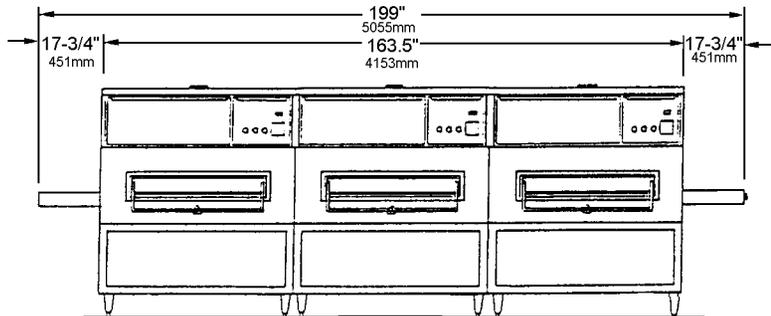
Top View

⚠ RECOMMENDED MINIMUM CLEARANCES: rear of oven to wall - 11-13/16" (300mm)

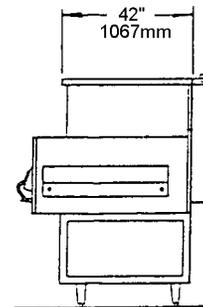
⚡ Oven Vent - Gas Oven Only

CONVEYOR SPEED expressed in bake time

25 min. 0 sec. - maximum
2 min. 0 sec. - minimum

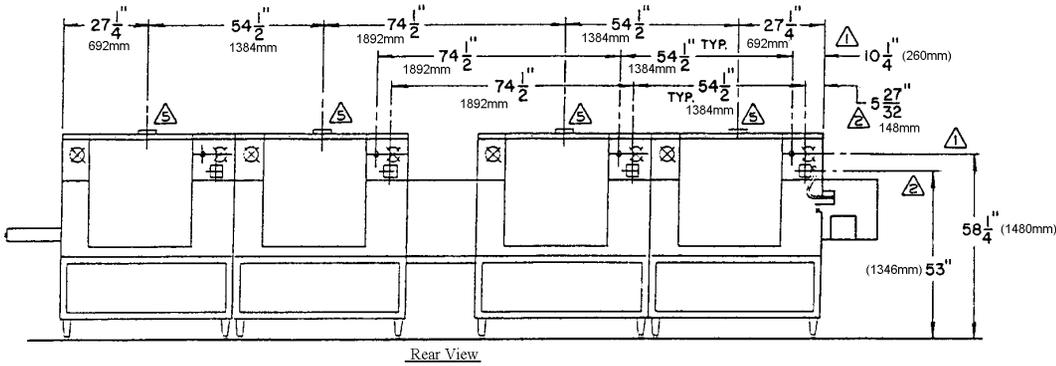


Front View

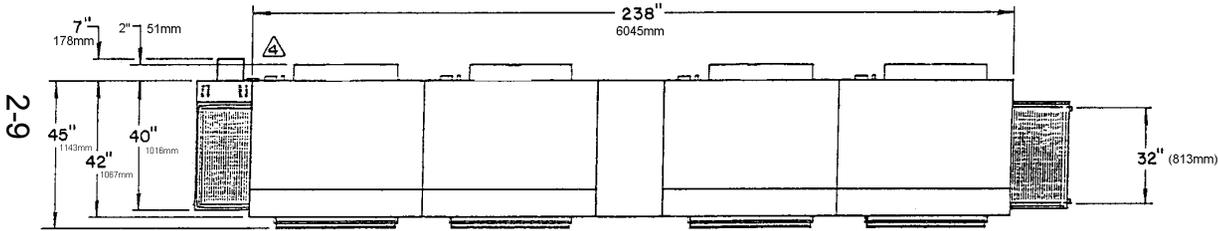


Side View

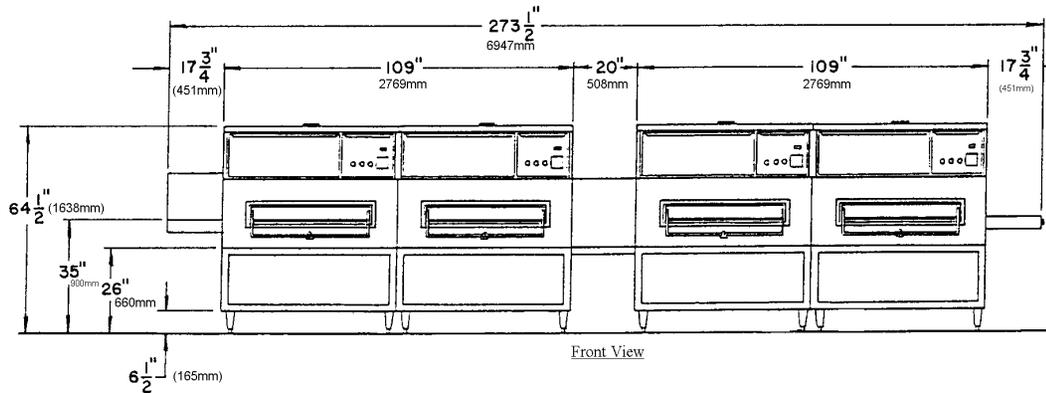
Figure 2-9
Dimensions and Data: PS360U Quad Tandem



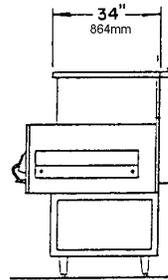
Rear View



Top View



Front View



Side View

DIRECT GAS FIRED:

Gas rating - 135,000 BTU/HR (40kW) each oven.
Total 540,000 BTU/HR (160 kW)

Required gas pressure - Natural: 20 - 30 mbar

LPG: 50 mbar

Recommended supply pipe size -

Natural: 2-1/2" (64MM) N.P.T.

LPG: 1-1/2" (38MM) N.P.T.

Connections - 3/4" (19mm) N.P.T. inlet connection (4 total)
3/4" (19mm) full-flow gas shut-off valves (4 total)

Electrical Rating - 1PH 208-240V 2 Pole 3 Wires with ground 8 amps 50HZ.
Separate electrical service required for each oven.

RECOMMENDED MINIMUM CLEARANCES: rear of oven to wall - 11-13/16" (300mm)

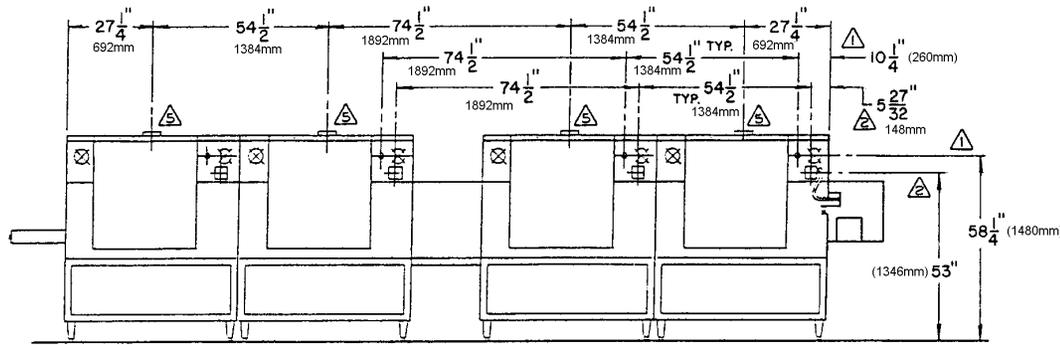
Oven Vent - Gas Oven Only

CONVEYOR SPEED expressed in bake time

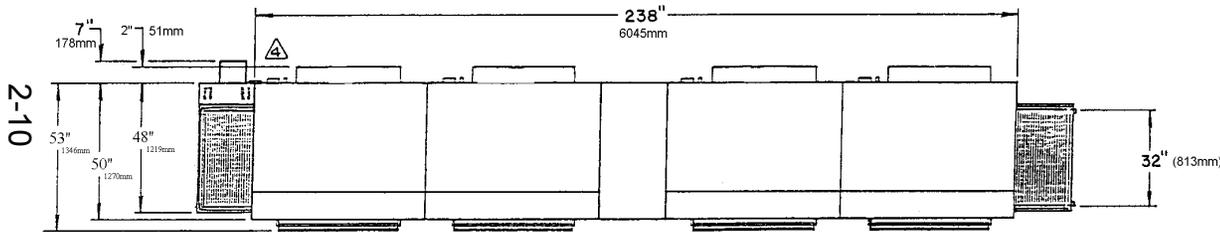
25 min. 0 sec. - maximum

2 min. 0 sec. - minimum

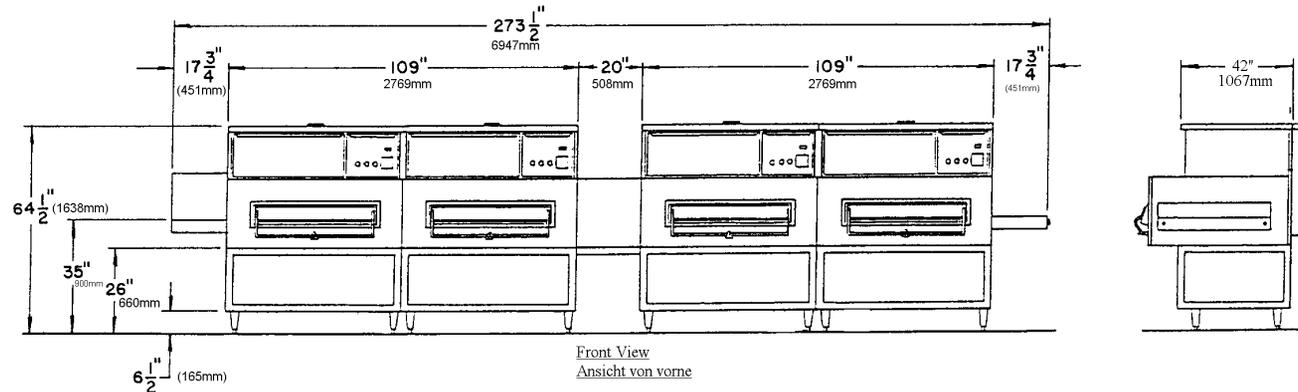
Figure 2-10
Dimensions and Data: PS360WB-U Quad Tandem



Rear View
Ansicht Von



Top View
Ansicht von oben



Front View
Ansicht von vorne

DIRECT GAS FIRED:

Gas rating - 170,000 BTU/HR (50kW) each oven.
Total 680,000 BTU/HR (200kW)
Required gas pressure - Natural: 20 - 30 mbar
LPG: 50 mbar

Recommended supply pipe size -

Natural: 2-1/2" (64MM) N.P.T.
LPG: 1-1/2" (38MM) N.P.T.
⚠ Connections - 3/4" (19mm) N.P.T. inlet connection (4 total)
3/4" (19mm) full-flow gas shut-off valves (4 total)
⚡ Electrical Rating - 1PH 208-240V 2 Pole 3 Wires with ground 8 amps 50HZ. Separate electrical service required for each oven.

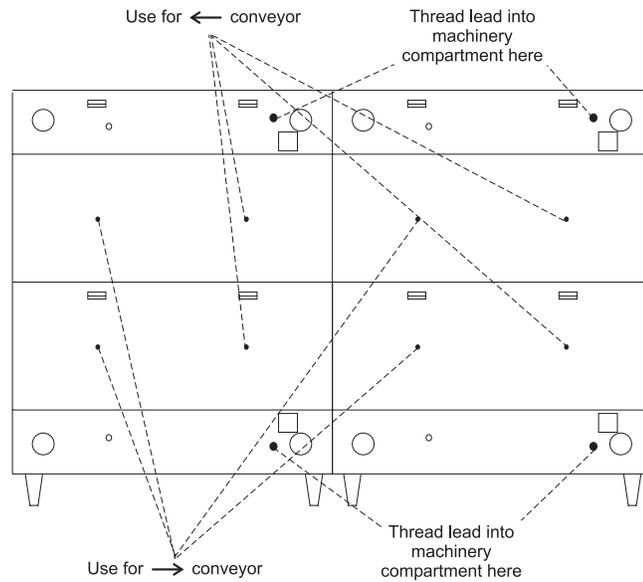
⚠ RECOMMENDED MINIMUM CLEARANCES: rear of oven to wall - 11-13/16" (300mm)

⚠ Oven Vent - Gas Oven Only

CONVEYOR SPEED expressed in bake time

25 min. 0 sec. - maximum
2 min. 0 sec. - minimum

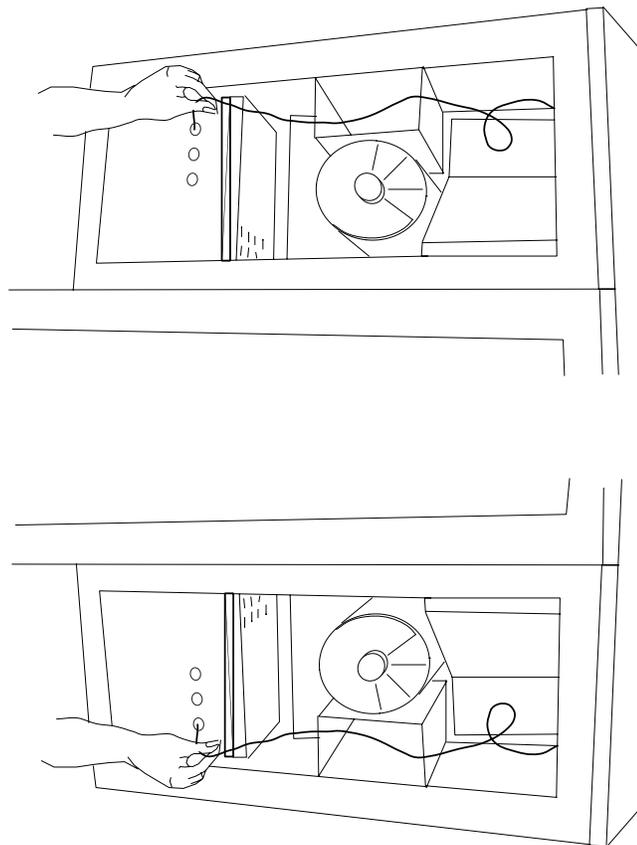
SECTION 2
INSTALLATION
IV. THERMOCOUPLE
INSTALLATION



1. Install the thermocouple sensing bulb into the correct hole in rear of bake chamber as shown in Figure 2-11.

2. Thread thermocouple lead through grommet and into the machinery compartment.

Figure 2-11
Thermocouple Installation Locations



3. Remove the right-side access panel of the machinery compartment.

Thread the thermocouple lead through the side of the machinery compartment as shown in Figure 2-12, and into the electrical box (at the right-front of the machinery compartment).

Figure 2-12
Placing the Thermocouple Leads

SECTION 2 INSTALLATION

4. Connect the thermocouple leads to the temperature controller as shown in Figure 2-13.

5. Repeat Steps 1-4 for each of the other ovens in the installation.

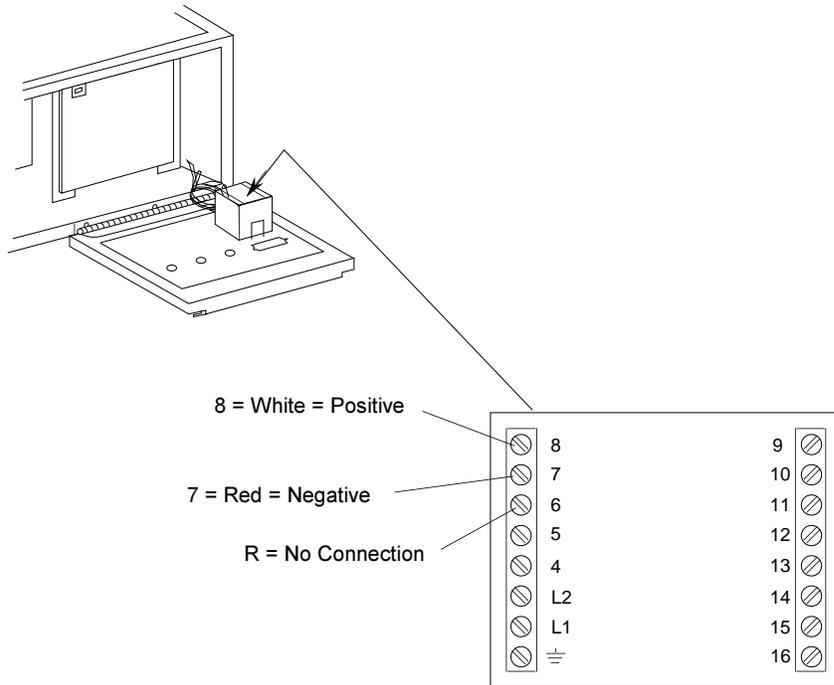


Figure 2-13
Thermocouple Lead Connections

V. ASSEMBLY

If the installation includes upper ovens mounted atop lower ovens, the ovens must be stacked before joining the tandem ovens together.

If the installation includes ovens that are to be mounted on stands, assemble the ovens to the stands before joining the ovens together. An exploded view of the stand is shown in Figure 2-14.

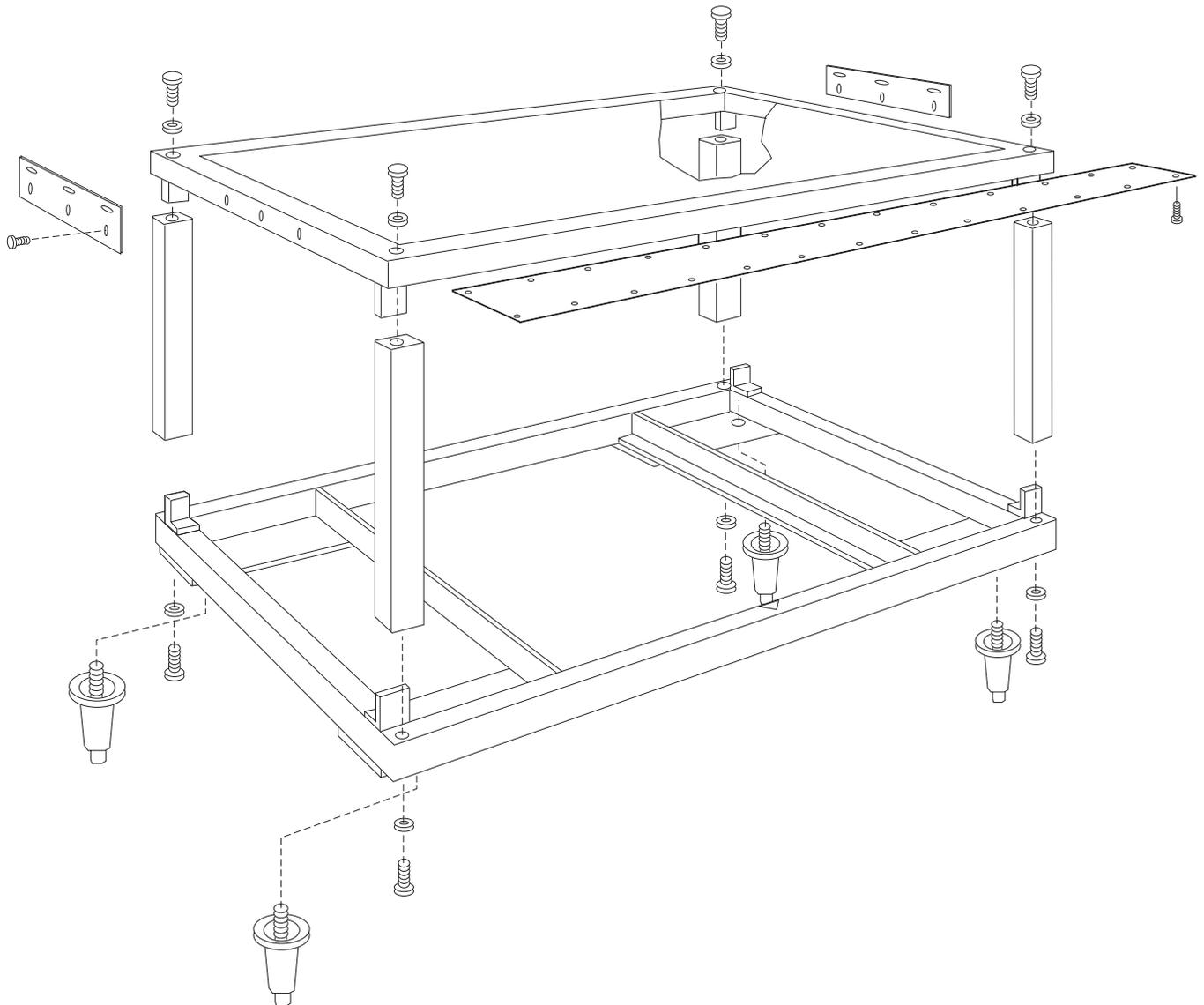


Figure 2-14
Exploded View - Upper Oven Stand

SECTION 2 INSTALLATION

JOINING THE OVEN BODIES

For TANDEM and DOUBLE TANDEM installations, perform Steps 1-7 to join the ovens.

For TRI TANDEM installations, perform Steps 1-7 to join two of the ovens together, and ensure that they are level; then, repeat Steps 1-7 to join the third oven to the two that are assembled.

For QUAD TANDEM installations, perform Steps 1-7 for EACH PAIR of ovens, producing two sets of two joined ovens. Do not assemble the center bridge section at this time.

1. Determine the proper position of the ovens by referring to Figure 2-15. Then, move the ovens to their approximate final locations.

NOTE: The Sealing Gasket Assembly is shown attached to the left oven in Figure 2-15, but may be pre-mounted to EITHER of the two ovens.

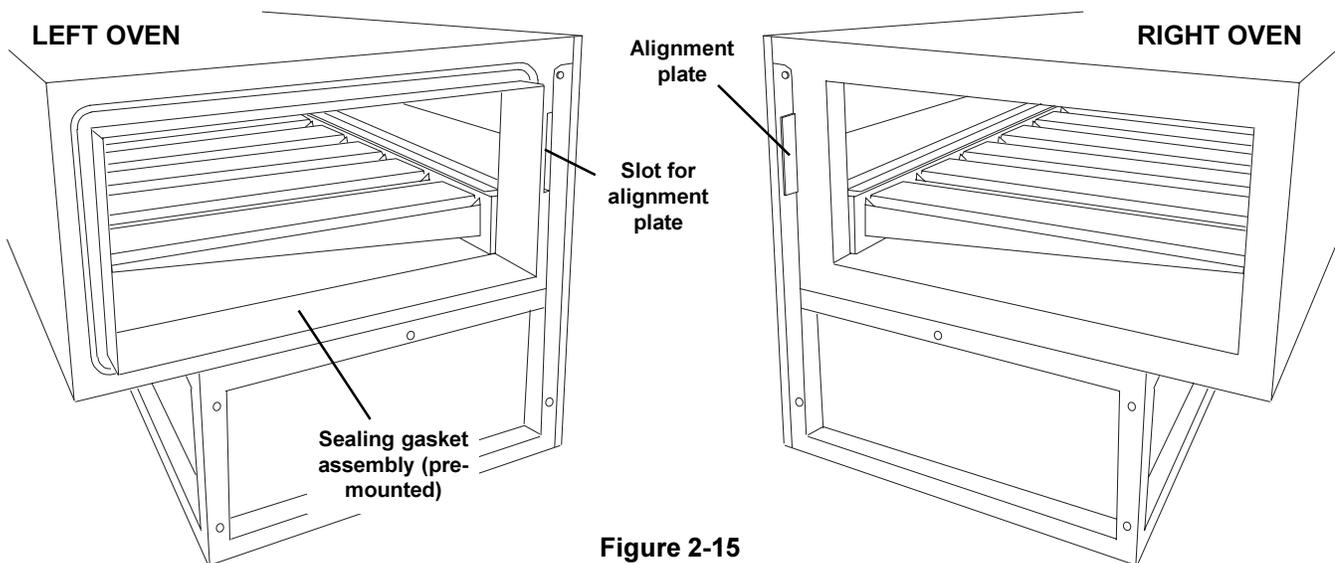


Figure 2-15
Oven Positioning and Alignment

2. Remove the rear axial cooling fans that are adjacent to the mating sides of the ovens, as shown in the diagram. Leave the fan wiring connected to the oven.

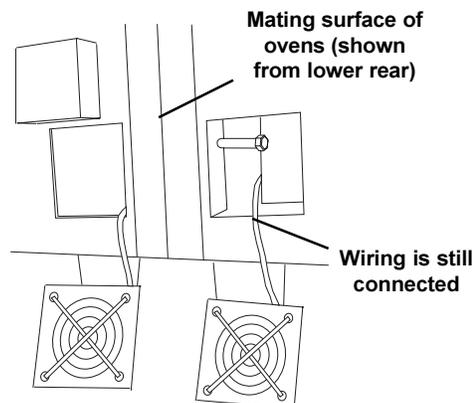


Figure 2-16
Cooling Fan Removal

3. Insert three of the supplied 1/2 x 5" bolts through the holes in the frame of the right oven, pointing outward as shown in Figure 2-17. Then, slide the spacers into place on the bolts.

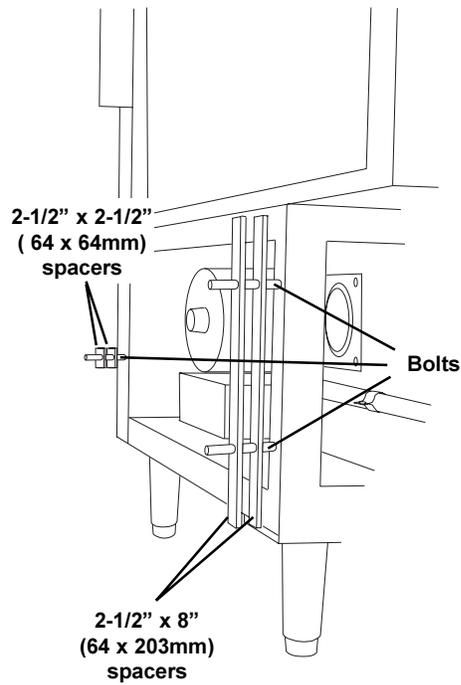


Figure 2-17
Bolts and Spacers

4. Push the ovens together. Check that the mounting bolts, alignment plate, and sealing gasket are properly aligned.

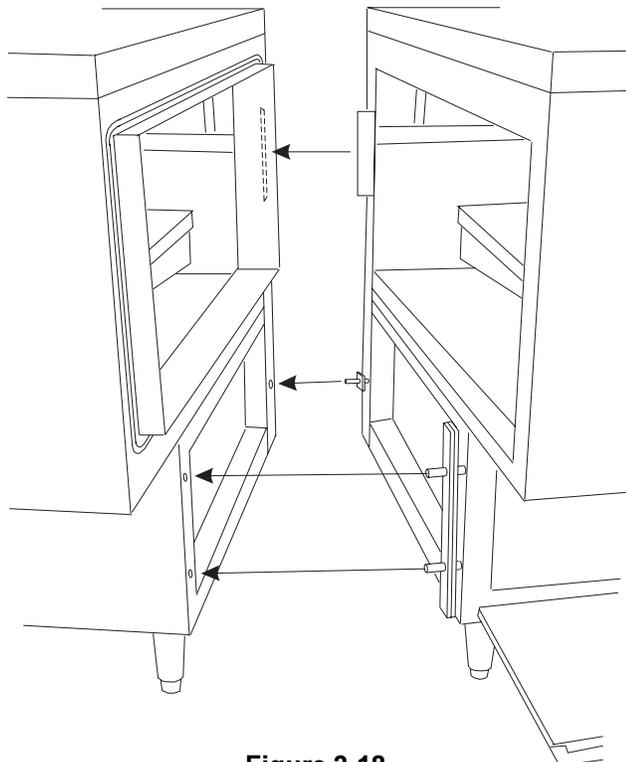


Figure 2-18
Aligning the Ovens for Assembly

SECTION 2 INSTALLATION

5. Check the alignment of the track rails using a straightedge. The rails **MUST BE LEVEL** across the gap between the ovens. If necessary, adjust the oven legs to align the track rails.

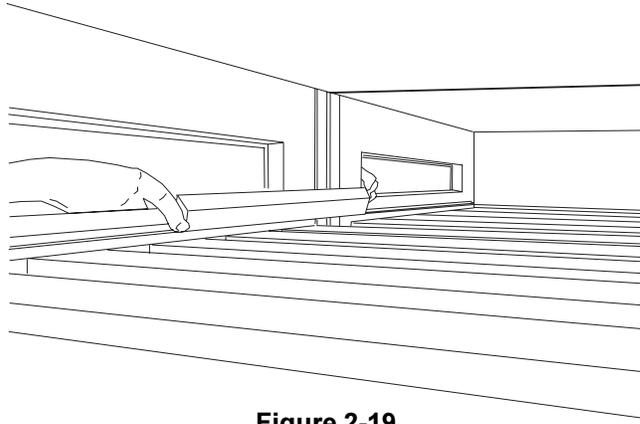


Figure 2-19
Checking Track Rail Alignment

6. Tighten all of the attaching bolts. Check that the mating edges of the ovens align properly. If gaps appear between the tops of the ovens, it will be necessary to loosen the connecting bolts and realign the ovens.

IMPORTANT: If it is necessary to realign the ovens, remember to re-check the alignment of the track rails.

7. Attach the front trim strip between the two ovens, as shown in Figure 2-20.

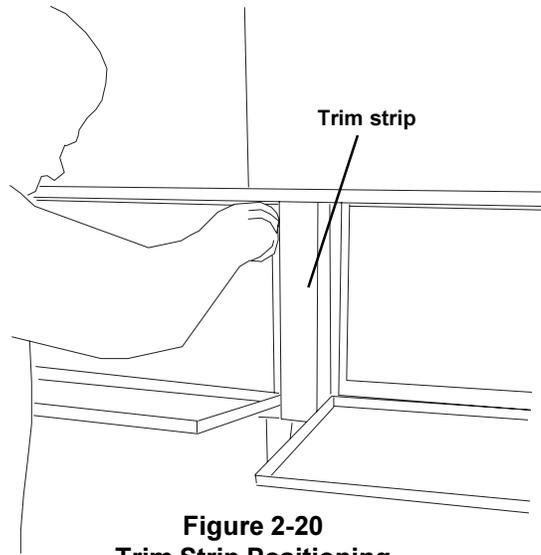
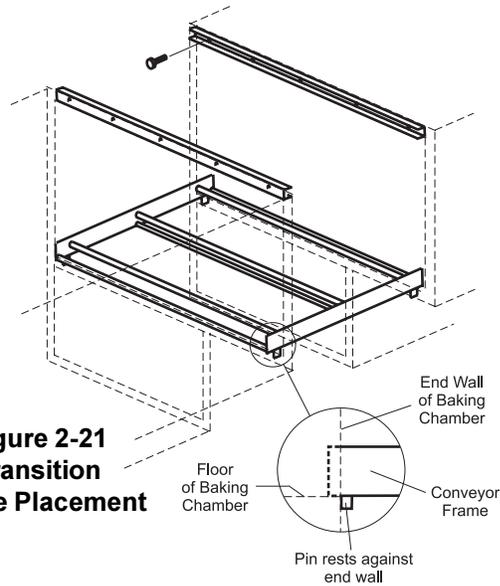


Figure 2-20
Trim Strip Positioning

8. Perform one of the following, as appropriate:
 - For PS360/360WB Tandem and Double Tandem installations, skip ahead to the **INSTALLING THE CONVEYOR FRAME AND BELT** section (Page 2-19).
 - For PS360/360WB Tri Tandem installations, perform Steps 1-7 again to attach the third oven to the two that have just been assembled. Then, skip ahead to the **INSTALLING THE CONVEYOR FRAME AND BELT** section (Page 2-19).
 - For PS360/360WB Quad Tandem installations, perform Steps 1-7 again to attach the two remaining ovens to each other. Then, continue on to Step 9 to attach the center (transition) section.

- Test-fit the transition section of the conveyor frame, as shown in Figure 2-21. The alignment pins on the bottom of the frame ensure correct spacing of the center ovens.



- Attach the two angled support brackets between the two center ovens, as shown in Figures 2-22a and 2-22b.

Note that a LOWER OVEN (PS360L, PS360WB-L) uses different support brackets for the front and rear, while an UPPER OVEN (PS360U, PS360WB-U) uses identical brackets on the front and rear.

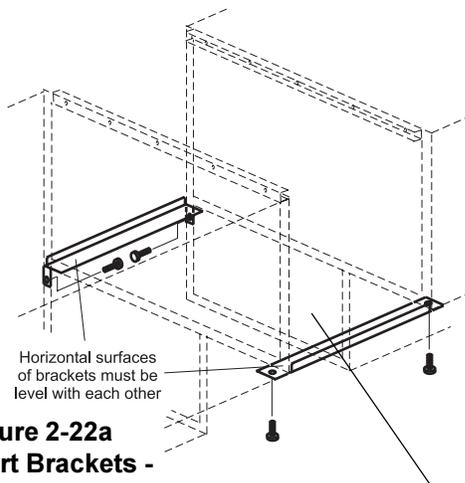


Figure 2-22a
Support Brackets -
Lower Oven

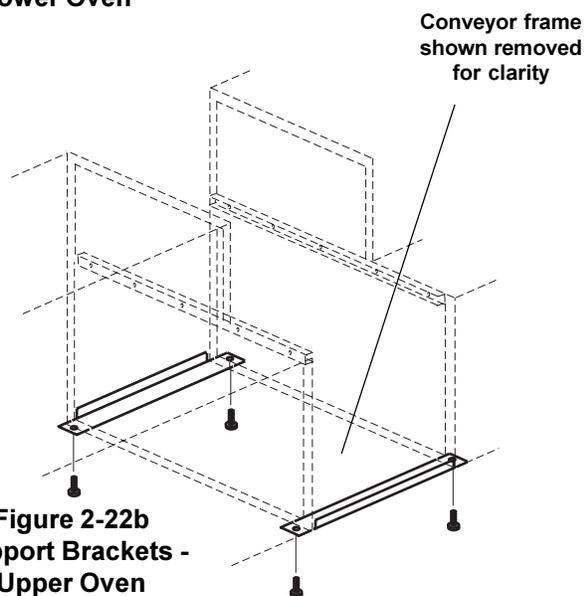


Figure 2-22b
Support Brackets -
Upper Oven

SECTION 2
INSTALLATION

10. Remove the transition section of the conveyor frame.
Place the transition floor panel into place atop the support brackets. See Figure 2-23.

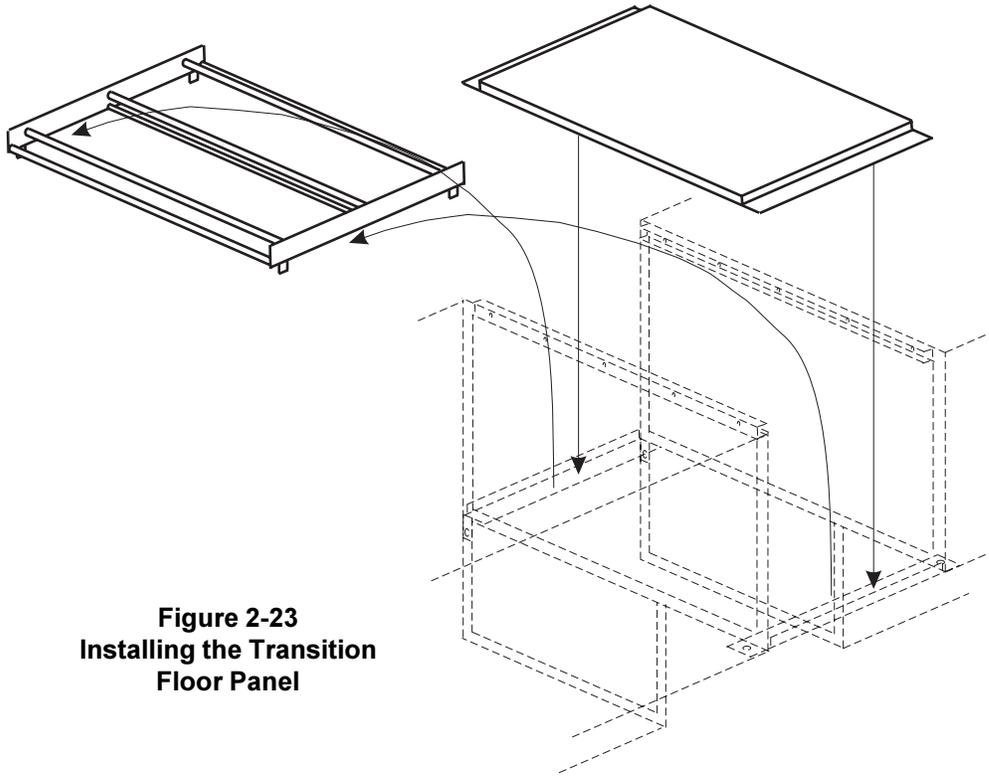


Figure 2-23
Installing the Transition
Floor Panel

11. Replace the transition (center) conveyor section, as shown in Figure 2-24.

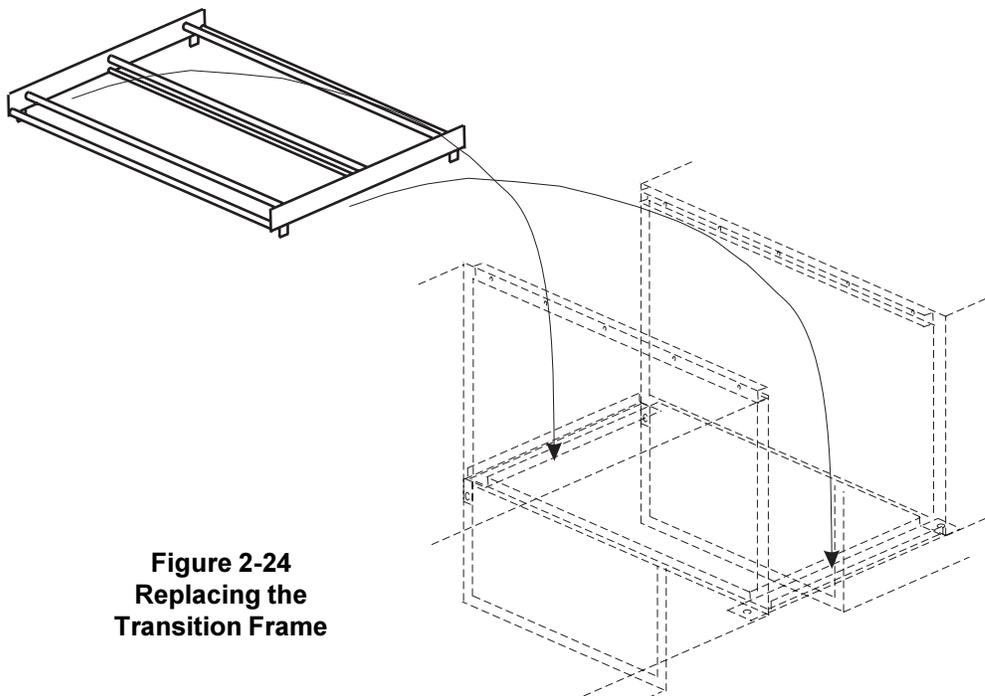


Figure 2-24
Replacing the
Transition Frame

INSTALLING THE CONVEYOR FRAME AND BELT

FOR ALL TYPES OF OVENS, ENSURE THAT THE DRIVE SECTION/END OF THE CONVEYOR FRAME IS PLACED ON THE SAME END OF THE OVEN AS THE CONVEYOR DRIVE MOTOR.

1. Insert the conveyor frame into the oven as follows:

For a TANDEM or DOUBLE TANDEM oven, slide the conveyor frame assembly into either end of the oven.

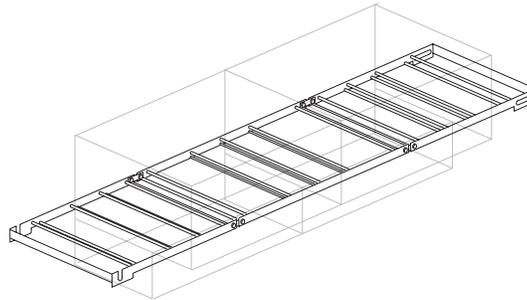


Figure 2-25a
Installing the Conveyor Frame-
Tandem and Double Tandem Ovens

For TRI TANDEM ovens, slide one center section and one end section of the frame into EACH END of the oven. The four sections should butt against each other.

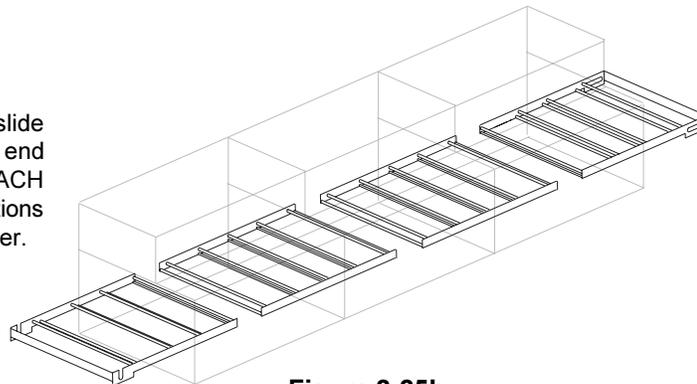


Figure 2-25b
Installing the Conveyor Frame-
Tri Tandem Ovens

For QUAD TANDEM ovens, slide two intermediate sections and one end section of the frame into EACH END of the oven. Butt the two inner intermediate sections against the transition (center) frame section. The other frame sections should butt against each other.

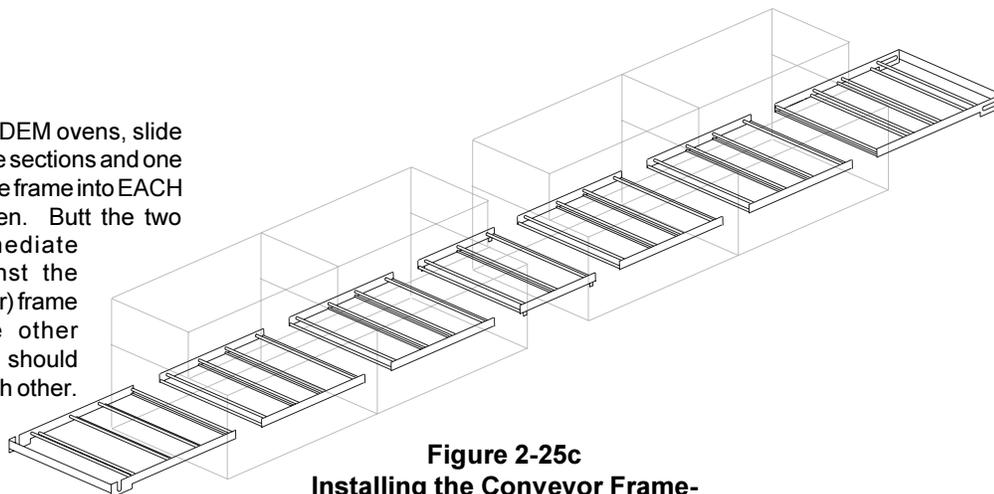
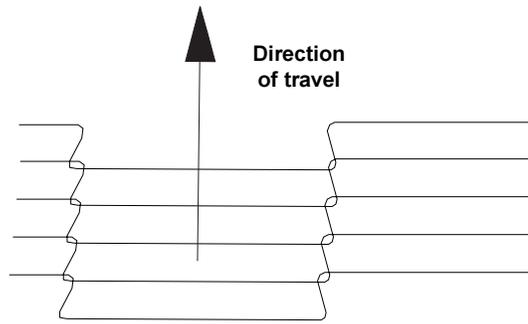


Figure 2-25c
Installing the Conveyor Frame-
Quad Tandem Ovens

SECTION 2 INSTALLATION

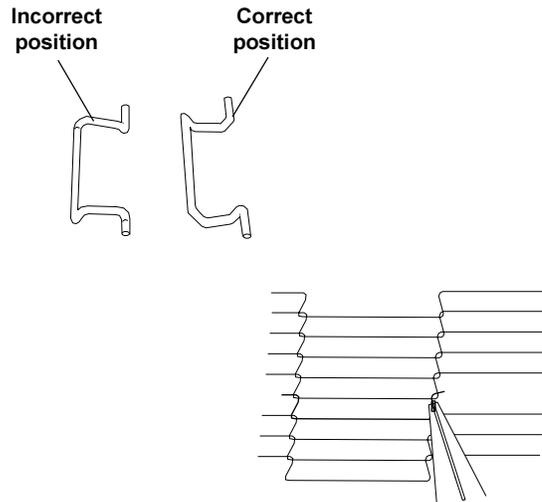
- Slide the conveyor belt through the support rods underneath the frame, and thread it through the oven. Then, reach through the oven window and pull the free end of the belt through the oven so that it lies atop the conveyor frame.

Check that the links on the conveyor are oriented as shown in Figure 2-26.



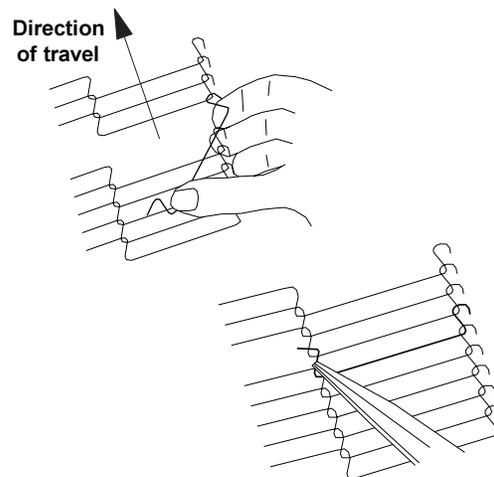
**Figure 2-26
Conveyor Link Orientation**

- Connect the inside master links. Check that the links are oriented as shown in Figure 2-27.



**Figure 2-27
Inside Master Links**

- Connect the outside master links. Note that the outside master links have right and left sides. The right-side master link has an open hook facing you, as shown in Figure 2-28.



**Figure 2-28
Outside Master Links**

- For a TANDEM, DOUBLE TANDEM, or TRI TANDEM oven installation, skip ahead to the next section. For a QUAD TANDEM oven installation, continue on to Step 6.

- Slide the top transition panel into place. Then, slide the two transition side panels into place. See Figure 2-29.
- If the four latches are not already attached to the side and top transition panels, attach them in place as shown in Figure 2-29.

Fasten the latches on the side and top panels to hold the panels in place.

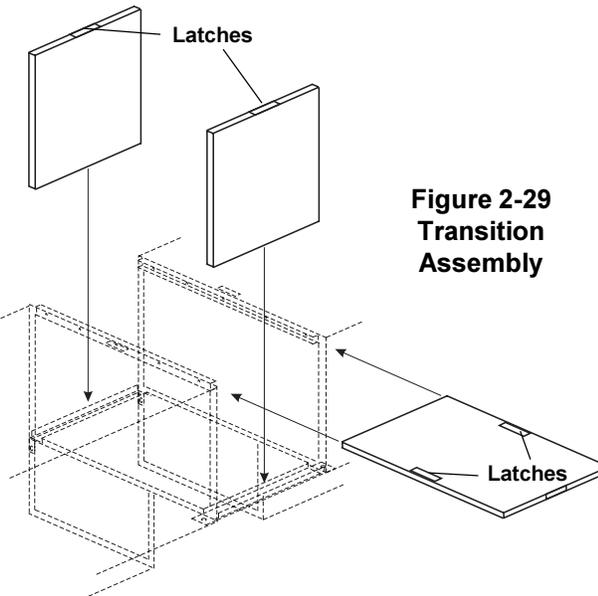


Figure 2-29
Transition
Assembly

- LOOSELY attach the conveyor drive motor to the end wall of the oven, as shown in Figure 2-30.
- Assemble the conveyor drive chain in place on the motor and conveyor drive sprockets.
- Position the motor to adjust the tension of the drive chain. The deflection of the chain should not exceed 1/4" (6mm). Then, tighten the motor in place.

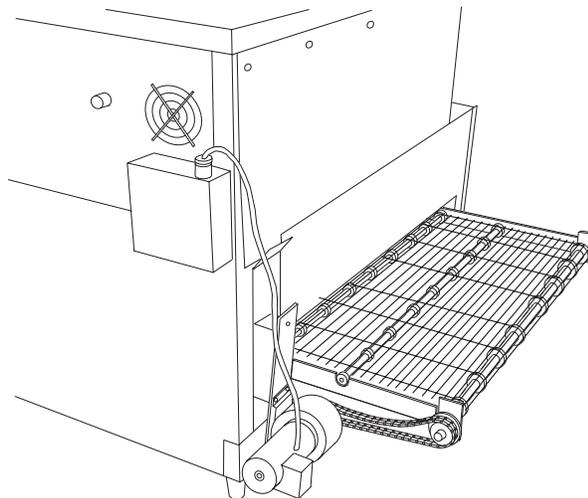


Figure 2-30
Conveyor Motor and Drive Chain Assembly

- Assemble the end plugs and motor housing onto the oven.

TANDEM AND DOUBLE TANDEM OVENS ONLY:
Assemble the conveyor crumb trays and conveyor extension covers onto the oven.

GAS OVEN ROUGH-IN

UTILITY ROUGH-IN DIMENSIONS AND POSITIONING

CAUTION

IT IS REQUIRED THAT THE OVEN BE PLACED UNDER A VENTILATION HOOD FOR ADEQUATE AIR SUPPLY AND VENTILATION.

**GAS SUPPLY
&
ELECTRICAL SUPPLY
PROVIDED BY CUSTOMER**

**DO NOT USE CONDUIT
FOR GROUND**

CIRCUIT BREAKER

1 circuit breaker/fused disconnect switch **with lockout/tagout** is required for each oven cavity. Wire each oven cavity separately.

ELECTRICAL SPECIFICATIONS

220-230V, 1 Ph, 8 Amp draw, 50 Hz, 2 pole, 3 wire system per oven cavity (2 hot, 1 grd).

GAS RATING

Models PS360U/L: 135,000 BTU/HR, 34,020kcal/HR, 40kW/HR
Models PS360WB-U/L: 170,000 BTU/HR, 42,840kcal/HR, 50kW/HR

MINIMUM GAS METER RATING

600 Ft.³/Hour (17m³h) for 1 or 2 oven cavities.
1200 Ft.³/Hour (34m³h) for 3 or 4 oven cavities.
Minimum rating does not take other gas appliances into consideration. Gas consumption varies at each site. Total BTU/HR (kcal/hr) must be calculated on high flame off of each appliance to determine if meter needs to be larger.

MINIMUM GAS PIPE SIZE

Natural: 2" (51mm) ID for 1 or 2 oven cavities with runs up to 200 ft.(61m).

OR

2-1/2" (64mm) ID for 3 or 4 oven cavities with runs up to 200 ft.(61m)

Must be a dedicated line.

Runs over 200 ft. consult factory

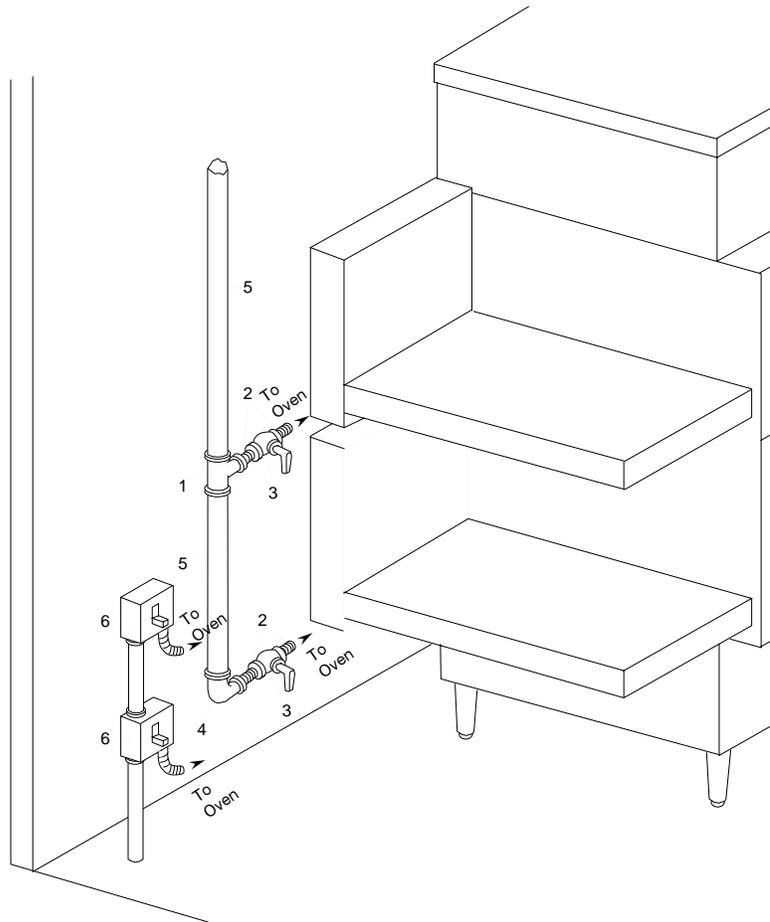
Propane: 1-1/2" (38mm) ID for 1 or 2 oven cavities with runs up to 200 ft.(61m).

OR

2" (51mm) ID for 3 or 4 oven cavities with runs up to 200 ft.(61m).

Must be a dedicated line.

Runs over 200 ft. consult factory



**Figure 2-31
Oven Rough-In**

GAS VALVES

3/4" (19mm) ID **full flow** gas shut-off valve.
A separate connection and valve must be provided for each oven.

REQUIRED SUPPLY GAS PRESSURE

Natural: 20-30mbar
Propane: 50mbar

SUGGESTED

If space permits, service should be located to the left of the ovens to allow access to switches and valves.

User Supplied Items:

ITEM	DESCRIPTION
1	2"(51mm) X 2"(51mm) X 3/4"(19mm) TEE
2	3/4"(19mm) X 3"(76mm) NIPPLE
3	3/4" (19mm) FULLFLOW GAS SHUT-OFF VALVE
4	2"(51mm) X 3/4"(19mm) 90° REDUCER ELBOW
5	2"(51mm) ID GAS SUPPLY PIPE LINE-NATURAL GAS
6	15 AMP TOGGLE SWITCH - 2 POLE for GAS

VI. ELECTRICAL CONNECTION

Check the oven data plate before making any electric supply connections. Electric supply connections must agree with data on the oven data plate. A typical oven data plate is shown in Figure 2-34 (on Page 2-24).

NOTE: When the oven is installed, it must be electrically grounded in accordance with current IEC/CEE requirements and also with local codes.

The electrical installation, including the service connection, must comply with current IEC/CEE requirements and to local codes. The installation must undergo a complete electrical check before operating the oven.

Special attention must be given to the polarity of the supply when connecting to oven input terminals.

All connections are made at one common connection at the back of each oven. Refer to Figures 2-32 and 2-33.

NOTE: At the installation location, it is required that the electrical supply for each oven incorporates a main circuit breaker (not furnished). The circuit breaker must have 3mm contact gaps breaking all poles of the supply.

WARNING: If your electrical supply has fast-acting circuit breakers, then the initial starting current of the blower motors in Model PS360WB-U and PS360WB-L may trip the breakers. It is suggested to use slow-acting circuit breakers with these models.

For further electrical information, refer to the wiring diagram.

WARNING: The connections to the exhaust system, electrical supply, and gas supply must follow the installation instructions. Initial start-up of the oven can be performed only by an authorized agent.

Figure 2-32
Junction Connection Box (Lower Oven)

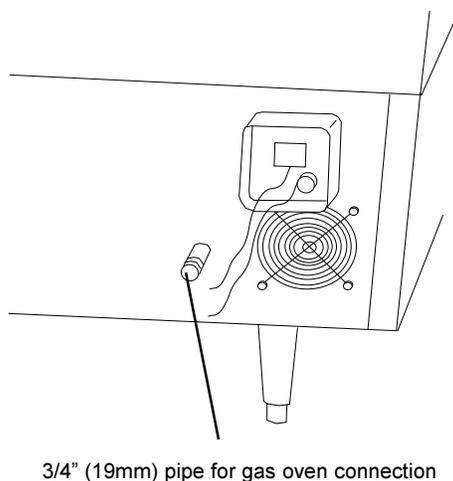
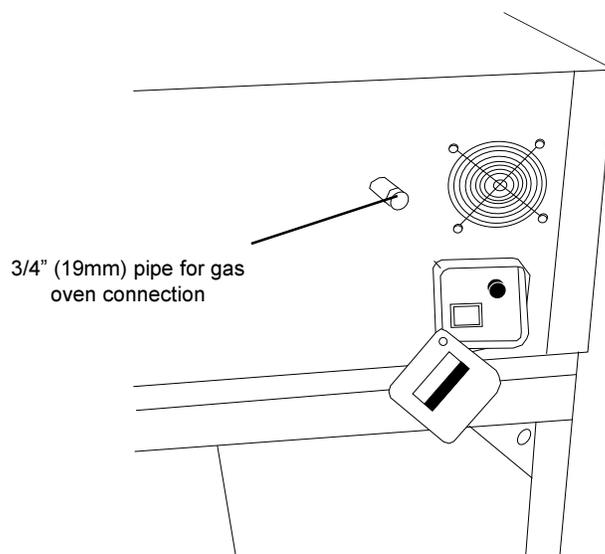


Figure 2-33
Junction Connection Box (Upper Oven)



SECTION 2
INSTALLATION

 <p>1400 TOASTMASTER DRIVE, ELGIN ILLINOIS 60120 USA</p>					
MOD., TYP <input type="text"/>		SR.-NR: <input type="text"/>		ANNO <input type="text"/>	
TYPE,-BAUART, TIPO-B 23		ID.-NR: <input type="text"/>			
	IE,IT,PT ES,GB	DE	NL	BE,FR	AT,CH
CAT	"2H3+	"2ELL3B/P	"2L3B/P	"2E+3+	"2H3B/P
P	G20 20 G30 29-37	G20 20 G25 20 G30/31 50	G25 25 G30 28-30 G31 30	G20 20-25 G30 29-37	G20 20 G30/31 50
<p>Qn = <input type="text"/> kW U 220-230 V. 50 Hz ~ Pn <input type="text"/> W</p>					

Figure 2-34
Typical Oven Data Plate - Models PS360/PS360WB

VII. GAS SUPPLY FOR GAS HEATED OVENS

Pipe sizing -- Always install a shut off valve in the gas supply line to the oven. This valve should be the same size as the supply line.

Please remember that the longer the pipe runs, the more the pressure drops. One 90° elbow equals a 1,2 m length of pipe.

Each oven section requires a nominal gas input as follows:

PS360U,L (per oven)	40 kW
PS360WB-U, -L (per oven)	50 kW

Follow the recommended pipe sizing and meter sizing as indicated in the Rough-in Drawing (Figure 2-31,Page 2-22).

The flexible hose furnished with the oven must be positioned as shown in Figure 2-35.

NOTE: *The recommended pipe sizes are larger than usually required to eliminate any operation problems. It is much less expensive to make the initial installation large enough to do the job rather than redoing the job later.*

For lighting instructions, refer to Step-by-Step Operation in the **OPERATION** Section of this manual.

CAUTION

DURING PRESSURE TESTING NOTE ONE OF THE FOLLOWING:

1. The oven and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressure in excess of 1/2 psig (3.45 kPA).
2. The oven must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressure equal to or less than 1/2 psig (3.45 kPA).
3. If the incoming pressure is over 50 mbars, a separate regulator must be installed before the 3/4" manual gas shutoff valve located at the rear outside of the oven.

WARNING:

To prevent damage to control valve regulator during initial turn on of gas, it is **very important** to open manual shutoff valve **very slowly**.

After the initial gas turn on, the manual shutoff valve must remain open except during pressure testing as outlined in the above steps or when necessary during service maintenance.

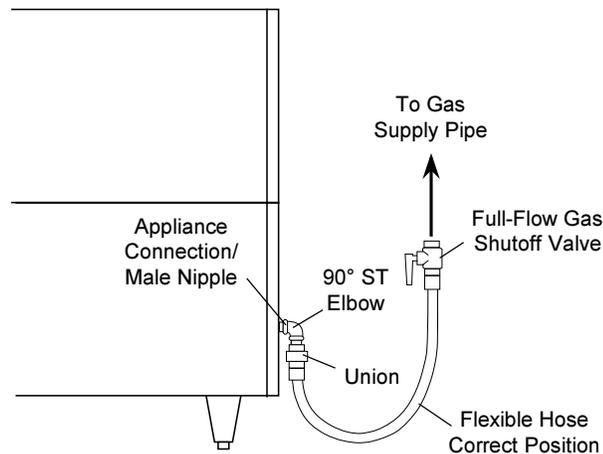


Figure 2-35
Flexible Hose Connector Installation

VIII. PREPARATION FOR VARIOUS GASES

Before proceeding to set up the oven for a specific gas, the main gas supply valve and the electrical supply circuit breaker should be turned off.

When preparing the oven for use of Group H or L Natural gases, the orifice (Manifold) pressure should be adjusted to the values shown in the chart on Page 1-1.

The main orifice and also the by-pass (low flame) orifice should be changed for the specific gas type used as shown in the following Table, also refer to Section IX, **CHANGING ORIFICES**.

FOR USE WITH NATURAL GAS

The input to the burner can be determined using the orifice (manifold) pressure data or by the volume supplied using the gas meter.

Using the orifice pressure data you must know the specific gas quality used and when using the volume method you must know the heat value (HuB) of the gas used (Obtainable from your local gas supplier).

If you used the orifice pressure method, you should double check the rated input using the volume method.

If the measured input does not correspond with the rated input, check first that correct orifices are installed. If the orifice sizes are as specified, check and correct the supply and orifice pressures to obtain the correct input based on the gas meter reading.

FOR USE WITH LIQUID (LP) GAS

When using liquid gas the converter in the multifunction gas valve has to be turned end over end - 180° (Refer to Figure 2-36). This takes the governor out of operation.

GAS TYPE AND PRESSURE LABEL			
IT	II _{2H3+}	Predisposto per gas metano	20 mbar
GB	II _{2H3+}	Adjusted for natural gas	20 mbar
FR	II _{2E+3+}	Essaye au gaz naturel (E/L)	20-25 mbar
DE	II _{2ELL3B/P}	Eingestellt auf Erdgas (E)	20 mbar
DE	II _{2ELL3B/P}	Eingestellt auf Erdgas (LL)	20 mbar
ES	II _{2H3+}	Preparado para gas natural	20 mbar
NL	II _{2L3B/P}	Aangelegd op aardgas	25 mbar
BE	I _{2E+}	Essaye au gaz naturel/aangelo op aardgas	20-25 mbar

GAS TYPE AND PRESSURE LABEL			
IT	II _{2H3+}	Predisposto per G.P.L.	28-30/37 mbar
GB	II _{2H3+}	Adjusted for L.P.G.	28-30/37 mbar
FR	II _{2E+3+}	Essaye au gaz naturel liquide	28-30/37 mbar
DE	II _{2ELL3B/P}	Eingestellt auf Flüssiggas	50 mbar
ES	II _{2H3+}	Preparado para gas liquido	28-30/37 mbar
NL	II _{2L3B/P}	Aangelegd op vloeibaar gas	30 mbar
BE	I ₃₊	Aangelegd op vloeibaar gas/essaye au gaz liquide	28-30/37 mbar

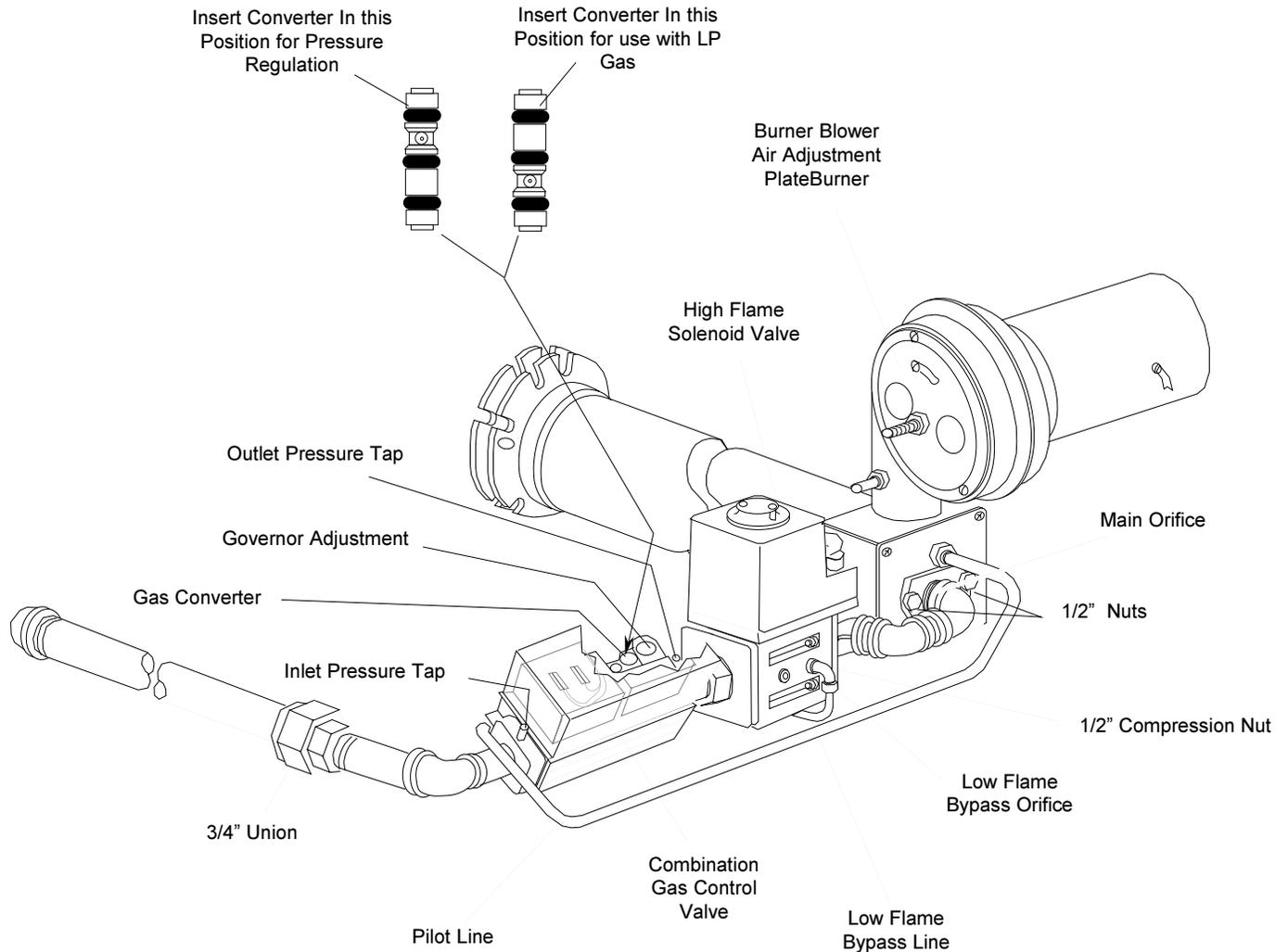


Figure 2-36
Burner/Piping Assembly

IX. CHANGING ORIFICES

TO CHANGE MAIN ORIFICE (Refer to Figure 2-36)

1. Turn off main gas supply valve.
2. Open 3/4" union in gas supply line.
3. Remove 1/2" nuts securing gas train to the burner housing.
4. Using a 11/16" wrench remove orifice from the mounting flange.
5. Install new orifice in reverse order.

WARNING

Before operating oven check for gas leaks!

TO CHANGE BYPASS (LOW FLAME) ORIFICE (Refer to Figure 2-36)

1. Turn off main gas supply valve.
2. Open 3/4" union in gas supply line.
3. With 1/2" wrench loosen compression nuts securing bypass tube to solenoid valve.
4. Remove orifice from bypass tube.
5. Install new orifice in reverse order.

X. VOLUMETRIC METHOD

WARNING

Before operating oven check for gas leaks!

IMPORTANT

During these measurements, no other gas appliance should be in operation being supplied from the same gas meter.

To determine gas flow setting value "E":

E = Liters/min.

NB = Rated input in kW

HuB = Heat (Calorific) value of gas in kW/m³

$$E = \frac{NB}{HuB}$$

To determine the time of 0.1m³ (100 liters) gas usage:

$$\text{Time in minutes} = \frac{100}{E}$$

The time of the gas flow through the meter should be taken with a stopwatch.

1. Remove cover screw from the gas valve pressure (governor) adjustment valve.
2. Open main gas supply valve and start oven according to supplied instructions with the temperature control at maximum setting.
3. Once oven is in operation, adjust pressure valve (governor) to the calculated volume using the time for 100 liters of flow through. Turning the adjustment screw clockwise will increase the flow and counter-clockwise will reduce it.

4. Replace cover screw on adjustment valve and turn off main gas supply valve.
5. Record the reading obtained from the gas meter and calculate obtained gas flow. Compare this to the indicated flow in the **CHART OF ORIFICE SIZES, GAS PRESSURES, NOMINAL INPUT RATINGS AND GAS FLOW** on Page 1.
6. Note the following comments and procedures to assure correct gas supply pressure and adjusting the gas valve to obtain proper orifice (manifold) pressure.

XI. VARIATIONS OF RATED SUPPLY PRESSURES

Special attention should be given to the supply pressure and gas flow pressure at the supply connection to the oven. The nominal supply pressure for gas family Group 2 (natural gas) should be 20 mbar.

If the supply pressure is lower or higher than the rated (nominal) pressure then the reason should be investigated and the gas supplier contacted.

If the supply pressure is lower than 17 mbar's or higher than 25 mbar's then the oven should be shut down and the gas supplier notified. No adjustment of the oven controls should be made and the oven should not be operated.

TO CHECK GAS SUPPLY PRESSURE:

1. Close main gas supply valve.
2. Remove supply (inlet) pressure measuring stud screw from gas valve and attach the manometer to the stud.
3. Open main gas supply valve and restart oven with temperature control at maximum setting.
4. Measure inlet (supply) pressure. For all natural gases this should be between 17 and 25 mbar's.
5. Turn oven off, close main gas supply valve, remove manometer from stud and tighten cover screw in to pressure measuring stud.

ORIFICE (MANIFOLD) PRESSURE METHOD:

1. Turn off main gas supply valve.
2. Remove pressure measuring stud screw located at the "out-flow" (closest to gas burner) of the gas valve and attach a manometer.
3. Remove cover screw from the gas valve pressure (governor) adjustment valve.
4. Open main gas supply valve and start oven according to supplied instructions with the temperature control at maximum setting.
5. Once oven is in operation, adjust pressure valve (governor) to the orifice pressure value as shown for the specific gas in the Gas Specifications Table.
6. Turn oven off, close main gas supply valve, remove "U" tube manometer and tighten cover screw into pressure measuring stud.

SECTION 2 INSTALLATION

SPECIAL NOTICES:

The ovens should be operated only in an area that has good air circulation.

The oven must be installed under an electrically powered ventilating hood.

Installation of replacement parts requiring access to the interior of the oven is permitted only by authorized service personnel.

The operator should be properly trained to the functioning of the oven.

This instructions manual should be supplied to the operator.

Constructional changes to the area where the oven is installed shall not affect the air supply to the oven.

The installation, start-up and changes required when changing from one gas type to another can be performed only by a certified professional.

These ovens are intended only for commercial use and are to be operated only by professionals.

It is required that the oven is regularly inspected for proper functioning. The frequency of inspections are dependent on the oven usage, however it should be performed at least once a year.

After adjustments or service work the oven has to be checked for gas leaks.

NOTE: *After conversions, readjustments or service work the oven has to be tested for proper functioning. Basically the following applies:*

- Testing for gas leaks,
- Testing for correct air supply, specifically to the burner blower,
- Testing of proper combustion and gas supply,
- Testing of correct gas supply controls,
- Testing the flue gas escape from the oven,
- Testing the vent system of the installation location.

SECTION 3 OPERATION

I. CONTROL FUNCTIONS

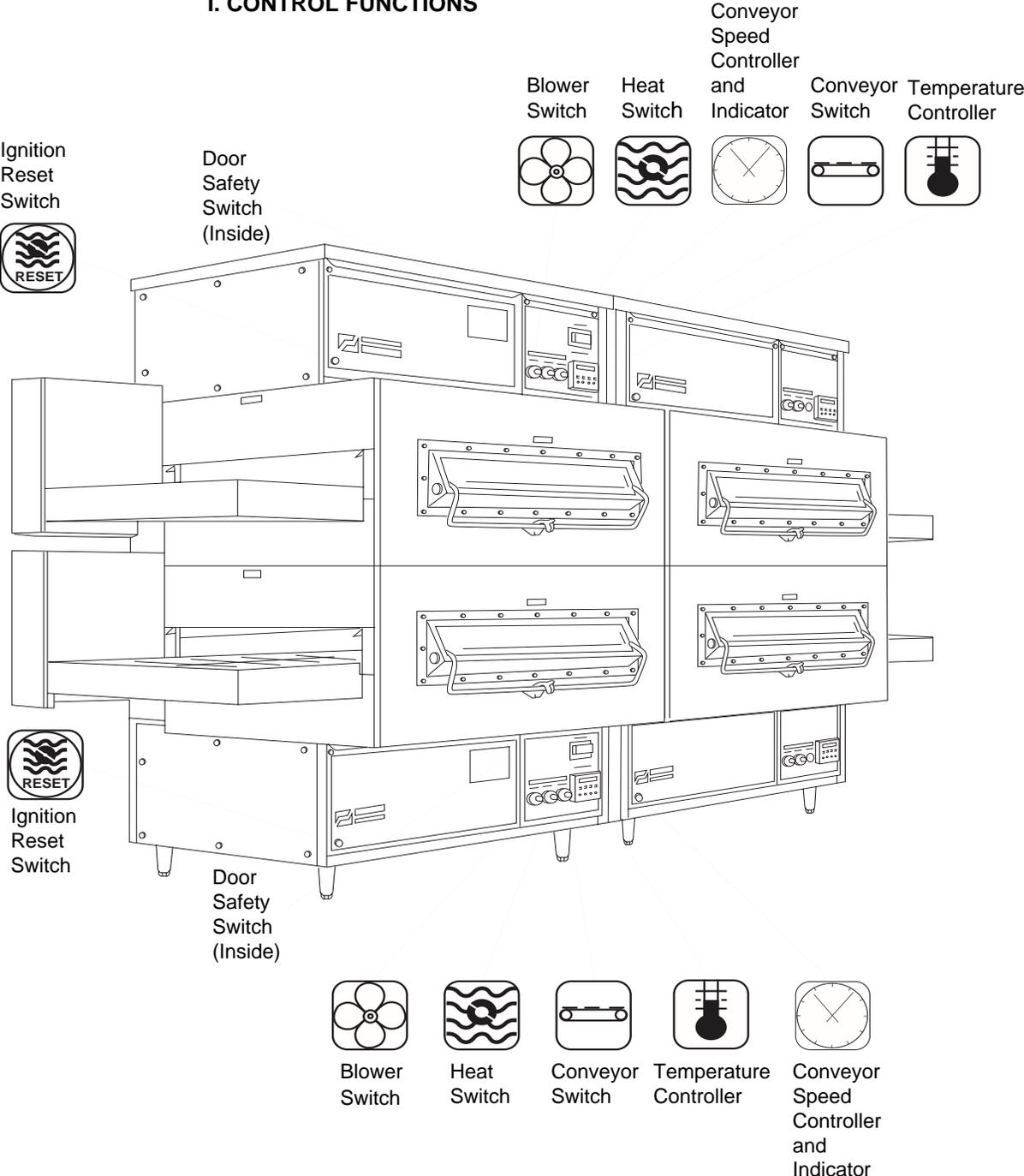


Figure 3-1. Oven Controls

NOTE
The ovens are only for professional use, and the ovens may only be used by qualified personnel.

II. COMPONENT INFORMATION AND LOCATION (EACH OVEN SECTION)

A. Door Safety Switch

Located at the inside upper left corner of the control box.

WARNING: DO NOT TOUCH THE WIRES GOING TO THIS SWITCH BECAUSE CURRENT IS ALWAYS PRESENT.

Opening the control panel permits the switch to open, disconnecting power to all electrical controls.

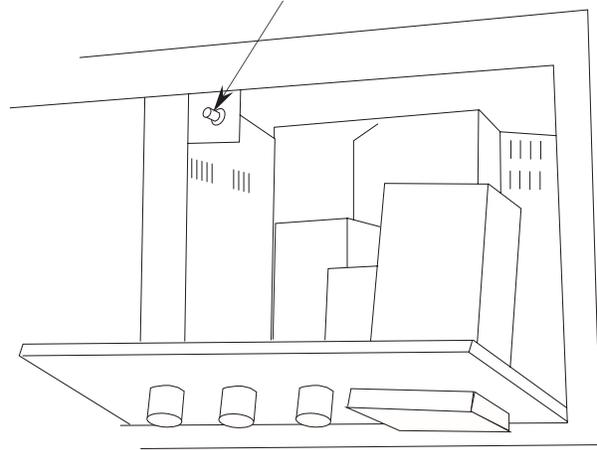


Figure 3-2. Door Safety Switch

B. Blower Switch

The blower switch has two positions. The switch must be in the "I" (on) position for the burner to ignite, permitting the oven to heat. The blowers circulate air throughout the oven and must stay on during baking and during the cool-down cycle (above 93°C [200°F])

to prevent blower bearing damage. To protect the two blower motors and bearings, a thermostatic override (cool-down switch) is built into the oven. When the temperature inside the oven is over 180° F (82° C), the blowers continue to run even after the blower switch is turned to the "O" (off) position.

Centrifugal switches (built into each of the blower motors) serve as safety interlocks for the burner. The burner cannot ignite if either of the blower motors' centrifugal switches is open.

C. Heat Switch

Turning the heat switch to the "I" (on) position initially starts operation of the oven purge circuit. After approximately 45 seconds, the pilot burner lights. After the pilot is lit, the main gas valve opens, permitting gas to go to the burner and heat the oven.

This switch is in series with the burner blower motor centrifugal switch, the high-temperature limit safety switch, and the blower motors' centrifugal switches.

D. Temperature Controller

The temperature controller is a solid-state, on/off type for maintaining the desired temperature setting. The temperature controller continuously monitors the ovens' temperature and actuates the high-flame solenoid valve in gas heated ovens. The heat is 'on' for the time required

to maintain a constant temperature.

The temperature controller contains a high-limit (safety) switch that shuts down the oven when the oven reaches 343°C (650° F) and a low-limit switch which allows the oven to cool down to 82° C (180° F) before shutting off the blowers.

E. Conveyor Switch 

The on/off ("1"/"0") switch for the conveyor drive motor is on the control panel of the controlling oven section. Also on this control panel is the conveyor speed control and indicator (Figures 3-3A and 3-3B).

(Display shows dc voltage value corresponding to the conveyor motor speed)

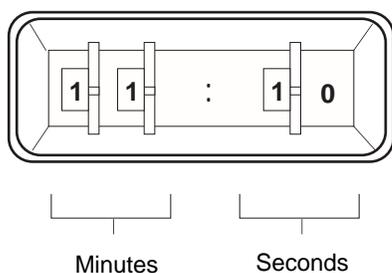


Figure 3-3A. Conveyor Speed Control and Indicator - Tandem and Double Tandem Oven

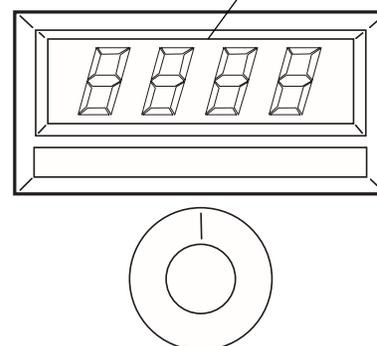


Figure 3-3B. Conveyor Speed Control and Indicator - Tri Tandem and Quad Tandem Oven

MEASURING CONVEYOR SPEED.

To measure the conveyor speed, place an item at the product entrance end of the oven bake chamber, as shown in Figure 3-4. Time how long it takes for the leading edge of the item to go from the entrance end of the bake chamber to its exit end (Figure 3-5). This is your conveyor speed or bake time.

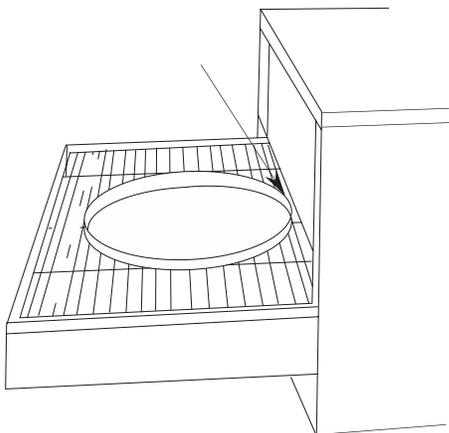


Figure 3-4. Product at entrance end of bake chamber - BEGIN TIMING

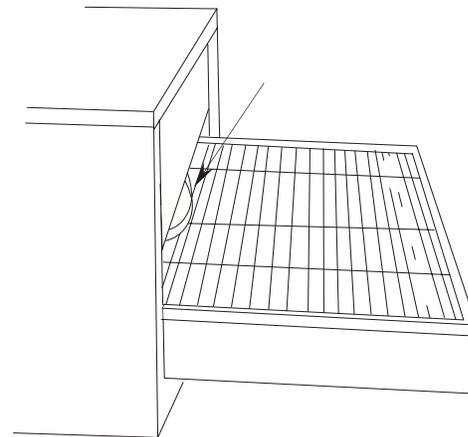


Figure 3-5. Product at exit end of bake chamber - END OF TIMING

SECTION 3 OPERATION

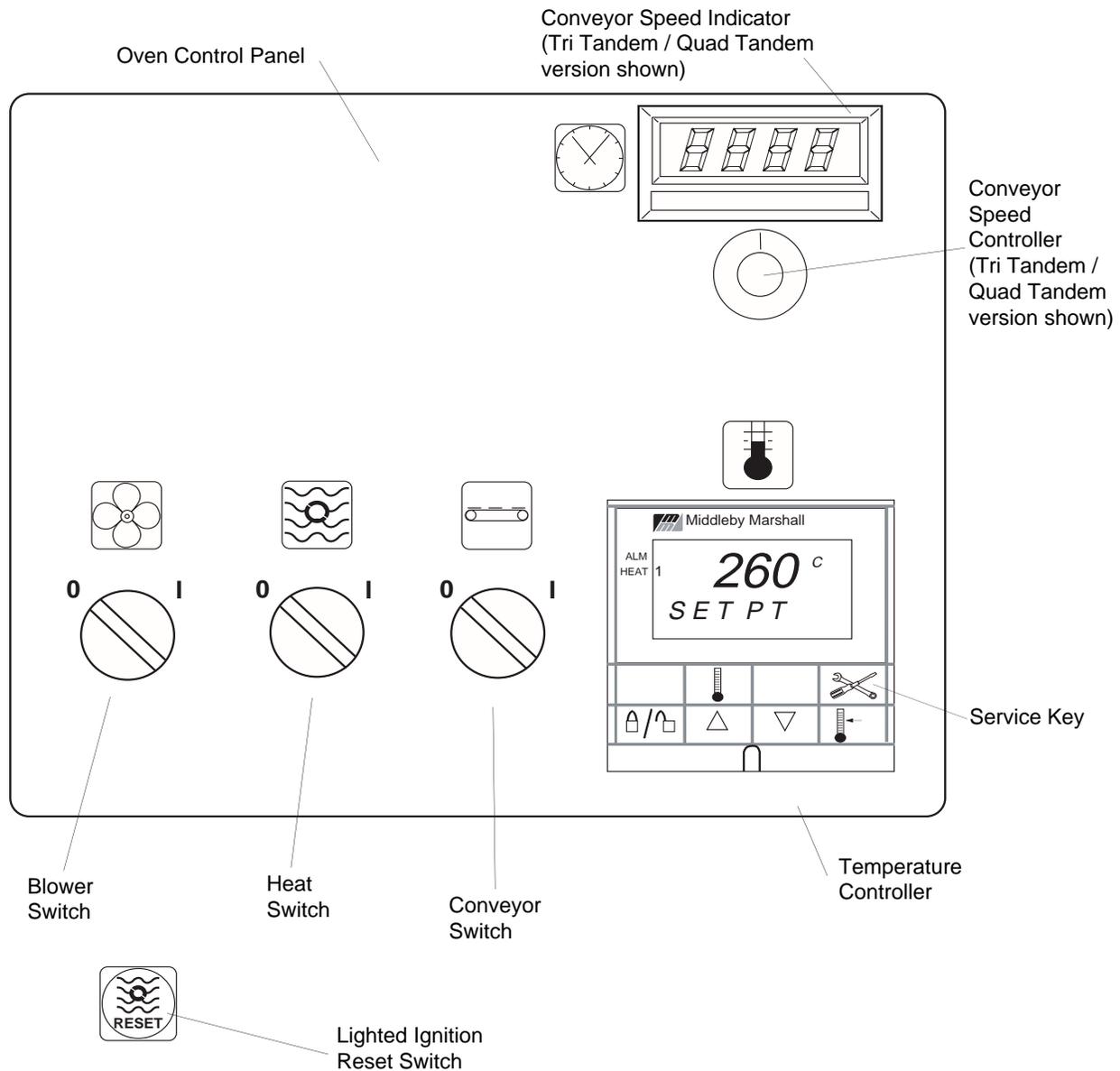


Figure 3-6. Control Panel

III. STEP-BY-STEP OPERATION

A. Startup Procedure

1. Turn on the main disconnect switch / circuit breaker.
2. Open the manual gas supply valve.
3. Turn the blower switch  to "I" (on)
4. Set the temperature controller to the desired baking temperature. (Refer to paragraph B for Temperature Controller Operating Instructions.)

5. Turn the heat switch  to "I" (on). The ignition system goes through a 45-second purge time after which the pilot lights and ignites the burner. If the burner does not ignite, the red light on the "RESET" pushbutton switch will light. The RESET switch must be pushed to restart the ignition sequence. This restarting can be repeated; however, after 15 minutes, the control system goes into automatic 'lockout.' When 'lockout' occurs, the heat switch must be turned to "O" (off) before the restart procedure can be repeated to ignite the burner.

6. Set the conveyor speed controller  to the desired value.

7. Turn the conveyor switch  to "I" (on).

B. Temperature Controller Operation Instructions

1. Setting the desired temperature ('set point').

a. Lock/Unlock

The 'set point' must be unlocked before its temperature can be changed.

Press the UNLOCK  and SET POINT  buttons simultaneously to unlock the set point. The UP Arrow button  and DOWN Arrow button  will now function for 60 seconds. See Figure 3-7.

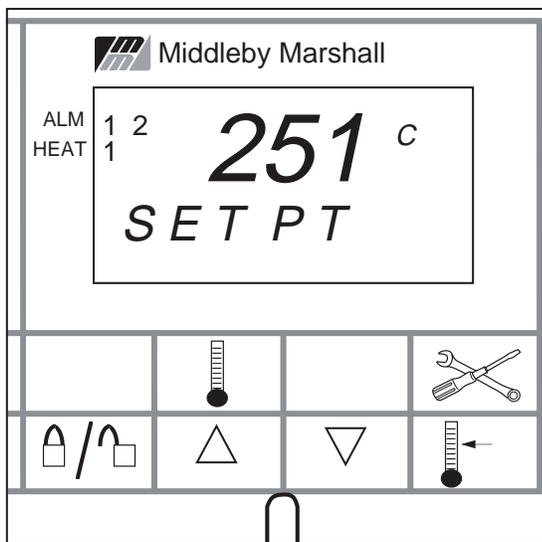


Figure 3-7

SECTION 3 OPERATION

b. Changing the 'set point'.

Press the UP Arrow button ▲ or DOWN Arrow button ▼. The temperature set point will increase or decrease. If this button is kept depressed, the temperature set point will continue to increase or decrease at a faster rate.

2. Displaying the actual oven temperature. See Figure 3-8.

- a.** To check the oven temperature, press the TEMPERATURE  button once to display the actual oven temperature. The word "TEMP" also appears.

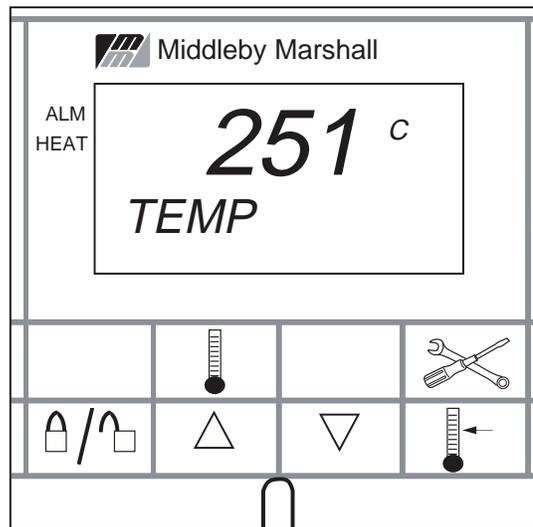


Figure 3-8

- b. Press the TEMPERATURE  button again to display the 'set point'. If the TEMPERATURE  button is not pressed, the display automatically shows the temperature set point after 60 seconds.

3. Display Messages

- a. ALM - The ALM window will display either a “2” or will be blank. See Figure 3-9.

AA. The “2” signals that the oven temperature is below 200°F (93°C). The “2” appears only while the oven is initially heating and has not yet reached 200°F (93°C), or after the heat switch is turned off and the oven has cooled below 200°F (93°C).

BB. The ALM window is blank whenever the oven temperature is 200°F to 650°F (93°C to 343°C).

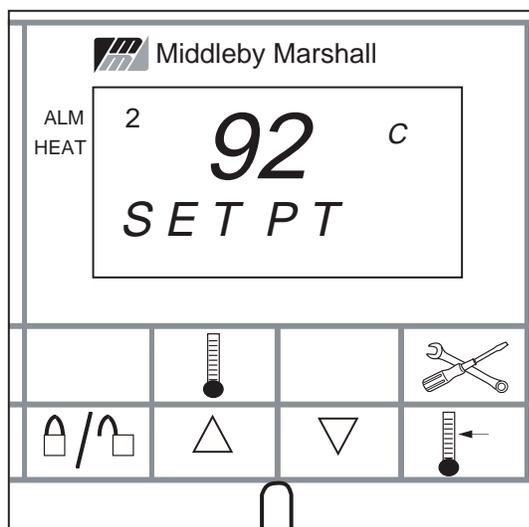


Figure 3-9

SECTION 3 OPERATION

- b. HEAT - The HEAT window will display either a "1" or it will be blank. See Figure 3-10.

AA. The "1" signals that the temperature controller is calling for heat *and* the burner is turned full on.

BB. When the HEAT window is blank, the temperature set point has been reached *and* the burner is turned down to low flame.

CC. During normal operation, the "1" continues to blink on and off every few seconds. This indicates that the temperature controller is maintaining the desired temperature (the 'set point').

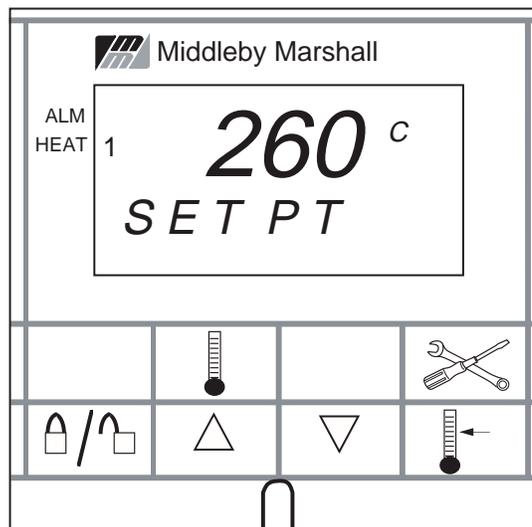


Figure 3-10

- c. FAILSF (Failsafe) See Figure 3-11.
- AA. If the oven does not reach 200°F (93°C) in 15 minutes, the temperature controller will shut off the high flame valve and begin flashing “FAILSF” and “SET PT” alternately. You will also note that the “2” in the ALM window stays on. This condition signals a problem in oven heating or heat sensing.
- BB. To reset the temperature controller, turn off the blower switch . Wait 10 seconds and turn the blower switch  back on. The “2” in the ALM window, the current temperature set point, and the words “SET PT” will be displayed again. The temperature controller will now cycle through its normal procedures.
- d. F/C - The F/C window will display either an “F” or a “C”.
- AA. The “F” indicates that the temperature displayed is in degrees Fahrenheit.
- BB. The “C” indicates that the temperature displayed is in degrees Celsius.

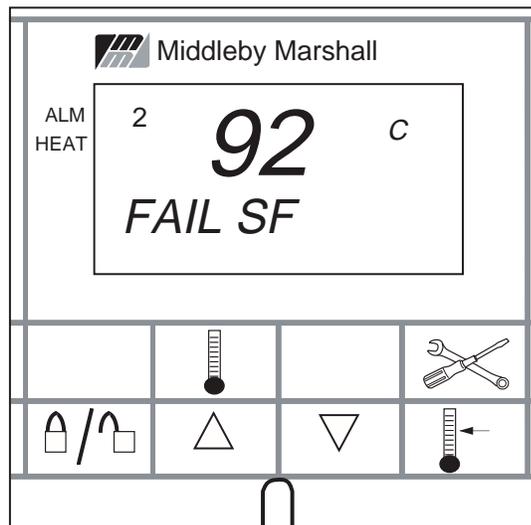


Figure 3-11

SECTION 3 OPERATION

C. Shutdown Procedure

1. Turn the blower  and heat  switches to "0" (off).

NOTE: *The blowers will remain on, until the oven temperature cools down to 93°C (200°F) at which time they will stop automatically.*

2. Turn the conveyor switch  to "0" (off), after making certain that there are no products left on the conveyor inside the oven.
3. Turn off the main gas supply valve.
4. Open the window.

Power Failure

In case of power failure, turn off all switches, open the oven window on each oven section, and remove all products from the conveyor. After power has been restored, perform the normal startup procedure.

D. Products Baked/Cooked in Ovens

The oven can be used to bake and/or cook a wide variety of food products, such as pizza, pizza-type products, cookies, sandwiches, and others.

E. Bake Time vs. Bake Temperature

Along with oven temperature, the bake is dependent on the conveyor speed (or 'bake time'); that is, the time it takes the product to pass through the oven.

1. 'Bake time' is actually conveyor speed and is defined as the time the pizza is actually in the oven. This is measured by noting the time when the leading edge of the pizza enters the oven and the time the leading edge of the pizza leaves the oven. This is adjusted by using the conveyor speed controller.

2. 'Bake temperature' is adjusted by changing the set point of the temperature controller to the desired temperature. (Instructions for changing the set point of the temperature controller appear earlier in this Section of the manual.

3. When establishing a bake time and temperature for a given product, a general rule can be: As the bake time increases, the bake temperature decreases. The reverse is also true; increase the temperature, decrease the time. Yet, there are limits to this rule because a golden-brown appearance is desired. Going to extremes will result in a burnt exterior and raw interior, or it will result in a very light-colored, but over-baked, product.

After a good bake has been established, the fine adjustments should be made by holding either the bake time or bake temperature constant.

Example: Thick pizza has good brown color on top and bottom, but the center is not quite done. Bake time: 8 minutes, 0 seconds. Bake temperature: 248°C (480°F).

Solution: Hold the temperature constant, but increase the bake time to 8 minutes, 30 seconds. This will give the heat more time to penetrate to the center of the product.

SECTION 3
OPERATION

F. Conveyor Speed (Bake Time) and Time of Delivery

CONVEYOR SPEED (BAKE TIME)- As stated in the previous paragraphs, conveyor speed (bake time) is defined as the amount of time that elapses between the time when the Leading edge of a pizza enters the oven and when the leading edge exits the oven.

Conveyor Speed (Bake Time) is controlled by adjusting the conveyor speed controller.

Bake Time will be the same for any size pizza

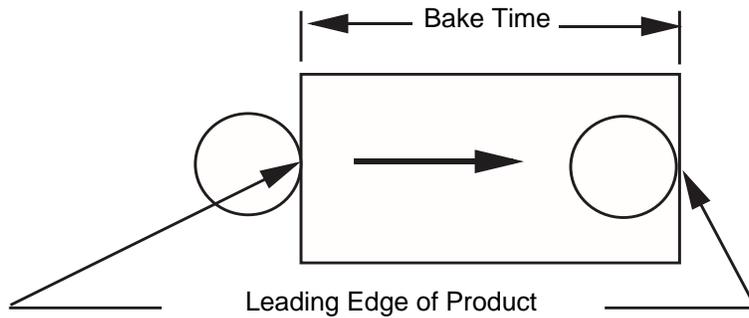


Figure 3-12. Bake Time

TIME OF DELIVERY- Time Of Delivery is the amount of time that elapses between the moment when the Leading edge of a product enters the oven and the moment when the Trailing edge of the product is fully discharged and is ready to be delivered to the customer.

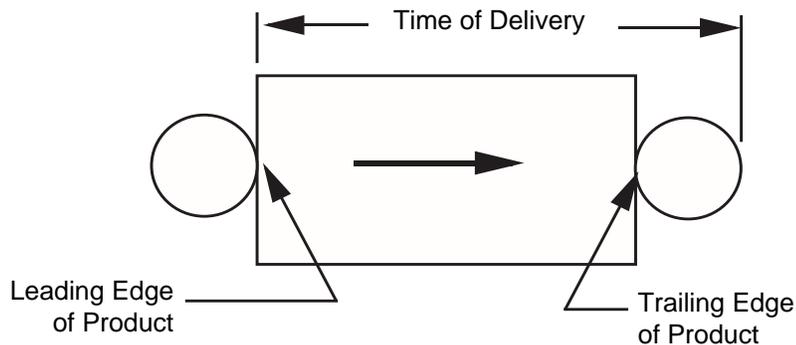


Figure 3-13. Time of Delivery

SECTION 4 MAINTENANCE

CAUTION: DO NOT use any abrasive cleaning materials or water spray. Wipe clean *only*. Cleaning with a water hose or pressurized steam cleaning equipment voids the oven warranty.

I. MAINTENANCE - DAILY

A. Exterior

Everyday, clean the outside of the oven using a soft cloth moistened with mild detergent. Rinse by wiping with a soft cloth moistened with clear water. Wipe dry.

B. Fans and Grills

1. Clean the two fan grills (Figure 4-1) on the rear of each oven **DAILY**. Also, clean the grills for cooling air exhaust: one located on top of an upper oven, and one located beneath the front of a lower oven. Clean these grills with a stiff, nylon-type brush.

2. Check the air intake of the cooling fans **DAILY**. The best time to check is right after starting the oven. IF THE FAN(S) ARE NOT OPERATING CORRECTLY, THEY MUST BE REPAIRED OR REPLACED IMMEDIATELY. Serious damage could be done to the blower motors and/or the solid-state electrical components. When a fan fails, the end panel must be removed as a temporary solution. **CAUTION:** *This is only a temporary solution. Oven damage may still occur while a fan remains unrepaired.*

3. Clean the ventilating hood air filters.

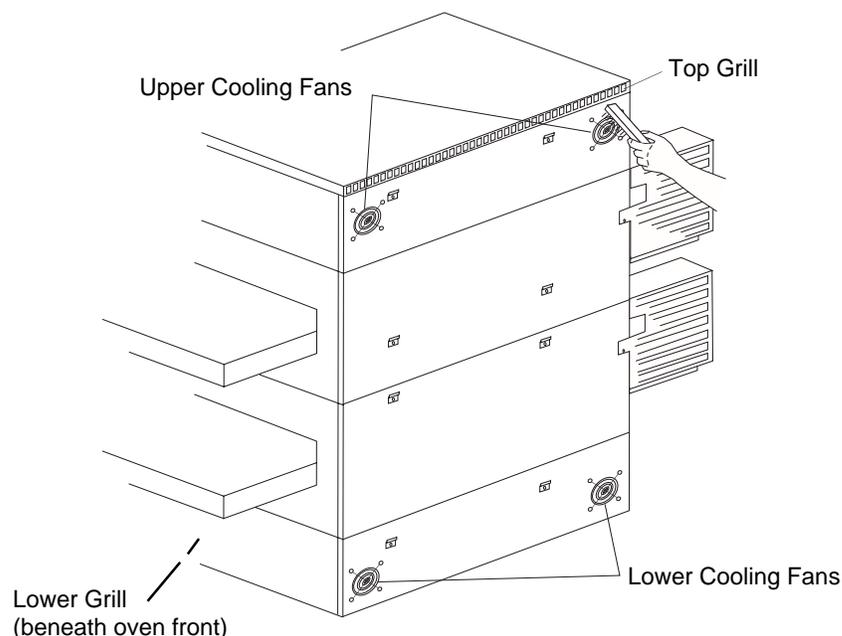


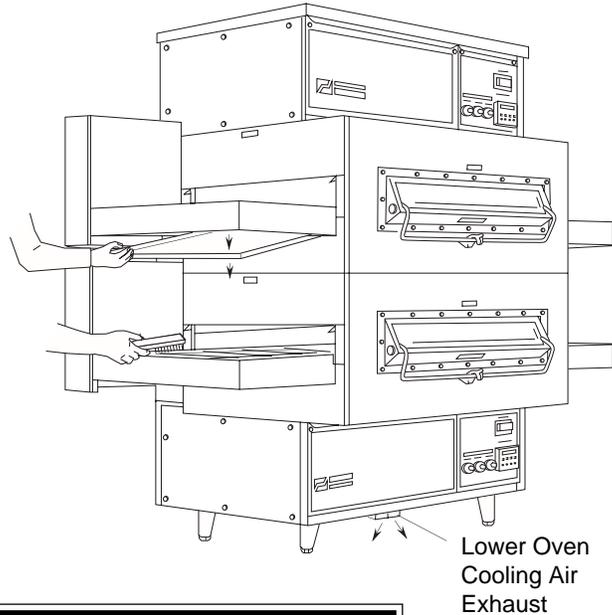
Figure 4-1. Oven Cooling Fans -Two on upper oven and two on lower oven

SECTION 4
MAINTENANCE

C. Conveyor Belts (Tandem and Double Tandem Ovens only)

Everyday, stand at the unloading end of the conveyor with a brush (Figure 4-2, lower oven). Brush all crumbs off the belt so that they fall into the crumb pan below the conveyor. (Figure 4-3 shows crumb pans for both upper and lower ovens.)

Figure 4-2. Conveyor Belt Cleaning (lower oven) and Crumb Pan Removal (upper oven)

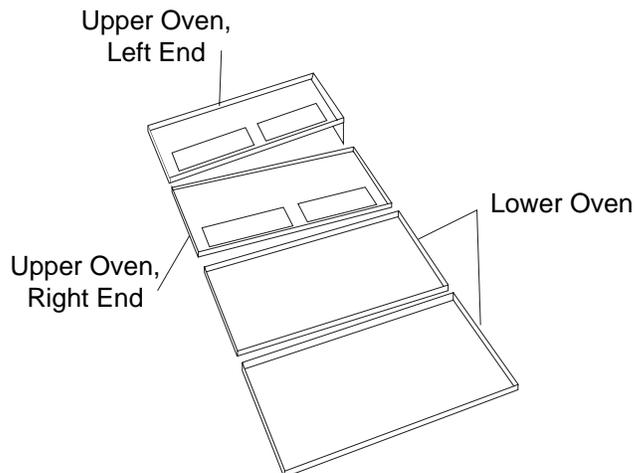


WARNING: Before performing any further maintenance, turn the main power switch off.

D. Crumb Pans (Tandem and Double Tandem Ovens only)

1. Remove and clean the crumb pans at both ends of an oven (Figure 4-2, upper oven). Remove each crumb pan by lifting the end of the pan nearest the end of the conveyor; then, slide the pan toward the oven slightly. Now, lower the front of the pan, and pull it from beneath the conveyor. (Figure 4-4 shows a view of this procedure from the side of the conveyor.)

Figure 4-3. Crumb Pans, Upper and Lower Ovens



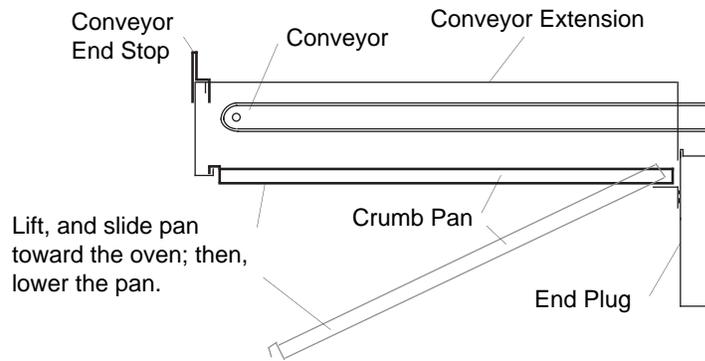


Figure 4-4. Crumb Pan Removal

The crumb pans **with** cutout holes (and an end shield attached on the inner end) are used at the left end (conveyor motor end) of an upper oven. The shield protects the conveyor motor from heat. The crumb pans **without** cutout holes are installed on a lower oven.

2. After cleaning, reinstall the crumb pans.

E. Window

1. **Clean the window in place, unless** it needs a thorough cleaning, which will require removal, as follows.
2. Remove the window by opening it (into the oven interior). Then, unscrew the window knobs from each end (Figure 4-5).

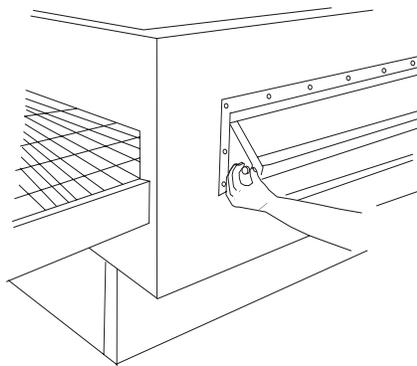


Figure 4-5. Unscrewing a Window Knob, Before Removal

3. Push the open window all the way inside the oven, making sure it is clear of the frame. Now, turn the window sideways inside the oven (Figure 4-6,) and then remove it. This will avoid breaking the window.

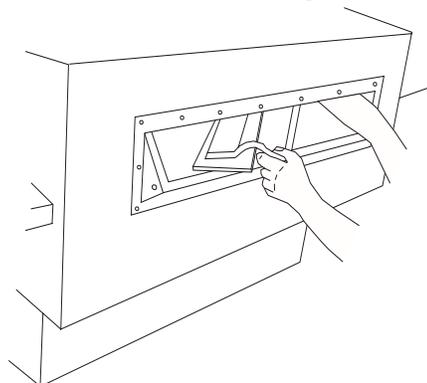


Figure 4-6. Window Removal

II. MAINTENANCE - MONTHLY

WARNING: Before performing any further maintenance, turn the main power switch off.

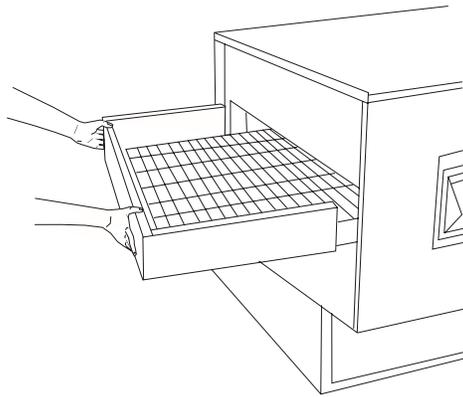
NOTE: The interior may require cleaning more than once a month, depending on the volume of baking.

To clean the interior, you must disassemble some parts of the oven.

A. Removing conveyor from oven for cleaning

1. Remove the crumb pans (Tandem and Double Tandem Ovens only). Refer to the Daily Maintenance procedures.
2. Remove conveyor extension covers from both ends of oven (Figure 4-7) (Tandem and Double Tandem Ovens only).

Figure 4-7. Conveyor Extension Cover Removal



3. After removing the bottom shield (located below the shroud) by removing its three screws, remove the conveyor motor shroud. Loosen the hanger screw; then, lift and remove the motor shroud.
4. Remove the end plugs from the oven side with the conveyor drive motor.
5. Release the tension from the conveyor drive chain, as follows:
 - Tandem and Double Tandem Oven:
Lift, and push, the conveyor assembly slightly into the oven.
 - Tri Tandem and Quad Tandem Oven:
Loosen the mounting bolts of the conveyor drive motor.
Shift the motor to release the drive chain tension.
6. Detach the drive chain from the conveyor drive shaft sprocket.

NOTE: *The conveyor assembly of a tandem or a double tandem oven can be removed from either end of oven. If you are removing the conveyor from the end of the oven without the drive motor, the drive sprocket assembly must be removed by loosening the 3/32" set screw on the conveyor drive shaft collar. Then, remove the drive sprocket assembly from the end of the shaft.*

7. Pull the conveyor belt until its master links are near the end of the upper belt surface. Disconnect the master links. (Refer to the later procedure "E. Conveyor belt link removal", in this section, for additional details.)

8. Remove the conveyor belt by rolling it into a bundle. Place the belt in a safe location.

9. Slide the conveyor frame sections out of the oven, placing them on the floor for cleaning.

NOTE: Tandem and Double Tandem Ovens - Conveyor frame sections are connected to each other with hinges. The conveyor frame must be removed as a unit.

Tri Tandem and Quad Tandem Ovens - Conveyor frame sections are separate and must be removed from **both** ends of the oven.

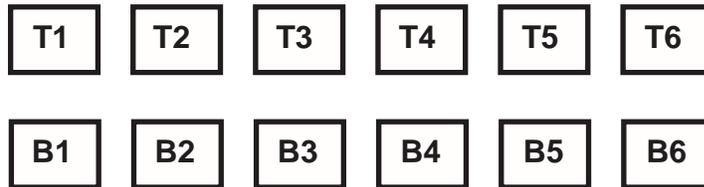
10. For a Quad Tandem oven, remove the two transition side panels. Then, slide out the top transition panel to obtain access to the conveyor frame sections for removal. (Refer to pages 2-19 through 2-21 for illustrations of these oven components and text that clarifies the procedure.)

SECTION 4
MAINTENANCE

B. Disassembling the blank plates and air fingers for cleaning

1. Use a felt pen to mark each plate and all parts of the air fingers with a 'finger arrangement' identifier, like those shown in Figure 4-8, when removing the blank plates and air fingers from the oven baking chamber. This marking should include the finger manifold, inner plate, and the outer plate of each air finger.

Figure 4-8. "Finger Arrangement" Identifiers



Air fingers and blank plates should be marked in the order shown, as viewed from the front of the oven. (The finger arrangement numbers for an *upper* oven can be preceded with a "U"; example: UB1, UT2, etc.)

Record the finger arrangement identifiers on paper and identify the number of rows of holes in each air finger's outer plate, along with the position of each 'full-blank' plate and 'half-blank' plate. Usually, a finger arrangement label is installed on the inside of the machinery compartment access panel. The finger arrangement should still be recorded for instances when the label is not available or illegible.

2. Slide each blank plate and air finger along the channels on the rear baking chamber wall (Figure 4-9), until each can be extracted from the oven. Prevent twisting or turning, to avoid interference in the channel(s).

Remove top and bottom air fingers and blank plates from either end of the oven (Figure 4-10). It is highly recommended that each plate and air finger be marked (Figure 4-8) at the time of removal to aid reinstallation in exactly the same position.

Figure 4-9. Blank Plate Removal

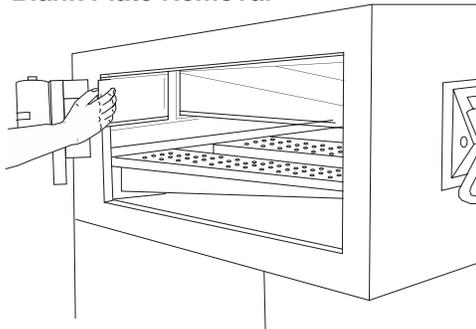
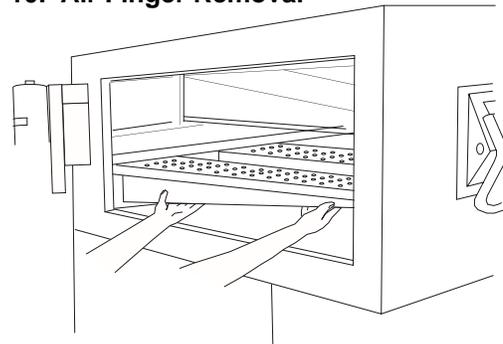


Figure 4-10. Air Finger Removal



3. After removing each air finger, place it in an upright position to remove the outer plate. Gently, step on the lip of the finger manifold and pull the outer plate upward to disassemble it, as shown in Figure 4-11.

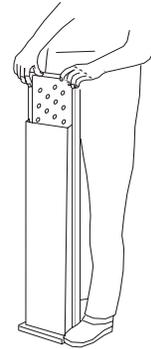


Figure 4-11. Outer Plate Disassembly

NOTE: The outer plate is stainless steel and may be cleaned by either soaking in a hot, strong detergent solution or using a caustic cleaner.

The conveyor belt can also be cleaned in the same way.

4. To remove an inner plate, pull its end away from the finger manifold, then, lift it out and up, as shown in Figure 4-12.

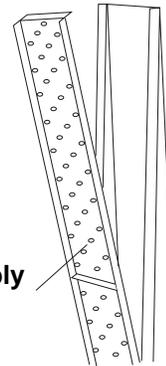


Figure 4-12. Inner Plate Disassembly

CAUTION: *DO NOT use caustic cleaner on an inner plate or a finger manifold, to avoid damage.*

5. While the oven chamber is clear, clean it with a vacuum cleaner; then, wipe it with a damp cloth.

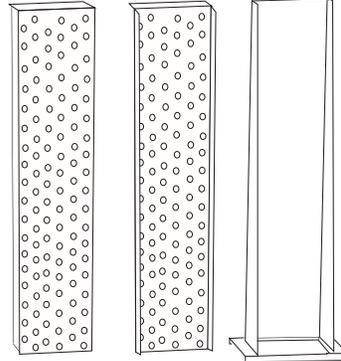
CAUTION: *DO NOT USE A CAUSTIC CLEANER OR EXCESSIVE WATER WHEN CLEANING THE INTERIOR OF THE OVEN CHAMBER.*

When cleaning the oven, a non-caustic cleaner, which removes baked-on grease and carbon from metal and glass and will not damage the aluminum coating on the interior oven surface, is recommended.

C. Reassembly and reinstallation of air fingers

Each air finger is made up of one inner plate, one outer plate and one finger manifold (Figure 4-13). **Be sure to match the 'finger arrangement' identifier markings (T1, T2, etc.) on all the parts of each air finger during reassembly.**

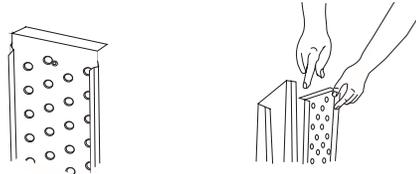
Figure 4-13. Air Finger Parts



1. Reassemble the inner plate into the finger manifold (Figure 4-14). Keep your fingers clear to avoid pinching them.

The inner plate of an air finger will only go in one way because of its design, as shown in Figure 4-15.

Figure 4-14. Inner Plate Reassembly Details



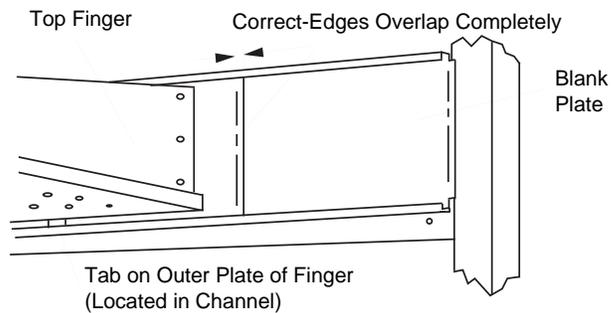
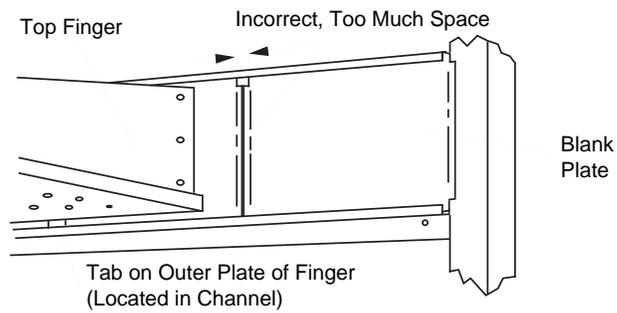
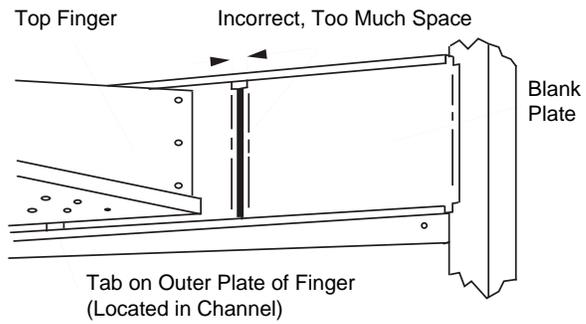
2. Reassemble the outer plate by sliding it downward in the grooves on the side walls of the finger manifold. Keep your fingers clear to avoid pinching them.

3. Reinstall the air fingers (and blank plates) into the oven by sliding them into the channels on the rear oven wall, using the method shown in Figures 4-9 and 4-10. Support the outer end of the finger (oven front), while pushing the base of the finger manifold portion along the channels. Remember to reinstall each air finger, according to the identifiers marked on them. Each finger must go back into its original location.

Each oven is shipped with a finger arrangement label mounted inside the machinery compartment access panel. If this sticker is not legible, it is very important to mark the fingers as they were pulled out and to record them on a separate paper.

4. Ensure that the air fingers and blank plates fit tightly together in the channel with edges interlocked and no space between edges, as shown in Figure 4-15.

Figure 4-15.
Air Finger Rein-
stallation Details

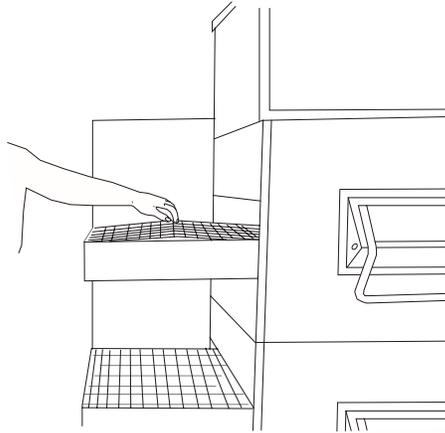


D. Checking conveyor belt tension

WARNING: *Oven conveyor belt must be cool for adjusting tension. DO NOT adjust belt when HOT.*

1. Check the belt tension by lifting the conveyor belt (Figure 4-16). (The conveyor assembly can either be in or out of the oven.) The belt should not lift more than 3" to 4" (75 to 100 mm).

Figure 4-16. Checking Conveyor Belt Tension



2. Adjust the conveyor belt tension screws (located on the right end of the conveyor assembly) for the proper 3" to 4" (75 to 100 mm) deflection.

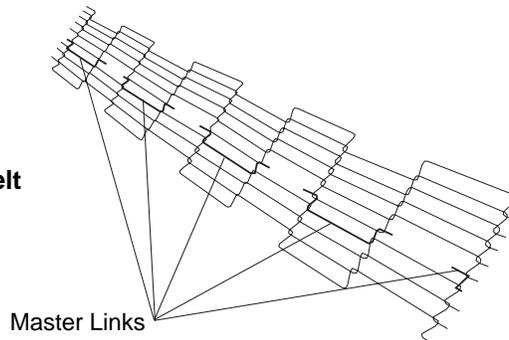
3. If the conveyor belt tension screws do not allow the conveyor belt **to have** the proper tension, at least one entire link must be removed. Use the following procedure ("E. Conveyor belt link removal") to remove a link.

When conveyor belt **is** under proper tension, proceed directly to "F. Conveyor reassembly into oven".

E. Conveyor belt link removal

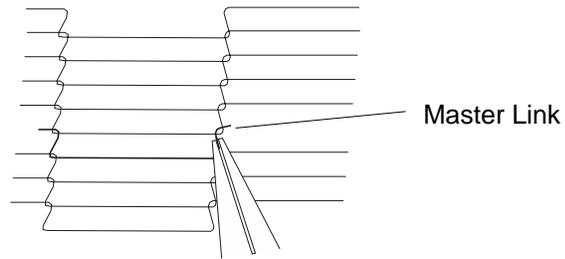
1. Remove an entire conveyor belt link by positioning the belt's master links near the end of the conveyor belt, as shown in Figure 4-17. (The conveyor assembly can either be in or out of the oven.)

Figure 4-17. Conveyor Belt Master Links



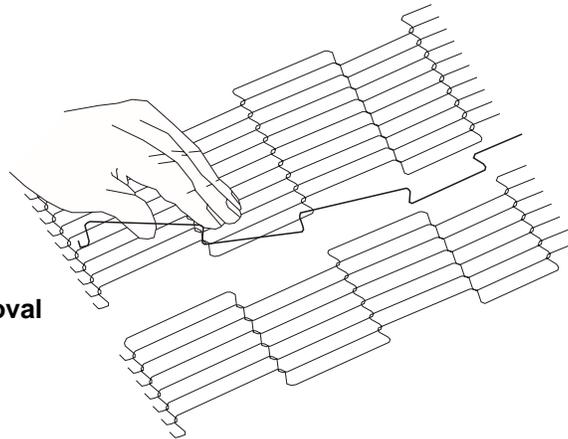
2. Unhook the master links at the end of conveyor belt, using long-nosed pliers, as shown in Figure 4-18.

Figure 4-18. Unhooking the Master Links



3. Unhook the complete belt link to be removed and slide it out (Figure 4-19). (Do not discard this removed link because it can be used for making spare master links.)

Figure 4-19. Entire Link Removal



4. Prepare to reconnect the inner master links.

IMPORTANT NOTICE: Before connecting the inner master links, notice that these links have a correct position. The master link (at the right in Figure 4-20) is in the correct (horns up) position for inserting into the conveyor belt. The link with horns facing down is in the incorrect position.

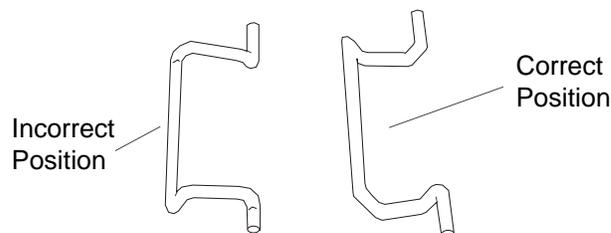


Figure 4-20. Master Link Positions

SECTION 4 MAINTENANCE

5. Reconnect the outer master links, as shown in Figure 4-21.

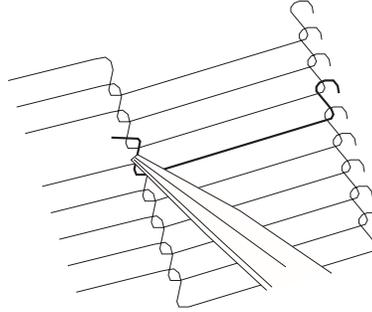


Figure 4-21. Outer Master Link Connection

IMPORTANT NOTICE: The outer master links have right and left sides to them. The right-edge master link has an open hook facing you, as shown in Figure 4-22. This will match the right outer edge of the conveyor belt. Remember, this hook travels backwards on the conveyor.

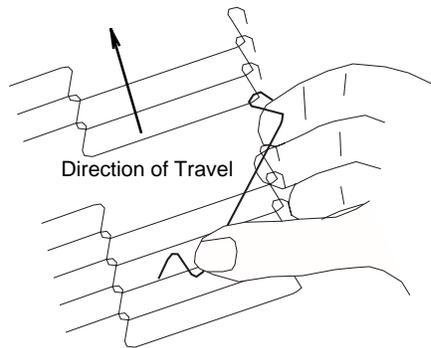


Figure 4-22. Right-edge Outer Master Link Position

F. Conveyor reinstallation into an oven

Refer to the procedures "INSTALLING THE CONVEYOR FRAME AND BELT" in Section 2, pages 2-19 through 2-21, for details concerning conveyor reinstallation and reassembly.

II. MAINTENANCE - EVERY 3 MONTHS

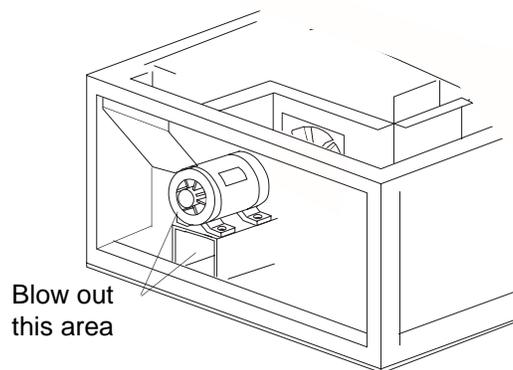
WARNING: All electric power must be shut off *before* beginning this maintenance procedure.

NOTE: It is recommended that an authorized Middleby Marshall service agent should perform the 3-month and 6-month maintenance procedures.

A. Cleaning the blower motors (See Figure 4-23.)

Remove the end panels from the machinery compartment. Clean the blower motors in each oven section and the surrounding area, using either compressed air or CO₂. Thoroughly blow out the motor compartment and vents inside the motor. Failure to do this may cause premature failure of the electric motor.

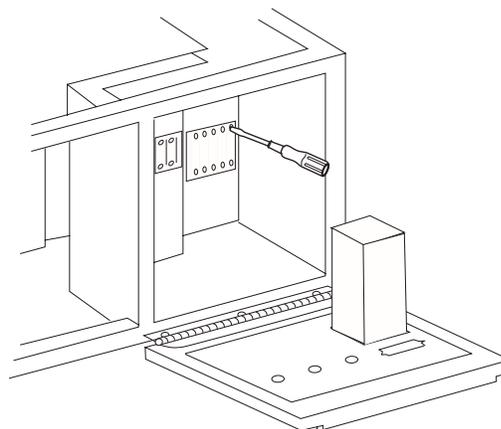
Figure 4-23. Blower Motor Cleaning



B. Electrical terminals

Open the control panel door by loosening the two screws. Tighten all electrical control terminal screws, including the electrical contactor terminal screws, as shown in Figure 4-24.

Figure 4-24. Electrical Terminal Maintenance



SECTION 4 MAINTENANCE

IV. MAINTENANCE - EVERY 6 MONTHS

WARNING: All electric power must be shut off *before* beginning this maintenance procedure.

NOTE: *It is recommended that an authorized Middleby Marshall service agent should perform the 3-month and 6-month maintenance procedures.*

A. Check the brushes of the conveyor drive motor; when worn to less than 3/32" (2.4mm), replace the brushes.

B. Clean and inspect the burner nozzle and electrode assembly. Also, check the oven venting system; clean the oven flue, when necessary.

C. For Tandem and Double Tandem Ovens, check the conveyor drive shaft bushings and spacers. Replace any worn parts.

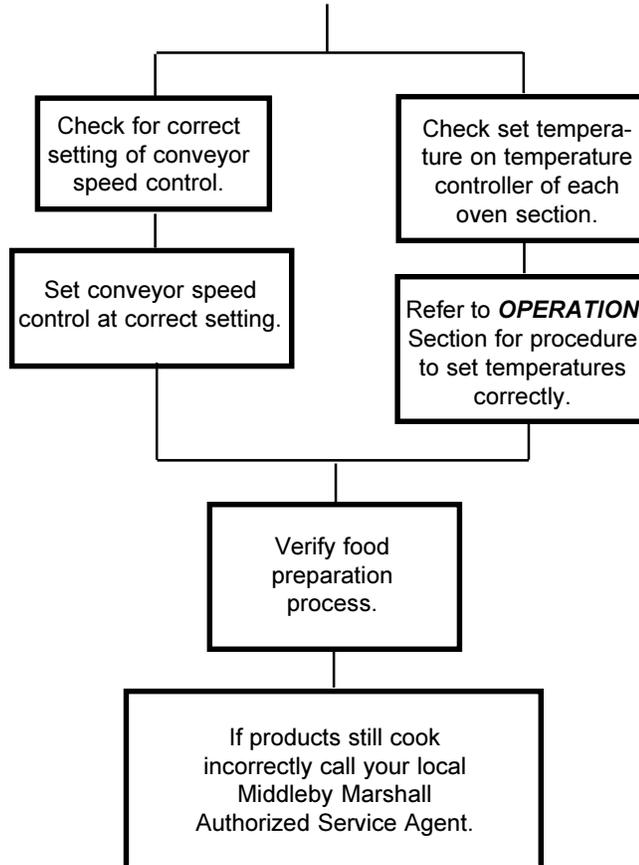
D. For Tri Tandem and Quad Tandem Ovens, check for wear on the conveyor shaft bearings. If necessary, lubricate with NLGI #2 Lithium-base Grease.

IMPORTANT NOTICES:

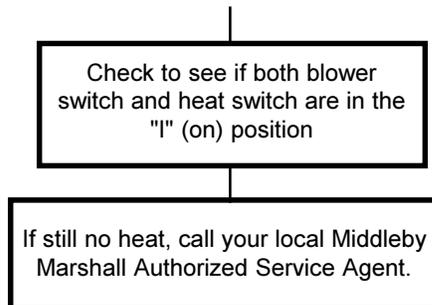
- The installation, startup, and changes required for changing from one gas type to another can be performed only by an authorized service agent.
- Installation of replacement parts requiring access to the interior of the oven is permitted only by authorized service personnel.
- If there are any problems with the operation of the oven, an authorized service agent must be called.
- Obtaining a service contract with a manufacturer's authorized service agent is recommended.

SECTION 5 TROUBLESHOOTING

PROBLEM: **PRODUCTS OVERCOOKED OR UNDERCOOKED**



PROBLEM: **OVEN SECTION(S) WILL NOT HEAT**



PROBLEM:
**OVEN BLOWER AND CONVEYOR OPERATE
BUT OVEN SECTION(S) WILL NOT HEAT**

If the oven section(s) do not reach 200°F (93°C) within 15 minutes, the temperature controller(s) will flash "FAILSF". To reset the temperature controller(s), turn the blower switch(es) off for 30 seconds.

Try restarting the oven section(s) again. If the oven section(s) will not heat, call your local Middleby Marshall Authorized Service Agent.

PROBLEM:
**CONVEYOR WILL NOT HOLD PROPER SPEED
OR WILL NOT RUN AT ALL**

Check if conveyor is jammed on something in oven.

Check for proper tension of conveyor drive chain and conveyor belt. Refer to **MAINTENANCE** Section for checking procedure.

Check that drive sprocket is tight.

If conveyor still will not run, call your local Middleby Marshall Authorized Service Agent.

PROBLEM:
**OVEN SECTION(S) WILL NOT TURN ON WHEN
THE SWITCHES ARE TURNED ON**

Check if wall circuit breakers
are turned on.

If oven section(s) still will not respond, call your
local Middleby Marshall Authorized Service
Agent.

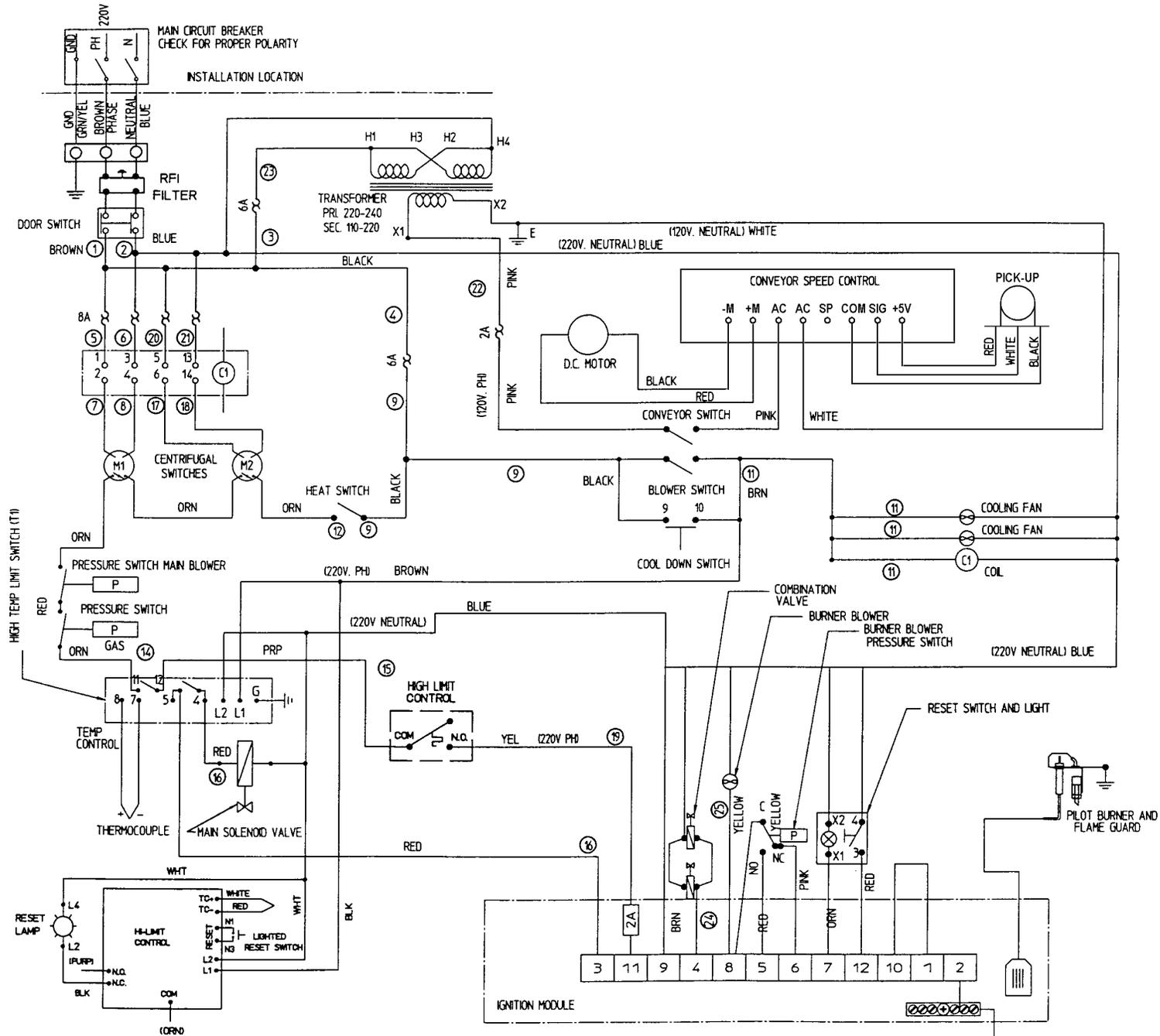
PROBLEM:
**BLOWER MOTORS RUNNING BUT LITTLE OR
NO AIR AT FINGERS**

Fingers assembled
incorrectly after cleaning. Refer to the
MAINTENANCE section for instructions
on removing and reassembling the air
fingers.

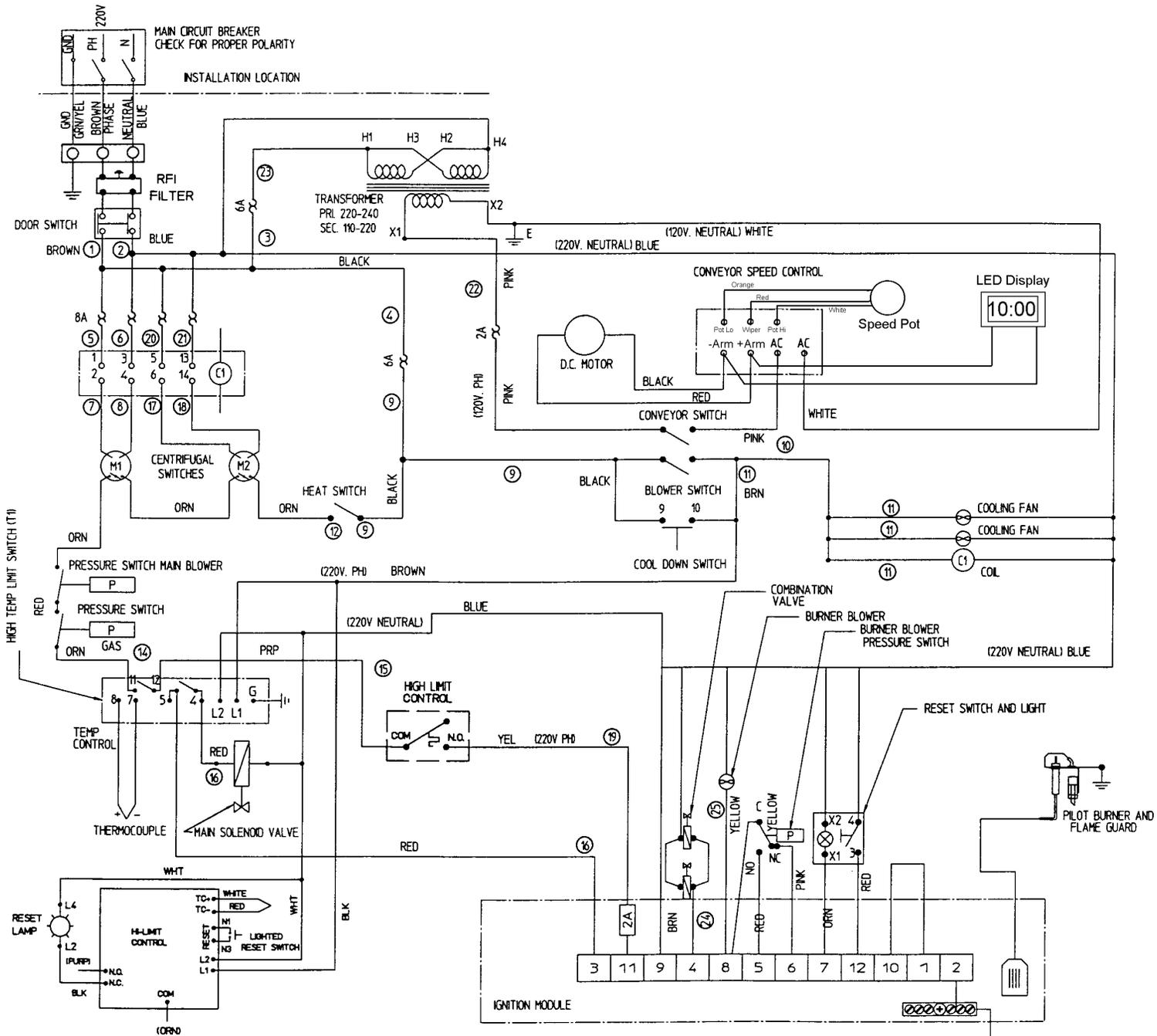
SECTION 5
TROUBLESHOOTING

NOTES:

SECTION 7
ELECTRICAL SCHEMATICS

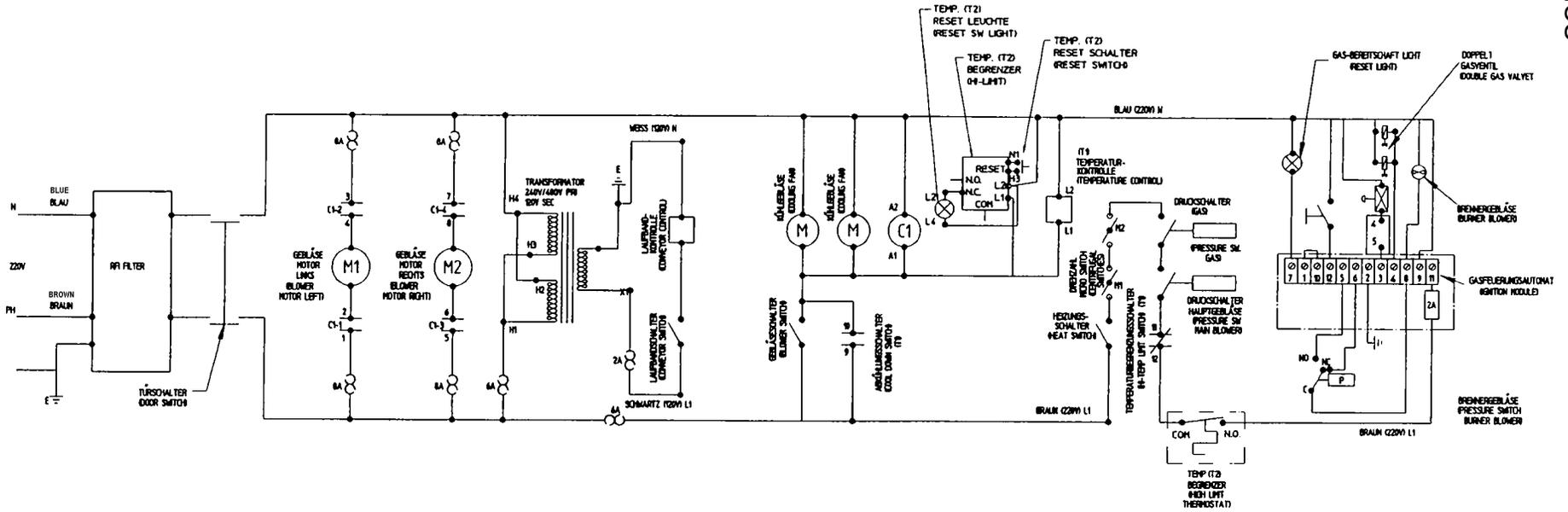


Electrical Wiring Diagram:
PS360/360WB Tandem and Double Tandem Ovens



Electrical Wiring Diagram:
 PS360/360WB Tri Tandem and Quad Tandem Ovens

6-4



Electrical Schematic:
PS360/360WB Tandem Ovens (all versions)

NOTES:



Middleby Cooking Systems Group • 1400 Toastmaster Drive • Elgin, IL 60120 • (847)741-3300 • FAX (847)741-4406

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