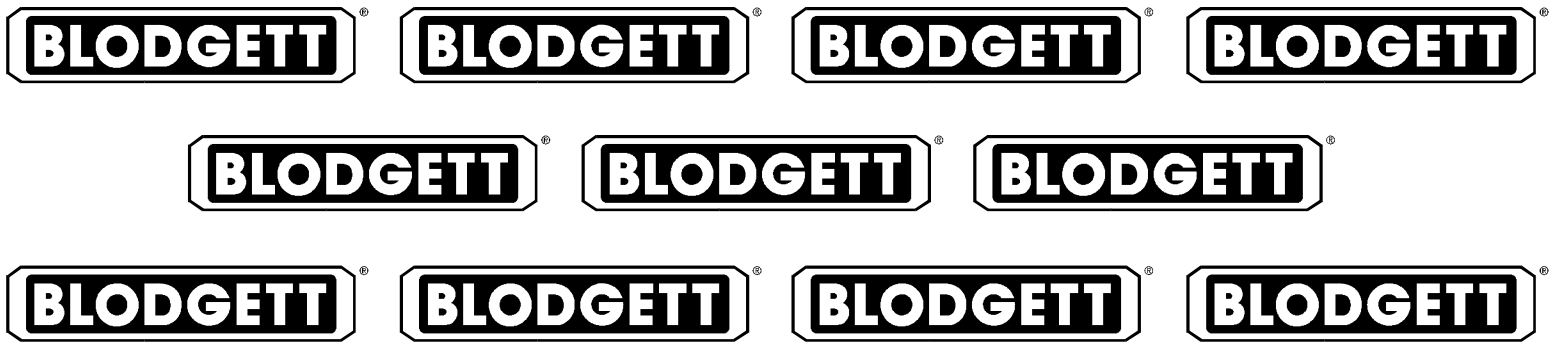

MT3870
CONVEYOR OVEN
SERVICE AND REPAIR MANUAL

BLODGETT OVEN COMPANY

www.blodgettcorp.com

50 Lakeside Avenue, Box 586, Burlington, Vermont 05402 USA Telephone (802) 658-6600 Fax: (802)864-0183

PN M7489 Rev B (6/01)

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NOTE: This addendum applies to tandem ovens only.

CONTROL DESCRIPTION

1. DIGITAL DISPLAY — Displays the time, temperature and controller related information.
2. OVEN ON/OFF — Controls power to the oven.
3. NUMERIC KEYS — Used to enter numerical data in the programming mode.
4. CLEAR KEY — Used to clear the display if an error is made in the programming mode.
5. SET TEMP KEY — Used to view or program the temperature setpoint.
6. ACT TEMP KEY — Used to view the current oven temperature.
7. PROG/ENTER KEY — Used to enter and exit the programming mode. Also used to lock in programmed settings.
8. STATUS LAMPS — When lit indicate that the fan or burners are operating.

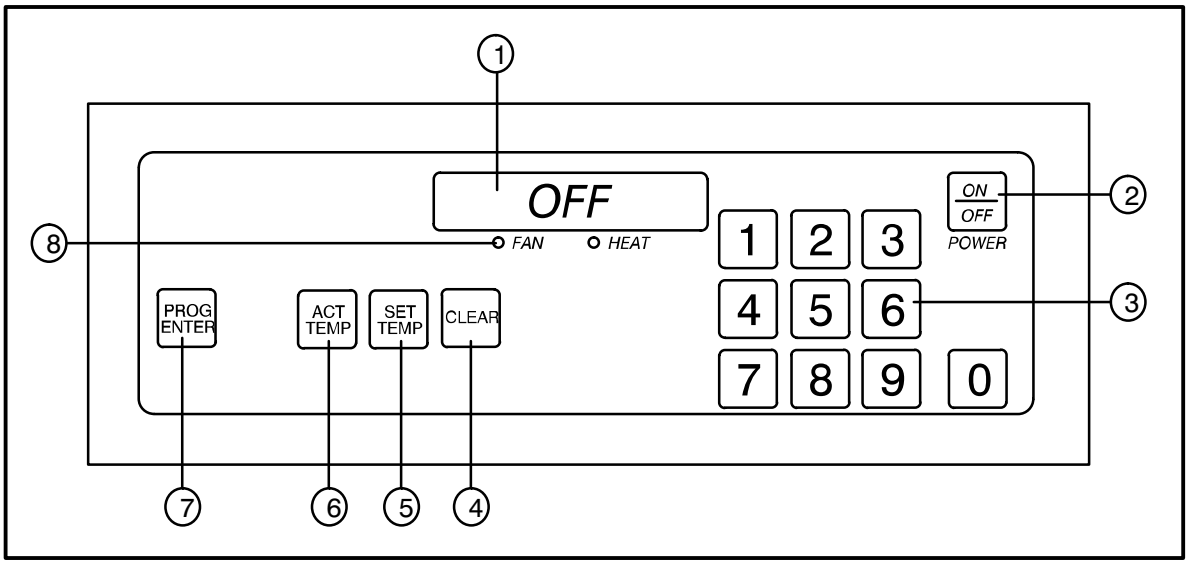
NOTE:

This oven, supplied with remote control, is equipped with an emergency shut down switch.

Should you need to stop the heat press the emergency switch.

WARNING:

Do not use the emergency switch as a GENERAL on/off switch!



Operation — Cooking Computer without Conveyor Control

OPERATION

To turn the oven on:

1. Turn the manual gas valve to ON.
2. Press and hold the ON/OFF key (2). The display reads *OFF* when the oven is idle.
3. The display will flash *WAIT • LOW • SET • TIME • 0.*
4. The FAN and HEAT status lamps (9) light. The fans begin to run. The heat rises to the temperature setting stored in the computer's memory. The conveyor default time is 0.

To display the actual oven temperature:

1. Press the ACT TEMP key (6). The LED on the key will light and the display reads *ACTUAL • nnnn°F.*

To view the temperature set point:

1. Press the SET TEMP key (5). The LED on the key will light and the display flashes *SET • TEMP • nnnn°F.*

To turn the oven off:

1. Press the ON/OFF key (2). The fans will continue to run until the oven cools to a safe temperature.

OVEN SHUT-DOWN

Turn the Computer Controller off (press and momentarily hold the ON/OFF key). Since the Cool Down circuit is already energized, the blower motor(s) will continue to run until the oven reaches approximately180°F (82°C). The blower motor(s) will then automatically shut off.

COOL-DOWN CIRCUIT

Blodgett Mastertherm® conveyor ovens are equipped with a cool-down feature for motor shaft and bearing protection. When the oven reaches approximately 180°F (82°C), the relay contacts close allowing the blower motor(s) to continue to run regardless of the Computer Controller status. As noted previously, the blower(s) will continue to run until the temperature drops below 180°F (82°C).

NOTE:

This oven, supplied with remote control, is equipped with an emergency shut down switch.

Should you need to stop the heat press the emergency switch.

WARNING:

Do not use the emergency switch as a GENERAL on/off switch!

Literature Addendum

Operation — Cooking Computer without Conveyor Control

PROGRAMMING PROCEDURES

Programming the Cook Time:

1. The conveyor belt default time is 0.

Programming the Temperature:

1. Press the PROGRAM/ENTER key (8).
2. Press the SET TEMP key (5). The display reads *PROG-? • SET • TEMP-? • _ _ _ _ °F.*
3. Use the NUMERIC keys (3) to enter the desired temperature set point. The control displays the numbers as they are entered. If an error is made, press the CLEAR key (4) and re-enter the number.
4. Press the PROGRAM/ENTER key (8) again.
5. Press the PROGRAM/ENTER key (8) a second time to lock-in the new temperature. The new temperature setpoint will be stored in the computer's memory.

Operation at the Programmed Settings:

1. Press and hold the ON/OFF key (2).
2. The FAN and HEAT status lamps (9) light. The fans begin to run. The heat rises to the temperature setting stored in the computer's memory.
3. The display will flash *WAIT • LOW • SET • TIME • 0* until the programmed bake temperature is reached. The HEAT lamp (9) will remain lit until the oven reaches the temperature set point.
4. The display reads *READY* and the HEAT lamp (9) goes out.
5. The oven is now ready to accept product.
6. Press and hold the ON/OFF key (2) to turn the oven off. The fans continue to run while the oven cools to a safe temperature.

DISPLAY INFORMATION

- WAIT • *LOW* — indicates that the present oven temperature is lower than the set point temperature. When the oven reaches the set point temperature the display changes to *READY*.
- *READY* — indicates that the oven is ready to accept product.
- *SET • TIME • 0* — indicates the current cook time setting.
- *HIGH • TIME* — indicates that the temperature is well above the set point. This usually occurs when moving from a higher to a lower temperature. Wait until the display reads ready before loading product.
- *HIGH • TEMP • LIMIT* — indicates that the oven temperature exceeds the high limit. The Over Temperature Alarm buzzer will sound. Shut the oven off and wait for the unit to cool down.
- *HIGH • TEMP • PANEL* — indicates that the control area reaches an excessive temperature. Shut the oven off and wait for the unit to cool down.
- *PROBE • OPEN • PROBE • SHORT* — indicates that the temperature sensor has failed. The Alarm buzzer sounds. Shut the oven off and contact a service representative.

NOTE:

This oven, supplied with remote control, is equipped with an emergency shut down switch.

Should you need to stop the heat press the emergency switch.

WARNING:

Do not use the emergency switch as a GENERAL on/off switch!

CHAPTER 1

INTRODUCTION

OVEN SPECIFICATIONS

VENTILATION REQUIREMENTS

The hood should completely cover the unit with an overhang of at least 6" (15 cm) on all sides not adjacent to a wall. The distance from the floor to the lower edge of the hood should not exceed 7' (2.1 m). The ventilation system should replace 80% of the exhaust volume with fresh make up air. TABLE 1 should be used as a guideline.

	Single	Double	Triple
CFM	1200-1650	2400-3300	3600-5000
M^3/min	34 - 47	68-93	102-142

TABLE 1

ELECTRICAL SPECIFICATIONS

NOTE: Three Phase hookup is not permitted.

WARNING: DO NOT INSTALL A "HIGH LEG" TO ANY CONVEYOR OVEN!

Installations within the U.S.

The MT3870 requires a 15 Amp, 60HZ, 1Φ, 208-240VAC, 4 wire service consisting of L1, L2, neutral and ground. See FIGURE 1. Use 90°C wire and size to National Electric or local codes.

Installations outside the U.S.

The MT3870 requires a 15 Amp, 50Hz, 1Φ, 230 VAC, 3 wire service consisting of L1, neutral and ground. See FIGURE 1. Use 90°C wire and size wire according to local codes.

CE approved installations

Connect the oven to a separate group 230V, 50 hz with rigid connection and circuit breaker. The circuit breaker should disconnect all poles, including neutral with a contact separation of at least 3 mm.

NOTE: The burner control unit is phase sensitive. If the phase and neutral are switched the control locks out.

Connect exhaust fan connector 1 and 2. See FIGURE 1. Connect phase + neutral + ground.

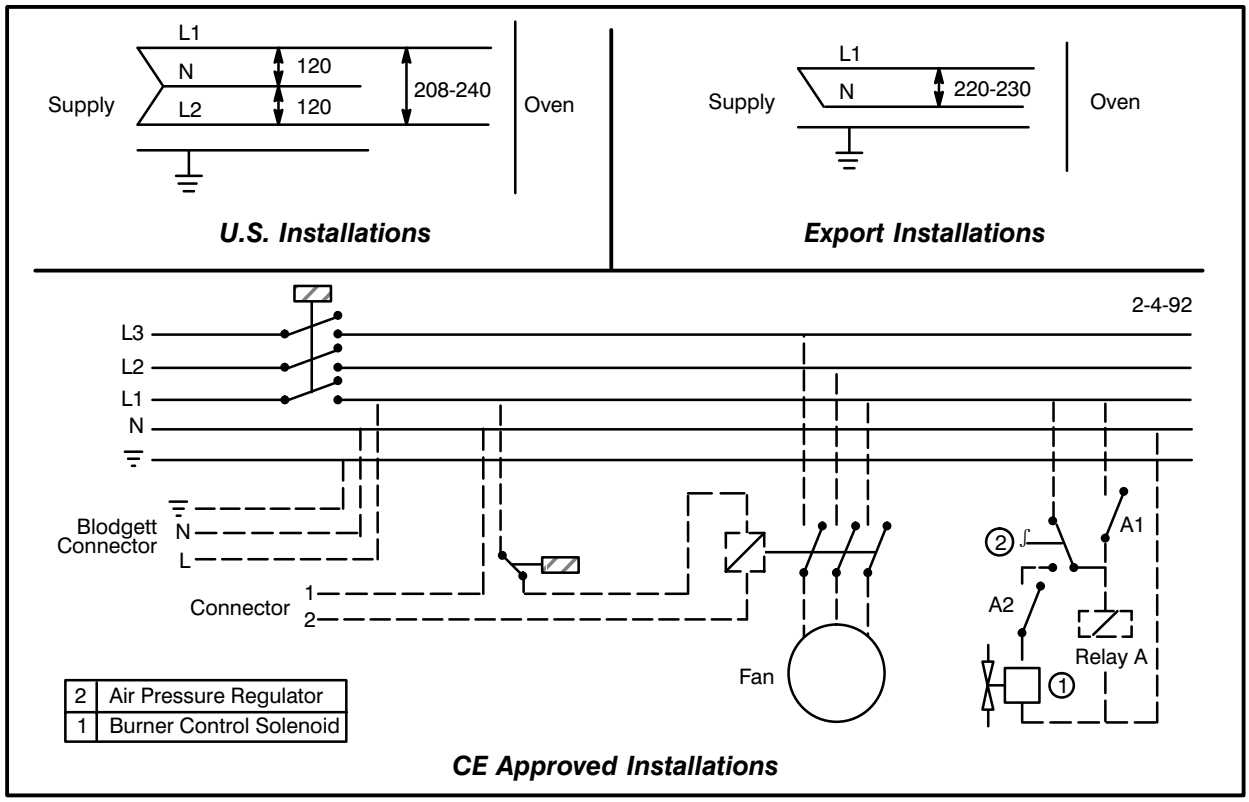


FIGURE 1

GAS SPECIFICATIONS

GAS CONNECTIONS

Domestic and General Export installations

The gas line should be large enough to accommodate the peak demand of all the gas appliances. TABLE 2 reflects a straight line, 50 foot run with no coupling restrictions and no other appliances drawing service. Gas line installations MUST conform to National Fuel Gas Code NFPA 54/ANSI Z223.1 Sec. 1.4 (Latest Edition). TABLE 2 should be used as a guideline only.

NOTE: For any pipe runs over 50 feet (15 m), consult the factory.

CE approved installations

1. Connect the oven to the gas line with the proper type of gas according to Local and National Installation Standards. See TABLE 2.

GAS REQUIREMENTS

The firing rate for the MT3870 is 150,000 BTU/Hr. (43.9 kW/Hr.)

NOTE: For natural gas meter sizing, consult your local gas company to ensure that your meter will provide the proper supply.

Installations within the U.S.

1. Add the total BTU's/hr of all the gas appliances.
2. Convert BTU's to cubic ft/hr using the formula Cu Ft/Hr = 1000 BTU/Hr for natural gas.
3. Size the meter accordingly.

Installations outside the U.S.

1. Add the total M^3/min of all the appliances.
2. Size the meter accordingly.

DOMESTIC AND GENERAL EXPORT

	Natural Gas			Propane Gas		
Gas Line Sizing						
Single	3/4" line			3/4" line		
Double	1-1/4" line			1″ line		
Triple	1-1/4" line			1-1/4" line		
Orifice Size	#1			#29		
Incoming Gas Pressure	W.C.	kPa	mbar	W.C.	kPa	mbar
Static	7"	1.74	17.4	12.5"	3.11	31.1
Operational	5.5"	1.36	13.7	11"	2.73	27.4

CE APPROVED UNITS

Type of Gas	Inlet Pressure mbars	Burner Pressure mbars	Injector Diameter mm	Air Opening mm	Pilot Injector mm	Standard Delivery Value kW (H_S)
G25	25	12	5,80	16	2 x 0,63	46 Nat. Gas
G20	20	8	5,80	16	2 x 0,63	46 Nat. Gas
G20/G25	20/25	Totally Inscrewed Pressure Regulator	5,15	16	2 x 0,63	46 Nat. Gas
G30	30/50	17	3,48	16	2 x 0,30	46 Butane
G31	30/37/50	24	3,48	16	2 x 0,30	46 Propane

TABLE 2

ILLUSTRATED PARTS LISTS

ELECTRICAL COMPONENTS

NOTE: ✓ = ASAP Distributor Required Stocking Parts

Ref. No.	Part No.	Description
1	✓ M6474	Computer Control Kit, Closed Loop SB (Qty 1)
1	✓ FW525	Computer Control Kit, Closed Loop SB (Qty 1) (Reconditioned)
	M5635	Computer Control Kit, Open Loop TB (Qty 1)
	M3175	Decal, Lexan Control (Qty 1)
	✓ M7427	Probe, Temperature RTD, 500 OHMS (Qty 1)
	M7202	Conversion Kit, Open Loop to Closed Loop (Qty 1)
	M3347	Cable, Computer Control, 25 Pin, 10' (Qty 1)
	✓ M3348	Cable, Computer Control, 9 Pin, 10' (Qty 1)
	M3490	Cable, Computer Control, 25 Pin, 50' (Qty 1)
	M3491	Cable, Computer Control, 9 Pin, 50' (Qty 1)
	✓ M3349	Harness, Inter−Connecting DC Drive, 3−Wire (For 9 Pin) (Qty 1)
	M3353	Harness, Relay Board (Open Loop) (For 25 Pin) (Qty 1) (Before 9/15/95)
	M7237	Harness, Relay Board (Closed Loop) (For 25 Pin) (Qty 1) (After 9/15/95)
2	M3314	Bracket, Computer Wall (Qty 1)
	M5661	Bracket Assy., Cable Clamp (Qty 1)
3	✓ M0984	Pick Up, PV−2 (Qty 1) (After 9/15/95)
4	M7236	Board, Relay/Transformer (Qty 1)
5	✓ 22672	Relay, Control (Qty 4)
6	✓ M3352	Transformer, 120V to 24V (Qty 1)
7	✓ 20349	Buzzer, 120V (Qty 1)
8	✓ M3295	Thermostat, High Limit (Manual Reset) (Qty 1)
9	✓ M1362	Snap Disc, L140/20F, 2 Pole SPST (Qty 1)
	✓ M2453	Snap Disc, L140/20F, 3 Pole SPDT (Qty 1)
10	✓ M0595	Switch, Air Pressure SPDT (Qty 1)
11	✓ M0152	Contact, Emergency Stop Switch (Qty 1)
12	M3296	Activator, Emergency Stop Switch (Mushroom Shape) (Qty 1)
	M3297	Nameplate, Emergency Stop (Qty 1)
13	M0593	Terminal Block, 2 Pole (Qty 1or CE Qty 2)
	✓ M2469	Fan, Axial 110 CFM 4 1/2" (Qty 4) (Before 11/14/95)
	22718	Fan Guard & Hardware (Qty 3) (Before 11/14/95)
	✓ M0572	Cord, Axial Fan 30" Power (Qty 4) (Before 11/14/95)
14	✓ M6381	Blower, Cooling (Qty 1) (After 11/14/95)
15	✓ M3136	Breaker, 7 AMP Circuit (Qty 4)
16	✓ M2772	Breaker, 4 AMP Circuit (Qty 2)
	M6590	Plate Assy., Control SB (Qty 1)
	M7482	Plate Assy., Control TB (Qty 1)
	M1694	Cord Set & Plug Assy., 10 Foot (Qty 1)
	M0772	Receptacle, Twist Lock (Qty 1)
17	✓ M0708	Contactor, 3 Pole, 120V Coil (Qty 1)
18	✓ M3322	Hood Interlock, Mechanical (Qty 1)

CONVEYOR COMPONENTS

NOTE: ✓ = ASAP Distributor Required Stocking Parts
** = Item is Too Large for UPS*

Ref. No.		Part No.	Description
19		M6338	Belt, Wire S/S (Total Length 38" SB (Per Foot) MT3870 18 FT, MT3855 16 FT)
		M7889	Belt, Wire S/S (Total Length 18—1/2" TB (Per Foot) MT3870 18 FT)
20		M7272	Tensioner (After Assy., Belt MT3870 (Qty 2) 9/15/95)
21	✓	M2379	Speed Control Board, Bodine (Qty 1)
	✓	M2254	Fuse, Line, 22 Bodine Board, 5 AMP, 125V (Qty 1)
	✓	M2316	Fuse, (Qty 1) 23 Armature, Bodine Board, 200 MA, 250V
24		M3301	Capacitor, (SB Qty 1 or Speed Control Board TB Qty 2)
25	✓	M2378	Motor, (SB Qty 1 or Conveyor Drive, Bodine 130V TB Qty 2)
	✓	M2500	Brush Set, Bodine (Qty 1)
		M0391	Chain, Drive & Order (SB Specify 2 FT or TB Specify 4 FT M0112)
	✓	M0112	Masterlink, Drive Chain (Qty 1)
		M6791	Guard, Drive 26 Chain SB (Qty 1)
		M6482	Guard, Drive Chain TB (Qty 1)
	*	M3981	Conveyor (Before Assy., Drive SB MT3870 (Qty 1) 9/15/95)
27	*	M6154	Conveyor (After Assy., Drive SB MT3870 (Qty 1) 9/15/95)
	*	M3982	Conveyor (Before Assy., Idle SB MT3870 (Qty 1) 9/15/95)
28	*	M6155	Conveyor (After Assy., Idle SB MT3870 (Qty 1) 9/15/95)
	*	M7592	Conveyor Assy., Drive TB MT3870 (Qty 1)
	*	M7593	Conveyor Assy., Idle TB MT3870 (Qty 1)
	*	M4432	Conveyor (Qty 1) Assy., Drive SB MT3855G (Before 11/14/95)
	*	M4433	Conveyor (Qty 1) Assy., Idle SB MT3855G (Before 11/14/95)
	*	M6777	Conveyor MT3855G Assy., Folding (Drive & Idle) SB (Qty 1) (After 11/14/95)
29		M2672	Shaft, Conveyor Drive (Qty 1)
30		M2673	Shaft, Conveyor Idle (Qty 1)
31	✓	M0109	Sprocket, Motor Drive, 12 Tooth (Qty 1)
	✓	M0110	Sprocket, Conveyor Drive, 15 Tooth (Qty 1)
32	✓	M0108	Sprocket, Conveyor Belt, 11 Tooth (Qty 18)

CONVECTION COMPONENTS

NOTE: ✓ = ASAP Distributor Required Stocking Parts

Ref. No.	Part No.	Description
33	✓M4224	Motor & Blower Assy. CW MT3870 (Qty 2)
34	✓M4225	Motor & Blower Assy. CCW MT3870 (Qty 2)
	M5419	Motor & Blower Assy. CCW MT3855G (Qty 3) (After 2/27/94)
	M2564	Capacitor, Motor MT3870 (Qty 4)
	NOTE: Call factory if MT3855G oven was manufactured before 2/27/94 to verify motor part number.	
	✓M5722	Insulation Kit for Blowers MT3870 (Qty 1)
	M7991	Insulation Kit for Blowers MT3855G (Qty 1)
35	M6466	Nozzle Assy. w/ Diverter MT3870 (Qty 14) Generic
	M5466	Nozzle Assy. w/ Diverter MT3855G (Qty 12) (Before 11/14/95)
	M7105	Nozzle Assy. w/ Diverter MT3855G (Qty 6) (After 11/14/95) (See L−497)
	M7106	Nozzle Assy. w/ Diverter MT3855G (Qty 6) (After 11/14/95) (See L−497)
	M1962	Hold Down, Nozzle MT3870 (Qty 1) (Before 9/15/95)
	M7399	Hold Down, Nozzle MT3870 Qty 1) (After 9/15/95)
	M5486	Hold Down, Nozzle MT3855G (Qty 1) (Before 11/14/95)
	M7380	Hold Down, Nozzle MT3855G (Qty 1) (After 11/15/95)
36	M3106	Diverter, Air (LH & RH) MT3870 (Qty 2)
	M3106	Diverter, Air (LH & RH) MT3855G (Qty 2) (Before 11/14/95)
	M5179	Diverter, Air (LH & RH) MT3855G (Qty 2) (Before 11/14/95)
	M5453	Diverter, Air (Center) MT3855G (Qty 1)(Before 11/14/95)
	M7372	Diverter, Air (LH) MT3855G (Qty 1) (After 11/14/95) (See L−495 & L−496)
	M7374	Diverter, Air (RH) MT3855G (Qty 1) (After 11/14/95) (See L−495 & L−496)
	M7373	Diverter, Air (Center) MT3855G (Qty 1) (After 11/14/95) (See L−495 & L−496)

AIR PLATES

NOTE: ✓ = ASAP Distributor Required Stocking Parts

Ref. No.	Part No.	Description
37	M6470	Plate Assy., Air RH MT3870 Generic (Qty 1)
38	M6469	Plate Assy., Air LH MT3870 Generic (Qty 1)
	M5767	Plate Assy., Air RH (R to L) MT3855G Generic (Qty 1)
	M5768	Plate Assy., Air LH (R to L) MT3855G Generic (Qty 1)
	M5648	Plate Assy., Air RH (L to R) MT3855G Generic (Qty 1)
	M5649	Plate Assy., Air LH (L to R) MT3855G Generic (Qty 1)
	24613	Hook, Air Pan (Qty 1)
39	M6597	Plate Assy., Block Off MT3870 Generic (Qty 6)
	M6079	Plate Assy., Block Off MT3855G Generic (Qty 6)

GAS BURNER COMPONENTS

NOTE: ✓ = ASAP Distributor Required Stocking Parts

Ref. No.	Part No.	Description
40	22132	Burner Assy. Complete (Specify Model & Gas Type) (Qty 1)
41	✓M0767	Blower Motor, Comb. w/ Control Box (Qty 1)
42	✓M2383	Blower Motor, Combustion (Qty 1)
43	✓M2381	Transformer, 120V to 24V (Qty 1)
44	✓M2382	Relay, Time Delay (Qty 1)
45	M0454	Orifice, Main Burner LP (Qty 1)
45	M0455	Orifice, Main Burner Natural (Qty 1)
46	✓M2727	Pilot Burner & Igniter Assy. LP (Qty 1)
46	✓M2726	Pilot Burner & Igniter Assy. Natural (Qty 1)
47	M6378	Shield, Pilot Burner (Qty 1)
48	✓M0415	Flame Sensor (Qty 1)
49	✓M2690	Orifice, Pilot LP (Qty 1)
49	✓M0697	Orifice, Pilot Natural (Qty 1)
50	M0248	Tube, Pilot Aluminum 1/4" (1.583 Feet)
51	M0959	Fitting, Compression 1/4 (Qty 2)
52	M2799	Union, Compression (Qty 1)
53	21225	Fitting, Elbow (Qty 1)
54	4588	Nipple, Pipe 3/4 x 1−3/8 Close (Qty 3 or CE Qty 2)
55	M0280	Tee, 3/4 x 3/4 x 1/4 (Qty 1)
56	M0278	Bushing, 1/4 x 1/8 Hex (Qty 2)
57	M0281	Plug, Pipe 1/8 Black (Qty 2)
58	17874	Ell, Black 1/2 x 3/4 (Qty 1)
59	M0590	Nipple, Pipe 1/2 x 2−1/2 (Qty 1)
60	M0279	Union, 1/2 Inch Black (Qty 1)
61	1949	Nipple, Pipe 1/2 x 1−3/16 Close (Qty 1)
62	M0317	Elbow, 1/2 Inch Street 90 Deg (Qty 1)
63	21278	Nipple, Pipe 1/2 x 3−1/2 (Qty 1)
64	M3238	Tee, 1/2 x 1/2 x 1/4 (Qty 1)
65	✓23007	Spring, Solenoid Valve, LP to Natural (Qty 1)
65	✓18612	Spring, Solenoid Valve, Natural to LP (Qty 1)
	23114	Conversion Kit, LP to Natural MT3870 (Qty 1)
	✓21389	Conversion Kit, Natural to LP MT3870 (Qty 1)
	M5259	Conversion Kit, LP to Natural MT3855G (Qty 1)
	M5290	Conversion Kit, Natural to LP MT3855G (Qty 1)
66	✓M0282	Valve, Manual Gas (Qty 1)
67	✓M5495	Dual Solenoid/Pressure Regulator, Nat 24V (Qty 1)
67	✓22190	Dual Solenoid/Pressure Regulator, LP 24V (Qty 1)
68	✓M1054	Spark Box, Johnson (Qty 1)
	21242	Connector Kit, Gas Flex 48" (Qty 1)
	21826	Connector Kit, Gas Flex 36" (Qty 1)
69	M7280	Flame Tube Assy., MT3870 (Qty 1)
	M7390	Flame Tube Assy., MT3855G (Qty 1)

EXTERIOR COMPONENTS

NOTE: ◆ = Doors are not returnable

Ref. No.	Part No.	Description
	◆ M2868	Door Assembly, Pull Down S/S (used w/enclosed Greenheck hood system) (Qty 1)
	M2188	Handle Kit, Door 2” (used w/M2868) (Qty 1)
70	◆ M3944	Door Assembly (used w/ false front) (Qty 1)
71	M4275	Handle Kit, Door 22” (used w/ M3944) (Qty 1)
72	M1871	Plate, RH Pivot Slotted (Qty 1)
73	M1872	Plate, LH Pivot Slotted (Qty 1)
74	M3602	Bracket Assy., Mounting (Qty 2)
75	M3603	Bracket Assy., Mounting (Qty 2)
	M5475	Filter Assy., MT3855G (Qty 1) (Before 11/14/ 95)
76	M3751	False Front Assy., MT3870 (Qty 1)
	M4563	False Front Assy., MT3855G (Qty 1)
	M3751	Tape, Closed Cell Foam
	M5032	Chimney Kit, Single (Qty 1) (Before 11/95)
	M7464	Chimney Kit, Single (Qty 1) (After 11/95)
	M7160	Chimney Kit, Double (Qty 1) (Before 11/95)
	M7463	Chimney Kit, Double (Qty 1) (After 11/95)
	21390	Legs, 17−1/4” w/ Casters (Double) (Set of 4)
	21391	Legs, 23−1/4” w/ Casters (Single) (Set of 4)
	14444	Casters, Cradle (Triple Oven) (Set of 4)
77	M3783	Stop, Product S/S (Qty 1)
78	M3779	Extension Assy., Product 6” (Qty 1)
	M4223	Extension Assy., Product 10” (Qty 1)
	M7575	Extension Assy., Product 15” (LaRosa’s) (Qty 1)
	M2824	Crumb Pan, Idle MT3870 (Qty 1) (Before 9/15/95)
79	M6168	Crumb Pan, Idle MT3870 (Qty 1) (After 9/15/95)
	M2823	Crumb Pan, Drive MT3870 (Qty 1) (Before 9/15/95)
80	M6167	Crumb Pan, Drive MT3870 (Qty 1) (After 9/15/95)
	M6910	Crumb Pan, Idle MT3855G (Qty 1)
	M6906	Crumb Pan, Drive MT3855G (Qty 1)
	M5612	Plug Assy., Lower RH MT3870 Qty 1) (Before 9/15/95)
81	M7276	Plug Assy., Lower RH MT3870 (Qty 1) (After 9/15/95)
82	M5612	Plug Assy., Lower LH MT3870 (Qty 1)
	M7386	Plug Assy., Lower MT3855G (Qty 2)
83	M3116	Plug Assy., Upper MT3870 & MT3855G (Qty 2)
84	M2460	Air Curtain, Upper End Plug (Qty 2)
	M3728	Support Assy., Upper End Plug RH MT3870 (Qty 2)
	M3729	Support Assy., Upper End Plug LH MT3870 (Qty 2)
	M7149 M7150	Support Assy., Upper End Plug RH MT3855G (Qty 2) Support Assy., End Plug LH MT3855G (Qty 2)
85	M3724	Handle, End Plug (Qty 2)
	22229	Stacking Assy., Double (Qty 1)
	M4633	Panel & Filter Assy. (Qty 1) MT3870 (All) & MT3855G (Before 11/14/95)

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
	M5485	Panel & Filter Assy. MT3855G (Qty 1) (After 11/14/95)	86	M7266	Control Box Cover w/ Access Door MT3870 (Qty 1) (After 9/15/96)
	XXXXX	Control Box Cover w/ Louvers MT3855G (Qty 1) (Before 11/14/95)	87	M6035	Latch, Access Door (Qty 1)
	M6799	Control Box Cover w/ Access Door MT3855G (Qty 1) (After 11/14/95)		M2689	Body Back, MT3870 (Qty 1) (Before 9/15/95)
	XXXXX	Control Box Cover w/ Louvers MT3870 (Qty 1) (Before 9/15/95)		M7254	Body Back, MT3870 (Qty 1) (After 9/15/95)
				M4248	Body Back, MT3855G (Qty 1)

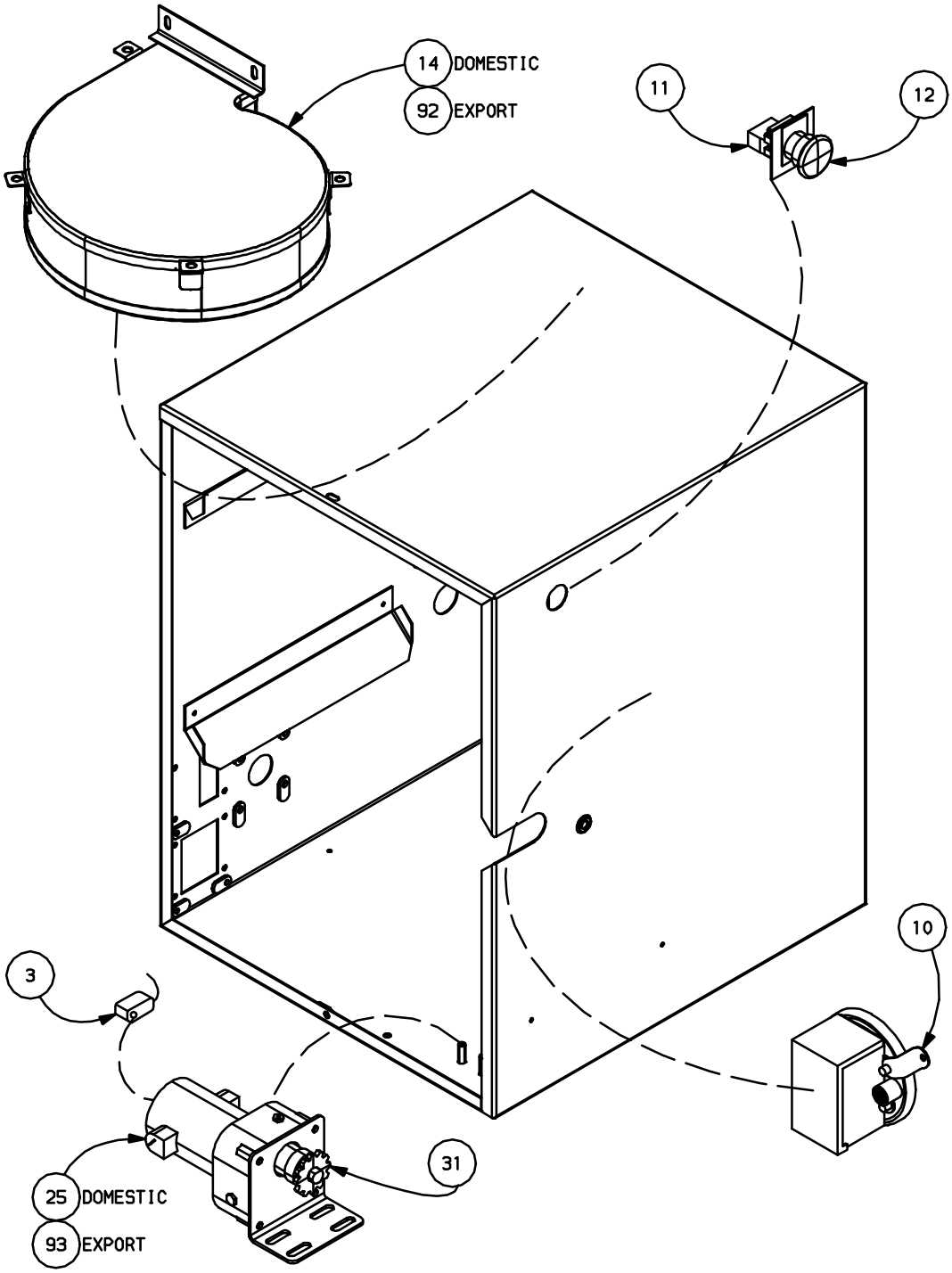
EXCLUSIVE TO EXPORT

NOTE: ✓ = ASAP Distributor Required Stocking Parts

Ref. No.	Part No.	Description
88	M2276	Burner Assy., Complete (Qty 1)
89	M4597	Motor & Blower Assy., CW MT3870 (Qty 2)
90	M4598	Motor & Blower Assy., CCW MT3870 (Qty 2)
91	M6000	Dual Solenoid/Pressure Regulator, Nat. (Qty 1)
91	M6001	Dual Solenoid/Pressure Regulator, LP (Qty 1)
92	M7283	Blower, Cooling Export (Qty 1)
93	M3128	Motor, Conveyor Drive Bodine, 180V (Qty 1)
94	M3153	Digital Speed Control Board, Bodine (Qty 1)
95	M2630	Fuse, Line, Bodine Board, 500 MA (Qty 1)
96	✓M2316	Fuse, Armature, Bodine Board, 200 MA, 250V (Qty 1)
	M5717	Board, Relay (Open Loop) SB (Qty 1)
97	M7282	Board, Relay (Closed Loop) SB (Qty 1)
98	M6025	Fuse, 25V 80 ma (Qty 1)
99	M6024	Transformer, 220V to 24V (Qty 1)
100	✓20350	Buzzer, 240V (Qty 1)
101	R1580	Stop, End (Qty 1)
102	M6449	Filter, Noise (Qty 1) CE
103	M7880	Computer Control Kit, Closed Loop SB (Qty 1) CE
104	M7888	Relay, 1 Second Time Delay (Qty 1) CE
105	M2386	Blower Motor, Combustion (Qty 1) CE
106	M7333	Pilot Burner & Ignitor Assy., LP (Qty 1) CE
106	M7334	Pilot Burner & Ignitor Assy., Nat. (Qty 1) CE
107	M2497	Switch, Push Button (Qty 1) CE
108	M2498	Switch, Contact (Qty 1) CE
109	M3330	Switch, Air Pressure Differential (mbr) (Qty 1) CE
	M2819	Switch, Air Pressure (in/wc) (Qty 1) Australia
110	M0706	Orifice, Main Burner (Specify MTD) (Qty 1) CE
111	R0164	Terminal Block, Power (Qty 2) CE
112	R0166	Terminal Block, Ground (Qty 1) CE
113	✓M3168	Spark Box, 240V (Landis & Gyr) (Qty 1) CE
114	✓M2247	Contactor, 240V, 50 HZ (Qty 1) CE
115	XXXXX	Indicator Light (Qty 2) CE
	18265	Indicator Light, 28V, Red, Round (Qty 1) CE
116	16037	Indicator Light, 250V, Red, Round (Qty 1) CE & Australia
117	16775	Relay, SPST, 240V, 30 Amp. (Qty 1) CE
118	M3172	Timer, Fixed, 2 Second (Qty 1) CE
119	M3173	Timer, Fixed, 10 Second (Qty 1) CE
	M6589	Plate Assy., Control SB (Qty 1) CE
	M7323	Plate Assy., Control SB Qty 1) Australia
	M6982	Piping Assy. (Qty 1) CE
120	M6029	Connector, Liquid Tight (Qty 1) CE
121	10809	Nipple, Pipe 1/2 x 2 (Qty 1) CE
122	M2835	Fitting, Elbow 90 Street 1/8" (Qty 1) CE
123	M3443	Bushing, Adapter (Qty 2) CE
124	M2841	Fitting, Pressure Tap (Qty 2) CE

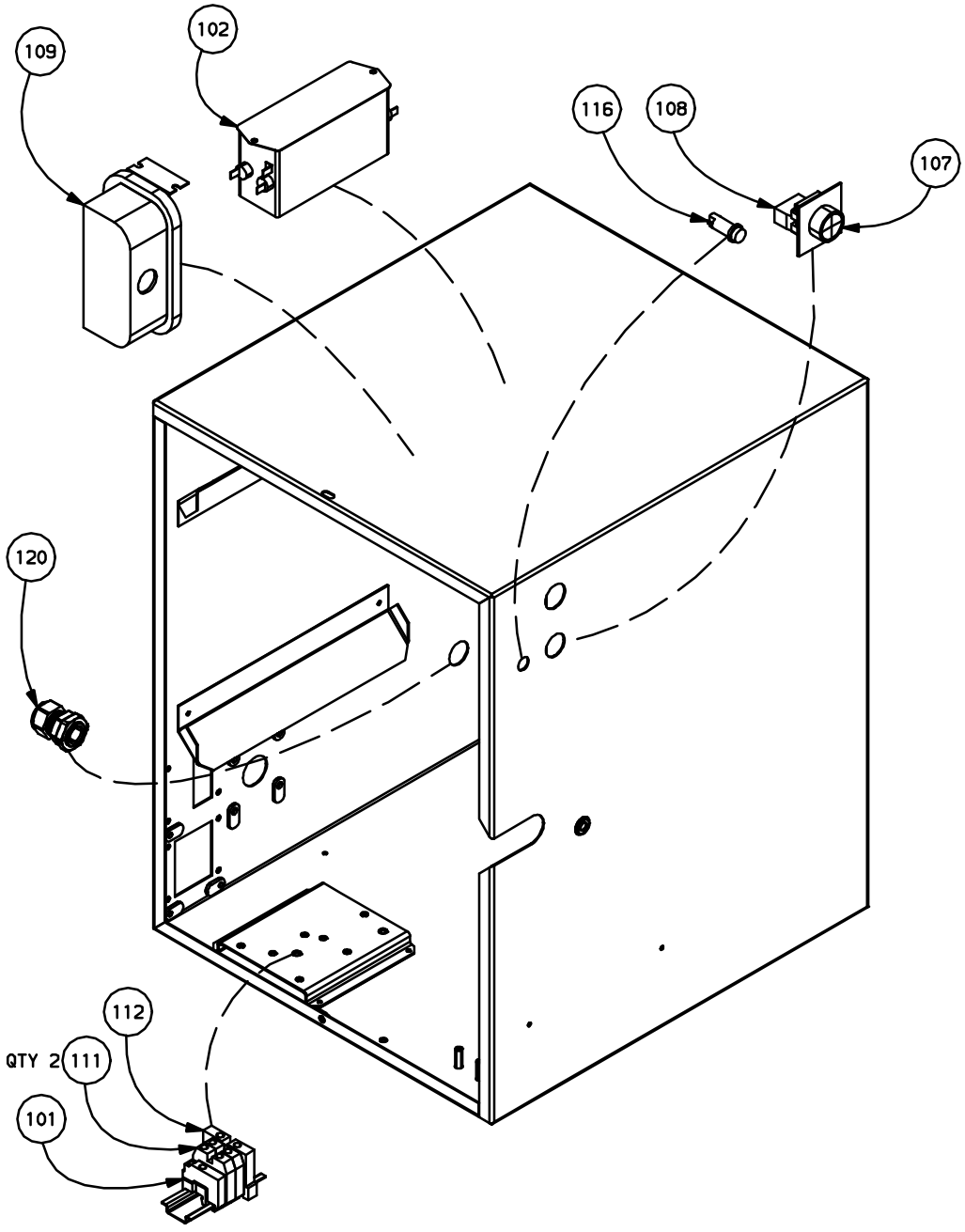
MT3870 DOMESTIC & GENERAL EXPORT CONTROL BOX

(Control Plate and/or Gas Burner Components not Shown)



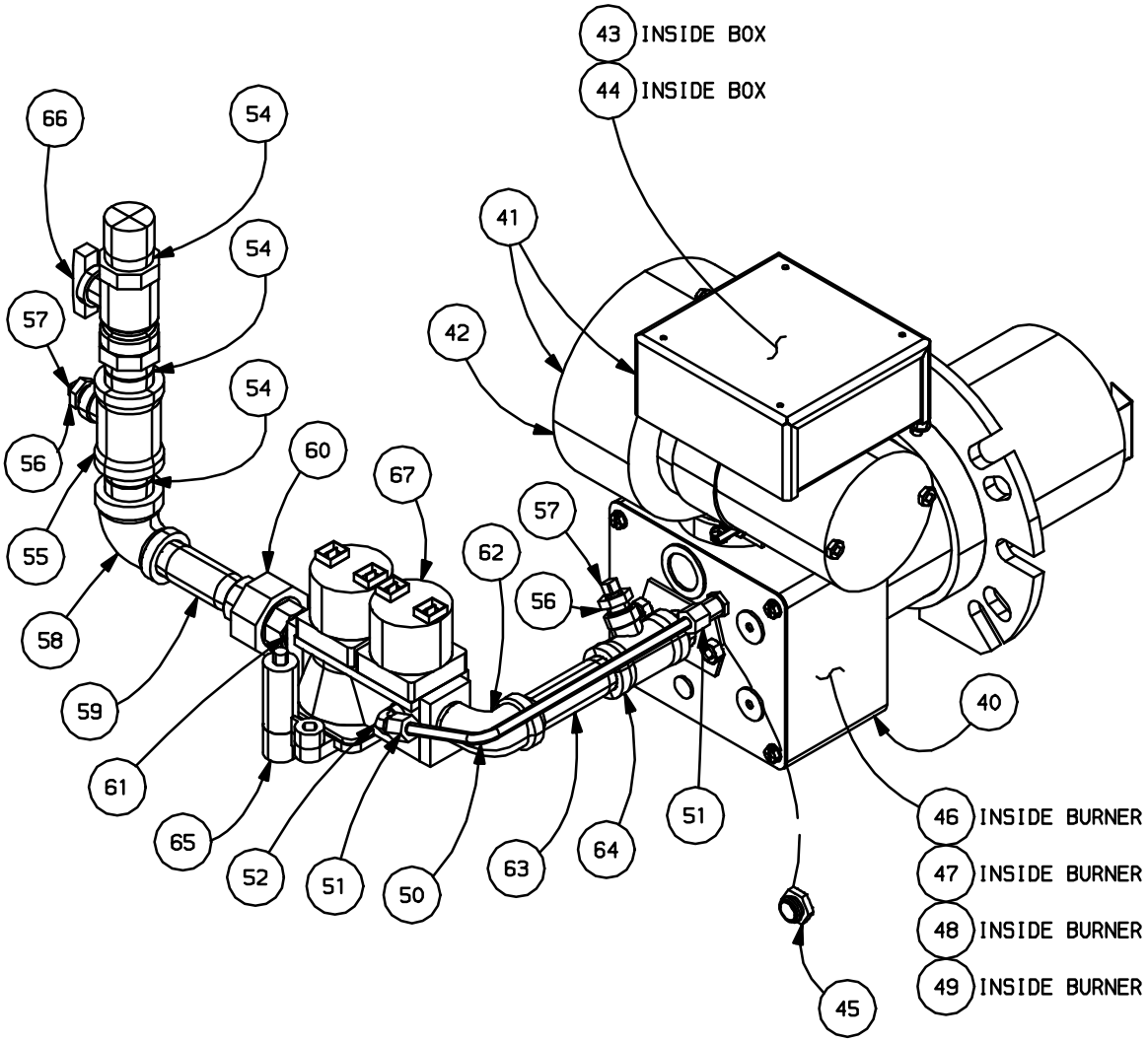
MT3870 CE CONTROL BOX

(Control Plate and/or Gas Burner Components not Shown)



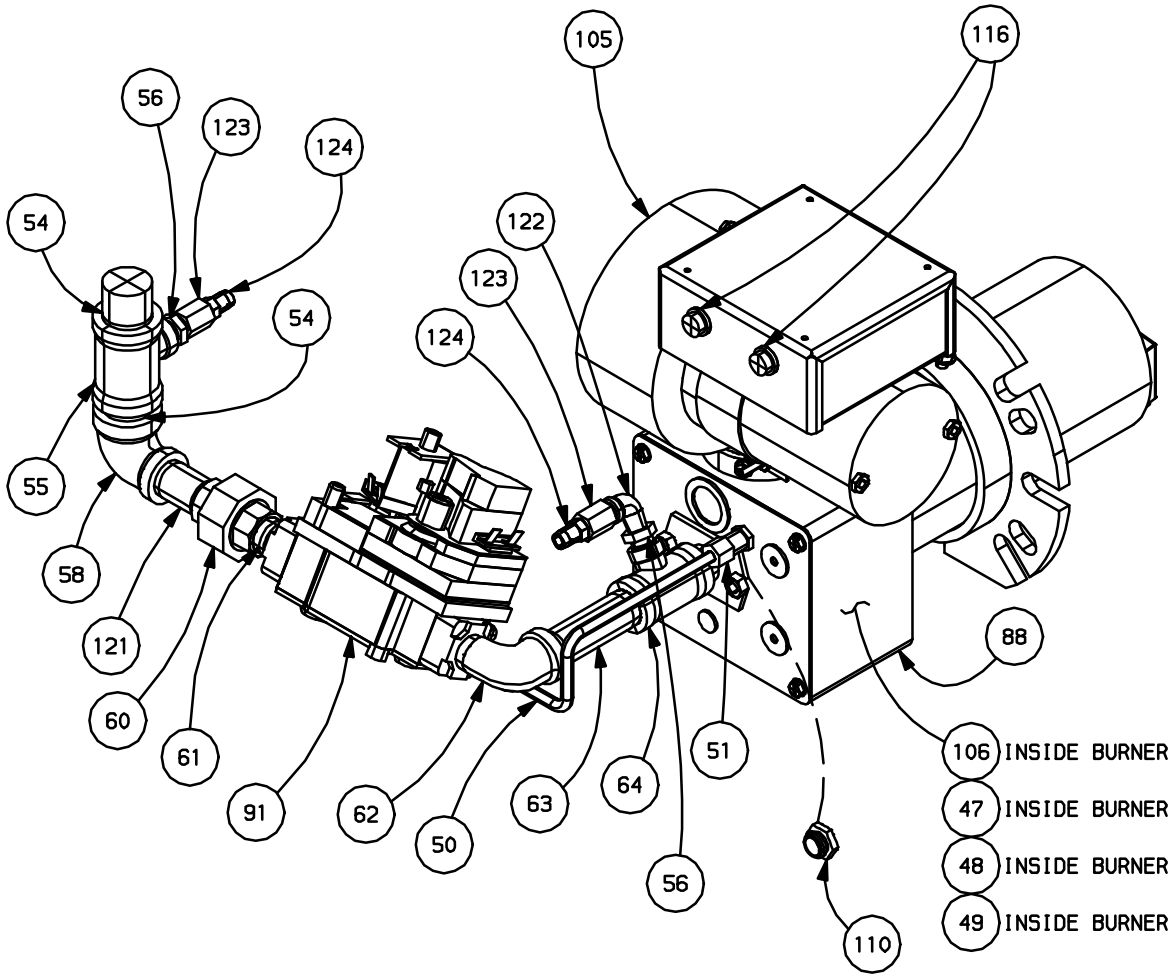
MT3870 DOMESTIC GAS BURNER COMPONENTS

(Control Box not Shown)



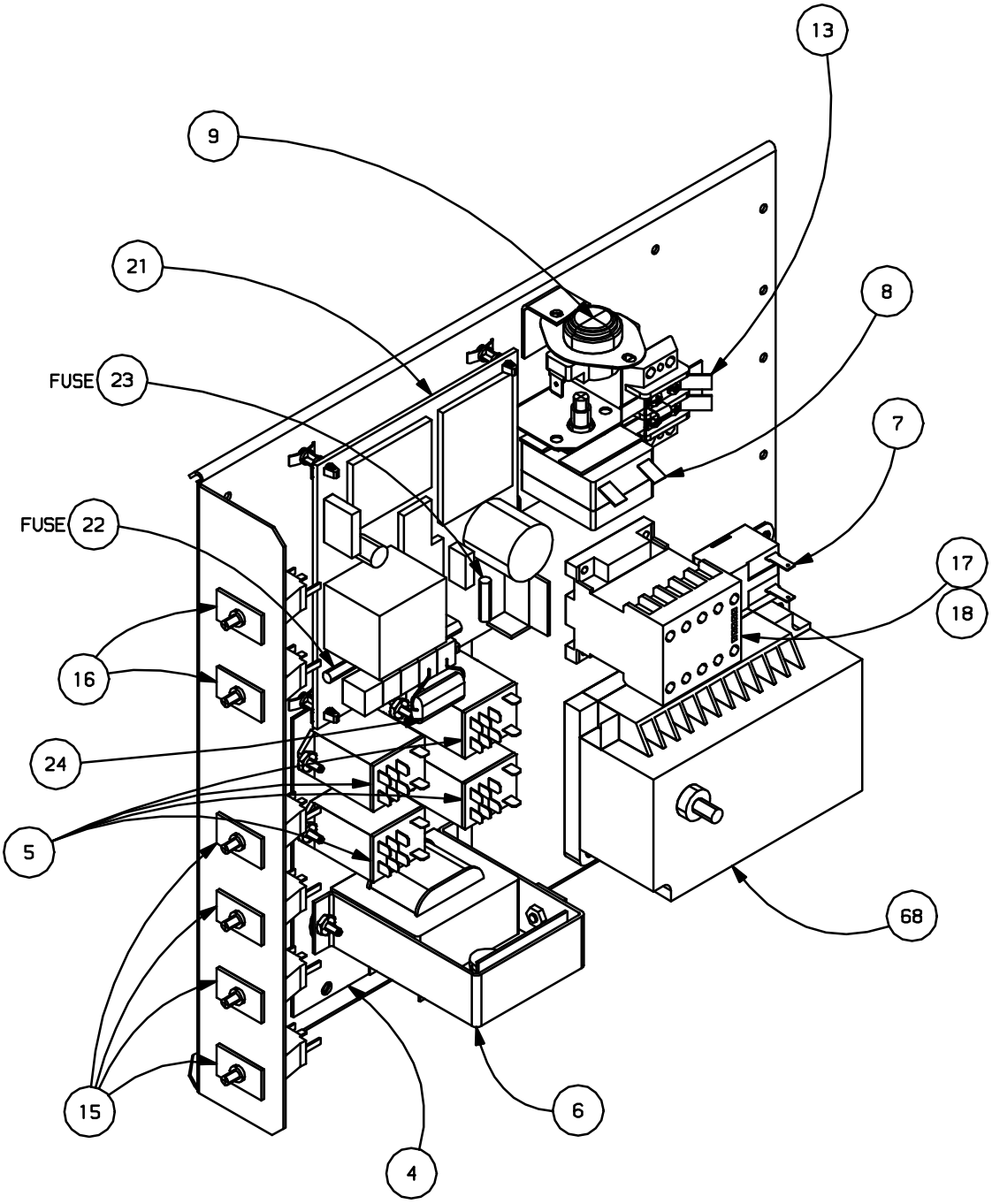
MT3870 CE GAS BURNER COMPONENTS

(Control Box not Shown)



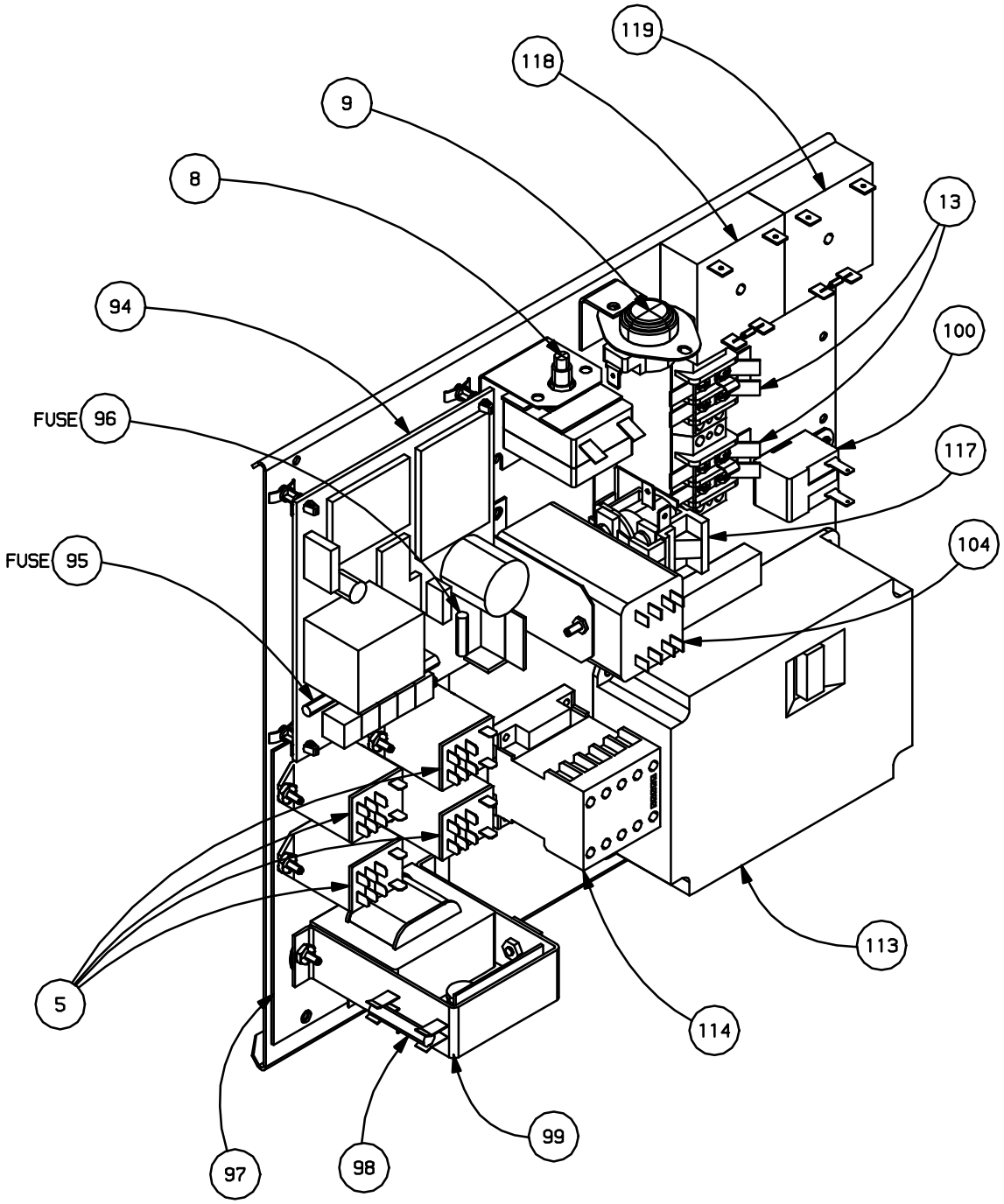
MT3870 DOMESTIC & GENERAL EXPORT SB CONTROL PLATE ASSY

(M6590)

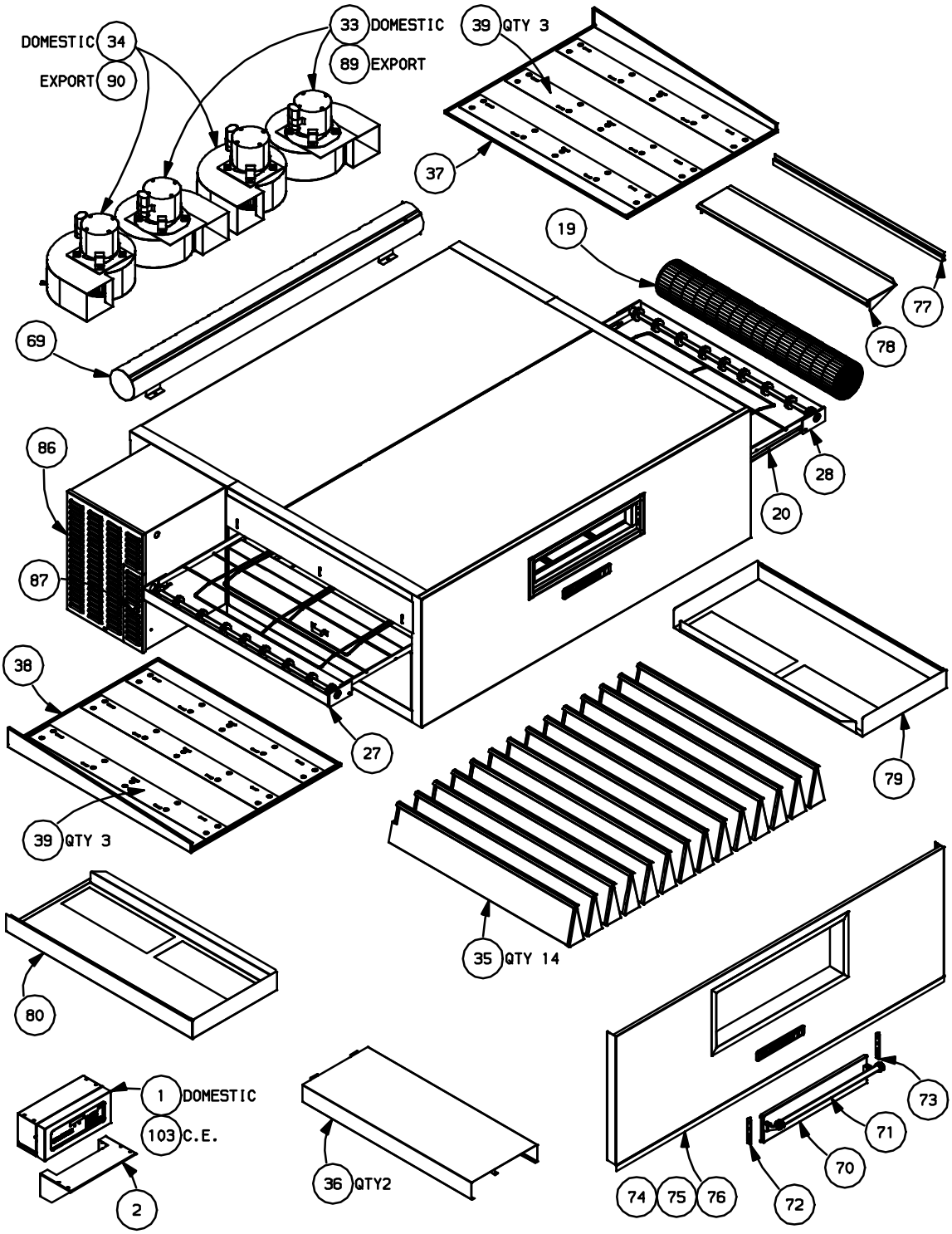


MT3870 CE SB CONTROL PLATE ASSY

(M6589)



MT3870 EXTERIOR OVEN VIEW



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CHAPTER 2

ASSEMBLY

OVEN ASSEMBLY PROCEDURES

RETURN AIR DIVERTERS

1. Slide the return air diverters into the oven and clip to the lower rear of the baking cavity. The edge of the diverter should be 3" (7.6 cm) from the outside edge of the oven cavity.

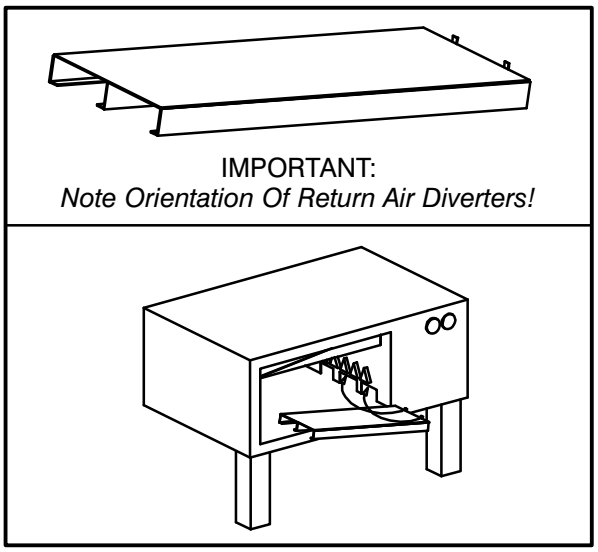

FIGURE 1

AIR NOZZLES

1. Install the nozzles from the center of the oven to the ends. The bottom of the nozzle must fit into the slot of the nozzle support located at the front of the oven.
2. Secure the nozzle hold-down strip across the inside front of the oven using the existing screws attached to the oven wall.

CONVEYOR RACK ASSEMBLIES

1. Slide the drive side conveyor rack assembly (with the sprocket on the end of the shaft) into the support tracks.
2. Push until the end sprocket is inserted into the control compartment.
3. Install the alignment bolt through the conveyor and control box.
4. Slide the idle side conveyor rack assembly into the support tracks from the exit end of the oven.

WIRE CONVEYOR BELT

NOTE: The conveyor belt has loops on all four sides. The belt must be installed so the loops travel as shown in FIGURE 2.

1. Thread the wire belt from the right side of the oven, lower level first.
2. After pushing the belt through on the lower level, leave about 12" (30.5 cm) hanging out on the left side.
3. Take the remainder of the belt, loop it around the right shaft, and push it through on the upper level. The two ends of the belt should be approximately 6-9" (15-22 cm) past the left shaft (right shaft if right to left travel is required) on the upper level of the belt support.

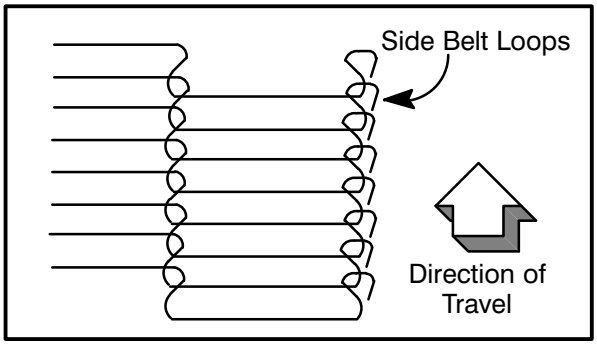

FIGURE 2

4. Install the inner and outer master links as shown in FIGURE 3.

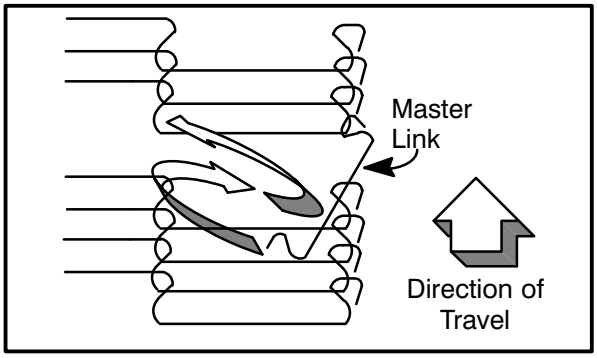

FIGURE 3

Unless otherwise specified, the conveyor travel is factory set for left-to-right operation when facing

the front of the oven. If a direction change is required, the polarity of the drive motor must be reversed. To change the polarity of the drive motor, disconnect the oven from the power source and interchange the black and white motor leads at the D.C. Controller Board located within the control box. **If the polarity of the motor is changed to right-to-left belt travel, the conveyor belt must be installed from the left side of the oven instead of the right side.**

NOTE: Change the air plates whenever the conveyor belt direction of travel is changed. See FIGURE 4.

DRIVE CHAIN

1. Install the drive chain around the drive motor and then around the sprocket on the conveyor belt support.
2. Push the conveyor motor back to tighten the drive chain.
3. Lock the motor into position by tightening the four 1/4-20 hex head screws between the conveyor motor and the control box.

AIR PLATES

Verify that the proper air plates were received. Inspect the orientation of the air plates. Refer to FIGURE 4.

NOTE: Standard air plates shown. Alternate plates available for some installations.

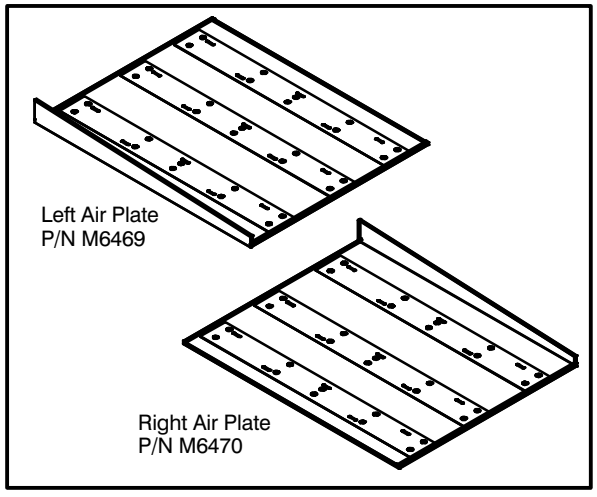

FIGURE 4

END PLUGS

1. Install the upper end plug support brackets at both ends of the oven.
2. Install the upper and lower end plugs at both ends of the oven.

CONVEYOR BELT TENSIONERS

Each tensioner installs between the idle end of the conveyor (the side opposite the drive) and the oven's body side.

1. Compress the spring by hand to engage the tensioner pin with the hole in the oven's body side. (Refer to FIGURE 5).

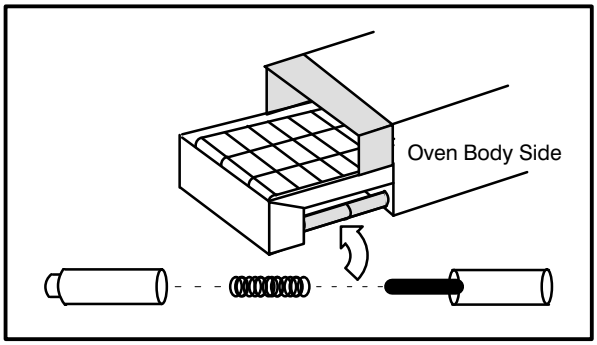

FIGURE 5

CRUMB PANS

1. Install the crumb pans under each end of the conveyor.

MOUNT REMOTE CONTROL

1. Mount the remote control unit on a wall within reach of the computer cables.
2. Connect the computer cables from the controller's rear connector to the connector located at the rear of the oven.

FALSE FRONT (IF APPLICABLE)

Hang false front. Install door handle.

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CHAPTER 3

OPERATION

COMPUTER CONTROLLER

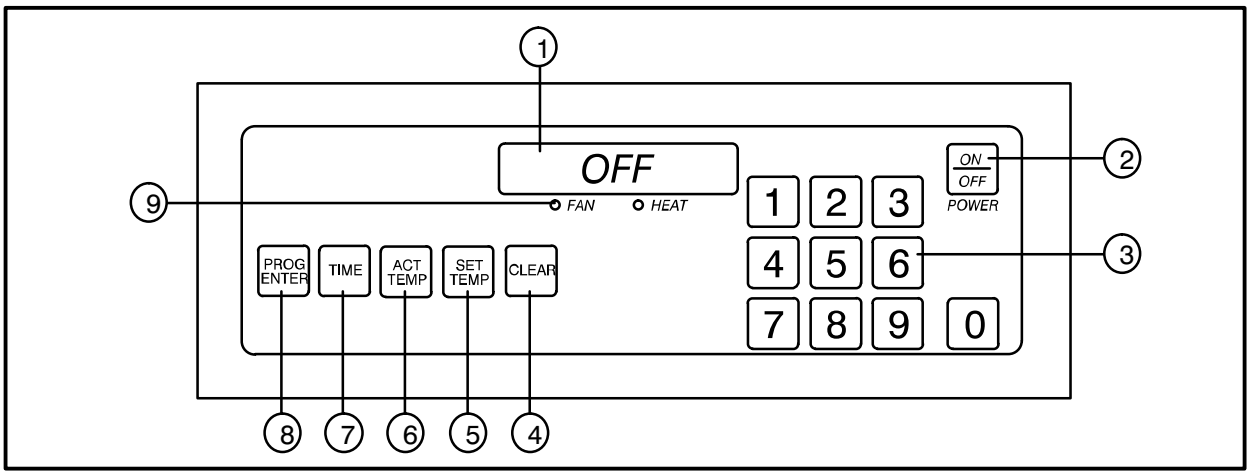


FIGURE 1

CONTROL DESCRIPTION

1. DIGITAL DISPLAY — Displays the time, temperature and controller related information.
2. OVEN ON/OFF — Controls power to the oven.
3. NUMERIC KEYS — Used to enter numerical data in the programming mode.
4. CLEAR KEY — Used to clear the display if an error is made in the programming mode.
5. SET TEMP KEY — Used to view or program the temperature setpoint.
6. ACT TEMP KEY — Used to view the current oven temperature.
7. TIME KEY — Used to view or program the cook time.
8. PROG/ENTER KEY — Used to enter and exit the programming mode. Also used to lock in programmed settings.
9. STATUS LAMPS — When lit indicate that the fan or burners are operating.

This oven, supplied with remote control, is equipped with an emergency shut down switch. Should you need to stop the belt, fans, or heat press the emergency switch.

Do not use the emergency switch as a GENERAL on/off switch!

CONTROL OPERATION

To turn the oven on:

1. Press and hold the ON/OFF key (2). The display reads *OFF* when the oven is idle.
2. The display flashes *WAIT* • *LOW* • *SET* • *TIME* • *mmss.*
3. The FAN and HEAT status lamps (9) light. The fans begin to run. The heat rises to the programmed temperature. The conveyor belt travels at the programmed speed.

To view the cook time setting:

1. Press the TIME key (7). The LED on the key lights and the display flashes *SET* • *TIME* • *mmss.*

To display the actual oven temperature:

1. Press the ACT TEMP key (6). The LED on the key lights and the display reads *ACTUAL* • *nnnn°F.*

To view the temperature set point:

1. Press the SET TEMP key (5). The LED on the key lights and the display flashes *SET* • *TEMP* • *nnnn°F.*

To turn the oven off:

1. Press the ON/OFF key (2). The blower motor(s) continue to run regardless of the controller status until the temperature drops below 180°F (82°C).

PROGRAMMING PROCEDURES

Programming the Cook Time:

1. Press the PROGRAM/ENTER key (8).
2. Press the TIME key (7). The display reads *PROG-? • SET • TIME-? • _ _ _ _.*
3. Use the NUMERIC keys (3) to enter the desired cook time. The display will read the numbers as they are entered. If an error is made, press the CLEAR key (4) and re-enter the number.
4. Press the PROGRAM/ENTER key (8) a second time to lock-in the new time. The new cook time will be stored in the computer's memory.

Programming the Temperature:

1. Press the PROGRAM/ENTER key (8).
2. Press the SET TEMP key (5). The display reads *PROG-? • SET • TEMP-? • _ _ _ _ °F.*
3. Use the NUMERIC keys (3) to enter the desired temperature set point. The control displays the numbers as they are entered. If an error is made, press the CLEAR key (4) and re-enter the number.
4. Press the PROGRAM/ENTER key (8) a second time to lock-in the new temperature. The new temperature setpoint will be stored in the computer's memory.

Operation at the Programmed Settings:

1. Press and hold the ON/OFF key (2).
2. The FAN and HEAT status lamps (9) light. The fans begin to run. The heat rises to the temperature setting stored in the computer's memory. The conveyor belt begins to travel at the timed speed stored in memory.
3. The display will flash *WAIT • LOW • SET • TIME • mmss* until the programmed bake temperature is reached. The HEAT lamp (9) will remain lit until the oven reaches the temperature set point.
4. The display reads *READY* and the HEAT lamp (9) goes out.
5. The oven is now ready to accept product.
6. Press and hold the ON/OFF key (2) to turn the oven off. The fans continue to run while the oven cools to a safe temperature.

DISPLAY INFORMATION

- WAIT • *LOW* — indicates that the present oven temperature is lower than the set point temperature. When the oven reaches the set point temperature the display changes to *READY.*
- *READY* — indicates that the oven is ready to accept product.
- *SET • TIME • mmss* — indicates the current cook time setting.
- *HIGH • TIME* — indicates that the temperature is well above the set point. This usually occurs when moving from a higher to a lower temperature. Wait until the display reads ready before loading product.
- *HIGH • TEMP • LIMIT* — indicates that the oven temperature exceeds the high limit from the 2nd level program. The Over Temperature Alarm buzzer will sound. Shut the oven off and wait for the unit to cool down.
- *HIGH • TEMP • PANEL* — indicates that the control area reaches an excessive temperature. Shut the oven off and wait for the unit to cool down.
- *PROBE • OPEN • PROBE • SHORT* — indicates that the temperature sensor has failed. The Alarm buzzer sounds. Shut the oven off and contact a service representative.

SEQUENCE OF OPERATION

DOMESTIC AND GENERAL EXPORT OVENS

COMPONENT REFERENCE

NOTE: Refer to FIGURE 3 for component locations.

1. COOKING COMPUTER
2. BURNER VALVE RELAY
3. BLOWER RELAY
4. MAIN CONTROL RELAY
5. SPEED CONTROL BOARD
6. SINGLE POLE SINGLE THROW THERMAL SWITCH
7. MANUAL RESET HIGH LIMIT SWITCH
8. CONVECTION FAN PRESSURE SWITCH
9. TRANSFORMER
10. COMBUSTION MOTOR
11. RELAY
12. CENTRIFUGAL SWITCH
13. IGNITION CONTROL MODULE
14. PILOT VALVE
15. MAIN VALVE
16. MOTOR CONTACTOR
17. CONVECTION FANS
18. COOLING BLOWER
19. SINGLE POLE DOUBLE THROW THERMAL SWITCH

OPERATION

1. Apply power to the oven. Program the time and temperature into the computer (1). The burner valve relay (2), blower relay (3) and main control relay (4) energize powering up the oven.
2. The main control relay (4) sends power to the speed control board (5) and the single pole single throw thermal switch (6). If this switch is closed, power will be supplied to the manual reset high limit switch (7). If this switch is closed power flows to the convection fan pressure switch (8).

   NOTE: The convection fan pressure switch (8) will close only if the convection fans are operating and putting a positive pressure on the switch.

   When this switch closes power goes to the primary side of the transformer (9) located inside of the box mounted on top of the combustion motor (10). When the relay (11) mounted in the same box is energized the combustion motor (10) should start.
3. Next the centrifugal switch (12) in the motor closes sending 24 volts to the ignition control module (13). This powers up the pilot valve (14). After the pilot valve is lit and the pilot flame is established through rectification, then terminal three of the ignition control module (13) will send 24 volts to the burner valve relay (2). If this relay is closed, power goes to the main valve (15) allowing it to open and send gas into the burner for ignition.
4. The blower relay (3) sends 115 volts to the coil of the motor contactor (16). Once energized the three convection fans (17) in the rear of the oven and a cooling blower (18) located in the combustion burner compartment start. There is also a single pole double throw thermal switch (19) in this circuit that allows the cooling blower to come on when the oven is turned off just in case the convection fan compartment should overheat.

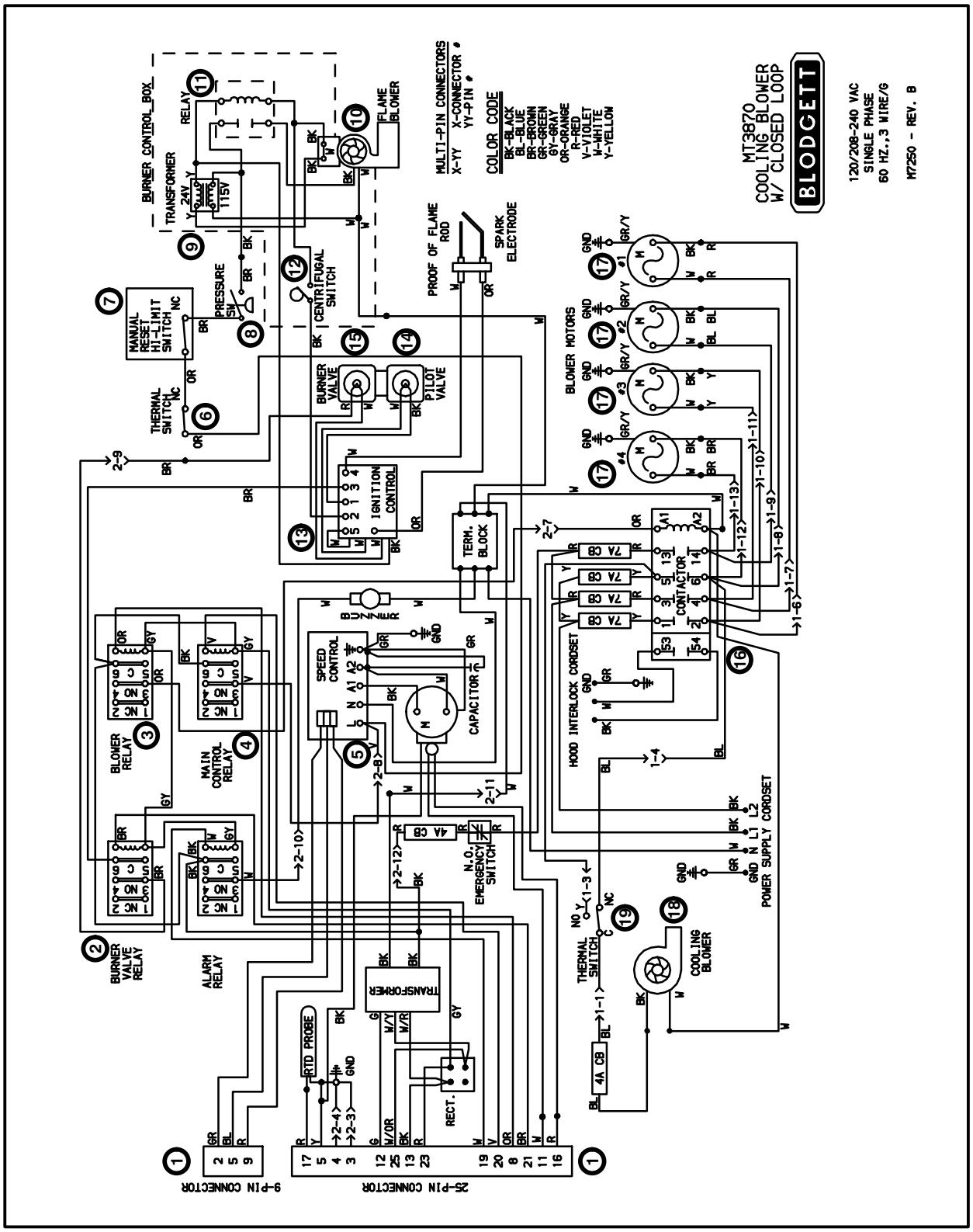

MT3870
COOLING BLOWER
W/ CLOSED LOOP
BLODGETT
120/208-240 VAC
SINGLE PHASE
60 HZ.,3 WIRE/G
M7250 - REV. B
BURNER CONTROL BOX
TRANSFORMER
RELAY
FLAME BLOWER
PRESSURE SW
CENTRIFUGAL SWITCH
MANUAL RESET HI-LIMIT SWITCH NC
THERMAL SWITCH NC
BURNER VALVE
PILOT VALVE
IGNITION CONTROL
PROOF OF FLAME ROD
SPARK ELECTRODE
MULTI-PIN CONNECTORS
X-YY X-CONNECTOR #
YY-PIN #
COLOR CODE
BK-BLACK
BL-BLUE
BR-BROWN
GR-GREEN
GY-GRAY
OR-ORANGE
R-RED
V-VIOLET
W-WHITE
Y-YELLOW
BLOWER MOTORS
TERM. BLOCK
CONTACTOR
HOOD INTERLOCK CORDSET
POWER SUPPLY CORDSET
N.O. EMERGENCY SWITCH
THERMAL SWITCH
COOLING BLOWER
BLOWER RELAY
MAIN CONTROL RELAY
BURNER VALVE RELAY
ALARM RELAY
SPEED CONTROL
CAPACITOR
BUZZER
TRANSFORMER
RECT.
RTD PROBE
4A CB
7A CB
9-PIN CONNECTOR
25-PIN CONNECTOR

FIGURE 2

CE OVENS

COMPONENT REFERENCE

NOTE: Refer to FIGURE 3 for component locations.

1. BLOWER RELAY
2. MOTOR CONTACTOR
3. CONVECTION FANS
4. CONVECTION PRESSURE SWITCH
5. BELT STOP RELAY
6. DC SPEED CONTROL BOARD
7. MANUAL RESET HI LIMIT SWITCH
8. HEAT RELAY
9. SINGLE POLE SINGLE THROW THERMAL SWITCH
10. SINGLE POLE SINGLE THROW RELAY
11. TRIPLE POLE DOUBLE THROW RELAY
12. DIFFERENTIAL BURNER PRESSURE SWITCH
13. COMBUSTION BLOWER MOTOR
14. TEN SECOND PURGE TIMER
15. LANDIS & GYR IGNITION CONTROL SYSTEM
16. 2 SECOND TIMER
17. DUAL SOLENOID GAS VALVE

OPERATION

1. Apply power to the oven. Program the time and temperature into the computer. The blower relay (1), belt stop relay (5) and heat relay (8) pull in and power up three separate circuits. The voltage to the relay coils is 12 VDC.
2. The blower relay (1) closes sending 230 volts to the coil of the motor contactor (2). Points 1, 2, 5 and 6 close powering the convection fans.
3. The convection fan pressure switch (4) closes due to the vacuum that is established in the burner tube chamber by the operation of the convection fans.
4. The belt stop relay (5) sends 230 volts to the DC drive board (6) and the manual reset hi limit switch (7).

   NOTE: This relay will only be powered if there is a time programmed into the computer. THE OVEN WILL NOT HEAT IF TIME IS NOT PROGRAMMED INTO THE COMPUTER.
5. The heat relay (8) sends 230 volts to a single pole single throw thermal switch (9). If closed the relay continues to send power to one side of a single pole single throw relay (10). This relay will not see power at it's coil until a triple pole double throw relay (11) closes.
6. Once the convection fan pressure switch (4) closes, 230 volts go to a differential pressure switch (12), the combustion blower motor (13), terminal #7 and the coil of the triple pole double throw relay (11).
7. When a differential is sensed at the differential pressure switch (12) the switch changes position allowing power to go to terminal #9 of the triple pole triple throw relay (11). This relay is a latching relay and is held closed by power that was applied at terminal #7.
8. Power flows from terminal #8 of the triple pole double throw relay (11) to a ten second purge timer (14). This timer allows the combustion blower (13) to operate for ten seconds allowing the combustion chamber to clear of any combustible gasses.
9. After the timer times out the voltage is applied to the other side of the coil of the single pole single throw relay (10). When that set of contacts closes, voltage goes to terminal #1 of the Landis & Gyr ignition control system (15). Terminal #8 will send power to one side of a two second timer (16) and the pilot coil of the dual solenoid gas valve (17). After two seconds elapse, the voltage is applied to the main coil of the dual solenoid gas valve (17). If proof of flame is strong the ignition system stays powered up. Should the flame signal be lost, the ignition control system will lock out.
10. Two sets of contacts are used as a hood interlock in the motor contactor (2), terminals #13 and #14. At this point there is no power to these terminals, they act only as a switch to turn on the hood when the oven is turned on.

    NOTE: This is an option that the customer may use, it is not a requirement.

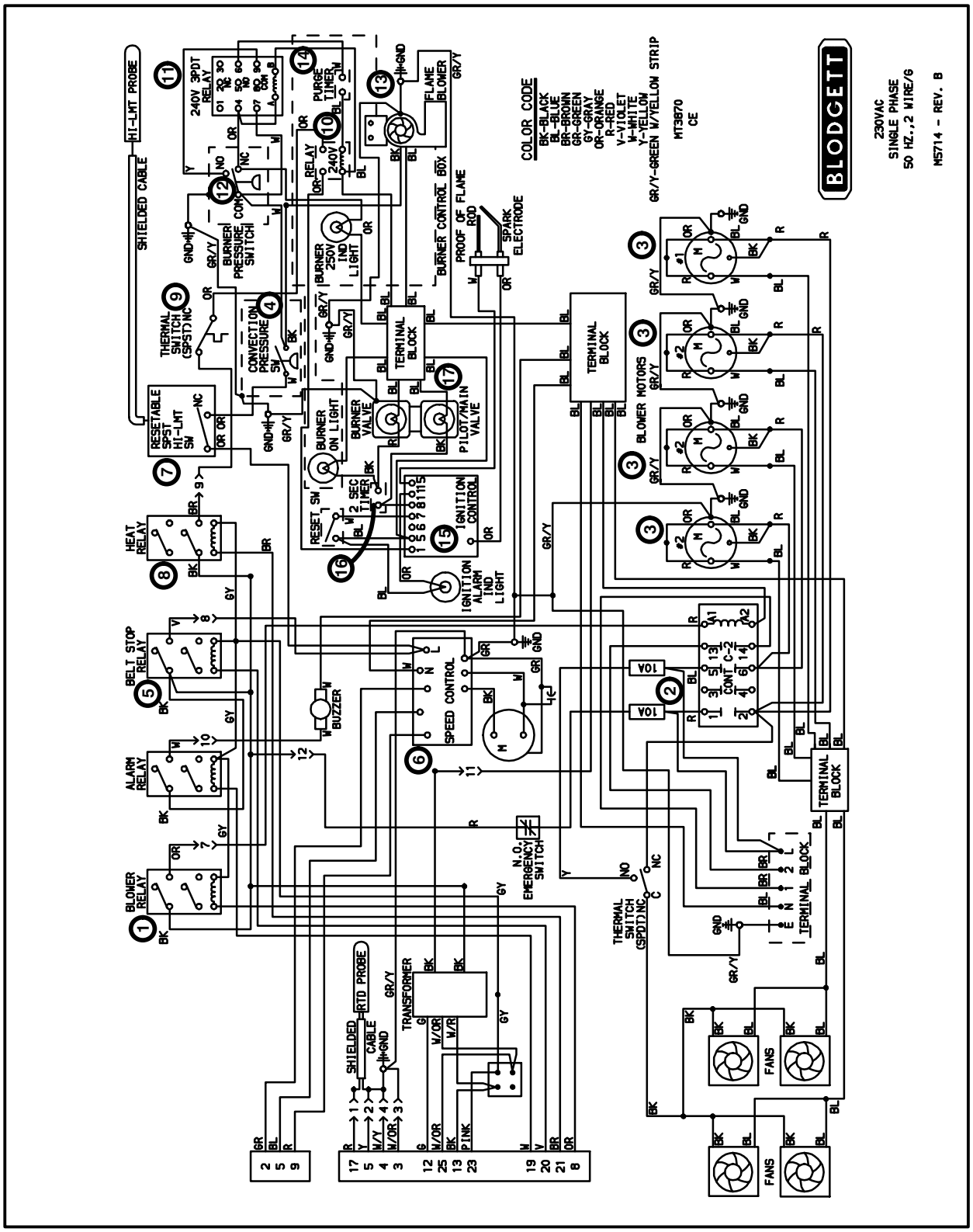

BLODGETT
230VAC
SINGLE PHASE
50 HZ.,2 WIRE/G
MT3870
CE
M5714 - REV. B
COLOR CODE
BK-BLACK
BL-BLUE
BR-BROWN
GR-GREEN
GY-GRAY
OR-ORANGE
R-RED
V-VIOLET
W-WHITE
Y-YELLOW
GR/Y-GREEN W/YELLOW STRIP
HI-LMT PROBE
SHIELDED CABLE
240V 3PDT RELAY
PURGE TIMER
FLAME BLOWER
BURNER PRESSURE SWITCH
BURNER 250V IND LIGHT
BURNER CONTROL BOX
PROOF OF FLAME ROD
SPARK ELECTRODE
THERMAL SWITCH (SPST) NC
CONVECTION PRESSURE SW
RESETABLE SPST HI-LMT SW
BURNER ON LIGHT
BURNER VALVE
PILOT/MAIN VALVE
TERMINAL BLOCK
RESET SW
2 SEC TIMER
IGNITION CONTROL
IGNITION ALARM IND LIGHT
HEAT RELAY
BELT STOP RELAY
ALARM RELAY
BLOWER RELAY
BUZZER
SPEED CONTROL
CONT C-2
10A
BLOWER MOTORS
N.O. EMERGENCY SWITCH
THERMAL SWITCH (SPDT) NC
TERMINAL BLOCK
GND
FANS
RTD PROBE
SHIELDED CABLE
TRANSFORMER

FIGURE 3

OVEN ADJUSTMENTS FOR COOKING

TEMPERATURE

The internal temperature of your product is very important; and should be taken as soon as the product completely exits the cooking chamber. This reading will give a general indication of whether or not the product is fully cooked. A multiple topping pizza, for example, will be cooked if the internal temperature is over 160-165°F (64-67°C). For a single topping, such as cheese, the temperature should be greater than 170-180°F (69-74°C).

CONVEYOR SPEED TIME VS. TEMPERATURE

Typically, as the temperature increases, the time decreases. Conversely, as the temperature decreases, the time increases. To find a good bake time and temperature, one or the other should remain constant. For example, if the temperature is set at 480°F (224°C) and the belt speed is set at 7 minutes 30 seconds, but the pizza is not as brown as desired, keep the time setting the same and increase the temperature to 500°F (234°C).

AIR FLOW ADJUSTMENTS

Since a variety of products can be cooked in this oven, special settings for air flow must be made for your product. Unless otherwise specified, Blodgett Mastertherm® conveyor ovens are shipped from the factory with only partial air flow above the conveyor. This means that most of the air flow holes are "blocked-off" via steel strips which stop the heated air from reaching the item being cooked. These strips or "block-off plates" can be easily relocated to regulate the amount of air for your particular needs. The area below the belt has all air flow holes open.

Here are some suggestions for setting up the air flow. Keep in mind that the first half of the oven is used for the initial baking of the product and the last half is used for browning. We will use pizza as an example.

EXAMPLE:

A good bake time and temperature have been established, but more browning on top of the pie is desired. Relocate one of the "block-off plates" above the belt to open a few rows of holes toward the exit end of the oven. This will allow more of the superheated air to brown the top just prior to exiting the oven.

EXAMPLE:

The bottom of the pie is golden brown, but the top is a little too dark. Closing off some of the air flow from the top at the exit end of the oven will cure this problem. Leave the time and temperature at the same settings.

EXAMPLE:

The top of the pie is too dark, but either the bottom is not done enough, the center of the pie is doughy, or the ingredients are not fully cooked. Open some of the rows of holes above the conveyor at the entry half of the oven and close off the holes at the exit. This will allow the superheated air to penetrate the pie from the top and bottom (at the beginning of the cooking cycle) quicker. As a result the center of the crust and/or ingredients will be cooked before the pie starts the browning stage. Leave the time and temperature at the same settings.

WARNING!!

In the event of a power failure, all switches should be turned off, and no attempt should be made to operate the appliance until power is restored.

In the event of a shut—down of any kind, allow a five (5) minute shut off period before attempting to restart the oven.

CHAPTER 4

CALIBRATION AND ADJUSTMENT

CONVECTION BLOWER MOTORS

TO CHECK MOTOR ROTATION

1. Remove the back of the oven body and verify proper motor rotation. (See FIGURE 1)

For motor placement, the direction of rotation is viewed from the oven's rear and working from left to right, beginning at the control box. In most cases, the motor direction is referenced to the end of the shaft (EOS). However, due to the vertical positioning of the motors in Mastertherm ovens, it is more instructive to reference the end of the motor (EOM) as looking from the rear of the oven. In FIGURE 1 all directions are taken from EOM. The correct rotation amperage draw is approximately 1 amp. If the measured amperage is less than .5, check for proper motor rotation direction.

TO CHECK LOW-LIMIT

1. Turn the oven on and let it heat up to approximately 200°F (93°C).
2. Shut the oven off. The blowers should come back on in several seconds.
3. Wait for the blowers to shut off.
4. Once the blowers are off, turn the oven back on. Press the "ACT TEMP" key to verify that the blowers shut off between 135°F (57°C) and 170°F (77°C). If the blowers do not shut off refer to the Troubleshooting section page NO TAG.

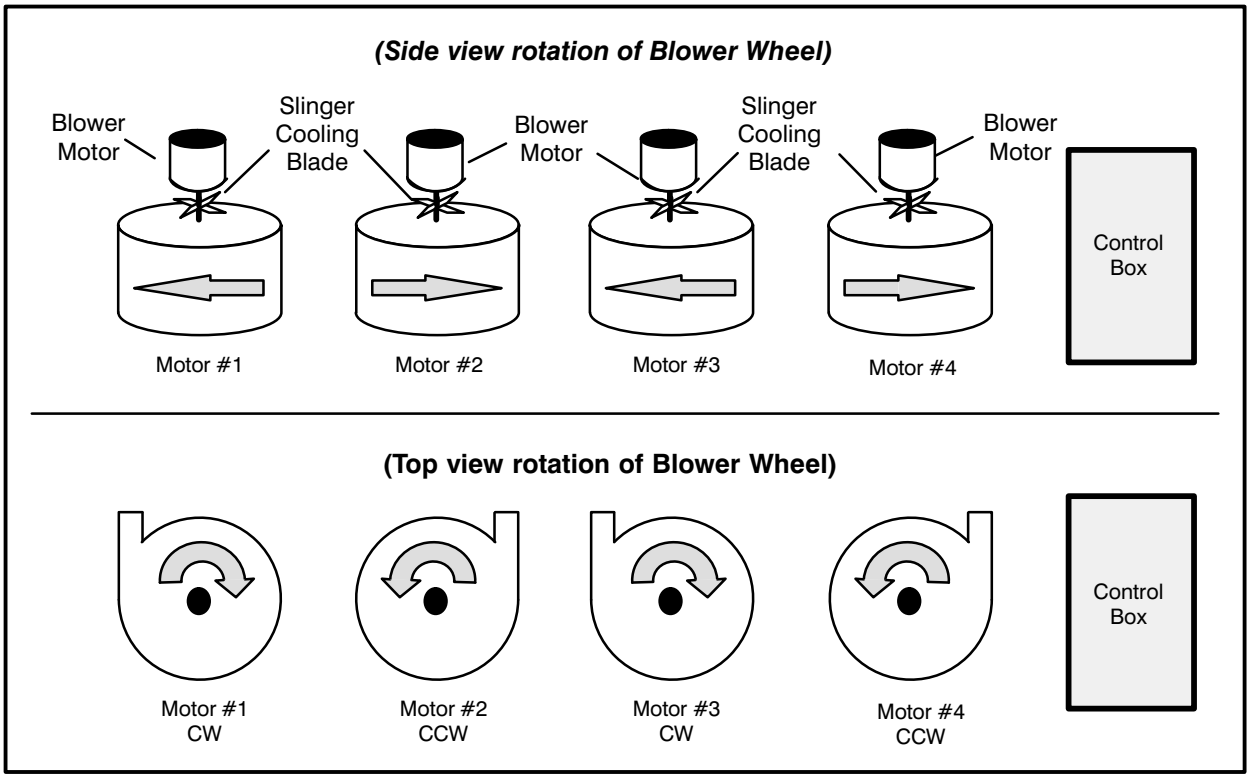


FIGURE 1

REGULATED GAS PRESSURE

1. Let the oven run up to 510°F (266°C). You may now verify the operational and regulated gas pressures.

Incoming static gas pressure to the unit, with all the gas appliances drawing from the supply, should be a minimum of 5.5" W.C. (13.7 mbar) for natural gas and 11" W.C. (28 mbar) for propane gas. The manifold pressure, if measured after the regulator located inside the control box, must be 3.5" W.C. (9 mbar) for natural gas and 10" W.C. (25 mbar) for propane gas. For CE pressures reference TABLE 2 on page 1—2 of the Introduction.

The pressure can be checked at the tap on the dual regulated gas valve or at the tap on the tee valve. If pressure adjustments are needed, turn the adjusting screw located under a screw cap on the left front side of the dual regulated valve. Adjust the gas pressure by turning the screw clockwise to raise the gas pressure and counter-clockwise to lower the gas pressure. Be sure to reinstall the screw cap; should the diaphragm rupture this cap acts as a flow limiter

The air shutter disc on the burner blower motor, located inside the control box at the top of the assembly, is factory adjusted to provide the most efficient blue flame possible at sea level. Visually examine the flame to verify it's quality. Should it need adjustment, increase or decrease the air mixture to attain the best flame quality.

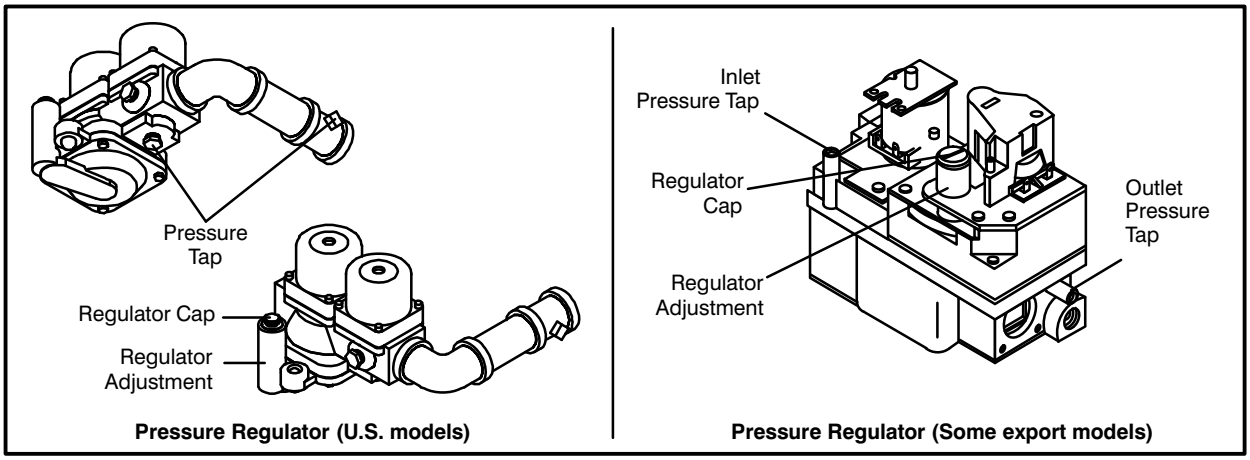


FIGURE 2

Setting Equipment for Other Types of Gas — CE Models

1. Shut off the gas valve and turn off the operating switch.
2. Dismantle the gas block by means of couplings.
3. Dismantle the main burner and replace the injector.
4. Replace pilot injector.
5. Install the burner and gas block.
6. Check for leakage and possible loose electrical connections.
7. Adjust gas pressure if necessary, See FIGURE 3.

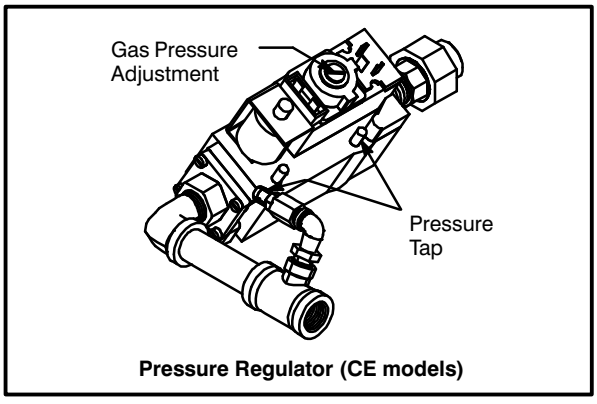


FIGURE 3

COMPUTER CONTROL CONFIGURATION

INITIATING ACCESS MODE

The Cooking Computer provides a special Access Mode for setting and displaying certain computer special functions. To initiate the Access Mode place the control in the OFF state, (OFF is shown in the display when power is first applied to the control). Press the following sequence of keys to set the control to Access Mode: CLEAR 1 2 3 4 5 6 ENTER. The display will show ACCESS.

CONFIGURATION

When the controller is in the "ACCESS" mode, press the following buttons: CLEAR 1 1 1 ENTER. With the exception of the positive and negative offsets, to be addressed later, all display data should correspond to the entries in the chart below. If the data does not match the chart, it should be changed accordingly. When the correct data is displayed press the PROG/ENTER key, the display will cycle on to the next screen. If a step is missed, press the CLEAR button to backup.

DISPLAY	ACTION TAKEN	DISPLAY	ACTION TAKEN
F/CMODE?	Press PROG ENTER	T ➧ F°(°C)	Press PROG ENTER again or hit any number and it will change.
POS OFFSET?	Press PROG ENTER	0°(0°)	Press PROG ENTER
NEG OFFSET?	Press PROG ENTER	0°(0°)	Press PROG ENTER
MAX-T ENTRY?	Press PROG ENTER	600°(315°)	Press PROG ENTER or change then press again.
MAX-T LIMIT?	Press PROG ENTER	625°(330°)	Press PROG ENTER
READY BAND?	Press PROG ENTER	10	Press PROG ENTER
MIN-HT ON?	Press PROG ENTER	60	Press PROG ENTER
DISPLAY INTEG?	Press PROG ENTER	30	Press PROG ENTER
T-CTRL INTEG?	Press PROG ENTER	10	Press PROG ENTER

TABLE 1

Boost Option — (versions 2.00 or 3.00)

When the controller is in the "ACCESS" mode, press the following buttons: CLEAR 2 1 2 ENTER to enter the boost option.

DISPLAY	ACTION TAKEN	DISPLAY	ACTION TAKEN
BOOST / MODE-? (Flash alternately)	Press PROG ENTER	OPT-1 or OPT-2	Press any numeric key to toggle between OPT-1 and OPT-2
Select OPT-1 to turn off boost mode.			

DISPLAY	ACTION TAKEN	DISPLAY	ACTION TAKEN
OPT-1	Press PROG ENTER	DONE SAVE EXIT	Press PROG ENTER
OPT-2 may be selected for MT3870 ovens only. If OPT-2 is selected values will be sequenced by pressing the PROG/ENTER key. Any value can be changed when its value is displayed, by entering the new numerical value followed by the PROG/ENTER key. After sequencing through all values the display will return to ACCESS.			
TEMP BOOST DEAD BAND?	Press PROG ENTER	+/- 1F	Press PROG ENTER
TEMP BOOST PLUS FACTOR?	Press PROG ENTER	+2 SEC	Press PROG ENTER
TEMP BOOST MINUS FACTOR?	Press PROG ENTER	-4 SEC	Press PROG ENTER
TEMP CONTROL MODE?	Press PROG ENTER	TIGHT	Press PROG ENTER
TEMP BOOST STAGE1 TIME?	Press PROG ENTER	4 SEC	Press PROG ENTER
TEMP BOOST STAGE1 TEMP?	Press PROG ENTER	10°F	Press PROG ENTER
TEMP BOOST STAGE2 TIME?	Press PROG ENTER	7 SEC	Press PROG ENTER
TEMP BOOST STAGE2 TEMP?	Press PROG ENTER	10°F	Press PROG ENTER
TEMP BOOST STAGE3 TIME?	Press PROG ENTER	10 SEC	Press PROG ENTER
TEMP BOOST STAGE3 TEMP?	Press PROG ENTER	10°F	Press PROG ENTER
DONE			

TABLE 2

EXITING THE ACCESS MODE

After pressing PROG/ENTER the last time, the display will show “EXIT” then beep and return to the “ACCESS” mode. Pressing and holding the ON/OFF key will turn the oven on. A new time and temperature must be entered upon exiting the “ACCESS” mode since the oven will automatically default to 0. The oven will not fire until both time and temperature are entered.

Firmware Model Version Display

Password: CLEAR 1 2 3 ENTER

MODEL - Computer Model Number — 6028 (Blodgett Conveyor Oven With Speed Control)

SW-VER - Firmware version number. V-xxyy xx = major version, yy = minor version

DATE-? -Firmware release date

CHKSUM - ROM checksum stored in PROM. xxxx - Value is display in hexadecimal format.

TEMPERATURE CALIBRATION

TO ENTER THE CALIBRATION MODE

1. Press the ON/OFF key until *OFF* is displayed.
2. Press CLEAR 1 2 3 4 5 6 ENTER to enter the access mode**.** The display reads *ACCESS*.
3. Press CLEAR ACT_TEMP ACT_TEMP ACT_TEMP ENTER to access the Temperature Calibration mode**.**
4. Disconnect the white wire from the D.C. motor. Secure so the wire will not ground against any part of the oven. This will disable the conveyor.

NOTE: Disregard the controller display. The only numbers of concern are the pyrometer reading and the temperature set point.

TO CALIBRATE THE OVEN TEMPERATURE

During operation, the temperature control is based on the measured temperature and the temperature offset which is programmed into the control. If the temperature measured in the center of the oven is below the oven setpoint a positive offset is needed. If the temperature measured in the center of the oven is above the oven setpoint a negative offset is needed.

NOTE: In the calibration mode the display gives the current measured temperature only.

To view the current temperature setpoint:

1. Press the SET_TEMP, key.

To change the temperature setpoint :

1. Press PROG/ENTER SET_TEMP.
2. Enter the desired setpoint.
3. Press the PROG/ENTER key.

To program the temperature offset:

To change the temperature calibration an offset, positive or negative, must be programmed.

1. Press PROG/ENTER followed by ACT_TEMP. The display flashes either *POS * OFFSET* or *NEG * OFFSET*

   NOTE: POS OFFSET is displayed if a value has been programmed in for a positive offset. NEG OFFSET is displayed if a value has been programmed for a negative offset. The only time both will be displayed is if a value of 0 has been entered for both.
2. Enter a value for the desired offset. The display flashes *DISPLAY * INTEG?.*
3. Press the PROG/ENTER key. The default value of 30 will be displayed.
4. Press the PROG/ENTER key. The display will flash *T-CTRL * INTEG?.*
5. Press the PROG/ENTER key. The default value of 10 will be displayed.
6. Press the PROG/ENTER key.

The control will now resume using the new parameters.

Verify the temperature calibration once the unit has cycled for 5 minutes with the new settings. Repeat calibration using a new offset value if necessary.

TO EXIT THE CALIBRATION MODE

1. Press the CLEAR key twice.
2. The display flashes *REBOOT* then displays the set time and temperature. You must re-enter a temperature for the oven to start heating again.

   A.) Press PROG/ENTER SET_TEMP

   B.) Enter the desired temperature.

   C.) Press the PROG/ENTER key. The heat light turns on and the burner begins to cycle at set point.

BELT SPEED CALIBRATION

CLOSED LOOP SYSTEM

To enter the calibration mode:

1. Press the ON/OFF key until *OFF* is displayed.
2. Press CLEAR 1 2 3 4 5 6 ENTER to enter the Access mode. The display reads *ACCESS*.
3. Press CLEAR TIME TIME TIME ENTER to access the Belt Speed Calibration mode. The display flashes *INIT*.

Belt speed calibration:

1. OVEN LENGTH — Set the length of the conveyor belt using the information from TABLE 3.
2. MOTOR RATIO — Set the motor gear ratio from the information from TABLE 3.
3. SHAFT TEETH — Set the shaft teeth number from the information from TABLE 3.
4. MOTOR TEETH — Set the motor teeth number from the information from TABLE 3.
5. BELT RADIUS — Set the belt radius from the information from TABLE 3.

   NOTE: The values given are estimates. If you reenter the calibration mode after setting the belt speed, the belt radius may differ from the table.

6. The display gives a four digit value followed by the letter K. Press ENTER twice to verify the belt time.

Belt speed verification:

1. ENTER TEST TIME — Enter a test time to verify the belt speed. The default setting is 7 minutes.
2. WAIT — 1 second delay before the belt moves.
3. ENTER ACTUAL TIME — Place an object on the belt. Note the time from entrance to exit. Enter the actual measured time.
4. ENTER TEST TIME — If the actual measured time is not within 5 seconds of the test time, repeat the belt verification test to obtain better accuracy. If the actual measured time is acceptable, press the CLEAR key to continue the belt speed calibration.
5. MAX/MIN CALC TIME — The control sets the fastest and slowest cook time the user can program. This requires a 1 minute delay in the calibration process.

   NOTE: If the control cannot read the shaft encoder the display reads ERROR then ABORT before exiting belt calibration. Verify the connection of the encoder Restart the belt speed calibration.

6. The display flashes *MIN SET TIME?* Press the PROG/ENTER key to display the calculated minimum set time. Press the PROG/ENTER key to accept this value or enter a new time with a value higher than the default. Press PROG/ENTER again to accept.
7. The display flashes MAX SET TIME? Press the PROG/ENTER key to display the calculated maximum set time. Press the PROG/ENTER key to accept this value or enter a new time with a value lower than the default. Press PROG/ENTER again to accept.
8. The display reads *DONE*.

To save the new belt speed:

1. Press ENTER to save the belt speed calibration program in the control's memory.

Oven Type	Oven Length	Motor Ratio	Shaft Teeth	Motor Teeth	Belt Radius
MT3870	70	600	15	12	8,712
MT3855	55	600	15	12	8,712
MT3270	70	600	15	12	8,712
MT3240	40	600	15	12	8,893
MT2136	36	600	15	12	8,712
MT1828	28	600	24	24	7,209

TABLE 3

OPEN LOOP SYSTEM — SINGLE BELT

To enter the calibration mode:

1. Press the ON/OFF key until *OFF* is displayed.
2. Press CLEAR 1 2 3 4 5 6 ENTER to enter the Access mode. The display reads *ACCESS*.
3. Press CLEAR TIME TIME TIME ENTER to access the Belt Speed Calibration mode. The display flashes *INIT*.

Belt speed calibration:

1. The display reads *BELT SIZE—?.* Enter the length of the conveyor belt for your model. See TABLE 4. Press the PROG/ENTER key.
2. The display reads *STEP—1.* The controller is in Step 1 of the calibration procedure: maximum belt speed. The motor control is automatically set to its maximum output. Place an object on the belt and note the time from entrance to exit.

   NOTE: Be certain to measure either the leading edge in and out or the trailing edge in and out. Do not use the leading edge in and the trailing edge out.

   A.) The display reads *STEP—1TIME—?.* Enter the time measured in STEP—1. Min: 0 Max: 59:59 (min:sec). Press the PROG/ ENTER key.

   B.) The display reads *STEP—1DIST—?.* Enter the belt length for your model. See TABLE 4. Press the PROG/ENTER key.
3. The display reads *STEP—2.* The controller is in Step 2 of the calibration procedure: minimum belt speed. The motor control is automatically set to its minimum output. The belt will travel very slowly during this part of the calibration procedure. To minimize the time spent on STEP—2, measure off 10” on the conveyor support. Place an object on the belt and note the travel time for the 10” measured distance.

   A.) The display reads *STEP—2 TIME—?.* Enter the measured travel time for STEP—2. Min: 0 Max: 59:59 (min:sec). Press the PROG/ ENTER key.

   B.) The display reads *STEP—2 DIST—?.* Enter 10”. Press the PROG/ENTER key.
4. The display reads *MIN—TM ENTRY?* (the fastest belt speed). Limits of this value are determined by the Step—1 and Step—2 calibration values. See TABLE 4 for correct entry for this model. Press the PROG/ENTER key.
5. The display reads *MAX—TM ENTRY? (*slowest belt speed). Limits of this value are determined by the Step 1 and Step 2 calibration values. Use 1600 (16 min). Press the PROG/ENTER key.
6. The display flashes *DONE* and *SAVE.* Press the PROG/ENTER key to permanently store the calibration values in non-volatile memory (NOVRAM).

NOTE: During these adjustments, pressing the clear button will abort all entries and require reprogramming of belt time mode. When exiting the Belt Speed Calibration Mode, enter a time. Otherwise the time defaults to zero and the oven will not heat, and the belt will not move.

Oven Type	Belt Length/ Distance	Minimum Oven Entry	Oven Type	Belt Length/ Distance	Minimum Oven Entry
MT1828	28	330 (3 min, 30 sec)	MT3270	70	330 (3 min, 30 sec)
MT2136	36	200 (2 min)	MT3855	55	330 (3 min, 30 sec)
MT3240	40	300 (3 min, 00 sec)	MT3870	70	330 (3 min, 30 sec)
MT3255	55	300 (3 min, 00 sec)			

TABLE 4

OPEN LOOP SYSTEM — TWIN BELT

To enter the calibration mode:

1. Press the ON/OFF key until *OFF* is displayed.
2. Press CLEAR FRONT BELT, FRONT BELT, FRONT BELT, PROG/ENTER to enter the Access mode. The display flashes *ACCESS*.
3. The display reads *ACTIVE BELT—?*. Press front belt for Front Belt Calibration
4. The display reads *FRONT—INIT—F*.

Belt speed calibration:

1. The display reads *BELT SIZE—?.* Enter the length of the conveyor belt for your model. See TABLE 5. Press the PROG/ENTER key.
2. The display reads *STEP—1.* The controller is in Step 1 of the calibration procedure: maximum belt speed. The motor control is automatically set to its maximum output. Place an object on the belt and note the time from entrance to exit.

   NOTE: Be certain to measure either the leading edge in and out or the trailing edge in and out. Do not use the leading edge in and the trailing edge out.

   A.) The display reads *STEP—1TIME—?.* Enter the time measured in STEP—1. Min: 0 Max: 59:59 (min:sec). Press the PROG/ENTER key.

   B.) The display reads *STEP—1DIST—?.* Enter the belt length for your model. See TABLE 4. Press the PROG/ENTER key.
3. The display reads *STEP—2.* The controller is in Step 2 of the calibration procedure: minimum belt speed. The motor control is automatically set to its minimum output. The belt will travel very slowly during this part of the calibration procedure. To minimize the time spent on STEP—2, measure off 10” on the conveyor support. Place an object on the belt and note the travel time for the 10” measured distance.

   A.) The display reads *STEP—2 TIME—?.* Enter the measured travel time for STEP—2. Min: 0 Max: 59:59 (min:sec). Press the PROG/ENTER key.

   B.) The display reads *STEP—2 DIST—?.* Enter 10”. Press the PROG/ENTER key.
4. The display reads *MIN—TM ENTRY?* (the fastest belt speed). Limits of this value are determined by the Step—1 and Step—2 calibration values. See TABLE 5 for correct entry for this model. Press the PROG/ENTER key.
5. The display reads *MAX—TM ENTRY? (*slowest belt speed). Limits of this value are determined by the Step 1 and Step 2 calibration values. Use 1600 (16 min). Press the PROG/ENTER key.
6. The display flashes *DONE* and *SAVE.*

Repeat the procedure for the rear belt by pressing, CLEAR, REAR BELT, REAR BELT, REAR BELT, PROG/ENTER**.**

NOTE: During these adjustments, pressing the clear button will abort all entries and require reprogramming of belt time mode. When exiting the Belt Speed Calibration Mode, enter a time. Otherwise the time defaults to zero and the oven will not heat, and the belt will not move.

Oven Type	Belt Length/ Distance	Minimum Oven Entry	Oven Type	Belt Length/ Distance	Minimum Oven Entry
MT1828	28	330 (3 min, 30 sec)	MT3270	70	330 (3 min, 30 sec)
MT2136	36	200 (2 min)	MT3855	55	330 (3 min, 30 sec)
MT3240	40	300 (3 min, 00 sec)	MT3870	70	330 (3 min, 30 sec)
MT3255	55	300 (3 min, 00 sec)			

TABLE 5

MOTOR CONTROL BOARD ADJUSTMENT

High/low speed motor control board adjustment for 180 and 130 volt DC motors

NOTE: The motor control board is located on the slide out control panel.

High Speed Motor Adjustment:

For closed loop systems follow Belt Speed Verification through STEP 5 (see page 4−6). For open loop systems follow Belt Speed Calibration through STEP 2 (see page 4−7 or 4−8).

1. With the motor connected (make no open circuit voltage readings) measure the voltage at the motor leads (A1 & A2 in FIGURE 4) on the DC control board. If the voltage is not within 3 VDC of the specified voltage continue with step 3.
2. Turn the MAX trim pot counter-clockwise to lower and clockwise to raise the voltage until it is within 3VDC of the specified voltage.

   NOTE: For closed loop systems this adjustment must be made quickly.

Low Speed Motor Adjustment:

For closed loop systems the computer automaticly proceeds to low speed. For open loop systems continue Belt Speed Calibration through STEP 3 (see page 4−7 or 4−8).

1. With the motor connected (make no open circuit voltage readings) measure the voltage at the motor leads on the DC control board (A1 & A2 in FIGURE 4). If the voltage is not 26VDC +/- 1 VDC, continue with step 3.
2. Turn the MIN SPEED pot clockwise to lower the voltage and counter-clockwise to raise the voltage.

NOTE: If any voltage adjustments were made hit the CLEAR key to abort the calibration mode. Reenter the calibration mode to verify that voltage is locked in.

COMPUTERIZED OVENS				
	130 Volt System		**180 Volt System**	
Model	Low	High	Low	High
MT1828	20	130	26	180
MT2136	20	130	26	180
MT3240	20	130	26	180
MT3270	26	130	26	180
MT3855	26	130	26	180
MT3870	26	130	26	130
NON-COMPUTERIZED OVENS				
MT2136	20	130	26	180
MT3255	26	130	26	180
MT3270	26	130	26	180
MG3270	26	130		
24 VDC SYSTEM				
MT1820	3.0	21		

TABLE 6

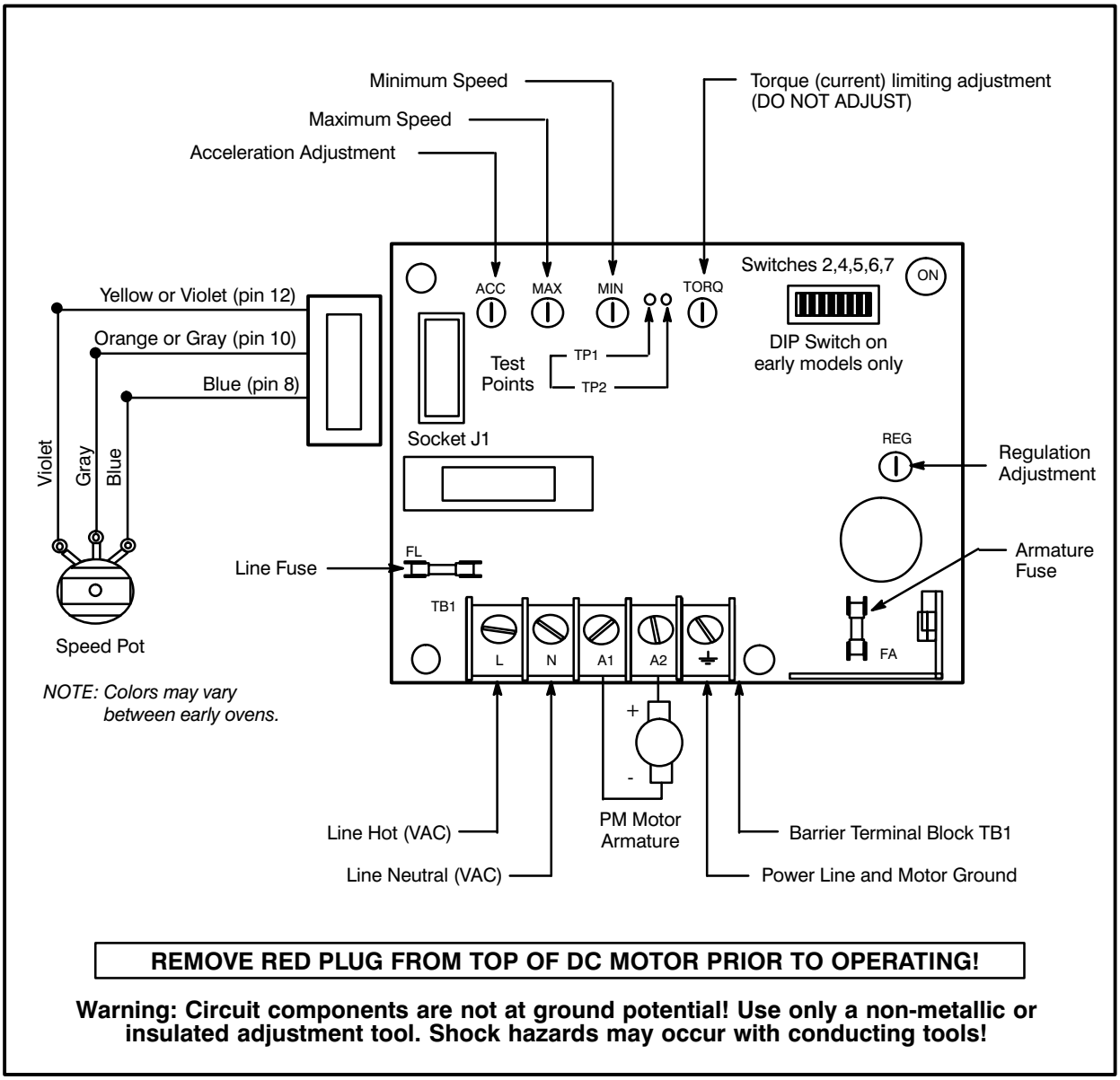

Minimum Speed
Maximum Speed
Acceleration Adjustment
Torque (current) limiting adjustment
(DO NOT ADJUST)
Switches 2,4,5,6,7
ON
ACC
MAX
MIN
TORQ
DIP Switch on
early models only
Test
Points
TP1
TP2
Yellow or Violet (pin 12)
Orange or Gray (pin 10)
Blue (pin 8)
Violet
Gray
Blue
Socket J1
REG
Regulation
Adjustment
Armature
Fuse
Line Fuse
FL
TB1
L
N
A1
A2
FA
Speed Pot
NOTE: Colors may vary
between early ovens.
+
-
PM Motor
Armature
Line Hot (VAC)
Line Neutral (VAC)
Barrier Terminal Block TB1
Power Line and Motor Ground
REMOVE RED PLUG FROM TOP OF DC MOTOR PRIOR TO OPERATING!
Warning: Circuit components are not at ground potential! Use only a non-metallic or
insulated adjustment tool. Shock hazards may occur with conducting tools!

FIGURE 4

RERATING THE APPLIANCE

Due to the lack of oxygen at higher elevations, the unit may need to be rerated. (The orifice size may need to be adjusted to accommodate different air pressures at higher elevations.) If not rerated, incomplete combustion may occur releasing Aldehydes and CO or Carbon Monoxide. **Any of these are unacceptable and may be hazardous to the health of the operator.**

To choose the correct orifice for different altitudes several factors must be known:

1. Altitude
2. BTUs per burner
3. Manifold pressure
4. Correct orifice size at sea level
5. BTU value of the gas

   The following are generally accepted heating values:

   A.) Natural Gas — 1000 BTU/Cu Ft

   B.) Propane — 2550 BTU/Cu Ft

   C.) Butane — 3000 BTU/Cu Ft

6. Specific gravity

   The following are generally accepted values (Air = 1.0):

   A.) Natural Gas — 0.63

   B.) Propane — 1.50

   C.) Butane — 2.00

NOTE: For other gases contact your local gas supplier for values.

Use the following formulas to calculate the correct orifice:

1. $\frac{\text{Firing rate}}{\text{\# of burners}} = \text{BTU per burner}$
2. $\frac{\text{BTU per burner}}{\text{Heating value of Gas}} = \text{CuFt/hr}$
3. $\frac{\text{CuFt/Hr}}{\text{Specific Gravity Multiplier}} = \text{Equiv. CuFt/hr}$
4. Use TABLE F-1 from the National Fuel Gas Code Handbook to determine the proper orifice size at sea level.

   NOTE: The sea level orifice size is needed to determine the proper orifice at any elevation.

5. Use TABLE F-4 from the National Fuel Gas Code Handbook to determine the correct orifice for the applicable elevation.
6. Use TABLE F-3 from the National Fuel Gas Code Handbook to determine the specific gravity multiplier.

EXAMPLE

Known factors:

1. Altitude = 5000 ft.
2. BTUs per appliance = 55,000
3. Number of burners = 2
4. BTU value of the gas = 900
5. Specific gravity = .50

Calculations:

1. $\frac{55{,}000}{2} = 27{,}500$ BTU per burner
2. $\frac{27{,}500}{900} = 30.55$ CuFt/hr
3. $\frac{30.55}{1.10} = 27.77$ Equiv. CuFt/hr

Using the tables in the National Fuel Gas Code Handbook we can determine that:

1. Correct orifice size at sea level = #40
2. Correct orifice size at 5000 ft = #42

CHECKING THE FIRING RATE

Method #1

1. Turn off all other appliances on the line. Press the ON/OFF key on the unit to call for heat.
2. Using either the 1/2 cu. ft. or the 2 cu. ft. dials, note the time it takes the indicator to complete one revolution. See FIGURE 5.
3. Use the following formula to determine the firing rate of the meter.

$$\frac{\text{3600 x size of test dial x 1000}}{\text{\# of seconds per revolution}} = \text{BTU/burner}$$

Example:

A.) 3600 x 2 = 7200

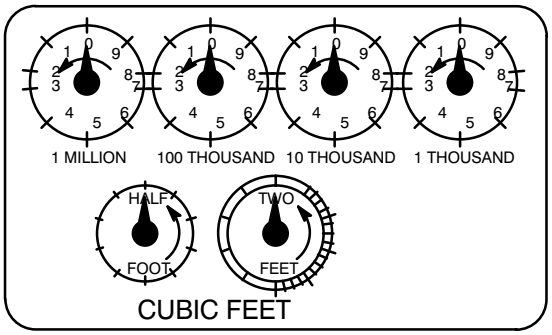
B.) $\frac{7200}{60}$ = 120 Cu. Ft./Hr

C.) To convert to BTU/Hr, multiply by one of the following generally accepted heating values:

Natural Gas — 1000 x 120 = 120,000 BTU
Propane — 2550 x 120 = 306,000 BTU
Butane — 3000 x 120 = 360,000 BTU

NOTE: You may also use TABLE XII from the National Fuel Gas Code Handbook to determine the firing rate of the meter.

Locate the time observed in STEP 2. Move across the table to either the 1/2 cu. ft. or the 2 cu. ft. column to find the gas input to the burner.



TYPICAL DOMESTIC GAS METER INDEX

FIGURE 5

Method #2

You may also determine the firing rate by sizing the main burner orifice and measuring manifold gas pressure. Either way is accurate, however method #1 is faster.

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CHAPTER 5

TROUBLESHOOTING

DC DRIVE SYSTEM

POSSIBLE CAUSE(S)	SUGGESTED REMEDY
Symptom #1 — Conveyor Belt will not run	
• Oven in OFF mode.	• Turn to ON position.
• Loose computer controller cord connection.	• Adjust and retighten cables and set screws.
• Time not programmed into computer.	• Program in a cook time. See Operation Section (page 3—2).
• Emergency stop switch on OFF.	• Pull switch out to ON.
• Control circuit breaker tripped.	• Reset breaker.
• Belt hooked on something in oven.	• Turn oven OFF, unhook and repair problem.
• 5 amp line fuse blown.	• Replace fuse. Determine amp draw.
• 200 milliamp armiture fuse blown.	• Replace fuse. Determine amp draw.
• Hall Effect Pickup not connected. *(Closed loop systems only)*	• Verify the unit is set for a single pulse pickup. If not, reset for a single pulse pickup. If yes reattach the pickup.
• Motor brushes worn out.	• Replace brushes.
• Defective conveyor drive motor.	• Replace conveyor drive motor.
• Defective conveyor drive motor controller.	• Replace conveyor drive motor controller.
• Wire from pickup open or misplaced.	• Repair or replace wire.
Symptom #2 — Computer error code MOTOR - SPEED - ERROR	
• Belt speed needs calibration.	• See Calibration and Adjustments (page 4—6).
• Voltage from Bodine controller to DAC not present. The DAC (Digital Analog Control) is a non-repairable component of the computer. There should be approximately 20 VDC between the red and green wires on the 3 pin connection of the DC drive board.	• Replace the drive motor controller.
• DAC voltage is present but not regulated between 4.7 and .47 VDC when different times are programmed into the cooking computer. Measure the voltage between the green and blue wires of the 3 pin connection.	• Replace the computer.

COMPUTER CONTROL SYSTEM

POSSIBLE CAUSE(S)	SUGGESTED REMEDY
Symptom #1 — Computer controller displays: PROBE - OPEN - PROBE - SHORT and alarm buzzer sounds	
• Internal problem with computer controller.	• Verify display integ. in the 2nd level programming. If the controller has been programmed the computer may need to be replaced.
• Loose connections at computer controller.	• Tighten connections.
• Shorted or open RTD probe.	• Use the chart in the Technical Appendix (page 6—10) to determine if probe is bad. Replace if necessary.
Symptom #2 — Computer controller displays: ERROR - HIGH - TEMP - LIMIT	
• Actual temperature exceeds programmed limit value. Default 605°F (319°C).	• Faulty burner valve relay. Replace relay.
• Internal problem with computer controller.	• Verify display integ. in the 2nd level programming. If the controller has been programmed the computer may need to be replaced.

HEATING SYSTEM

POSSIBLE CAUSE(S)	SUGGESTED REMEDY
Symptom #1 – Burner will not fire	
• Oven in OFF mode.	• Turn to ON position.
• Emergency stop switch on OFF.	• Pull switch out to ON.
• Control circuit breaker tripped.	• Reset breaker.
• Combustion motor not running.	• Check transformer for primary and secondary voltage. • Check main control and burner valve relays to see if closed. • Check relay in combustion burner box. If bad replace relay.
• Main Temperature Controller not set above ambient temperature.	• Set to desired temperature.
• Manual gas valve closed.	• Open valve.
• Intermittent Ignition Device (IID) system locked out.	• Reference Technical Appendix (page 6–1 through 6–3).
• Air pressure switch may be open.	• Check convection blower (or 4 convection fans) for proper operation.
• Blower motor(s) not running.	• Verify voltage to motor. If voltage is present, replace the motor or start capacitor.
• High Limit control tripped.	• Verify that 625°F (330°C) high limit is programmed into the controller. If so reset the high limit. Set the computer to 500°F (260°C). Use a pyrometer to verify the oven temperature. If the oven climbs significantly above the setpoint, use the chart in the Technical Appendix (page 6–10) to check the probe. If the probe is alright the computer may need replacement.
• Thermal switch in control compartment tripped.	• Check hood system.
• Excessive intake air temperature.	• Check hood system.
• If pilot fails to go out when the unit is shut down, the solenoid valve is bad.	• Replace valve.

POSSIBLE CAUSE(S)	SUGGESTED REMEDY
Symptom #2 – Oven will not reach desired temperature	
• Gas pressure to oven is too low.	• Contact local gas representatives.
• Top air plates missing.	• Install air plates.
• Faulty RTD probe.	• Use the chart in the Technical Appendix (page 6–10) to determine if probe is bad. Replace if necessary.
• Blower motor(s) running backward.	• Verify voltage to motor. If voltage is present, replace the motor or start capacitor.
• Controller out of calibration.	• Recalibrate the controller. See Technical Appendix (page 4–5).
• Excessive food/debris accumulation blocking the airflow.	• The inside of the oven should be cleaned to remove any materials that could have dropped off the conveyor belt and possibly blocked some of the air flow holes. This would include the removal of the conveyor belt, conveyor belt supports, and the nozzles. The oven interior and all parts removed should then be cleaned with an appropriate oven cleaner safe for aluminum.
Symptom #3 – Burner operates sporadically	
• Air pressure switch may be open.	• Check convection blower (or 4 convection fans) for proper operation.
• Thermal switch tripped.	• Determine the ambient temperature in the control compartment. If above 140°F (60°C) check the cooling fan operation.
• Faulty RTD probe.	• Use the chart in the Technical Appendix (page 6–10) to determine if probe is bad. Replace if necessary.
• Excessive food/debris accumulation blocking the airflow.	• The inside of the oven should be cleaned to remove any materials that could have dropped off the conveyor belt and possibly blocked some of the air flow holes. This would include the removal of the conveyor belt, conveyor belt supports, and the nozzles. The oven interior and all parts removed should then be cleaned with an appropriate oven cleaner safe for aluminum.

CONVECTION SYSTEM

POSSIBLE CAUSE(S)	SUGGESTED REMEDY
Symptom #1 — Blower motor(s) not running	
• Oven in OFF mode.	• Press ON/OFF key.
• Emergency stop switch on OFF.	• Pull switch out to ON.
• No power to oven.	• Verify power to motor(s). If there is voltage present, replace the motor. If voltage is not present, check the motor contactor.
• Motor circuit breaker tripped.	• Reset circuit breaker. Determine amp draw.
• Faulty start capacitor.	• Replace capacitor.
• Motor(s) burnt out.	• Check draw (3amps or greater).
• Motor contactor open.	• Check that the computer is turned on and that a cook time and temperature have been programmed. Check for voltage to the coil of the motor contactor. If voltage is present, replace the contactor. If voltage is not present, check that the blower relay is closed. If not, check for voltage at the blower relay coil. If a 12 VDC voltage is present at the coil the blower relay is bad. If there is no voltage present at the coil the computer may need to be replaced.
• Thermal overload tripped.	• Determine if the cooling blower (or fans) are operating. If not, verify voltage to the cooling blower. If voltage is present, replace the cooling blower motor. If voltage is not present, verify voltage through the thermal switch. If no voltage is present, replace the thermal switch.
Symptom #2 — Blower motor(s) do not shut off	
• Faulty motor contactor.	• Replace contactor.
• Faulty blower motor relay.	• If the temperature probe is good check for voltage at the coil of the blower relay. If voltage is not present the relay is bad. Replace the blower relay.
• Faulty auxiliary contact.	• Replace auxiliary contactor.
• Faulty probe.	• Check the resistance values of the temperature probe for values from 135-170°F (57-77°C). Reference TABLE 6 on page 6—10 of the Technical Appendix. If the values do not agree with the chart change the probe.
• Faulty computer.	• If voltage is present at the blower relay, the computer is bad. Replace the computer.

POSSIBLE CAUSE(S)	SUGGESTED REMEDY
Symptom #3 – Hood system does not operate when oven is on	
• Fan exhaust/supply problem. • Defective interlock circuit.	• Contact HVAC service. • Replace auxiliary contactor.
Symptom #4 – Blower motor running backward	
• Motor off by thermal overload (other fans forcing blower to spin). • Faulty capacitor.	• Determine if the cooling blower (or fans) are operating. If not, verify voltage to the cooling blower. If voltage is present, replace the cooling blower motor. If voltage is not present, verify voltage through the thermal switch. If no voltage is present, replace the thermal switch. • Replace capacitor.

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CHAPTER 6

TECHNICAL APPENDIX

INTERMITTENT IGNITION SYSTEM

PRINCIPLES OF OPERATION

Pilot flame sensing is a very important aspect of the ignition controls operation. Three zones are needed to give the proper air-gas ratio to produce a blue pilot flame.

Zone 1 – an inner cone that will not burn because excess fuel is present.

Zone 2 – around the inner, fuel rich cone is a blue envelope. This zone contains a mixture of vapor from the fuel rich inner cone and the secondary or surrounding air. This is where combustion occurs, and is the area of highest importance for proper flame sensor location.

Zone 3 – Outside the blue envelope is third zone that contains an excessive quantity of air.

FLAME RECTIFICATION

To identify a current conducted by the flame, we use flame rectification. Place two probes in Zone 2 of the pilot flame. When the surface area of one probe is larger than the other, current tends to flow more in one direction. DC current flows in only one direction, as opposed to AC current, which alternates its direction. The current is rectified from AC to DC by increasing the surface area of one probe and decreasing the surface area of the other.

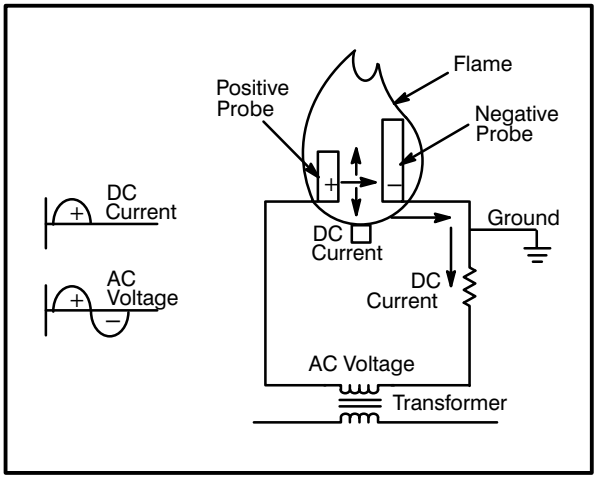


FIGURE 1

In the IID system the probes exposed to the pilot flame are the Flame Sensor and the Pilot Burner Hood. Since the surface area of the pilot hood is larger than the flame sensor, the current rectification process takes place. Current is conducted from terminal 4 at the control through the flame sensor cable to the flame sensor. As the current is conducted through the flame to the pilot hood, it is rectified from AC to DC because of the difference in surface area. The pilot hood is grounded back to the control, thereby completing the circuit.

Flame Sensing Circuit Current

For the ignition control to function properly, a minimum amount of current must flow through the flame sensing circuit.

As the pilot flame is established and current begins flowing in the flame sensing circuit, the current energizes a relay. A minimum amount of current is required to pull-in the relay. When the relay pulls in, one set of contacts opens which shuts off the high energy spark. Another set of contacts closes, putting 24 volts on terminal 3 which opens the main gas valve.

Current vs. Voltage

In normal operation an AC voltage will be present from terminal 4 to ground and a current will be present in the flame sensing circuit.

Even though an AC voltage is present, flame rectification occurs and a DC current flows in the sensing circuit.

For service checkout purposes, measuring these voltages and currents can provide useful information regarding the integrity of the ignition control.

Measuring the current flow rather than voltage is the preferred procedure. Due to the internal circuitry of the ignition control and varying input impedance of voltmeters, the measured voltage will vary depending on type and model of voltmeter being used. However, measuring the current provides a more precise evaluation of the ignition control and flame sensing circuit.

A proper reading not only indicates a functional control, but also verifies all components of the circuit such as flame sensor, cable and ground.

SERVICE PROCEDURES

Service the IID system as follows:

1. Make certain the thermostat contacts are open.
2. Check for proper supply voltage at primary and secondary of system transformer.
3. Close thermostat contacts and observe system.
4. Determine which system condition exists:
   A.) No spark, system does not function
   B.) Spark present but pilot will not light
   C.) Pilot lights but main valve will not open
5. Follow the appropriate service checkout procedure to troubleshoot and repair system.
6. Observe the system through several complete operating cycles.

VOLTAGE AND CURRENT MEASUREMENTS

When servicing the electronic ignition control there are several times when voltages and currents must be measured or observed.

NOTE: All voltages measured will be AC voltage and all current measured will be DC current.

Terminal	Terminal Use
1	Pilot valve connection between terminal #1 and ground
2	Wire from thermostat
3	Main valve connection between terminal #3 and ground
4	Flame sensor

TABLE 1

To Measure AC Voltages:

1. Set the selector switch on the voltmeter to the AC voltage position.
2. Connect the meter leads in parallel with the voltage to be measured.
3. Read the voltage at the meter.

To Measure DC Flame Sensing Current:

1. Turn off the power supply to the ignition control.
2. Disconnect the flame sensor cable from terminal #4 on Johnson units or terminal #1 on Landis & Gyr units.
3. Set the selector switch on the meter to microamp scale. connect the positive (red) lead to terminal #4 and the negative (black) lead to the sensor cable.
4. Disconnect the main valve lead from terminal #3. This will prevent the main burner from igniting. A proper measurement of flame sensing current is taken with the pilot light only.
5. Turn the power back on and close the thermostat contacts. Read the current at the meter.

   NOTE: The minimum current required for the Johnson G770 is 0.15DCμA. The minimum current required for the Landis & Gyr is 2.0DCμA. (This unit is polarity specific.)
6. Turn the power off to disconnect the meter and reconnect terminal #3 and #4.

To Measure DC Flame Sensing Current Using the Johnson Y99AU-3 Signal Transducer:

1. Set the function selector switch to the DC voltage position.
2. Turn off the supply voltage to the control.
3. Disconnect the flame sensor cable from terminal #4 on the ignition control.
4. Connect the male 1/4" spade connector (—) to the flame sensor cable. Connect the female 1/4" spade connector (+) to terminal #4.
5. Disconnect the main valve lead from terminal #3 on the ignition control.
6. Turn the supply voltage on and close the thermostat contacts to cycle the system.
7. When the pilot lights, read the current on the meter display.

   NOTE: The conversion factor is 1DC volt — 1 DC microamp.

REPAIRING THE ELECTRONIC IGNITION SYSTEM

Flame Sensing Current Maintenance:

The flame sensor is made of carbon steel and subject to contamination and oxidation buildup. Any buildup on the sensor can add enough resistance to drop the signal below the required minimum. Carbon and oxidation can also build up on the pilot hood. The pilot hood is part of the circuit and must be kept as clean as the flame sensor.

1. Clean the flame sensor with steel wool or an emery cloth.
2. Clean the pilot hood with a small wire brush to remove any carbon or oxidation buildup.

Flame Sensor Replacement:

If the ceramic portion of the flame sensor is broken or if the contamination is extensive, the flame sensor may have to be replaced.

CAUTION!

Shut off all gas to the appliance by closing the shutoff valve in the supply line to that appliance. Disconnect the power supply to prevent electrical shock or possible damage to the equipment.

1. Disconnect the sensing probe cable from the old sensing probe.
2. Remove the old sensing probe from the pilot burner.
3. Check the length of dimension B to be sure the correct replacement probe is being used. See FIGURE 2.
4. Compare the sensing probe rod lengths, dimension A. If required, trim the length of the Y75 rod being installed to the same length as the sensing rod being replaced.

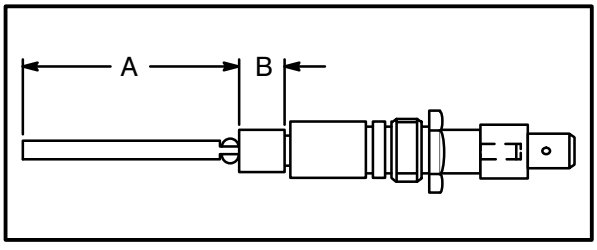


FIGURE 2

5. Install the Y75 sensing probe into the pilot burner. Reconnect the sensing probe cable. The connections to the sensing probe and control terminal must be secure.
6. Restore the power and the gas supply to the appliance.
7. IMPORTANT: Using a microammeter, check the signal passing through the sensing probe.
8. If the microamp signal is marginal, trim the flame sensing probe in increments of 1/8”. Be sure that there is still proper flame impingement on the flame sensing probe.

   Flame must surround sensing probe tip for approximately 1/2”.
9. Observe at least three complete operating cycles to see that all components are functioning correctly.

Ground Connection

Another important requirement for proper operation is the existence of a good electrical ground between the pilot assembly and the ignition control. This ground provides the path for sensing current to return to the control, thereby completing the sensing circuit.

In most systems we assume the pilot burner is grounded back to the control through the pilot tubing and gas valve. The gas valve would be grounded to the ignition control when the control is mounted on the valve. Controls that are not mounted to a gas valve require a separate grounding wire connecting the control to the pilot assembly.

In some instances this ground can become weak and cause a low sensing current signal. To assure that a proper ground exists between the control and pilot, a wire can be installed from one of the ground terminals to the pilot bracket. This will assure a strong ground and maintain a proper sensing current signal.

Using a 1/4” female spade connector, connect one end of the new wire to the ground strip on the ignition control. Attach the other end of the wire to a bolt or screw on the pilot burner bracket. Be sure to use a wire with a high temperature rated insulation.

SERVICING THE INVENT HOOD

ILLUSTRATED PARTS LIST

QTY	PART DESCRIPTION (SEE FIGURE 3)	ITEM
1	AMU/Exhaust Manifold/Duct Connection	1
1	AMU Duct Extension, 10 x 18 x 9”h	2
1	Exhaust Duct Extension, 9 x 18 x 12”h	3
1	AMU Support Bracket, Right	4
1	AMU Support Bracket, Left	5
1	Lower Front AMU Panel	6
1	Middle Front AMU Panel	7
1	Upper Front AMU Panel	8
2	Filter Trough/Receptacle	9
2	Filter,10x16”	10
2	Filter, 10 x 20”	11
1	Vertical Exhaust Manifold, Right	12
1	Vertical Exhaust Manifold, Left	13
1	Cooling Fan Exhaust Enclosure	14
1	Upper Exhaust Enclosure, Right	15
1	Lower Exhaust Enclosure, Right	16
1	Upper Exhaust Enclosure, Left	17
1	Lower Exhaust Enclosure, Left	18
1	Hardware Bag (includes the following) 2 Alignment Pins (qty 2) 1/4”-20 x 5/8” Hex Head Cap Screw (qty 4) 1/4” Flat Washer (qty 6) 1/4”-20 Lock Nut (qty 1) 1/4”-20 Shoulder Bolt (qty 1) 1/4”-20 x 1/2” Thumb Screw with Shoulder (qty 5)	19
4	Oven Securing Clip	20

TABLE 2

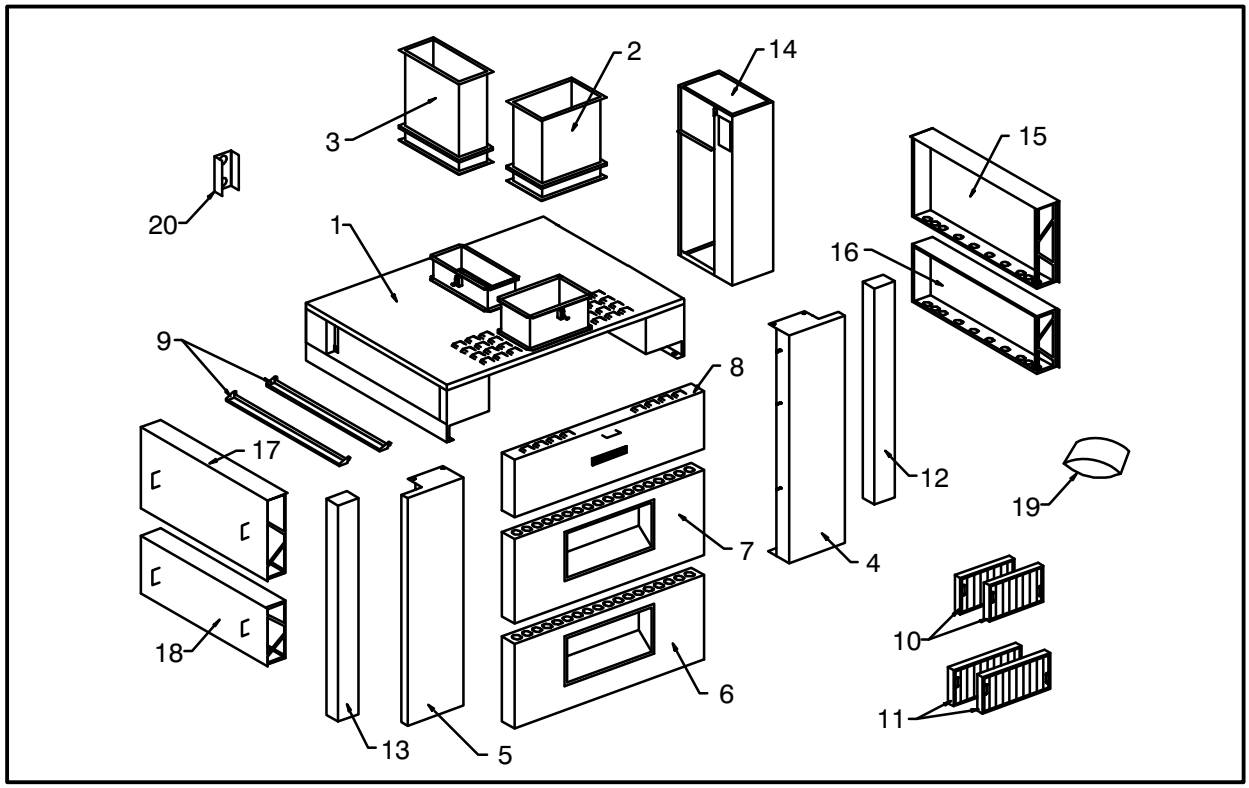


FIGURE 3

CLEANING AND MAINTENANCE

CAUTION!

The oven and the ventilation system get hot during operation. Allow the oven/ ventilation system assembly to cool so as to avoid possible injury.

EVERY MONTH

1. Remove the End Enclosures (items 15—18) by lifting them up and pulling them away from the oven.
2. Remove the Filters (items 10 and 11) by lifting them up and then swinging the bottom out and down.
3. Remove the Filter Trough Receptacles (item 9).
4. Clean the parts by running them through a dishwasher or wash them by hand with hot, soapy water. **Do not use scouring pads (plastic or metal) on the exterior surfaces as they will scratch and mar the exterior finish.** Rinse the panels in warm water and dry them.
5. Reinstall the Filter Trough/Receptacles, Filters and End Enclosures.

EVERY THREE MONTHS

1. Remove the End Enclosures (items 15—18) by lifting them up and pulling them away from the oven.
2. Remove the Filters (items 10 and 11) by lifting them up and then swinging the bottom out and down.
3. Remove the Filter Trough Receptacles (item 9).
4. Lift off the Cooling Fan Exhaust Enclosure (item 14).
5. Remove the Vertical Exhaust Manifolds (items 12 and 13) by removing the thumb screws.
6. Clean the parts by running them through a dishwasher or wash them by hand with hot, soapy water. **Do not use scouring pads**

(plastic or metal) on the exterior surfaces as they will scratch and mar the exterior finish. Wipe out the exhaust channel portion of the AMU/Exhaust Manifold/Duct Connection (item 1) assembly. Brush and clean the guards of the oven cooling fans.

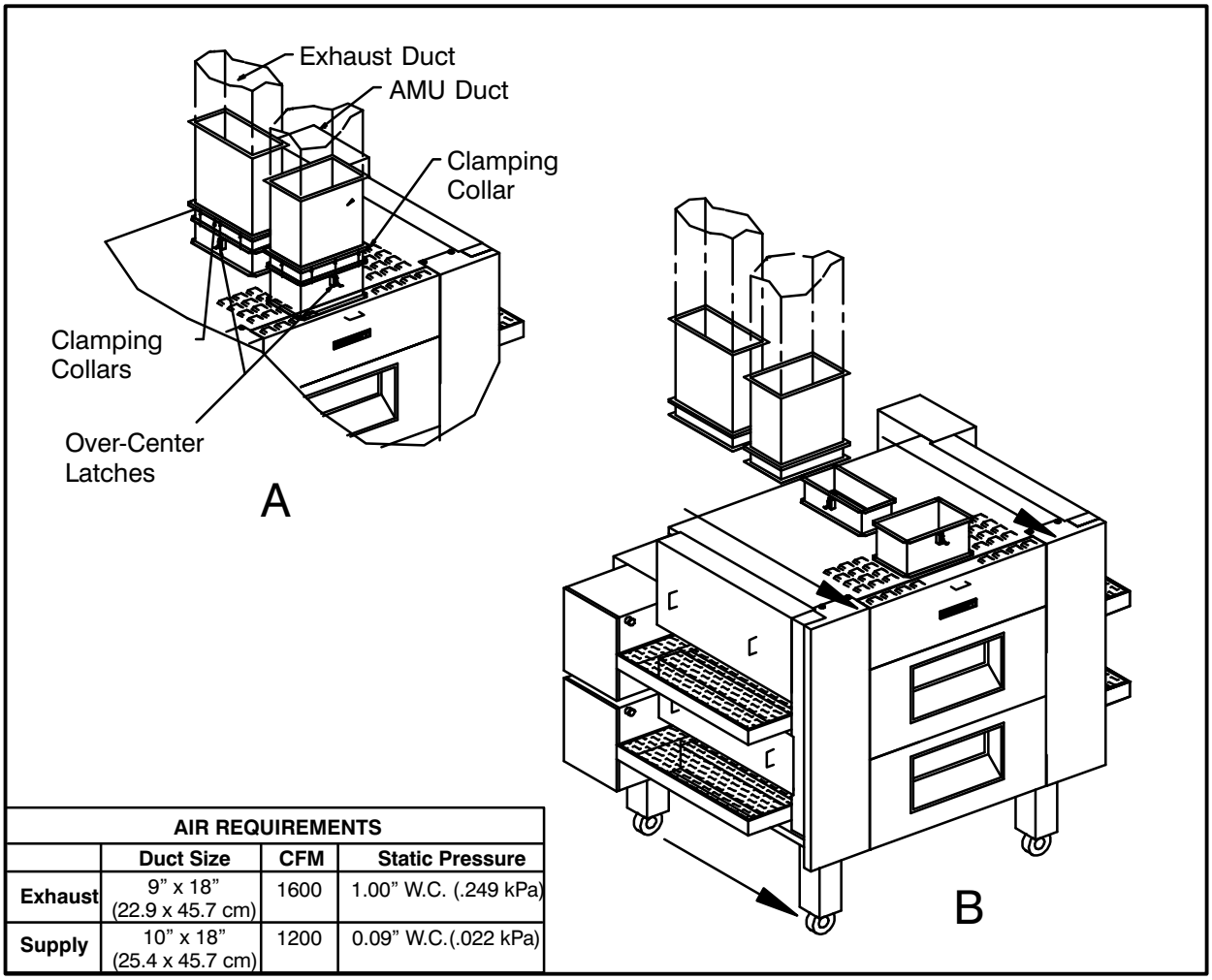
7. Dry the parts and return them to their positions.

NOTE: This regular maintenance is in addition to the daily, quarterly, semi-annual and annual cleaning schedule included in the oven operating manual.

SERVICING ACCESS

For servicing the oven, disconnect the gas and electric services from the oven. Use the following procedure to move the oven/ventilation system assembly for maintenance.

1. Release the over-center latches on the exhaust and Air Make-Up duct collars.
2. Slide the clamping collars up and secure them out of the way.
3. Release the brakes on the front locking casters of the oven assembly.
4. Roll the oven out away from the wall. (See FIGURE 4).



AIR REQUIREMENTS			
	Duct Size	**CFM**	**Static Pressure**
Exhaust	9" x 18" (22.9 x 45.7 cm)	1600	1.00" W.C. (.249 kPa)
Supply	10" x 18" (25.4 x 45.7 cm)	1200	0.09" W.C.(.022 kPa)

FIGURE 4

PRESSURE CONVERSION

PRESSURE CONVERSION CHART									
in/H_2O	P.S.I	in/Hg	mm/H_2O	mm/Hg	kg/cm^2	bar	mbar	Pa	kPa
1	.0361	.0735	25.41	1.868	.0025	.0025	2.489	248.9	.2489
2	.0722	.1470	50.81	3.736	.0051	.0050	4.978	497.8	.4978
3	.1083	.2205	76.22	5.604	.0076	.0075	7.467	746.7	.7467
4	.1444	.2940	101.62	7.472	.0102	.0099	9.956	995.6	.9956
5	.1804	.3673	127.0	9.335	.0127	.0124	12.44	1244	1.244
6	.2165	.4408	152.4	11.203	.0152	.0149	14.93	1493	1.493
7	.2526	.5143	177.8	13.072	.0178	.0174	17.42	1742	1.742
8	.2887	.5878	203.2	14.940	.0203	.0199	19.90	1990	1.990
9	.3248	.6613	228.6	16.808	.0228	.0224	22.39	2239	2.239
10	.3609	.7348	254.0	18.676	.0254	.0249	24.88	2488	2.488
11	.3970	.8083	279.4	20.544	.0279	.0274	27.37	2737	2.737
12	.4331	.8818	304.8	22.412	.0304	.0299	29.86	2986	2.986
13	.4692	.9553	330.2	24.280	.0330	.0324	32.35	3235	3.235
14	.5053	1.029	355.6	26.148	.0355	.0348	34.84	3484	3.484
15	.5414	1.102	381.0	28.016	.0381	.0373	37.33	3733	3.733
16	.5774	1.176	406.4	29.879	.0406	.0398	39.81	3981	3.981
17	.6136	1.249	431.8	31.752	.0431	.0423	42.31	4231	4.231
18	.6496	1.322	457.2	33.616	.0457	.0448	44.79	4479	4.479
19	.6857	1.396	482.6	35.484	.0482	.0473	47.28	4728	4.728
20	.7218	1.470	508.0	37.352	.0507	.0498	49.77	4977	4.977
21	.7579	1.543	533.4	39.22	.0533	.0523	52.26	5226	5.226
22	.7940	1.616	558.8	41.09	.0558	.0547	54.74	5474	5.474
23	.8301	1.690	584.2	42.96	.0584	.0572	57.23	5723	5.723
24	.8662	1.764	609.6	44.82	.0609	.0597	59.72	5972	5.972
25	.9023	1.837	635.0	46.69	.0634	.0622	62.21	6221	6.221
26	.9384	1.910	660.4	48.56	.0660	.0647	64.70	6470	6.470
27	.9745	1.984	685.8	50.43	.0685	.0672	67.19	6719	6.719

in/H_2O	P.S.I	in/Hg	mm/H_2O	mm/Hg	kg/cm^2	bar	mbar	Pa	kPa
28	1.010	2.056	710.8	52.26	.0710	.0696	69.64	6964	6.964
29	1.047	2.132	736.8	54.18	.0736	.0722	72.19	7219	7.219
30	1.083	2.205	762.2	56.04	.0761	.0747	74.67	7467	7.467
31	1.119	2.278	787.5	57.91	.0787	.0772	77.15	7715	7.715
32	1.155	2.352	812.8	59.77	.0812	.0796	79.63	7963	7.963
33	1.191	2.425	838.2	61.63	.0837	.0821	82.12	8212	8.212
34	1.227	2.498	863.5	63.49	.0862	.0846	84.60	8460	8.460
35	1.263	2.571	888.9	65.36	.0888	.0871	87.08	8708	8.708
36	1.299	2.645	914.2	67.22	.0913	.0896	89.56	8956	8.956
37	1.335	2.718	939.5	69.08	.0938	.0920	92.04	9204	9.204
38	1.371	2.791	964.9	70.95	.0964	.0945	94.53	9453	9.453
39	1.408	2.867	990.9	72.86	.0990	.0971	97.08	9708	9.708
40	1.444	2.940	1016	74.72	.1015	.0996	99.56	9956	9.956
41	1.480	3.013	1042	76.59	.1040	.1020	102.0	10204	10.20
42	1.516	3.086	1067	78.45	.1066	.1045	104.5	10452	10.45
43	1.552	3.160	1092	80.31	.1091	.1070	107.0	10701	10.70
44	1.588	3.233	1118	82.18	.1116	.1095	109.5	10949	10.95
45	1.624	3.306	1143	84.04	.1142	.1120	112.0	11197	11.20
46	1.660	3.378	1168	85.90	.1167	.1144	114.5	11445	11.44
47	1.696	3.453	1194	87.76	.1192	.1169	116.9	11694	11.69
48	1.732	3.526	1219	89.63	.1218	.1194	119.4	11942	11.94
49	1.768	3.600	1244	91.49	.1243	.1219	121.9	12190	12.19
50	1.804	3.673	1270	93.35	.1268	.1244	124.4	12438	12.44
51	1.841	3.748	1296	95.27	.1294	.1269	126.9	12693	12.69
52	1.877	3.822	1321	97.13	.1320	.1294	129.4	12941	12.94
53	1.913	3.895	1346	98.99	.1345	.1319	131.9	13190	13.19
54	1.949	3.968	1372	100.8	.1370	.1344	134.4	13438	13.44
55	1.985	4.041	1397	102.7	.1395	.1369	136.9	13686	13.69
56	2.021	4.115	1422	104.6	.1421	.1393	139.3	13934	13.93

TABLE 3

CONVERSION FACTORS

COMMON CONVERSION FACTORS		
Multiply	**By**	**To Get**
BTU/hr	.001054804	MJ/hr
	.0002931	kW
	.29285	W
BTU/Ft^3	.0372589	MJ/m^3
	8.905102	kcal/m^3
MJ/hr	948.0434279	BTU/hr
Mj/m^3	26,839225	BTU/ft^3
kW	3414.71732	BTU/hr
ft^3	.02832	m^3
ft^2	.09290304	m^2
inches	25.40005	mm
feet	.3048	meters
meters	3.281	feet
pounds	.4536	kg
inches W.C.	.249082	kPa
	2.49082	mbar
kPa	4.01885	inches W.C.
	10	mbar
mbar	0.401474	inches W.C.
kW	3.6	Mj/hr
kcal/m^3	.1122952	BTU/ft^3
Kwh/m^3	96.65	BTU/ft^3

TABLE 4

PRESSURE CONVERSIONS FACTORS		
Multiply	**By**	**To Get**
in/H_2O	0.0361	P.S.I.
	25.41	mm/H_2O
	1.868	mm/Hg
	.0025	kg/cm^2
	.0025	bar
	2.489	mbar
	248.9	Pa
	.2489	kPa
P.S.I	27.71	in. H_2O
	2.036	in. Hg
	703.1	mm/H_2O
	51.75	mm/Hg
	.0703	kg/cm^2
	.0689	bar
	68.95	mbar
	6895	Pa
	6.895	kPa

TABLE 5

COOKING COMPUTER — TEMPERATURE VS RESISTANCE

T/F	Res/Ohms	T/F	Res/Ohms	T/F	Res/Ohms	T/F	Res/Ohms
70	541.12	230	711.43	390	877.15	550	1038.293
75	546.51	235	716.68	395	882.26	555	1043.255
80	551.9	240	721.92	400	887.36	560	1048.212
85	557.28	245	727.16	405	892.46	565	1053.165
90	562.66	250	732.4	410	897.55	570	1058.113
95	568.04	255	737.63	415	902.63	575	1063.057
100	573.4	260	742.85	420	907.72	580	1067.997
105	578.77	265	748.05	425	912.8	585	1072.931
110	584.13	270	753.29	430	917.87	590	1077.862
115	589.48	275	758.5	435	922.94	600	1087.709
120	594.84	280	763.71	440	928.002	605	1092.626
125	600.18	285	768.91	445	933.062	610	1097.539
130	605.53	290	774.11	450	938.118	615	1102.447
135	610.86	295	779.31	455	943.17	620	1107.35
140	616.2	300	784.5	460	948.216	625	1112.249
145	621.52	305	789.68	465	953.259	630	1117.1
150	626.85	310	794.87	470	958.296	635	1122
155	632.17	315	800.04	475	963.33	640	1126.9
160	637.48	320	805.21	480	968.359	645	1131.8
165	642.8	325	810.38	485	973.383	650	1136.7
170	648.1	330	815.54	490	978.403	655	1141.6
175	653.4	335	820.7	495	983.419	660	1146.4
180	658.7	340	825.86	500	988.43	665	1151.3
185	663.99	345	831.01	505	993.436	670	1156.1
190	669.28	350	836.15	510	998.438	675	1161
195	674.57	355	841.29	515	1003.436	680	1165.8
200	679.85	360	846.43	520	1008.429	685	1170.7
205	685.12	365	851.56	525	1013.417	690	1175.5
210	690.39	370	856.69	530	1018.402	695	1180.4
215	695.66	375	861.81	535	1023.381	700	1185.2
220	700.92	380	866.93	540	1028.356		
225	706.18	385	872.04	545	1033.327		

TABLE 6