SERVICE MANUAL

(DOMESTIC)

IMPINGER CONVEYOR OVENS

LOW PROFILE 1600 SERIES ADVANTAGE

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SEQUENCE OF OPERATIONS / 1600-000-A, 1601-000-A

MODEL 1600-000-A / 120 VAC / 60 HZ / NATURAL GAS
MODEL 1601-000-A / 120 VAC / 60 HZ / L.P. GAS

POWER SUPPLY	Electrical power to be supplied to the oven by a three conductor cordset. Voltage from the black conductor to the white conductor to be 120 VAC. White conductor is Neutral. Green conductor is Ground.
CONTROL BOX AUTO COOL DOWN	When the temperature in either one of the Control Boxes reaches 120°F ± 3°F (49°C ± 1.7°C), the Cooling Fan Thermostats will switch power to the Cooling Fans. The thermostats will interrupt power to the Cooling Fans when the temperature falls to 100°F ± 3°F (37°C ± 1.7°C).
MAIN FAN CIRCUIT	120 VAC is permanently supplied to the normally open double pole power switch, a normally open contact of the oven power relay and the normally open cooling fan thermostats. Closing the power switch supplies 120 VAC, through the 3 A cooling fan fuse, through both control box hi-limit thermostats to the coil of the oven power relay. These normally open contacts now close supplying 120 VAC, through the 10A main fan fuse to the 2 main fan motors and the 2 burner motors. Power is also supplied to the cooling fans, the heat and conveyor control systems.
BURNER CIRCUIT	Closing the Oven Power Relay supplies 120 VAC to the (2) burner Systems NOTE: This oven utilizes (2) complete Burner/Temp. Control systems. The sequence of operations is the same for each system.120 VAC is supplied, through the Centrifugal Switch of the Main Fan Motor (this switch closes when the Main Fan reaches approximately 1600 R.P.M.) through the 10 Amp Fuse, to the Ignition Control, the Electronic Temperature Control, and the burner transformer. As the Burner Blower reaches approximately 1600 R.P.M., its internal centrifugal switch will close, supplying 24 VAC to the ignition control. The Ignition Control operates on both 24 VAC and 120 VAC. When the control is energized by 24 VAC, 120 VAC is switched to the Hot Surface Igniter for 45 seconds for Hot Surface Igniter warm up. The igniter glows red, 24 VAC is switched to the gas valve which opens, and ignition should now occur. If ignition does not occur in 6 seconds, the control will lock out. To recycle after lockout, turn off the burner switch for 45 seconds and then turn the switch back on.
TEMPERATURE CONTROL	When the Centrifugal Switch of the Main Fan Motor closes, power is applied to the Temperature Control. The1K ohm Temperature Pot is adjusted to desired temperature. Thermocouple will provide varying millivolts to the Temperature Controller. The Temperature Controller supplies 120 VAC to the solenoid valve at intermittent intervals to maintain desired temperature. The heat lamp is energized with the solenoid valve.
CONVEYOR DRIVE	Closing the on/off switch supplies 120 VAC through the oven power relay to the motor control board. AC volts are converted to DC volts and are supplied to the conveyor motor at terminals A+ and A-.Adjustments of the speed control potentiometer will change resistance at terminals P1 and P2 varying the DC voltage to the motor. The speed of the conveyor motor will increase or decrease as the DC voltage from the board increases or decreases respectively.
NOTE:	The conveyor control uses a sensor and magnet, mounted on the conveyor motor that senses the motor speed. Any change in motor load, (±RPM) is detected by the sensor and the voltage to the motor is adjusted accordingly.
TEMPERATURE DISPLAY	Closing the switch supplies 120 VAC to the primary of the temperature display transformer. The secondary of this transformer supplies 12 VAC to the temperature display. The thermocouple supplies D.C. millivolts to the temperature display. The display converts this millivolt reading to a temperature reading.

TROUBLESHOOTING GUIDE

GAS OVENS

MODEL 1600-000-A / NATURAL GAS / 120 VAC / 60 HZ / 1 PHASE
MODEL 1601-000-A / L.P. GAS / 120 VAC / 60 HZ / 1 PHASE

NOTE: When checking components on left side of unit, be sure to check for proper connections in power connector, (marked P. C. on Schematic Diagram.) located inside motor cover.

SYMPTOM	POSSIBLE CAUSE	EVALUATION
Oven fan will not run	Incoming Power Supply	Check breakers, reset if required. Check power plug to be sure it is firmly in receptacle. Measure the incoming power/call power company if needed.
	Main Fan Switch	Check continuity between switch terminals.
	Fuse, 10 Amp	Check, replace if necessary.
	Fuse Holder	Check, replace if necessary.
	Fuse 3A	Check, replace if necessary.
	Fuse holder	Check, replace if necessary.
	Hi Limit Thermostat(s) Control Box	Check for voltage on both sides of the switch. Terminals are normally closed. If open, reset and test oven for proper operation. If thermostat will not hold and control box temperature is not exceeding 140°F (60°C), replace thermostat.
	Oven Power Relay	Check for 120 VAC to the relay coil. If voltage is not present, trace wiring back to the control box hi-limit. If voltage is present, check to insure contacts are closing. Check for 120 VAC supplied to terminal #2 of the relay.
	Main Fan Motor	Check for opens, shorts, or grounds. WITH POWER OFF turn fan blade to check for locked rotor.
	Capacitor	Check for shorts or grounds. WARNING: Capacitor has a stored charge, discharge before testing.
No control box cooling	Incoming Power	Check main circuit breakers, reset if required, call power company if needed.
	Main Fan Switch	Check continuity between switch terminals
	Fuse 3 amp.	Check, replace if necessary.
	Fuse Holder	Check, replace if necessary.
	Hi Limit Thermostat(s) Control Box	Check for voltage on both sides of the switch. Terminals are normally closed. If open, reset and test oven for proper operation. If thermostat will not hold and control box temperature is not exceeding 140°F (60°C), replace thermostat.
	Cooling Fan(s)	120 VAC should now be at the fan motor. If voltage is present, check motors for shorts or opens. WITH POWER OFF: Check for locked rotor.
No automatic control box cooling	Incoming Power Supply	Check circuit breakers, reset if required. Call the power company if needed.
	Cooling Fan Thermostat(s)	Check the cooling fan thermostat. (Thermostat closes at 120°F and opens at 100°F). With the cooling fan thermostat preheated, check for continuity. If switch is open, replace.
	Fuse, 3 amp	Check, replace if necessary
	Fuse Holder	Check, replace if necessary
	Hi Limit Thermostat(s) Control Box	Check for voltage on both sides of the switch. Terminals are normally closed. If open, reset and test oven for proper operation. If thermostat will not hold and control box temperature is not exceeding 140°F (60°C), replace thermostat.

	Cooling Fan(s)	120 VAC should be at the motor. If voltage is present, check motor for shorts, opens, or grounds. WITH POWER OFF: check for locked rotor.
Oven will not heat	Gas Supply	Check for adequate gas supply and closed manual gas valves. Also, check flexible gas line connection.
	Main Fan	If not operating, refer to "Oven fan will not run".

NOTE: These ovens utilize 2 complete burner/temperature control systems. Each system will follow the same troubleshooting sequence.

	Centrifugal Switch of Main Fan Motor	Check for 120 VAC supplied to the centrifugal switch, if voltage is not present, trace the wiring back to the oven power relay. Check for 120 VAC out of the centrifugal switch. If voltage is supplied to the centrifugal switch, and motor is running, but there is no voltage out of the centrifugal switch, replace the fan motor. (NOTE: See Schematic Diagram of proper wire numbers on motors.)
	Fuse, Burner 10A	Check, replace if necessary.
	Fuse holder	Check, replace if necessary
	Burner Blower Motor	Check for 120 VAC supply to the burner blower motor, if 120 VAC is present and motor does not turn, replace the motor.
	Burner Transformer	Check for 120 VAC to primary of the 24 VAC burner transformer. If voltage is not present, trace wiring back to the fuse. If voltage is present, check for 24 VAC at the secondary, if no secondary voltage is present, replace the transformer.
	Centrifugal Switch of Burner Blower Motor	Check for 24 VAC supply to the centrifugal switch of burner blower motor (see Schematic for proper wire numbers). If no voltage is present, trace wiring back to the transformer. If voltage is present, check for 24 VAC at the output of the centrifugal switch. If there is no output, and the burner blower motor is running, replace the burner blower motor.
	Ignition Control	Check for 24 VAC supply to the ignition control at terminals marked 24V and 24Vgnd. If voltage is not present, trace wiring back to the centrifugal switch. Check for 120VAC supply to the ignition control at terminals L1 and L2. If no voltage is present, trace wiring back to fuse. If the above checks are okay, proceed. The ignition control should switch 120VAC to the hot surface igniter, across the (2) terminals marked HIS. If no voltage is present, replace the ignition control.
	Hot Surface Igniter (Located inside Burner Assy)	If 120 VAC is present at HSI terminals, visually check to see that the hot surface igniter is heating (igniter may be viewed through port glass in end of burner tube). The igniter should glow bright red. Check all connections to be sure they are tight. If the igniter does not heat, replace.
	Ignition Control	After 45 seconds of hot surface igniter pre-heat, the ignition control will switch 24 VAC to the gas control valves. Check for 24 VAC output from the ignition control, and across terminals marked "valve" and "valve gnd". If no voltage is present, replace the ignition control. NOTE: The ignition control contains a safety lockout circuit. If a flame is not detected within 6 seconds after the gas control valve is energized, the ignition control will lockout. To reset, turn the power switch "off", wait 45 seconds and switch the system "on" to retry ignition.
	Gas Control Valves	Check for 24 VAC supplied to the gas control valves. If voltage is present, the valves should open. Check for gas pressure at the pressure tap, located in the gas piping just prior to the burner. If there is no gas pressure, and the voltage is supplied to valves, check piping for obstructions. If there

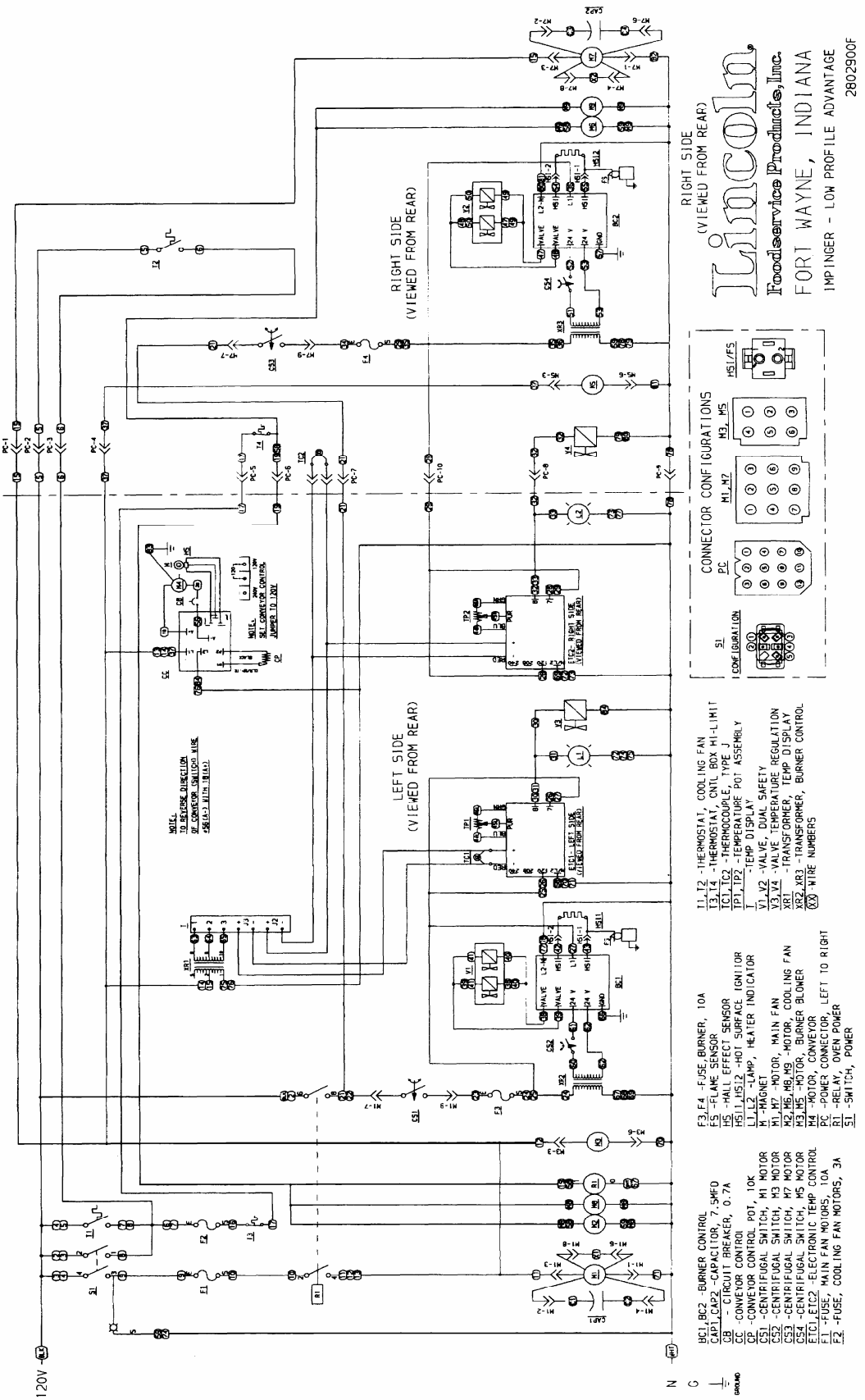
		are no obstructions, replace gas control valves.
Flame will not stay lit	Hot Surface Igniter	The ignition control will keep the gas control valves energized for 6 seconds. At the end of 6 seconds, the hot surface igniter must sense a flame, or, the ignition control will go into lockout. (The ignition control requires a minimum of 0.8 microamps D.C.) To check the flame sensing operation, connect a digital multimeter (capable of measuring D.C. micro-amps) between the "ground" terminal on ignition control and the ground lead. NOTE: This is a current measurement and the meter must be connected in series. If these readings are not achieved, check bypass orifice for obstructions, if bypass orifice is clear, replace the hot surface igniter. NOTE: The D.C. micro amp test must be conducted with the oven in low flame (bypass) operation. Turn the temperature control to its lowest setting.
	Power Supply	If there is sufficient micro-amp current, but the flame will not stay lit, check for proper polarity of the 120 VAC power supply
	Ignition Control	If there is sufficient micro-amp current, and the 120 VAC polarity is correct, but the flame will not stay lit, replace the ignition control. NOTE: Check for proper ground connection of the ignition control.
	NOTE: Flame should be lit at this time.	
Low flame is on, but no main flame	Temperature Control	Check for 120 VAC at terminal #7 to neutral on temperature control. If no voltage, trace voltage back to fuse holder. Turn the temperature adjustment knob to maximum temperature position and check for 120 VAC at the load terminal #8 and neutral. If 120 VAC is present and unit is not heating, refer to "Temperature Solenoid Valve" for next check. If 120 VAC is not present, proceed.
	Thermocouple Probe	WITH POWER ON AND THERMOCOUPLE LEADS ATTACHED TO THE TEMPERATURE CONTROL BOARD: Measure the D.C. millivolt output of these leads. Refer to thermocouple chart on page 17 for proper readings. If these readings are not achieved, replace the thermocouple.
	Temperature Set Potentiometer	Disconnect the potentiometer leads Disconnect the pot from the board. Place ohm meter test leads on the blue and green pot leads. Reading should be 1 K ohms. Place meter leads across the blue and purple pot leads and rotate knob from high to low. Repeat on green and purple leads. Check for even rise and fall of ohms reading to insure that there are no open or dead spots in the potentiometer. Check each lead to ground for shorts. Replace pot if it does not meet the above test
	Temperature Solenoid Valve	If 120 VAC is present on the temperature control board at load terminal #8 to neutral, check for voltage at temperature regulation valve. If voltage is present, listen for valve to open and close. Also check for opens or shorts in the coil. Replace as necessary.

Intermittent Heating	Thermal/Overload of Main Fan and Burner Blower Motors	The main fan motors and the burner blower motors are equipped with internal thermal protection and will cease to operate if overheating occurs. As the motors overheat and then cool, this will cause the units to cycle on and off intermittently. Improper ventilation or preventive maintenance may cause this. Also, most of the problems listed under "Oven will not heat" can cause intermittent failure.
Conveyor will not run	Voltage Supply	Check incoming voltage supply at line 1 to neutral. There should be a voltage reading of 120 VAC. If not present, check breakers.
	Fan Switch	See procedure for checking at beginning of section.
	10 Amp Fuse	Check and/or replace.
	Fuse holder	Check and/or replace.
	Speed Adjustment Potentiometer	This is a 0 to 10 K ohm, 1 turn potentiometer. With power off, remove the black and white pot leads from the motor control board at terminals P1, P2. Place the meter leads on the black lead (P2) and on the white lead (P1). Rotating the pot., slowly, from low to high, the meter readings should show an even transition from 0 to 10 K ohms ± 5%. There should be no dead or open spots through out the 1 turn of the pot. Check both leads to ground. There should be no continuity to ground. If any of the above checks fail, replace the pot
	DC Motor Control Board	Check for 120 VAC input to the control board at terminals L1 and L2. If not present, check wiring back to the fuse. If 120 VAC is present at L1 and L2, check both fuses on control board (8A line and 1A armature), check the VDC output at terminals A+ and A-. If 120 VAC is present at terminals L1 and L2, and DC voltage is present A+ and A-, but motor does not run, check gear motor as follows.
	Conveyor Gear Motor	If DC voltage is present at A+ and A- and the motor does not run, first check the mini breaker and then the conveyor. Refer to the next possible cause. Check the leads to the motor for evidence of any shorts or opens, and each lead to ground. Check motor brushes. From the top of the motor, rotate motor shaft to determine if there is a locked rotor or a locked gear box (use care so magnet and H.S. board are not damaged). Replace motor as needed.
	Conveyor	Check for any mechanical misalignment. Also, check for worn bearings. A conveyor belt that is over tightened will cause excessive bearing wear and sometimes, irregular speed.

Conveyor speed varying or intermittent	Power Supply	Check power supply at the DC control board for the 120 VAC at board terminals L1 and L2.
	Motor Control Board	Place the test meter probes on terminals A+ and A-. (With speed potentiometer set to maximum speed (Approximately 2 min.) The meter reading should be approximately 100 VDC (±3%), if voltage is not steady within limits, then the board is probably bad. Always check the speed pot., be sure it is okay before changing a board. This test is not always 100% accurate as this test is not performed at operating speeds. However, this test is the best method currently available.
	DC Gearmotor	If the DC control board is steady then the problem may be the motor or gearbox. Check the brushes in the motor for excessive arching and/or unusual wear. Check the motor and gearbox from instruction located under "possible cause" listing "conveyor gear motor."
	Magnet	Check to insure that the magnet (cemented to shaft of conveyor drive motor) has not been damaged, or come loose from motor shaft. Replace as needed.
	Hall Effect Sensor	Check for any physical damage to hall effect sensor (mounted on conveyor drive motor.) Check all wiring and connections for damage. Check all connections for tightness or proper location. Replace as needed. Connect new hall effect to system and check for steady operation.

Temp. display inoperative	Display Transformer	Measure the transformer primary for a nominal 120 VAC input, if voltage is not present, trace wiring back to the oven power source. Measure the secondary output, which will normally be 12-15 VAC. Voltage across terminals 1 and 3 on the temp. display should read 12-15 VAC. Terminals 1-2 and 2-3 should be 1/2 the voltage reading to 1-3. If the above secondary readings are not achieved, replace transformer.
	Temp. Display	If proper voltage is present at terminals 1, 2, and 3 on temperature display, but the display is not lighted, recheck all connections for tightness. If temperature display is still not operating, replace the temperature display.
Temp. Display inaccurate, erratic or inoperative	Thermocouple	Connect the thermocouple of a pyrometer to the thermocouple on the temperature control board. (Be sure to maintain proper polarity of thermocouple leads--see Adjustment Section for proper procedure.) The pyrometer will indicate oven temperature. Measure DC millivolts of thermocouple at the temperature display. See thermocouple chart in adjustment section for proper readings. Replace thermocouple if proper readings are not achieved. If readings are correct on the thermocouple, replace temperature display.

SCHEMATIC / 1600-000-A, 1601-000-A



REMOVAL, INSTALLATION & ADJUSTMENTS

MODEL SERIES 1600 ADVANTAGE

CAUTION !

BEFORE REMOVING OR INSTALLING ANY COMPONENT IN THE IMPINGER OVEN BE SURE TO DISCONNECT ELECTRICAL POWER AND GAS SUPPLY

BURNER CONTROL - HONEYWELL - REPLACEMENT

A. Remove appropriate control box cover.
B. Remove wires from control, note wire number and location for re-assembly.
C. Remove four (4) screws from control and replace.
D. Reassemble in reverse order and check system operation.

BURNER BLOWER MOTOR - REPLACEMENT

A. Remove appropriate control box cover.
B. Unplug motor connector.
C. Remove three (3) screws from blower tube at burner housing.
D. Remove air shutter assy. from old motor for installation on new motor assy.
E. Reassemble in reverse order and check system operation.
   NOTE: CHECK AIR SHUTTER ADJUSTMENT- should be set at 1/2 open.

HOT SURFACE IGNITER - REPLACEMENT

A. Remove appropriate control box cover.
B. Disconnect gas line at union.
C. Remove four (4) nuts from burner orifice bracket.
D. Remove tube for bypass flame.
E. Unplug connector at burner housing.
F. Remove three (3) screws from burner housing end cap and remove hot surface igniter and burner tube assy.
G. Replace igniter assembly and reassemble in reverse order. CAUTION: USE CARE NOT TO DAMAGE NEW IGNITER.
   NOTE: Check all gas line fittings for leaks. Make sure connector is seated properly.

BURNER INDICATOR LIGHT (GAS) - REPLACEMENT

A. Remove control box cover
B. Remove two (2) wires from light housing.
C. Slide light housing sideways to remove.
D. Reassemble in reverse order and check system operation.

CONVEYOR CONTROL POTENTIOMETER (10K OHM) - REPLACEMENT

A. Remove control box cover
B. Loosen two (2) allen screws and remove knob by sliding off shaft.
C. Remove nut from potentiometer shaft and push out.
D. Unplug wire connector from conveyor control board.
E. Reassemble in reverse order and check system operation.
F. Recalibrate conveyor control board.

CONVEYOR CONTROL BOARD - REPLACEMENT

A. Shut off power at main breaker.
B. Remove control panel top and front cover.
C. Disconnect wiring (push on connectors) from control board, note proper location of connectors for reinstallation and exchange boards on the mounting bracket before reinstallation.

D. Reassemble in reverse order and check system operation.

CONVEYOR CONTROL BOARD - CALIBRATION

A. Connect digital volt meter to the hall effect sensor. Black meter lead connected to black hall effect sensor lead, red meter lead to white hall effect sensor lead.
B. Turn conveyor control knob fully counter clockwise. Loosen knob and align with calibration line and tighten knob.
C. Set knob to 2 minute setting. Adjust "max" pot on conveyor control to 219 Hz.
D. Set control knob to 20 minute setting, and adjust "min" pot on conveyor control 21.9 Hz. Recheck at 2 minute and 20 minutes until proper readings are achieved. Seal pots with glyptol or nail polish.

CIRCUIT BREAKER

A. Shut off power at main breaker.
B. Remove control panel top and front panel.
C. Disconnect two (2) wires from circuit breaker.
D. Remove knurled mounting nut and push out.
E. Reassemble in reverse order.
NOTE: Be sure to reset breaker before operating.

CONVEYOR DRIVE MOTOR - REPLACEMENT

A. Shut off power at main breaker.
B. Remove conveyor.
C. Remove control panel top and front cover.
D. Disconnect wiring from motor and mark for reassembly.
E. Remove sprocket from motor drive shaft.
F. Remove 4 screws and remove conveyor motor and mounting bracket.
G. Remove mounting bracket from conveyor motor assembly.
H. Reassemble in reverse order.

REVERSING CONVEYOR DIRECTION

A. Shut off power at main breaker.
B. Remove control panel top.
C. Reverse wires fastened to terminals A+ and A- on conveyor control board. (See schematic diagram for wire numbers.)
D. Reassemble in reverse order.

HALL EFFECT SENSOR - REPLACEMENT

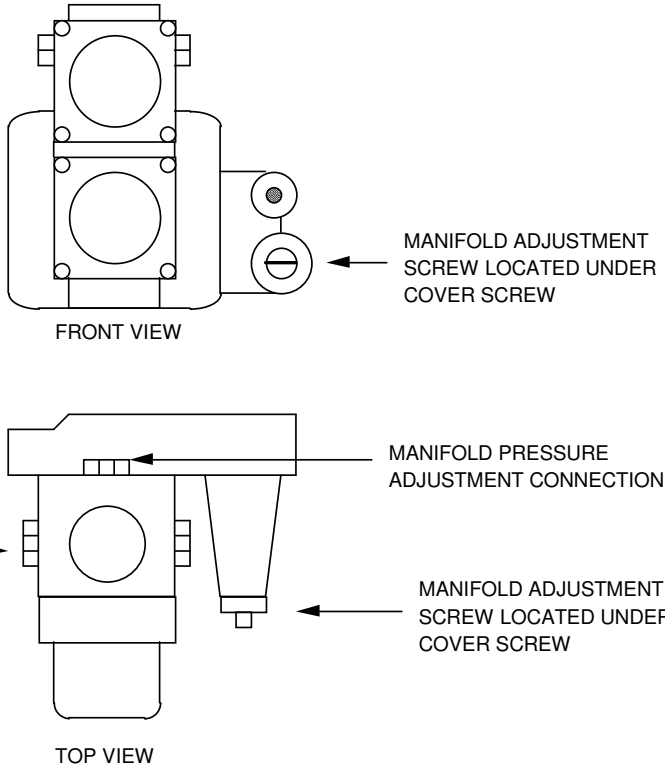
A. Shut off power at main breaker.
B. Remove control panel top and front cover.
C. Remove conveyor motor assembly.
D. Remove wire connector from hall effect sensor board.
E. Remove two (2) screws from conveyor drive motor.
F. Remove sensor board from mounting bracket.
G. Reassemble in reverse order.

FUSEHOLDER - REPLACEMENT

A. Remove appropriate control box cover.
B. Remove two (2) wires, note wire number and location.
C. Remove mounting nut on back side of fuse holder and push out.
D. Reinstall in reverse order and check system operation.

GAS VALVE, DUAL SAFETY - REPLACEMENT

A. Remove appropriate control box cover.
B. Remove incoming gas line.
C. Remove screws from incoming nipple mounting bracket.
D. Remove incoming nipple.
E. Remove bypass tube assy.
F. Disconnect pipe union.
G. Disconnect wiring from control valve (four [4] push on connectors), make note of wire numbers and location for reinstallation.
H. Remove gas piping from old valve and install on new one.
I. Reassemble in reverse order and check system operation. Set manifold pressure on gas valve. Pressure should be 3.5 in W.C. Nat., 10 in W.C. L.P.
NOTE: Check all gas line fittings for leaks, check and adjust manifold pressure.



TEMPERATURE REGULATING VALVE - REPLACEMENT

A. Remove appropriate control box cover
B. Remove bypass tube assy.
C. Remove four (4) nuts from burner orifice bracket.
D. Disconnect pipe union.
E. Disconnect two (2) wires from valve and remove assembly.
F. Remove gas piping from old valve and install on new one.
G. Reassemble in reverse order and check system operation. NOTE: Check all gas line fittings for leaks and insure valve gas flow is in proper direction .

MAIN ORIFICE - REPLACEMENT

A. Remove appropriate control box cover.
B. Remove bypass tube assembly.
C. Remove four (4) nuts from burner orifice bracket.
D. Disconnect pipe union.

E. Remove assembly and replace main orifice.
F. Reassemble in reverse order and check system operation.
NOTE: Check all gas line fittings for leaks.

TEMPERATURE CONTROL POTENTIOMETER - REPLACEMENT

A. Remove control box cover.
B. Loosen screw and slide knob off potentiometer shaft.
C. Remove mounting nut and push out.
D. Remove three (3) wires from electronic temperature control, note wire color and location for reinstallation.
E. Reassemble in reverse order and check system operation.

ON-OFF SWITCH (POWER) - REPLACEMENT

A. Remove control box cover.
B. Depress spring clips on side of switch and push out.
C. Remove wires from back of switch, note wire number and location.
D. Reassemble in reverse order and check system operation.
NOTE: Make sure switch housing is fully seated in control box housing.

DUAL TEMPERATURE DISPLAY - REPLACEMENT

A. Shut off power at main breaker.
B. Remove control panel top and front cover.
C. Remove all wires from temperature display and mark wires for reassembly.
D. Pry temperature display to remove from mounting tabs (this is a pressure fit).
E. Reassemble in reverse order.

CALIBRATE TEMPERATURE

A. (See 'Temperature setting for new temperature control board'.) Set Temp. Control to 500°F. Allow temperature to stabilize.
B. "Fine Tune" temperature setting to achieve measured temperature swings from 497°F to 503°F. When actual temperature falls between 497°F and 503°F, the display must show 500°F.
C. Adjust temp. adj. pot on Temp Display to achieve a display reading of 500°F (260°C).

TRANSFORMER-TEMPERATURE DISPLAY - REPLACEMENT

A. Remove control box cover and front panel.
B. Remove five (5) wires (2 primary side, 3 secondary side), note color and location of wires for reinstallation.
C. Remove two (2) screws from transformer base and replace assembly.
D. Reassemble in reverse order and check system operation.

BURNER CONTROL TRANSFORMER - REPLACEMENT

A. Remove appropriate control box cover.
B. Remove two (2) wires on primary side, note color and location.
C. Remove two (2) wires on secondary side at burner control (Honeywell).
D. Remove two (2) screws from transformer base and replace assembly.
E. Reinstall in reverse order and check system operation.

CAPACITOR, MAIN FAN MOTOR (7.5 MFD/370V) - REPLACEMENT

A. Remove appropriate control box cover.
B. Remove two (2) wires from capacitor, note wire number and location.
WARNING: Capacitor has a stored charge, discharge before handling or testing.
C. Cut two (2) tyraps securing capacitor to base and replace.
D. Reinstall in reverse order and check system operation.

RELAY - REPLACEMENT

A. Remove control box cover.
B. Remove wires from relay, note wire numbers and location for reinstallation.
C. Remove two (2) screws from relay base and replace relay.
D. Reassemble in reverse order making sure wire connectors are properly seated.
E. Check system operation.

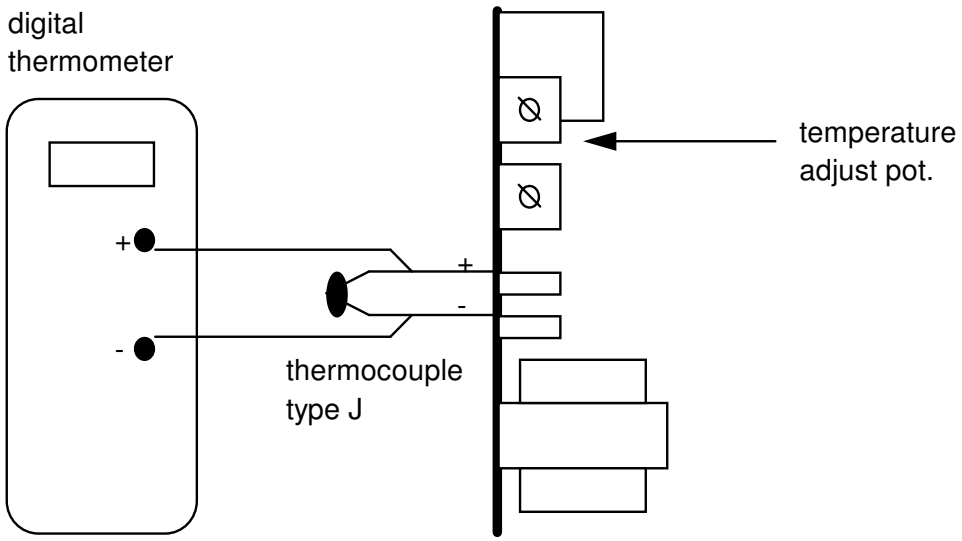
THERMOSTAT, COOLING FAN - REPLACEMENT

A. Remove appropriate control box cover.
B. Remove two (2) wires from thermostat, note wire number and location.
C. Remove two (2) mounting screws and replace thermostat.
D. Reassemble in reverse order and check system operation.

ELECTRONIC TEMPERATURE CONTROL - REPLACEMENT

A. Remove control box cover and front panel.
B. Identify correct control and remove wires from control. Note wire number and location for reinstallation.
C. Remove temperature control from mounting tabs.
D. Reassemble in reverse order and check system operation.

TEMPERATURE SETTING FOR NEW TEMPERATURE CONTROL BOARD



PROCEDURE FOR SETTING MAXIMUM TEMPERATURE POTENTIOMETER (P6)

NOTE: When replacing temp control, turn oven temperature control to its maximum heat position and allow 30 minute preheat before calibrating. Connect temperature probe to the oven thermocouple leads at the temperature control board and adjust potentiometer to a maximum temperature of 600°F (315°C). (See Diagram Above)

HIGH LIMIT THERMOSTAT - REPLACEMENT

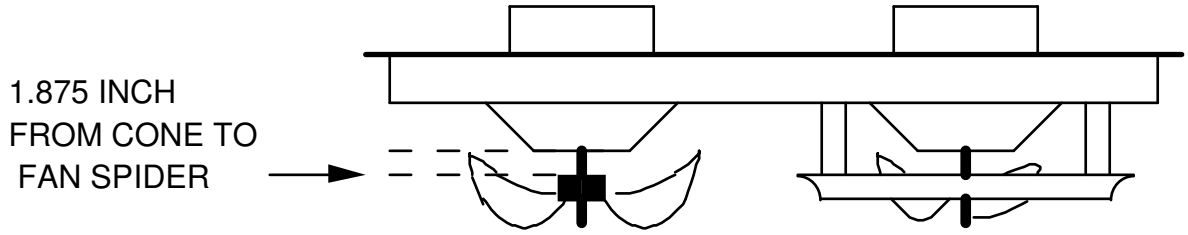
A. Remove appropriate control box cover.
B. Remove two (2) wires from thermostat, note wire numbers and location for reinstallation.
C. Remove screws from bracket and remove thermostat.
D. Reassemble in reverse order and check system operation.
NOTE: Depress reset button to insure thermostat is set for operation.

COOLING FAN MOTOR - REPLACEMENT

A. Remove appropriate control box cover.
B. Remove mounting screws.
C. Unplug electrical connector and remove fan motor assembly.
D. Reassemble in reverse order and check system operation.

MAIN FAN MOTOR - REPLACEMENT

A. Shut off gas supply and remove gas line and manifold lines from back of oven.
B. Remove screws from motor cover housing and lift off.
   NOTE: When ovens are stacked, all motor cover housings are fastened together.
C. Unplug power connector .
D. Unplug thermocouple.
E. Unplug two (2) motor connectors.
F. Remove eight (8) bolts from oven back (4 left, 4 right) and lift out.
G. Remove one (1) screw from fan hub and slide fan blade off of motor shaft.
   (Note location of fan blade for reinstallation).
H. Loosen lock nuts on cone. Remove two mounting bolts and remove motor from back assy.
I. Remove four (4) hex head screws from motor mount bracket.
   Remove motor mount from motor and reinstall on new motor.
J. Reassemble in reverse order.
   NOTE:
   1. Make sure motor is centered in back housing.
   2. Verify correct location of fan blade and that it is not hitting fan shroud.
   3. Make sure all connectors are properly seated and making good contact.
   4. When reinstalling gas manifold across back of oven, check all fittings for leaks.
K. Check system operation (allow 30 minute preheat for all checks).
   NOTE: Position of the fan on the motor shaft will be 1.875" from the top of the oven back cone to the blade spider assembly on the fan hub. (See drawing below.)



THERMOCOUPLE (TYPE J) - REPLACEMENT

A. Remove control box covers. Remove motor cover and remove oven back to access thermocouple.
   NOTE: Removal of oven back assy. is required to replace thermocouples.
B. Remove thermocouple from wire form in oven chamber and remove from chamber.
   NOTE: R. H. Thermocouple (viewed from front) is connected directly to the temperature control board, remove two (2) wires, make note of wire colors (terminal #6 is White + and terminal #7 is Red-) and location for reinstallation. When changing L.H. Thermocouple (viewed from front), the back motor cover must also be removed to gain access to the thermocouple connector plug.
C. Reassemble in reverse order making sure bulb is placed <u>securely</u> in the wire form in the oven chamber.
D. Check system operation, recalibrate as needed. NOTE: The R.H. and L.H. Thermocouples have different connectors on the wire ends and must be ordered accordingly.

INFORMATION:

When two wires composed of dissimilar metals are joined together and one of the ends is heated, a continuous current flow is generated. We use an iron constant (Type J) thermocouple. The iron wire increases the number of dissimilar junctions in the circuit.

It is possible to check a thermocouple with a properly calibrated D.C. millivolt meter. At 32°F, the millivolt reading should be 0.00. This can be checked by inserting the thermocouple into an ice bath.

The millivolt reading at 72°F should be 1.134.

When using the following chart, the temperature at the terminal connections must be noted. This temperature is called the Junction Temperature.

The following chart lists the thermocouple millivolt readings from 200°F to 600°F.

				O	**V**	**E**	**N**		**T**	**E**	**M**	**P**	
		200°F	250°F	300°F	325°F	350°F	400°F	425°F	450°F	500°F	550°F	600°F
J	90°F	3.26	4.77	6.30	7.06	7.83	9.37	10.14	10.91	12.46	14.00	15.53
U	88°F	3.32	4.83	6.36	7.12	7.89	9.43	10.20	10.97	12.51	14.05	15.59
N	86°F	3.37	4.88	6.41	7.17	7.94	9.49	10.26	11.03	12.57	14.11	15.65
C	84°F	3.43	4.94	6.47	7.23	8.00	9.54	10.31	11.09	12.63	14.19	15.71
T	82°F	3.49	5.00	6.53	7.29	8.06	9.60	10.37	11.14	12.69	14.23	15.76
I	80°F	3.55	5.06	6.59	7.35	8.12	9.66	10.43	11.20	12.74	14.28	15.82
O	78°F	3.60	5.11	6.64	7.40	8.17	9.72	10.49	11.26	12.80	14.34	15.86
N	76°F	3.66	5.17	6.70	7.46	8.23	9.77	10.55	11.32	12.86	14.40	15.94
	75°F	3.69	5.20	6.73	7.49	8.26	9.80	10.57	11.35	12.89	14.43	15.97
	74°F	3.72	5.23	6.76	7.52	8.29	9.83	10.60	11.37	12.92	14.46	15.99
	72°F	3.78	5.29	6.82	7.58	8.35	9.89	10.66	11.43	12.97	14.51	16.05
T	70°F	3.83	5.34	6.87	7.63	8.40	9.95	10.72	11.49	13.03	14.57	16.11
E	68°F	3.89	5.40	6.93	7.69	8.46	10.00	10.78	11.55	13.09	14.63	16.17
M	66°F	3.95	5.46	6.99	7.75	8.52	10.06	10.83	11.61	13.15	14.69	16.23
P	64°F	4.01	5.52	7.05	7.81	8.58	10.12	10.89	11.66	13.20	14.74	16.28
	62°F	4.06	5.57	7.10	7.86	8.63	10.18	10.95	11.72	13.26	14.80	16.34
	60°F	4.12	5.63	7.16	7.92	8.69	10.24	11.01	11.78	13.32	14.86	16.40

BEARING, CONVEYOR - REPLACEMENT

A. Remove conveyor from oven and place on a flat work surface.
B. Remove connecting links from conveyor belting. See Installation and Operating Instructions Manual.
C. Remove conveyor belting from conveyor. Remove drive sprocket from drive shaft
D. Move drive shaft or idle shaft toward end of conveyor, and shaft with bearing will now slip out of holding bracket.
E. Replace bearing and reassemble.

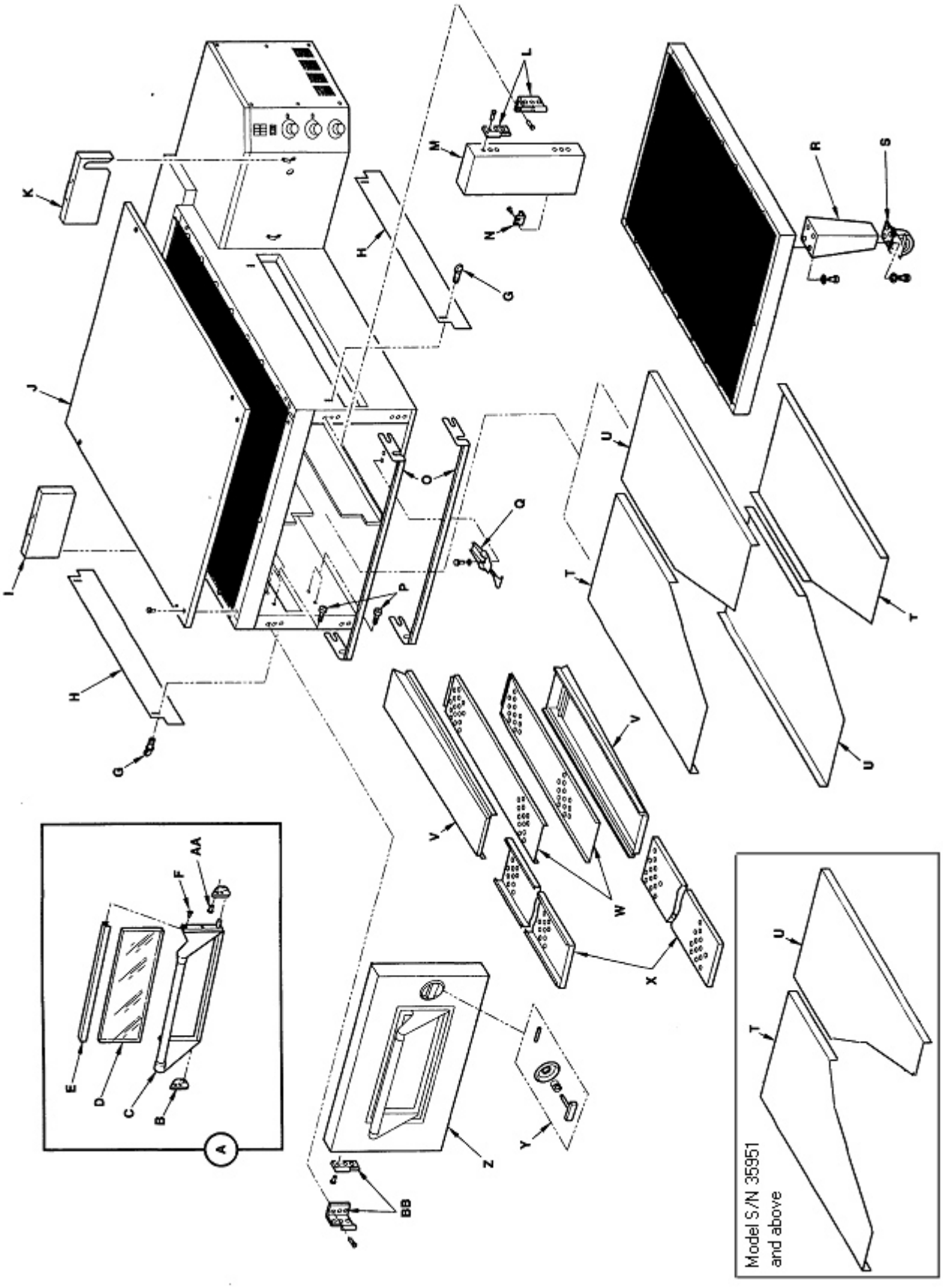
PARTS / GENERAL - 1600-000-A ADVANTAGE SERIES

LETTER	PART #	DESCRIPTION
A	369110	Access Window Assy
B	369929	Window Retainer
C	369926	Window Frame, Bottom
D	369925	Glass, Access Window
E	369927	Window Frame, Top
F	369930	Screw, 10-32x1/4
G	369211	Thumb Screw
H	369058	Baffle
I	370253	Drive Cover L.H.
J	1609	Oven Top
K	370252	Drive Cover L.H.
L	369745	Hinge Assy., Right
M	369723	Door Assy., Small
N	369783	Latch, Spring
O	369717	Finger Retaining Bracket
P	369057	Screw, Finger Retaining Bracket
Q	369501	Latch
R	369238	Leg
S	369030	Caster, High Stand
	369390	Caster, Low Stand
T	370167	Baffle, Air Return U.L. L.R. (S/N 35950 and below)
	370663**	Baffle, Air Return U.L. (S/N 35951 and above)
U	370166	Baffle, Air Return U.R. L.L. (S/N 35950 and below)
	370662**	Baffle, Air Return U.R. (S/N 35951 and above)
V	370168	Finger Housing T-1, T-3, B-2, B-4 (S/N 35950 and below)
	370665***	Finger Housing T-1, T-3, B-2, B-4 (S/N 35951 and above)
	370169	Finger Housing T-2, T-4, B-1, B-3 (S/N 35950 and below)
	370664***	Finger Housing T-2, T-4, B-1, B-3 (S/N 35951 and above)
W		Columnating Plates—See Installation Operations Manual
X	369707	Finger Cover
Y	369740	Handle Assy.
Z	369718	Door Assy., Large
AA	369931	Screw, 8-32x3/8
BB	369746	Hinge Assy. Left

**** Units from S/N 35951 and above DO NOT contain lower Air Return Baffles. These units only contain a total of two (2) Air Return Baffles which are placed above the top finger assemblies.**

***** These parts have minor design changes not shown in the exploded view drawing on page 19.**

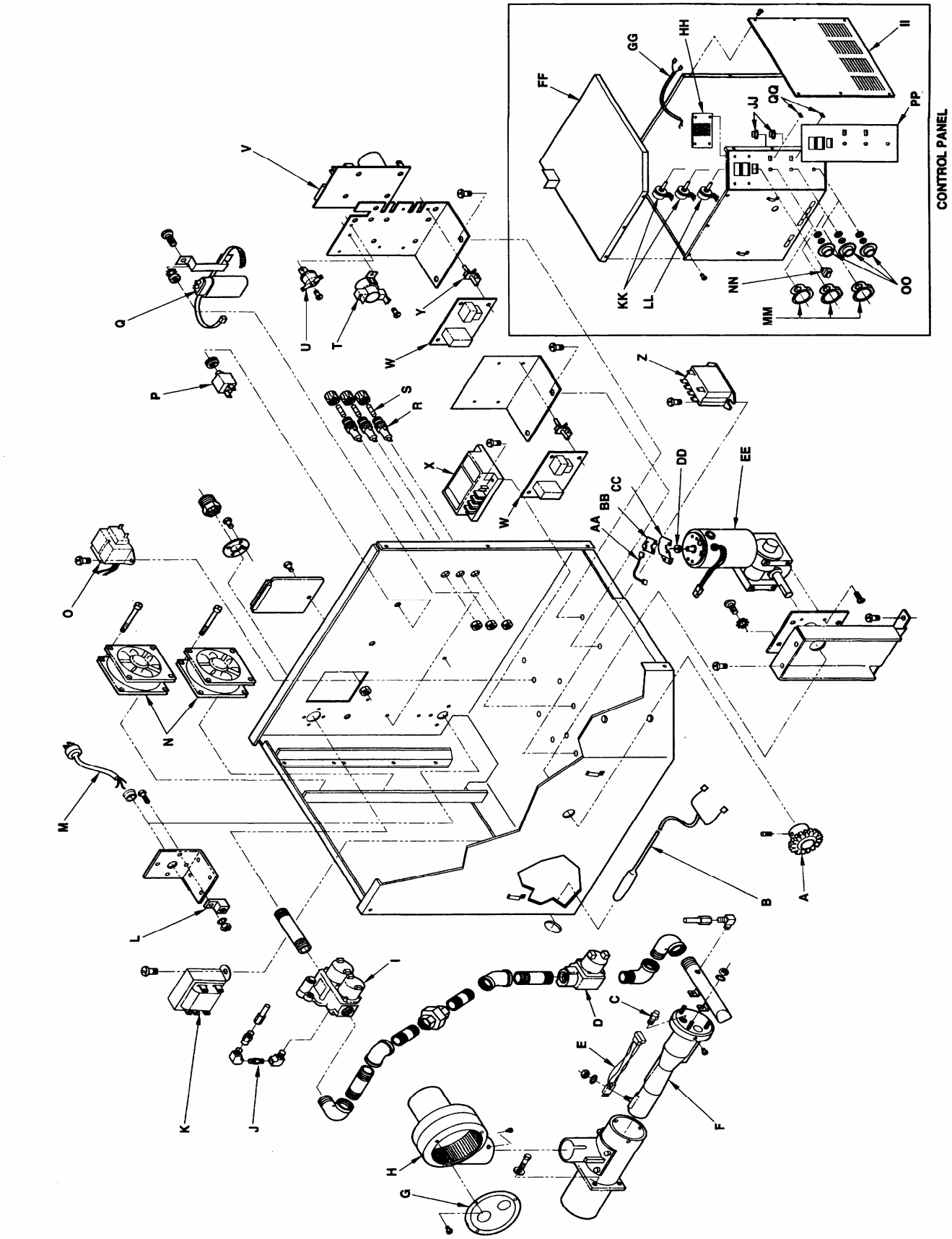
BLOW UP / GENERAL – 1600-000-A ADVANTAGE SERIES



PARTS / CONTROL BOX, RIGHT - 1600-000-A, 1601-000-A

LETTER	PART #	DESCRIPTION
A	369158	Sprocket, 10 Tooth
B	369705	Thermocouple
C	369757	Main Orifice, Nat.
	370279	Main Orifice, L.P.
D	369398	Solenoid Valve
E	369552	Hot Surface Igniter
F	369755	Venturi, Nat.
	369642	Venturi, L.P.
G	369401	Air Shutter Assy.
H	369366	Burner Blower Motor
I	369263	Gas Valve
J	369556	By-pass Orifice, Nat.
	370276	By-pass Orifice, L.P.
K	369173	Transformer, Temp. Display
L	353082	Ground Lug
M	369537	Power Cord
N	369124	Cooling Fan
O	369531	Transformer, Burner
P	369154	Circuit Breaker .7A
Q	369192	Capacitor
R	369012	Fuse Holder
S	369013	Fuse, 3A
	369014	Fuse, 10A
T	369507	Thermostat, Cooling Fan
U	369431	Thermostat, Control Box Hi-Limit
V	369803	Conveyor Control
W	369465	Temperature Control
X	369532	Ignition Control
Y	369856	Support Stand-Off
Z	369523	Relay
AA	369810	Cable, Hall Effect Sensor
BB	369823	Hall Effect Sensor
CC	369824	Bracket, Hall Effect Sensor
DD	369822	Magnet, 8 Pole
EE	370244	Conveyor Motor Assy (includes BB, CC, DD)
FF	370251	Control Box Top R.H.
GG	370058	Jumper, Thermocouple
HH	370249	Temperature Display, Dual
II	370256	Side Panel R.H.
JJ	369128	Pilot Light 125V
KK	369449	Temperature Control Pot. Assy.
LL	369809	Conveyor Pot. Assy.
MM	370277	Knob Guard
NN	369805	Switch, On/Off
OO	369316	Knob
PP	370248	Label, Oven Operation
QQ	350224	Lens, Yellow

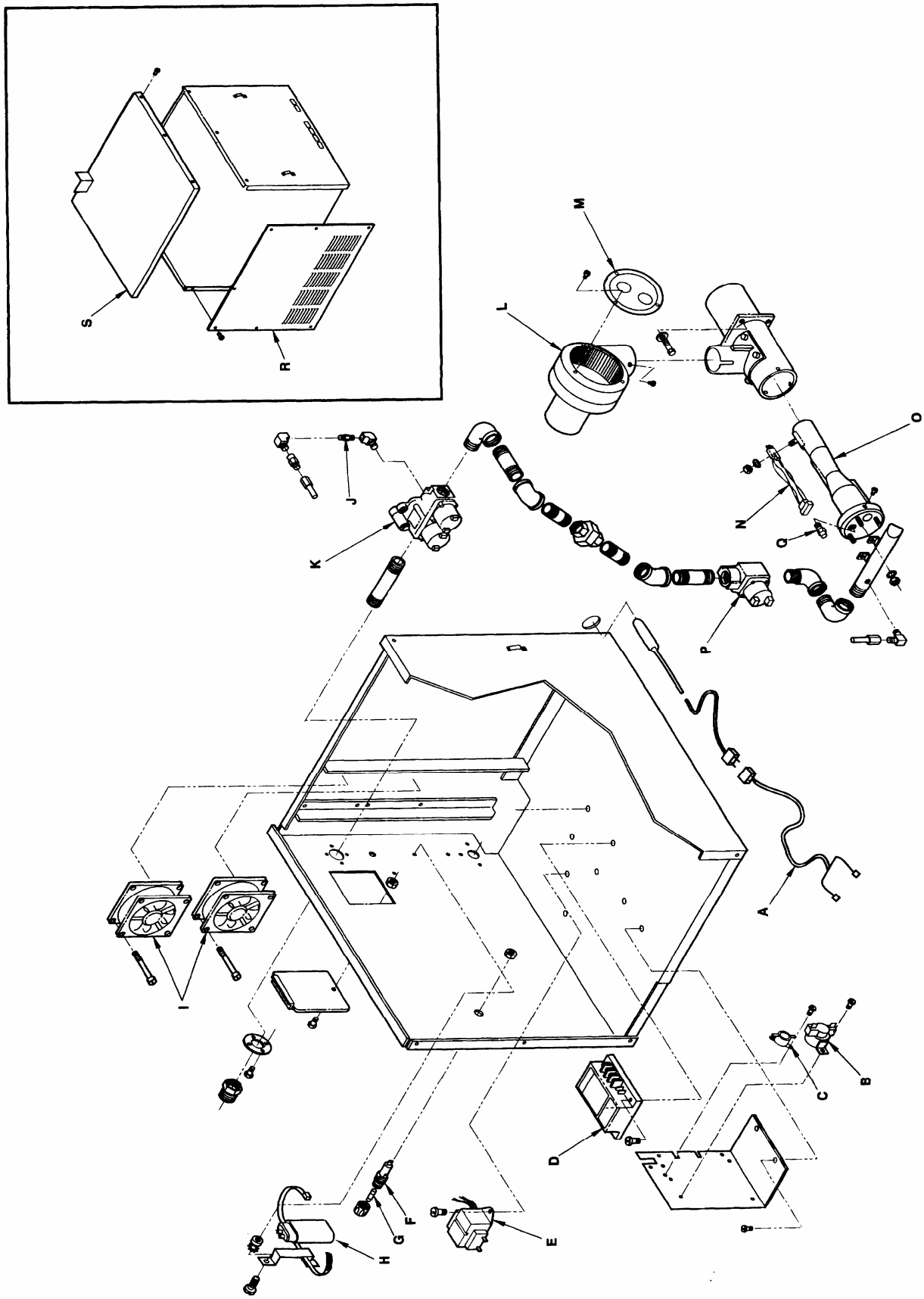
BLOW UP / CONTROL BOX, RIGHT - 1600-000-A, 1601-000-A



PARTS / CONTROL BOX, LEFT - 1600-000-A, 1601-000-A

LETTER	PART #	DESCRIPTION
A	369706	Thermocouple with Extension
B	369507	Thermostat, Cooling Fan
C	369431	Thermostat, Control Box Hi-Limit
D	369532	Ignition Control
E	369531	Transformer, Burner
F	369012	Fuse holder
G	369014	Fuse, 10A
H	369192	Capacitor
I	369124	Cooling Fan
J	369556	By-pass Orifice, Nat.
	370276	By-pass Orifice, L.P.
K	369263	Gas Valve
L	369366	Burner Blower Motor
M	369401	Air Shutter Assy.
N	369552	Hot Surface Igniter
O	369755	Venturi, Nat.
	369642	Venturi, L.P.
P	369398	Solenoid Valve Nat/L.P.
Q	369757	Main Orifice, Nat.
	370279	Main Orifice, L.P.
R	370272	Side Panel L.H.
S	370250	Control Box Top L.H.

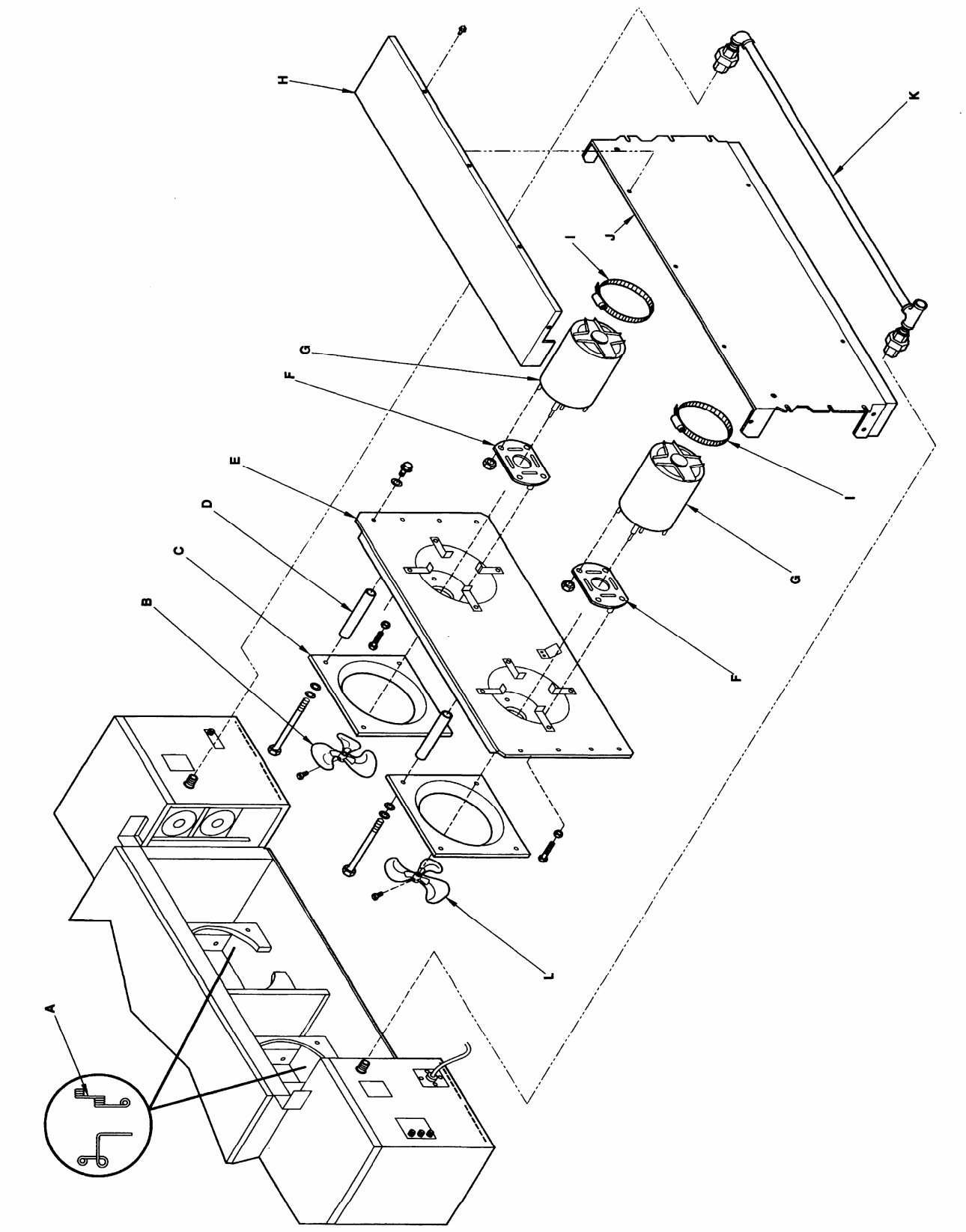
BLOW UP / CONTROL BOX, LEFT - 1600-000-A, 1601-000-A



PARTS / OVEN BACK - 1600-000-A - SERIES

LETTER	PART #	DESCRIPTION
A	369547	Wire Form Thermostat Bulb
B	369724	Fan, Clockwise Rotation
C	369776	Fan Shroud
D	369777	Stand-Off
E	369778	Rear Wall Assy.
F	369761	Motor Mount
G	369726	Motor, Main Fan 120V 60 Hz
H	1627	Duct Cap
I	369033	Motor Clamp
J	370245	Rear Duct
K	370246	Manifold Assy.
L	369725	Fan, Counter-Clockwise Rotation

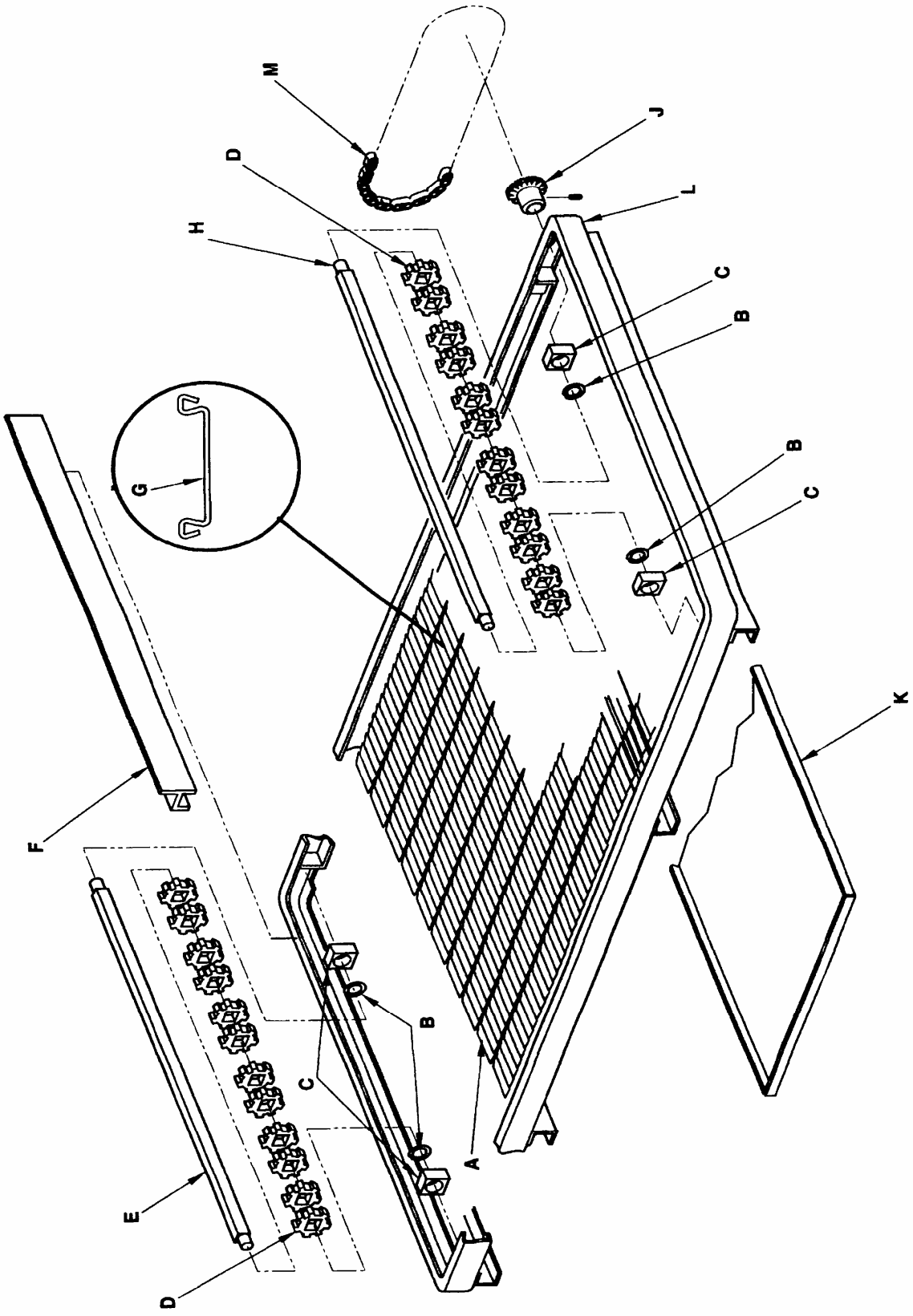
BLOW UP / OVEN BACK - 1600-000-A - SERIES



PARTS / CONVEYOR - 1600-000-A - SERIES

LETTER	PART #	DESCRIPTION
	369830	Complete Conveyor
A	369816	Conveyor Belting
	370092	Belt, 1 Foot Section
B	369825	Retaining Ring
C	369813	Conveyor Bearing Block
D	369314	Roll, Conveyor, Notched
E	369812	Conveyor Idler Shaft
F	369160	Conveyor Pan Stop
G	369814	Connecting Link
H	369811	Conveyor Drive Shaft
J	369161	Roller Chain Sprocket
K	369806	Crumb Pan
L	370050	Conveyor Frame
M	369162	Drive Chain

BLOW UP / CONVEYOR - 1600-000-A – SERIES



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