



MARKET FORGE

3500 SERIES CONVECTION STEAM COOKER PARTS AND SERVICE MANUAL

EFFECTIVE JULY 30, 2014

Superseding All Previous Parts Lists.

The Company reserves the right to make substitution in the event that items specified are not available.

ERRORS: Descriptive and/or typographic errors are subject to correction.

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PRINCIPLES OF OPERATION

The 3500 Pressureless Steam Cooker consists of two identical cooking compartments, one above the other, in a single cabinet assembly. Each compartment is fitted with independent electrically controlled steam circuits and spring-loaded, self-sealing doors with slam action latches. Compartments can be used separately or simultaneously for either constant steam or 60 minute timing. The principles of operation in this section include an explanation of steam, steam condensing, and electrical circuits and their functioning.

PLUMBING CIRCUITS

The plumbing circuits consist of the piping, steam solenoid valves, orifice, drain, and cold water condenser required to provide controlled steam application to the cooking compartments. A simplified diagram of these circuits is shown on the following page.

NOTE: This is strictly a pictorial schematic diagram and is not intended to show the actual configuration of the plumbing. All components are shown in correct relationship with each other. However, the diagram does not show their actual locations or position within the cooker.

As shown in the diagram, steam inlet and exhaust connections are connected at the factory directly into a steam boiler or direct-connected steam plumbing enclosed within the base cabinet on which the cooker is mounted. The boiler (or direct-connected steam control system) is equipped to supply constant, regulated steam at 14–15 PSI. Steam exhaust, having been reduced to water by the cold water condenser, is directed into the boiler (or direct-connected steam control) drain system. Steam inlet lines for compartments are equipped with normally closed solenoid valves operated by the electrical control circuits. The inlet valves are opened whenever the compartment control circuit is activated by use of the 60 minute timers.

STEAM INLET LINE

A steam supply line is plumbed from the boiler output (or direct-connected steam control) to a 1/2 inch barb fitting connected to the input sides of both steam inlet solenoid valves. When a cooking compartment is not in use, the valve for the compartment remains closed to prevent steam from entering. During operation, the appropriate inlet solenoid valve is opened by activation of the control circuit.

Steam is projected onto the surface of pans of food loaded into the compartment by an orifice located inside the compartment. Steam continues to flow through the compartment in this manner until the control circuit closes the solenoid valve.

STEAM EXHAUST AND DRAIN LINES

Perforated strainers at the drain line openings inside each compartment allow only steam, condensation, and liquid cooking drainage to enter. Prior to discharge into the boiler drain system, steam is converted to water by the cold water condensing systems for each compartment.

STEAM EXHAUST CONDENSING SYSTEM

The steam condensing system consists of the identical, two-position, normally closed cold water solenoid valves, with outlet sides connected into the exhaust plumbing for each cooking compartment. A spray nozzle directs cold water about the inside of the drain lines to increase cold water contact with exhausted steam.

Valve inlet sides are connected remote from the supply line of the steam boiler (or direct-connected steam plumbing). The valves respond to a thermostatic switch located inside the compartment. When the timer starts the cold water solenoids will energize.

ELECTRICAL CIRCUITS

The electrical circuits of the cooker control the power to activate timer motors and energize solenoid-operated valves and circuits, which in turn control application of steam to the cooking compartment and condensation of steam from the exhaust line. The cooker operates on 120V, 2 amp, 60Hz electrical service connected to all circuits from the circuits of the steam boiler (or direct-connected steam controls) contained within the cabinet on which the cooker is mounted. Power is supplied to the control circuit at all times when the shut-off device for the unit (supplied by the user) is in the ON position.

CONTROL CIRCUIT COMPONENTS

A brief description of the electrical circuit elements follows.

INDICATOR LIGHTS

An indicator light is included for both compartments. The light remains on (red) at all times when the coinciding timer dial is set and the door interlock switch is closed. The light turns off at the end of the timed cooking duration.

BUZZER

The buzzer is an alarm device that operates by oscillation of a striker against the core of an electromagnet. When the 60 minute timer dials reach the "0 Minute" position, the buzzer coil is energized to sound the buzzer. Movement of the timer dial to the OFF position opens the contact to the buzzer coil to shut it off.

60 MINUTE TIMER/CONSTANT STEAM

The timer contains a 120-volt AC synchronous motor that drives a timing dial through a gear reduction and clutch mechanism. The timer dial is manually set for any interval of operation from 0 to 60 minutes or constant steam as read on the calibrated dial face. The manual rotation of the dial moves the common element of the timer switch from the neutral (OFF) position to contact, which connects with the steam inlet solenoid valve operating circuit.

The cooker is placed into automatic operation with the setting of the timer dial. Its timing cycle, however, is automatically delayed by a thermostatic switch, which assures operating temperature is achieved before the timer motor begins to "time out." When the timer motor has operated for the preset duration, the common element is transferred to contact (4), returning the inlet solenoid valve to the closed position and energizing the buzzer. Contact to the buzzer circuit remains closed until the dial is manually turned to the OFF position, returning the common element (1) of the timer switch to the neutral position.

DOOR INTERLOCK SWITCH

The interlock switch is a single-pole proximity switch with normally open contacts. The switch is operated by the proximity of a magnet within the door. When the door is open, the switch contacts remain in the open position. When the door is closed and securely latched in place, the magnet is near the switch to close the contacts. Connected between the operating contact of the timers and the steam inlet solenoid valve, the door switch acts as a protective device to interrupt valve operation unless the door is closed.

THERMOSTATIC SWITCH

The thermostatically operated switch is a two-position, normally open switch mounted on the cooking compartment. The switch functions to activate the cold water solenoid valves of the steam condensing system and to delay timer motor operation until the compartment temperature reaches 195°F, thus assuring that cooking temperature exists throughout the timed duration.

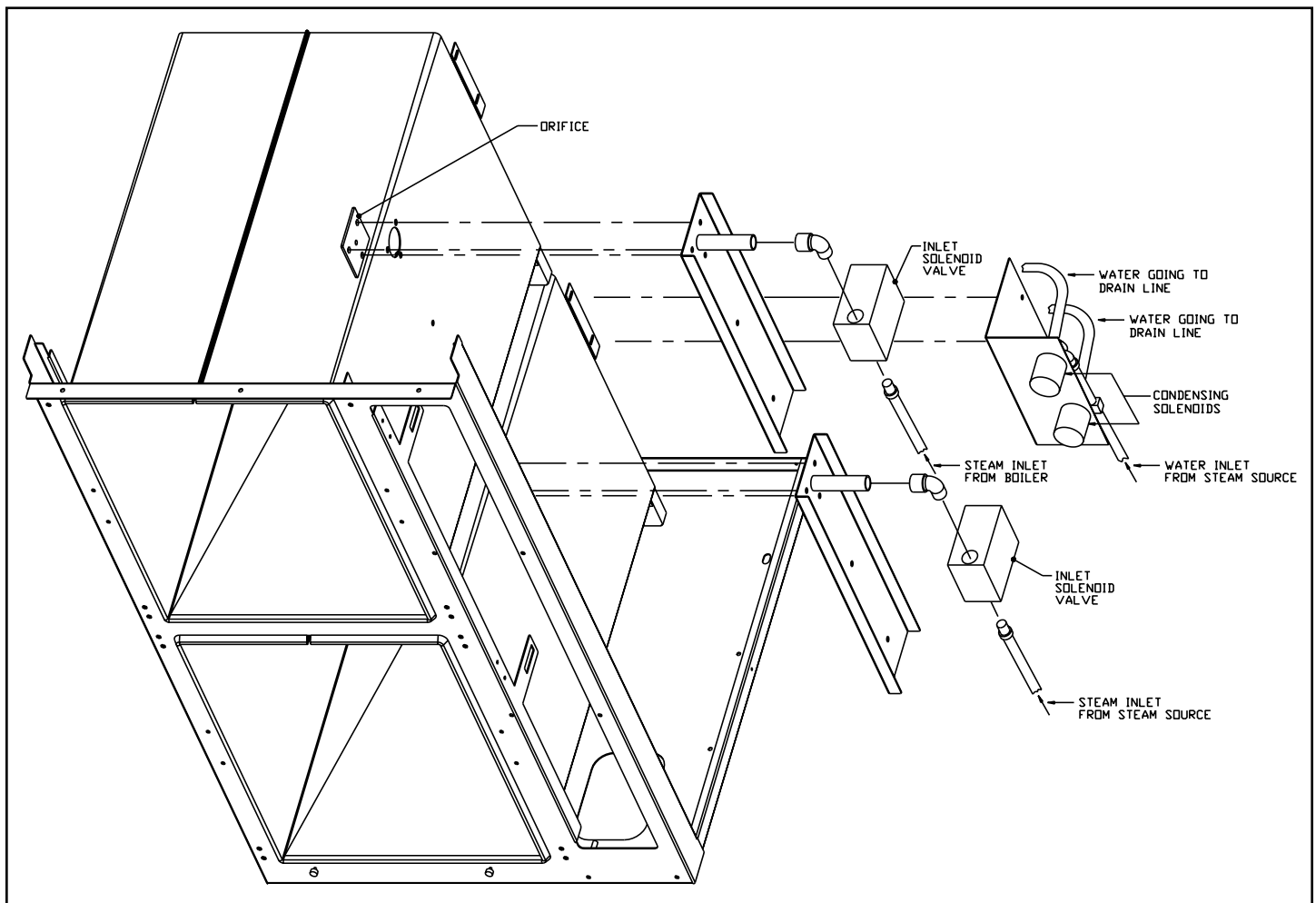


Figure 1

TROUBLESHOOTING

GENERAL TROUBLESHOOTING GUIDE

PROBABLE CAUSE	REMEDY
1. INDICATOR LIGHT FAILS TO LIGHT WITH TIMER SET.	
A. Power to Cooker Off.	Located external circuit breaker for incoming power and place in ON position.
B. Door interlock switch contact not closed.	Shut cooker door to close switch contacts. Check alignment of door with switch.
C. Door interlock switch faulty.	Replace switch. (Refer to door interlock switch section)
D. Indicator light burned out.	Replace light.
E. Faulty timer contacts.	Replace timer. (Refer to 60 minute timer section)
F. Faulty wiring.	Inspect condition of wire and tightness of all connections. Correct as needed.
2. STEAM FAILS TO ENTER COMPARTMENT WITH INDICATOR LIGHT ON.	
A. Faulty steam solenoid valve.	Replace valve. (Refer to steam solenoid valve section)
B. Faulty wiring.	Inspect condition of wire and tightness of all connections. Correct as needed.
3. STEAM ENTERS COMPARTMENT CONTINUOUSLY. TIMER DIAL NOT TURNING.	
A. Constant steam position.	Move knob to timing location.
B. Faulty thermostatic switch.	Replace switch. (Refer to cooking compartment thermostatic switch section)
C. Faulty timer motor.	Replace switch. (Refer to 60 minute timer section)
D. Faulty steam solenoid valve.	Replace switch. (Refer to steam solenoid valve section)
E. Faulty wiring.	Inspect condition of wire and tightness of all connections. Correct as needed.
4. STEAM CONTINUES TO FLOW INTO COMPARTMENT AND/OR BUZZER FAILS TO SOUND AT END OF TIMER SETTING.	
A. Timer contacts faulty.	Replace timer. (Refer to 60 minute timer section)
B. Buzzer faulty.	Replace buzzer. (Refer to cooking compartment thermostatic switch section)
C. Faulty wiring.	Inspect condition of wire and tightness of all connections. Correct as needed.
5. STEAM FLOWS CONTINUOUSLY FROM BOILER (OR DIRECT CONNECTED STEAM CONTROL) DRAIN LINE WITH COOKER IN OPERATION.	
A. Cold water not connected.	Turn on external shut-off valve.
B. Faulty thermostat.	Replace thermostat. (Refer to cooking compartment thermostatic switch section)
C. Faulty cold water solenoid.	Replace valve.
D. Faulty wiring.	Inspect condition of wire and tightness of all connections. Correct as needed.

The electrical trouble-shooting procedures that follow require access to components and terminals of the electrical control panel. Electrical controls are reached by removing screws that fasten the control panel to the frame. The panel may be pulled forward for testing while inter-connected to the cooker circuits or disconnected at the pin connection for complete removal and repair.

ELECTRICAL FAULT ISOLATION

Correction of an electrical failure first requires isolation of the fault to a single circuit or component. In most cases, the nature of the failure and its effect upon the operation of the cooker will be sufficient to narrow it down to one or more circuit elements. Refer to the isolating electrical faults table below.

INCOMING POWER

Before trouble-shooting any of the electrical parts or assemblies, verify that power is being supplied to the cooker. Incoming power is connected at the boiler (or direct-connected steam) control box located in the base cabinet. With power connected to the cooker, an AC volt-meter is

used to measure 120 volts across L1 and L2. If 120 volts is present, and the cooker will not operate, the fault lies within the electrical circuits of the cooker.

ELECTRIC INSPECTION

The first step in any electrical trouble-shooting procedure is a thorough physical inspection of all wiring connections.



WARNING:

Before removing control panel or checking connections and wiring, be sure that the circuit breaker for incoming power is OFF. When power is supplied, all exposed terminals of the control panel carry 120 volts.

Check all wiring connections by hand to assure that both ends of all connection points are tightly secured. Use a screwdriver to tighten connection points. If necessary, visually inspect all quick-disconnect terminals for evidence of corrosion. Terminals in this condition should be separated, cleaned with emery cloth until shiny, and tightly re-connected.

FAILURE	FAULT LOCATION
1. Will not operate in either constant steam or 60 minute timer.	A. Incoming power. B. Timer. C. Door interlock switch/relay. D. Wiring.
2. Operating in constant steam position, but not in 60 minute timer.	A. 60 minute timer. B. Wiring.
3. Operating in 60 minute timer position, but not in constant steam.	A. Timer. B. Wiring.
4. Steam solenoid valve fails to open with indicator light on.	A. Solenoid valve coil. B. Wiring.
5. Indicator light off with steam solenoid valve open.	A. Indicator light. B. Wiring.
6. With indicator light off steam solenoid valve open, timer dial fails to turn.	A. Compartment thermostatic switch. B. Constant steam position. C. Timer motor. D. Wiring.
7. Buzzer fails to sound at end of 60 minute timer mode.	A. 60 minute timer contacts. B. Buzzer. C. Wiring.
8. Steam flows continuously form boiler drain line.	A. Thermostatic switch. B. Cold water solenoid valve. C. Wiring.

TROUBLESHOOTING - 3500 ONLY

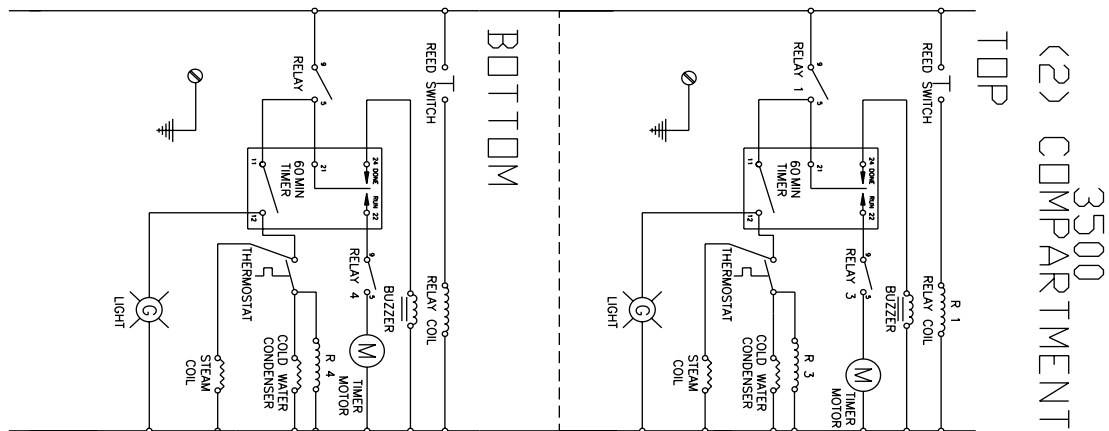
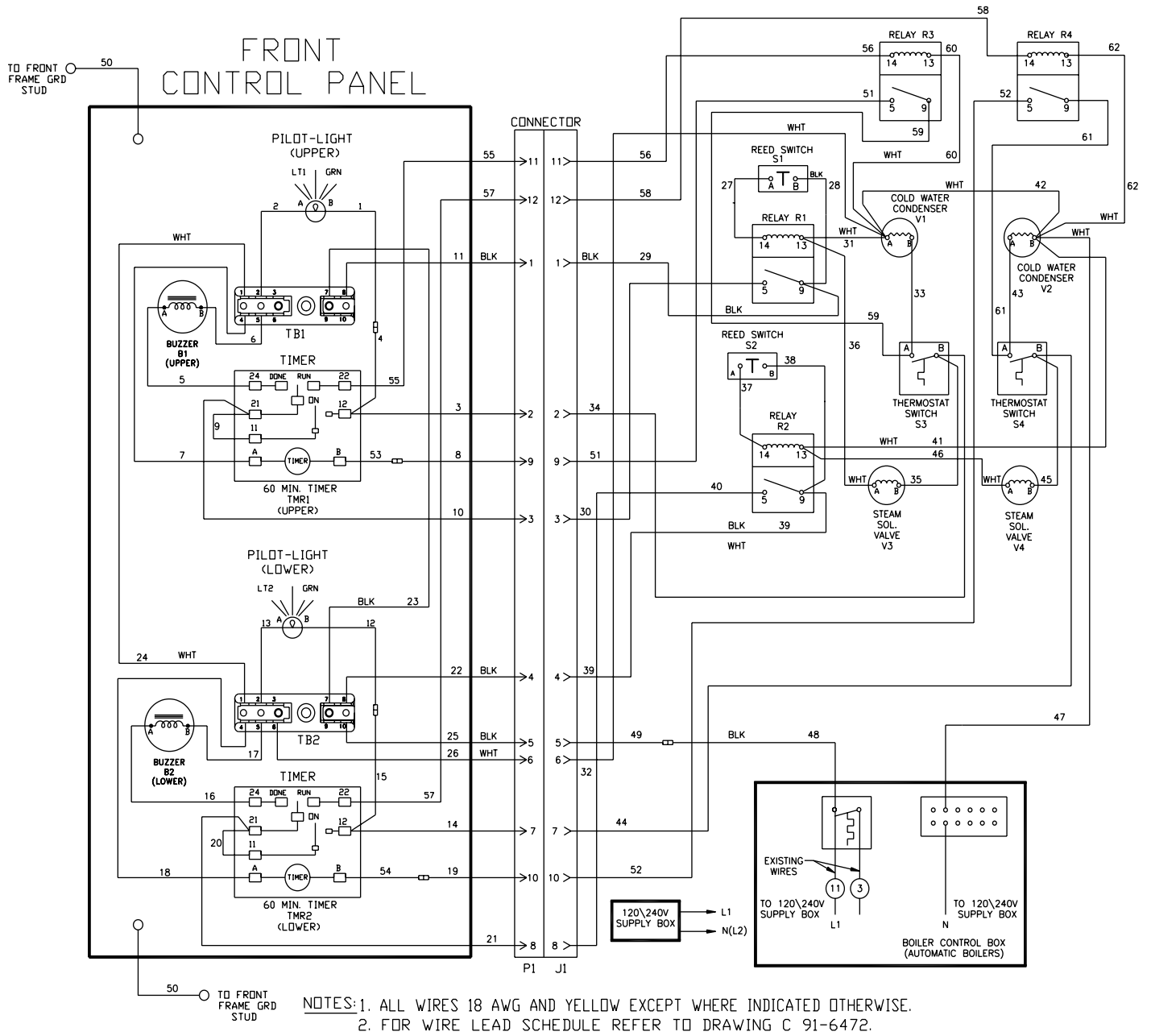
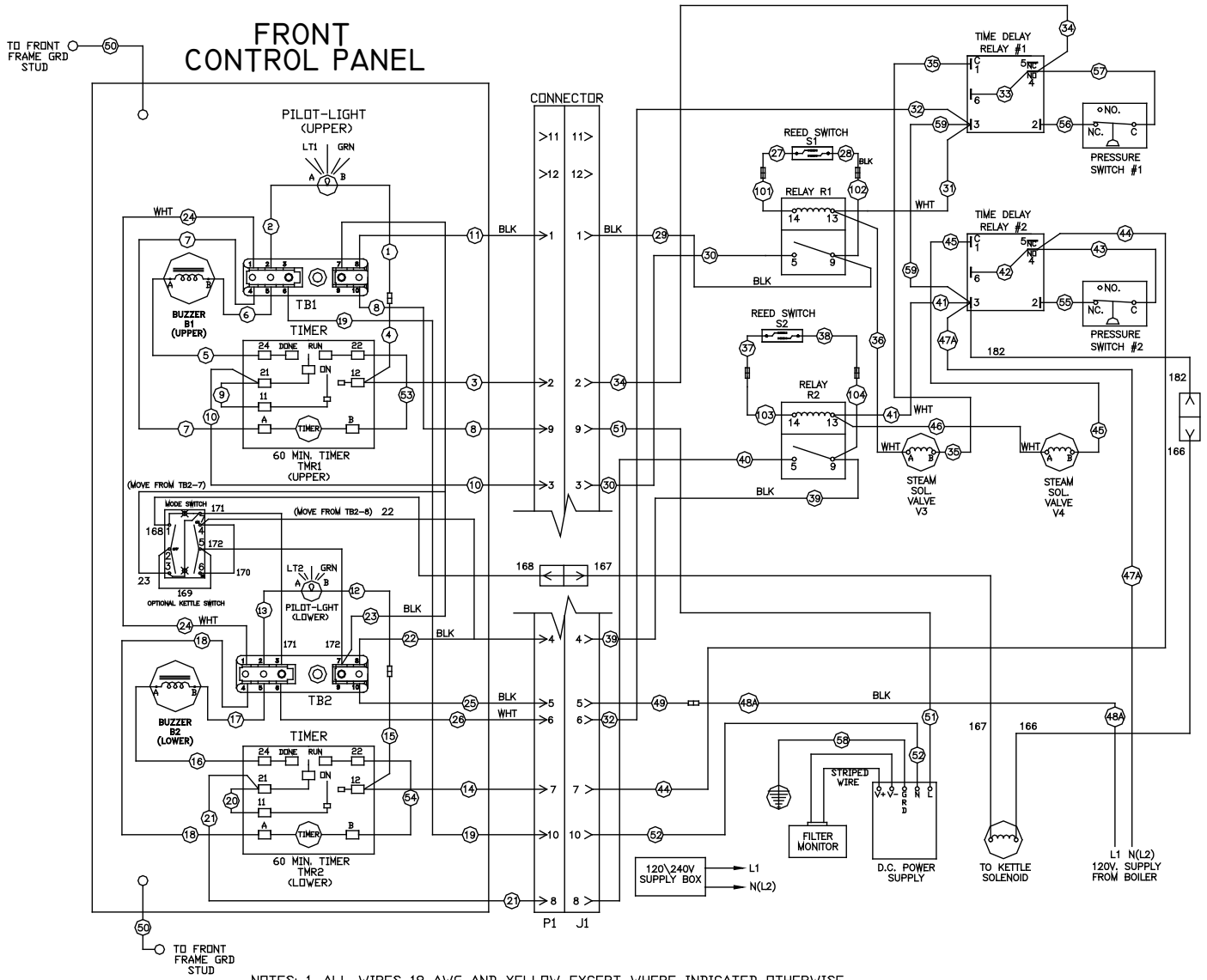


Figure 2

TROUBLESHOOTING - 3500 POWER PLUS ONLY



- NOTES: 1. ALL WIRES 18 AWG AND YELLOW EXCEPT WHERE INDICATED OTHERWISE.
 2. FOR WIRE LEAD SCHEDULE REFER TO DRAWING C 98-4376.
 3. HIDDEN LINES REPRESENT OPTIONAL COMPONENTS AND WIRING

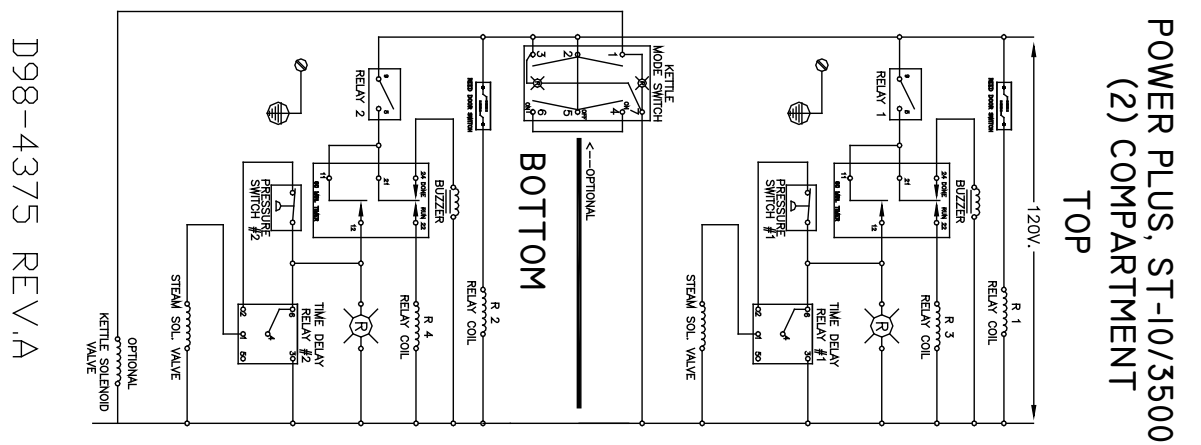


Figure 3

60 MINUTE TIMER

Timer Contacts

Defective timer contacts will result in failure of either cooker compartment to operate. When this occurs, remove the control panel and proceed as follows:

1. Turn off power to the cooker at external circuit breaker.
2. Disconnect all five wires from timer terminals.
3. Connect an ohmmeter between terminals 1 and 3.
4. Rotate timer dial beyond the "0 Minute" point (*any setting*) to obtain a reading of zero ohms on the ohmmeter. If zero ohm reading cannot be obtained, timer contacts are defective and the timer must be replaced.
5. Move ohmmeter leads to terminals 1 and 4.
6. Rotate timer dial to "0 Minute" position (*an audible click indicates correct position*). If zero ohm reading cannot be obtained, the timer is defective and must be replaced.
7. Remove ohmmeter and replace all five leads on timer terminals.

TIMER MOTOR

A defective timer motor will cause continuous operation in the Time mode, with the timer dial failing to return to the "0 Minute" position. Since thermostatic switch failure can cause the same symptom, fault must first be isolated to the timer by testing the thermostat (*Refer to cooking compartment thermostatic switch section*).

1. Carefully check motor wire leads and tighten loose connections.



WARNING:

**Use care while working with control panel.
Terminals carry 120 volts.**

2. Turn on power to the cooker.
3. Set timer dial (any setting beyond "0 Minute"). If operation is correct, the motor will turn the dial toward "0 Minute." If the motor fails to operate, it is defective and the entire timer must be replaced.
4. Shut off power to the cooker.

DOOR INTERLOCK SWITCH

Malfunction of the cooker door interlock switch prevents timer indicator lights from turning on and steam solenoid from opening when the timer dial is set. If steam does not enter the compartment and the indicator light fails to turn on with the door latch securely engaged, the fault may be in the door interlock switch. Proceed as follows:

1. Turn off power to the cooker.
2. Disconnect wires to the door switch terminals.
3. Connect an ohmmeter between the terminals of the switch.
4. Actuate the switch by closing the cooking compartment door. If a zero reading cannot be obtained, the switch is defective and must be replaced.
5. Remove the ohmmeter and replace the leads on switch terminals.

STEAM SOLENOID VALVES

When either inlet solenoid valve fails to operate, the fault may be a defective coil. A defective coil is found using an AC volt-meter to check the voltage at the coil wire terminals, with the cooker compartment operating in either constant steam or 60 minute timer mode. If voltage of 120 volts is present and the coil fails to open the valves, the fault is in the valve coil. Defective valve coils are not separately replaceable, requiring complete valve replacement.

INDICATOR LIGHTS

If the cooker compartment functions correctly, with the single exception that the indicator light fails to light during operation, the fault is a defective indicator light. A "burned out" or defective light is verified by using an AC volt-meter at the leads, with input power on the selector switch in the correct position for that timer, the timer set, and the door latches closed. If 120 volts is present, the fault is in the indicator light and requires replacement. If 120 volts is not present, the fault is in the wiring or control components (selector switch, timer, or door switch).

COOKING COMPARTMENT THERMOSTATIC SWITCH

A thermostatic switch included in the circuit for the timer motor delays timer operation until steam flowing into the compartment satisfies the temperature-actuated switch device. If a timer motor fails to operate within about one minute after the indicator light comes on (with cooker compartment empty), the cause may be a defective thermostatic switch. To test the switch, proceed as follows:

1. Disconnect the two wires connected to the thermostatic switch terminals.
2. Connect an ohmmeter between the two terminals of the switch.
3. Place the cooker into operation and observe ohmmeter dial. Within one minute of operation, the switch contacts close automatically to register a zero ohm reading on the dial. If a zero ohm reading is not obtained, the switch is defective.
4. Shut off cooker, disconnect ohmmeter leads, and replace wires on switch terminals.

BUZZER

If the buzzer does not sound at the termination of the operator-selected timer setting (timer dial returned to "0 Minute" position), the fault may be a defective buzzer. Buzzer operation is verified using an AC volt-meter at buzzer coil connections with input power on and selector switch and coinciding timer dial set at the "0 Minute" position. If voltage is 120 volts, the fault is in the buzzer, which must be replaced. If 120 volts is not present, the fault is in the wiring or control components (timer or selector switch).

COLD WATER CONDENSER CIRCUIT:

If during cooker operation steam exits from the drain line opening (located in lower boiler compartment) and the condensing system fails to operate, as evidenced by repeated discharge of water from the drain line, the condensing circuit is malfunctioning. The failure can be caused by a defective condenser thermostat or cold water solenoid coil, or by wiring failure. To test condenser thermostat, refer to cooking compartment thermostatic switch section.

If the condenser thermostat functions correctly, but either of the cold water solenoid valves fails to operate, the cause might be a faulty valve coil. A defective coil is found using an AC volt-meter to check the voltage at the coil wire terminals with the cooker compartment in operation. If voltage of 120 volts is present and the valve fails to open, the fault is in the valve coil. Defective valve coils are separately replaceable.

WIRING

All of the electrical components of the cooker (timers, indicator lights, etc.) are connected to each other by wiring.

If all of the electrical components are operating correctly (and the incoming power has been checked), but the cooker fails to operate, the fault lies in the wiring.

Using an ohmmeter, wiring continuity between the connections shown on the wiring diagram is readily verified. This is best done in stages, removing only those wires required for each continuity check. As each lead is replaced, it should be checked for evidence of corrosion, and cleaned if necessary. All leads must be tightly attached so as to provide a good electrical connection.

REPAIR & REPLACEMENT

Refer to Illustrated parts section of this manual contains a listing of all replaceable parts and associated exploded views of the 3500 Cooker. In most cases, disassembly procedures will be obvious from the exploded views. Instructions follow for procedures that are not readily apparent.

DOOR LATCH TENSION ADJUSTMENT

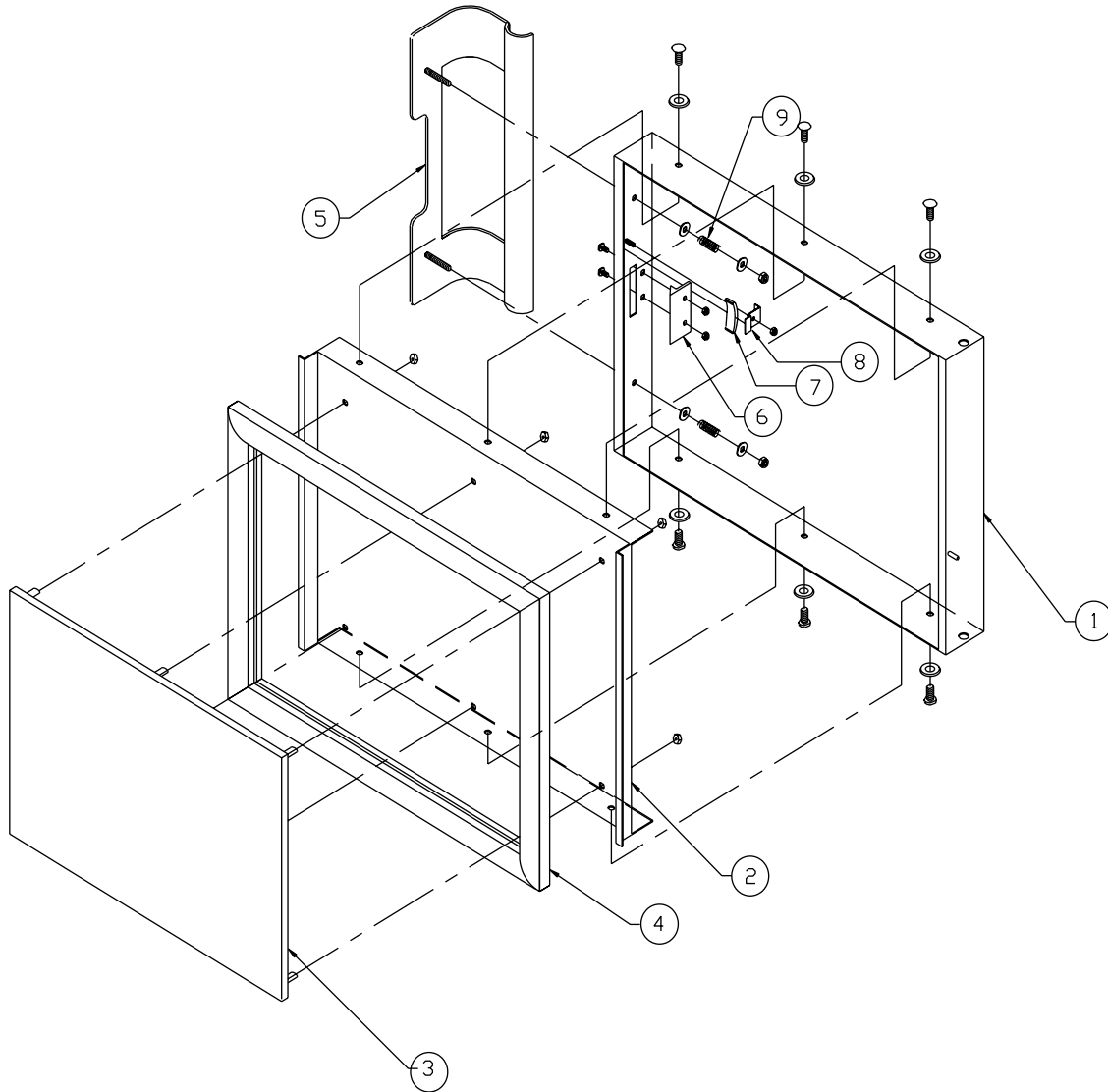


CAUTION:

Shut off main electrical power to unit.

1. Open the cooking compartment door.
2. Remove the control panel by removing the eight mounting screws and disconnecting the wire plug and restraining wire.
3. Tighten both nuts down until the springs are fully compressed.
4. Back each nut off 1/2 turn.
5. Remount the control panel, reconnecting wire plug and restraining wire.

DOOR ASSEMBLY

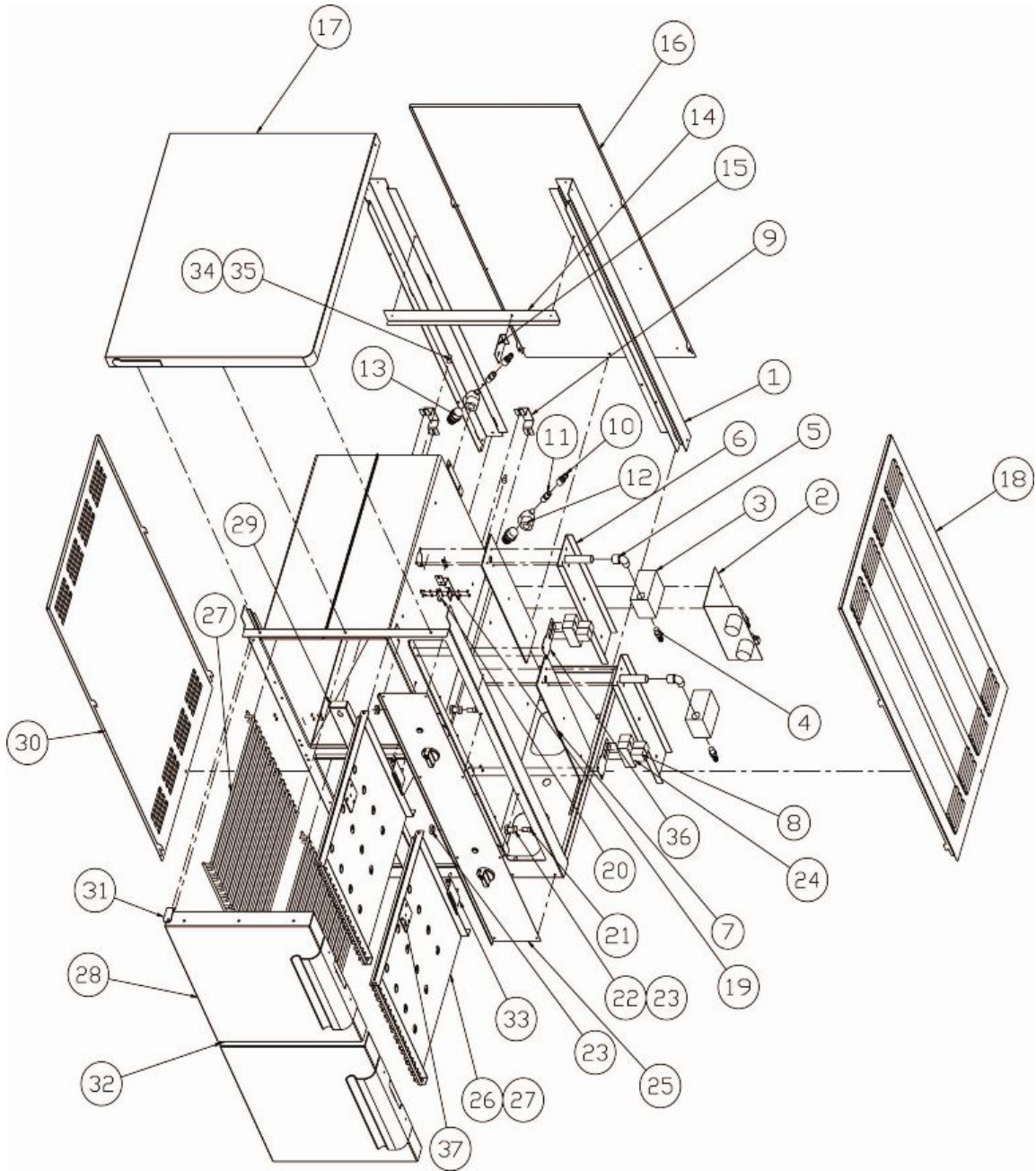


REF.	PART	DESCRIPTION	QTY
4	91-5286	DOOR GASKET	1
5	91-5745	DOOR HANDLE	1
6	09-1608	STRIKER	1
7	08-5027	MAGNET	1
8	91-5901	MAGNET BRACKET	1
9	08-4600	COMPRESSION SPRING	2

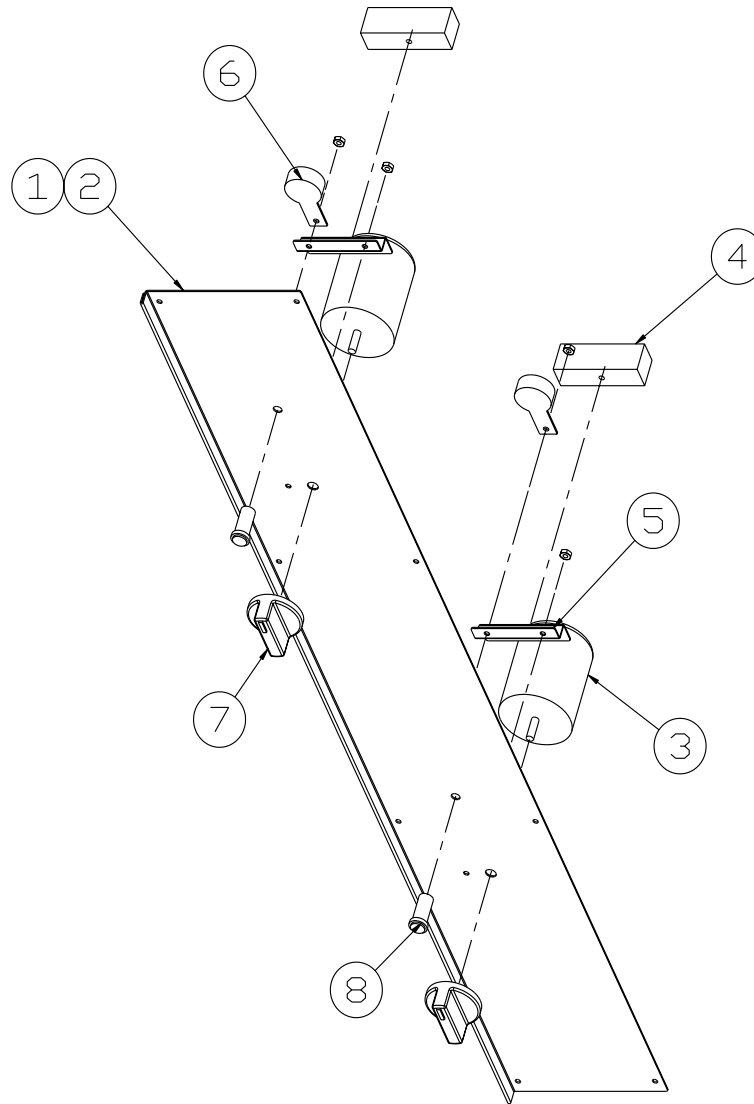
CABINET ASSEMBLY

REF	PART	DESCRIPTION	QTY
1	98-3501	POST, REAR	2
2	REF.	CONDENSER ASSY.	1
3	10-5859	INLET SOLENOID	2
4	08-4892	BARB, 1/2" IPS x 3/8" ID TUBE	2
5	10-8823	ELBOW, STREET, 1/2" IPS	2
6	98-3510	INLET ADAPTER ASSY.	2
7	91-6838	INLET GASKET	2
8	10-9174	RELAY TUBE	4
9	91-6477	BRACKET, LINER HOLD DOWN	2
10	08-4978	BARB, 1/4" IPS FEMALE X 1/4" ID TUBE	2
11	08-4866	SPRAYER NOZZLE (3500 ONLY)	2
12	08-4833	REDUCING TEE, 1" X 1" X 1/4" IPS	2
13	08-1207	BARB, 1" IPS	2
14	91-7638	STIFFENER, BACK	1
15	91-7639	BRACKET, LINER TIE	1
16	98-3503	PANEL, BACK	1
17	91-7619	PANEL, TOP	1
18	98-3505	PANEL, RT. SIDE	2
19	91-7690	BRACKET, REED SWITCH	2
20	08-6308	REED SWITCH	2
21	10-8105	THERMOSTAT, CONDENSER (3500 ONLY)	2
22	10-3739	REDUCER, 1/2" IPS X 3/8" IPS	2
23	10-4586	NUT, SEALER, 1/2" IPS	4
24	10-9175	RELAY, SOCKET	4
25	98-3511	CONTROL PANEL ASSY.	1
26	91-7697	BAFFLE, RACK SLIDE	2
27	91-5700	RACK, WIRE	4
28	91-6493	DOOR ASSY.	2
29	91-7684	STRAINER	2
30	98-3505	PANEL, LT. SIDE	4
31	91-6475	HINGE, TOP	2
32	91-6476	HINGE, BOTTOM	2
33	91-6492	LATCH, RECEIVER	2
34	91-6491	GROMMET	2
35	08-6538	VACUUM BREAKER	2
36	91-6940	RELAY BRACKET	2
37	91-7557	STEAM INLET ORIFICE PLATE	2
37A	10-7545	ACORN NUTS FOR PLATE	8
	91-7497	DRIP TROUGH (NOT SHOWN)	1

CABINET ASSEMBLY

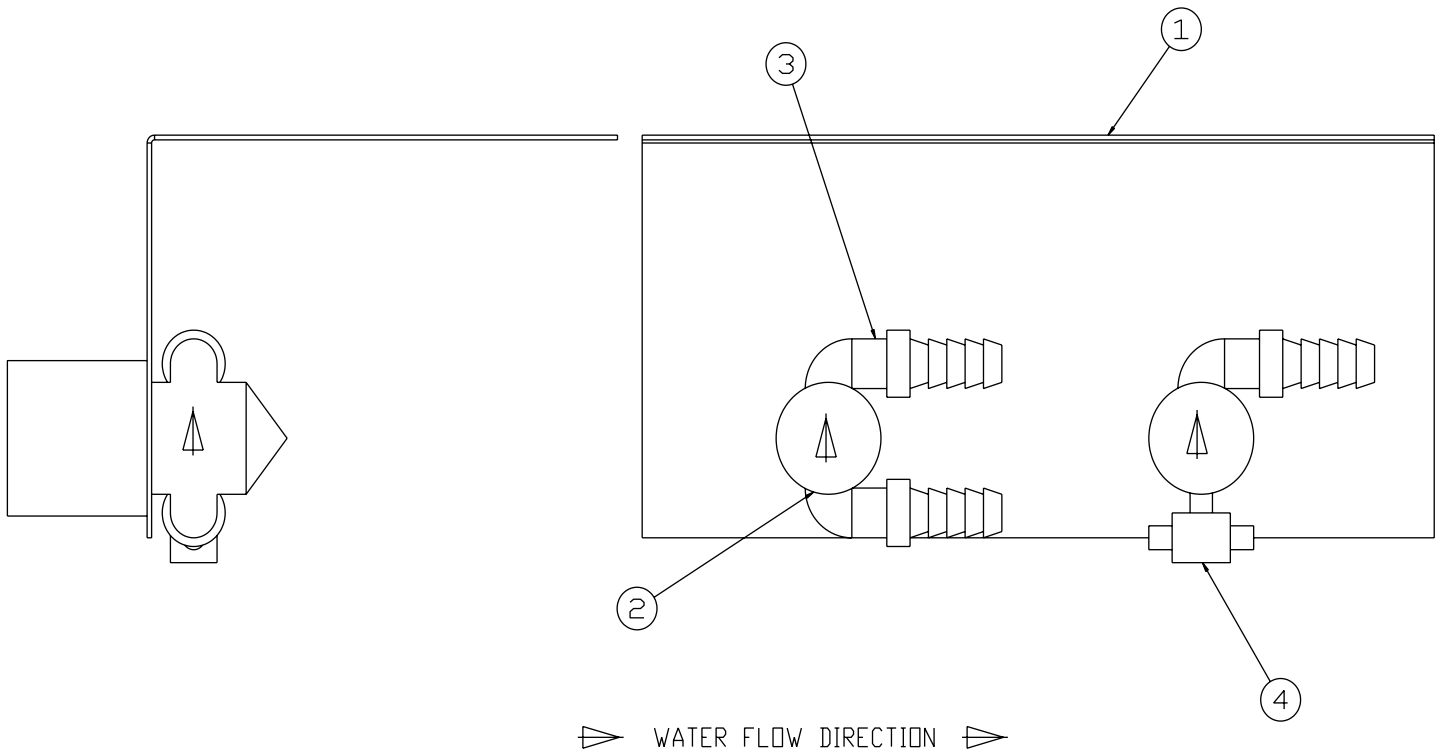


CONTROL PANEL ASSEMBLY



REF.	PART	DESCRIPTION	QTY
1	98-3504	CONTROL PANEL	1
2	98-3507	ARTWORK, CONTROL PANEL	1
3	08-6464	60 MIN. TIMER	2
4	08-6541	TERMINAL STRIP	2
5	91-6471	BRACKET, TERMINAL STRIP	2
6	10-7395	BUZZER	2
7	08-3826	KNOB, TIMER	2
8	10-5052	LIGHT, RED, ON/OFF	2

CONDENSER ASSEMBLY

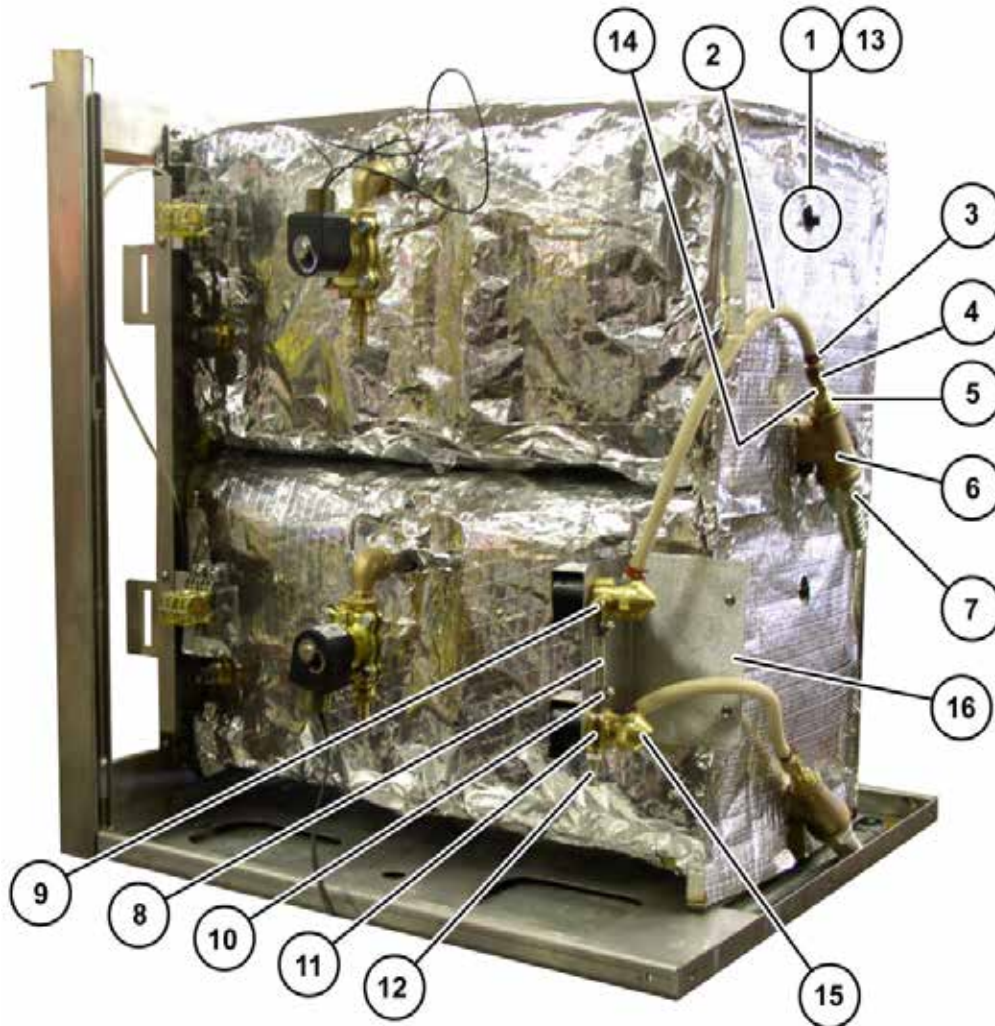


REF.	PART	DESCRIPTION	QTY
1	91-7640	CONDENSER BRACKET	1
2	08-4821	CONDENSER SOLENOID (3500 ONLY)	2
3	08-4864	HOSE BARB, 90°, 1/8" IPS (3500 ONLY)	3
4	08-5009	TEE, 1/8 IPS x 1/4 ID HOSE (3500 ONLY)	1
	98-4129	BRAIDED HOSE, 1/4" x 42" LG., W/FITTINGS, STAINLESS STEEL *	
	98-4136	BRASS TEE, FLAREL 1/8" NPT**	
	98-4139	BRASS ELBOW, FLARE, 1/8" NOT**	
	98-4140	BRAIDED HOSE, 1/4" x 4" LG., W/FITTINGS, STAINLESS STEEL **	

* FROM BOILER TO CONDENSER VALVES (3500/ST-10)

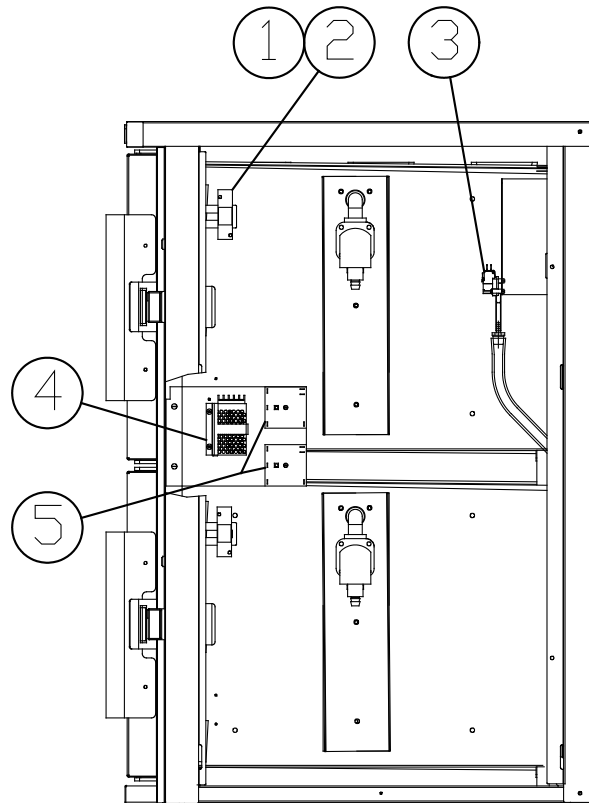
** TO INTERCONNECT BOTH VALVES

COMPLETE CONDENSER ASSEMBLY



REF.	PART	DESCRIPTION	QTY
1	08-6538	3/8" Check Valve	1
2	08-7970	Neoprene Hose 15 1/2"	1
3	08-7975	Clamp	2
4	08-4978	Hose Babs	1
5	10-3539	Bushing 1/2 x 1/4 Hex	1
6	08-5438	Tee, Brass 1" x 1/2" x 1"	1
7	08-1207	Hose Fitting 1" NPT	1
8	15-7208	Braided Stainless Steel Hose 2 1/2"	1
9	08-4864	Hose Barb, 90o, 1/8" IPS	2
10	08-1206	Hose Clamp	2
11	08-7923	Tee 1/8" NPT	1
12	08-4890	Hose Coupler, 1/8 IPS x 1/4 ID	2
13	91-6491	Grommet	1
14	08-4866	Spray Nozzle (3500 ONLY)	1
15	08-4821	Condenser Solenoid (3500 ONLY)	2
16	91-7640	Condenser Bracket	1

POWER PLUS



REF.	PART	DESCRIPTION	QTY
1	10-9175	RELAY SOCKET, (ONE PER COMPARTMENT)	2
2	10-9174	CUBE RELAY, (ONE PER COMPARTMENT)	2
3	08-6502	PRESSURE SWITCH	2
4	98-4206	POWER SUPPLY, 5 VDC	1
5	97-6455	TIME DELAY RELAY	2