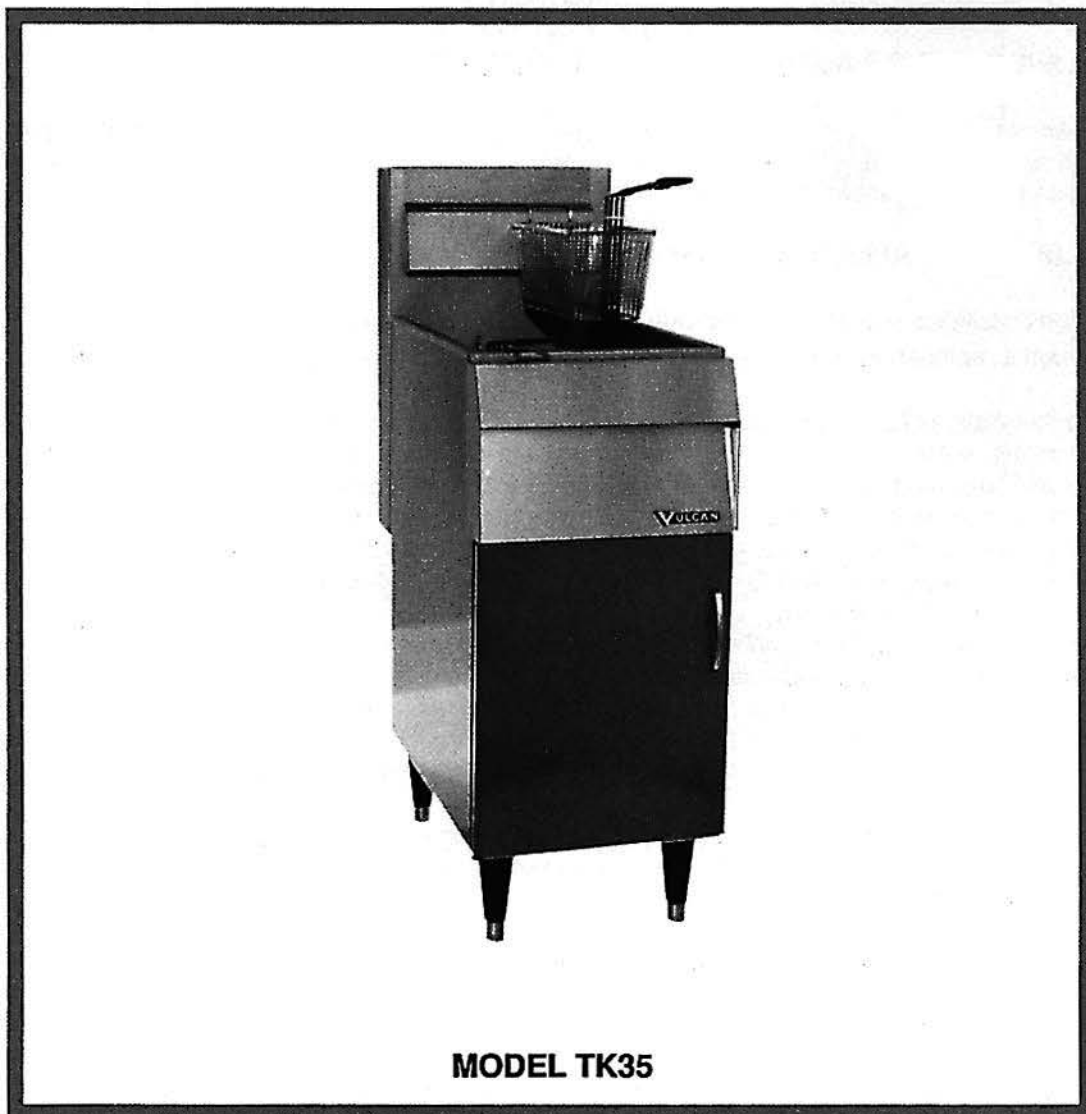


**VULCAN**

**SERVICE MANUAL FOR  
TK SERIES STANDARD AND  
FILTER-READY GAS FRYERS  
MODELS ML 52062,  
ML 52063 & ML 52064**



**MODEL TK35**

# **IMPORTANT**

## **OPERATING, INSTALLING AND SERVICE PERSONNEL**

Operating information for this equipment has been prepared for use by qualified and/authorized operating personnel.

All installation and service on this equipment is to be performed by qualified, certified, licensed and/authorized installation or service personnel, with the exception of any part marked with a □ in front of the part number.

Service may be obtained by contacting the Factory Service Department, Factory Representative or Local Service Agency.

## **DEFINITIONS**

### **QUALIFIED AND/OR AUTHORIZED OPERATING PERSONNEL**

Qualified or authorized operating personnel are those who have carefully read the information in this manual and are familiar with the equipment's functions or have had previous experience with the operation of the equipment covered in this manual.

### **QUALIFIED INSTALLATION PERSONNEL**

Qualified installation personnel are individuals, a firm, corporation or company which either in person or through a representative are engaged in, and are responsible for:

1. The installation of gas piping from the outlet side of the gas meter, or the service regulator when the meter is not provided, and the connection and installation of the gas appliance. Qualified installation personnel must be experienced in such work, be familiar with all precautions required, and have complied with all requirements of state or local authorities having jurisdiction. Reference in the United States of America – National Fuel Gas Code ANSI Z223.1 (Latest Edition). In Canada – Canadian Standard CAN/CGA-B149.1 NAT. GAS (Latest Edition) or CAN/CGA-B149.2 PROPANE GAS (Latest Edition).
2. The installation of electrical wiring from the electric meter, main control box or service outlet to the electric appliance. Qualified installation personnel must be experienced in such work, be familiar with all precautions required, and have complied with all requirements of state or local authorities having jurisdiction. Reference: In the United States of America – National Electrical Code ANSI/NFPA No. 70 (Latest Edition). In Canada – Canadian Electric Code Part 1 CSA-C22.1 (Latest Edition).
3. The installation of steam piping from the source of supply to the service inlet of the appliance. Qualified installation personnel must be experienced in such work, be familiar with all precautions required, and have complied with all requirements of state or local authorities having jurisdiction.

### **QUALIFIED SERVICE PERSONNEL**

Qualified service personnel are those who are familiar with Vulcan equipment who have been endorsed by the Vulcan-Hart Company. All authorized service personnel are required to be equipped with a complete set of service and parts manuals and stock a minimum amount of parts for Vulcan equipment.

## **IMPORTANT FOR YOUR SAFETY**

**THIS MANUAL HAS BEEN PREPARED FOR PERSONNEL AUTHORIZED, QUALIFIED, CERTIFIED OR LICENSED TO INSTALL GAS EQUIPMENT, WHO SHOULD PERFORM THE INITIAL FIELD START-UP AND ADJUSTMENTS OF THE EQUIPMENT COVERED BY THIS MANUAL.**

**POST IN A PROMINENT LOCATION THE INSTRUCTIONS TO BE FOLLOWED IN THE EVENT THE SMELL OF GAS IS DETECTED. THIS INFORMATION CAN BE OBTAINED FROM THE LOCAL GAS SUPPLIER.**

### **IMPORTANT**

**IN THE EVENT A GAS ODOR IS DETECTED, SHUT DOWN UNITS AT MAIN SHUTOFF VALVE AND CONTACT THE LOCAL GAS COMPANY OR GAS SUPPLIER FOR SERVICE.**

### **FOR YOUR SAFETY**

**DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS OR LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.**

**IN THE EVENT OF A POWER FAILURE, DO NOT ATTEMPT TO OPERATE THIS DEVICE.**

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# GENERAL

## INTRODUCTION

**Models** This service manual was specifically written for:

TK35	ML 52062
TK45	ML 52063
TK65	ML 52064

## TOOLS

- Standard set of hand tools.
- VOM with a sensitivity of at least 20,000 ohms per volt.
- Temperature tester (thermocouple or digital pyrometer).
- Gas test kit.

## INSTALLATION

Complete installation instructions are included with each fryer.

## LIGHTING PILOT

1. Turn thermostat "off".
2. Push gas valve extension arm in and turn to "off".
3. Wait 5 minutes for unburned gas to vent.
4. Push gas valve extension in and turn to "pilot".

5. While holding "in" on gas valve extension, light the pilot with a lit taper. Hold in place for approximately 1/2 minute before releasing.

**CAUTION:** If pilot does not remain lit, turn gas valve "off". Wait 5 minutes and repeat all pilot lighting instructions as stated above, allowing a longer period of time before releasing the combination valve dial. Adjust pilot flame, if necessary as outlined under "PILOT ADJUSTMENT" in "SERVICE PROCEDURES AND ADJUSTMENTS".

6. Turn combination valve dial to "on".

## CLEANING

Detailed cleaning instructions are included in the "INSTALLATION AND OPERATION MANUAL", Form 30608.

## OIL FILTERING

Filtering instructions for standard and filter ready fryers are included in the "INSTALLATION AND OPERATION MANUAL", Form 30608.

## OPERATION

Detailed operation instructions are included in the "INSTALLATION AND OPERATION MANUAL", Form 30608.

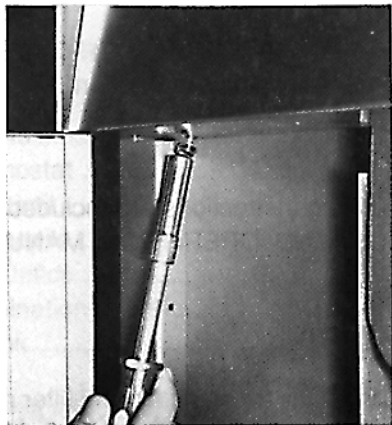
# REMOVAL AND REPLACEMENT OF PARTS

**NOTE:** The TK35 was used for the photographs in this manual.

## COVERS AND PANELS

### Door and Front Panel

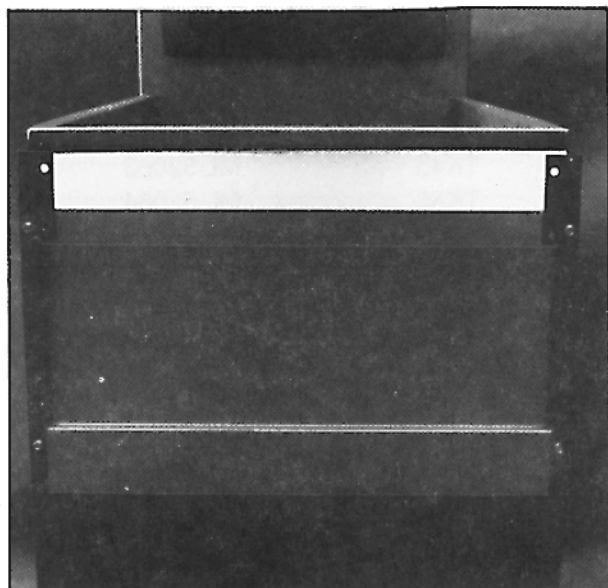
1. Open door and remove screws from front panel.



2. Hold door while lifting up and removing front panel.
3. Lift door off bottom hinge.
4. Reverse procedure to install.

### Heat Shield

1. Remove door and front panel as outlined under "COVERS AND PANELS" in "REMOVAL AND REPLACEMENT OF PARTS".
2. Remove screws holding heat shield in place.

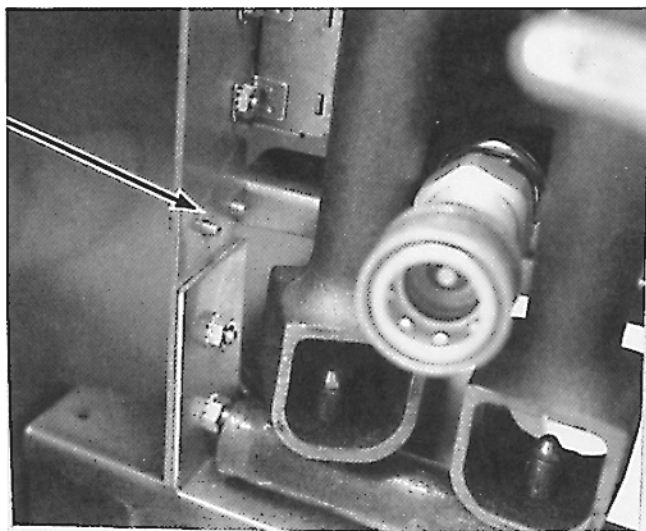


3. Lift heat shield away from fryer.

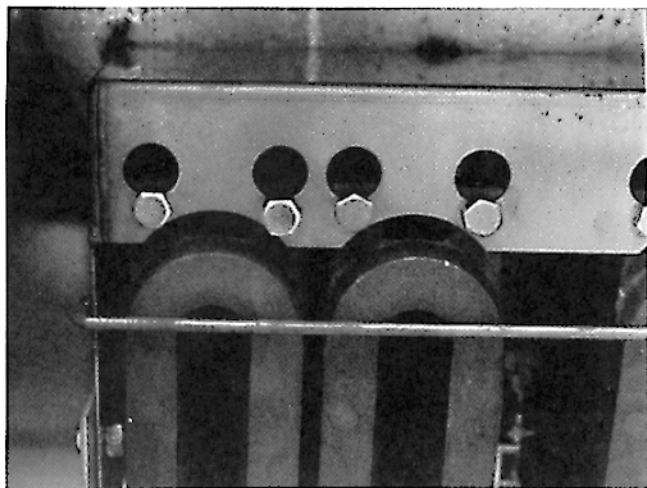
## BURNERS

**WARNING:** SHUT OFF GAS BEFORE SERVICING THE UNIT.

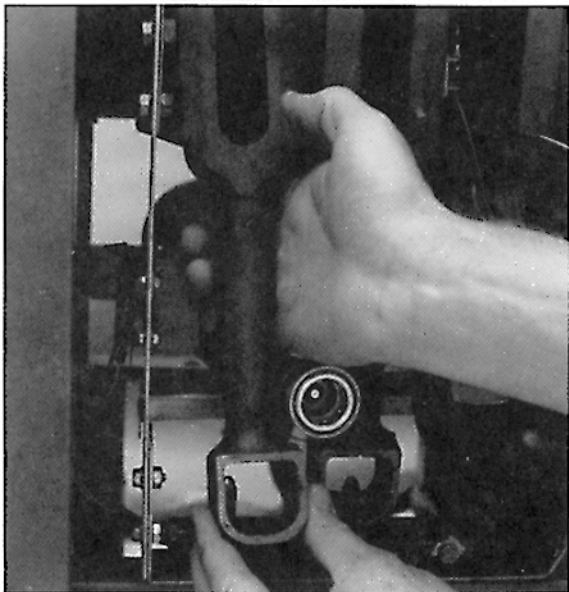
1. Remove door, front panel and heat shield as outlined under "COVERS AND PANELS" in "REMOVAL AND REPLACEMENT OF PARTS".
2. Remove the left side manifold hanger brace bolts to allow flexibility when removing burners.



- Loosen mounting bolts at the top of the burner which you wish to remove.



- Push burner up while simultaneously pulling the bottom of the burner forward in a tilting motion to clear the burner bullet nose burner orifice.



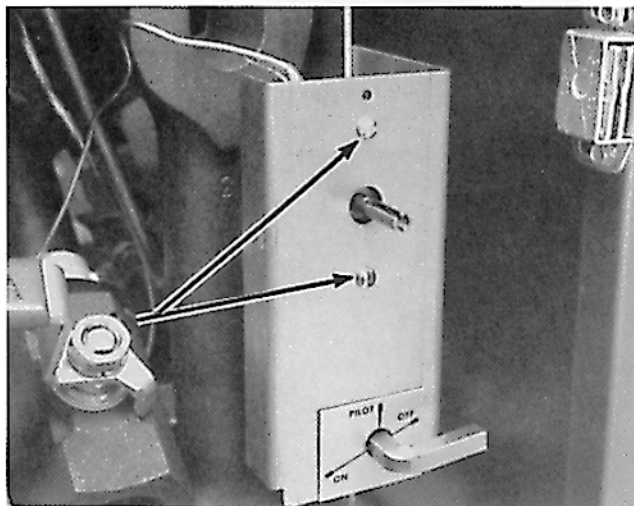
- Reverse the procedure to install.

## THERMOSTAT

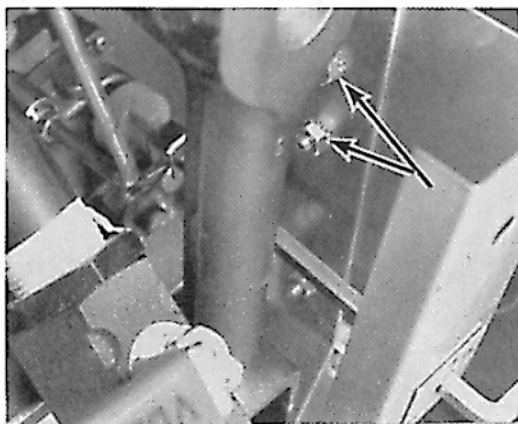
**WARNING: SHUT OFF GAS BEFORE SERVICING THE UNIT.**

- Drain shortening from frytank.

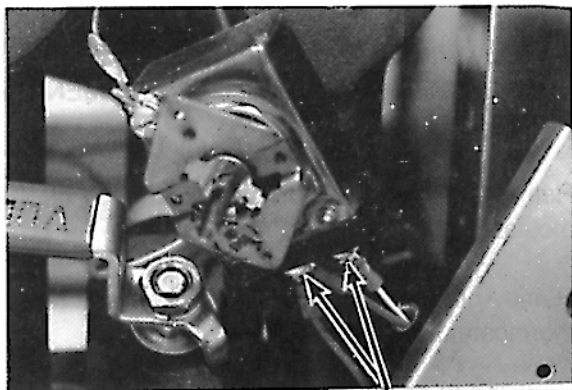
- Remove door, front panel and heat shield as outlined under "COVERS AND PANELS" in "REMOVAL AND REPLACEMENT OF PARTS".
- Remove left side burner as outlined under "BURNERS" in "REMOVAL AND REPLACEMENT OF PARTS".
- Remove thermostat knob by pulling knob off thermostat shaft.
- Remove thermostat mounting screws and remove thermostat from mounting bracket.



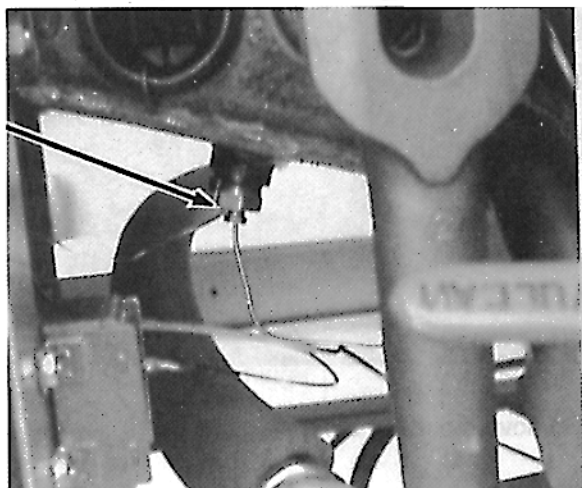
- Remove mounting bracket.



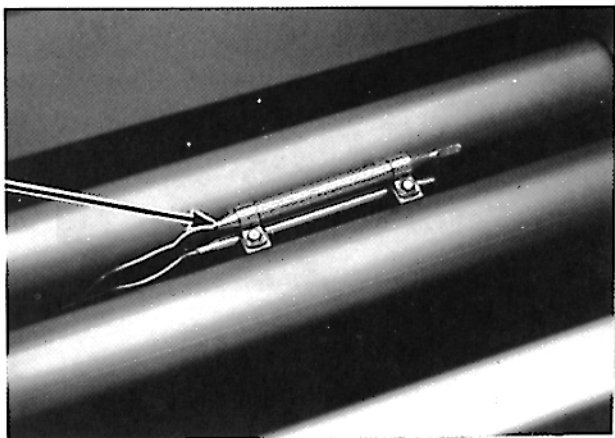
7. Remove wire leads from thermostat, noting all connections for reassembly.



8. Disengage the packing nut and ferrule holding the thermostat capillary tube beneath the frytank.



9. Remove the thermostat capillary bulb from the holding bracket inside the frytank.



10. Pull the thermostat capillary bulb through the underside of the frytank and remove the thermostat assembly from the fryer.

11. Reverse the procedure to install.

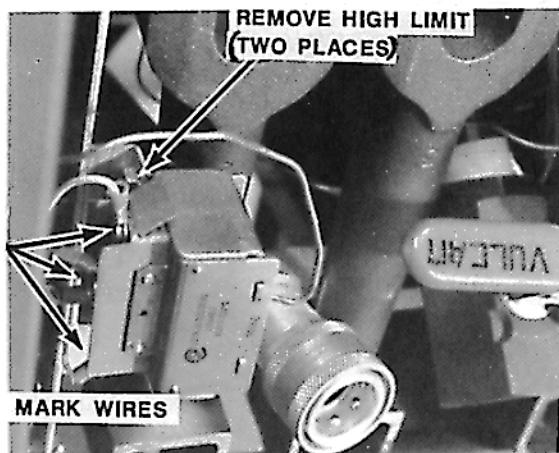
**NOTE:** When installing the new thermostat assembly:

- A. Do not kink thermostat wiring.
- B. Wrap threads of packing nut with teflon tape to prevent leakage.

## HIGH LIMIT

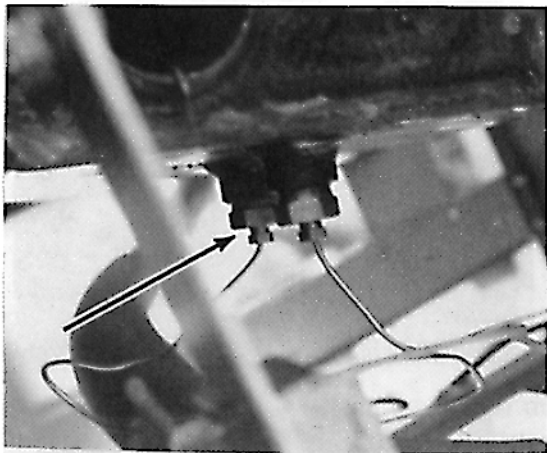
**WARNING:** SHUT OFF GAS BEFORE SERVICING THE UNIT.

1. Drain shortening from frytank.
2. Remove door, front panel and heat shield as outlined under "COVERS AND PANELS" in "REMOVAL AND REPLACEMENT OF PARTS".
3. Remove high limit from mounting bracket.
4. Remove wire leads from high limit, noting all connections for reassembly.
5. Remove left side burner as outlined under "BURNERS" in "REMOVAL AND REPLACEMENT OF PARTS".

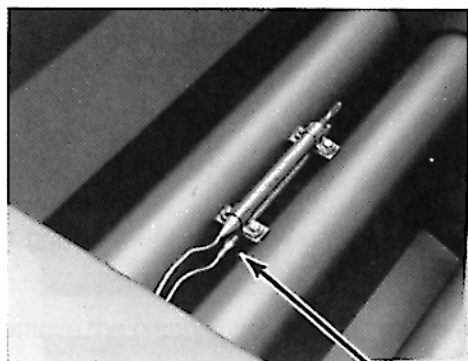




- Disengage the packing nut and ferrule holding the high limit capillary tube beneath the frytank.



- Remove the high limit bulb from the holding bracket inside the frytank.



- Pull the high limit capillary bulb through the underside of the frytank and remove the high limit assembly from the fryer.
- Reverse the procedure to install.

**NOTE:** When installing the new high limit:

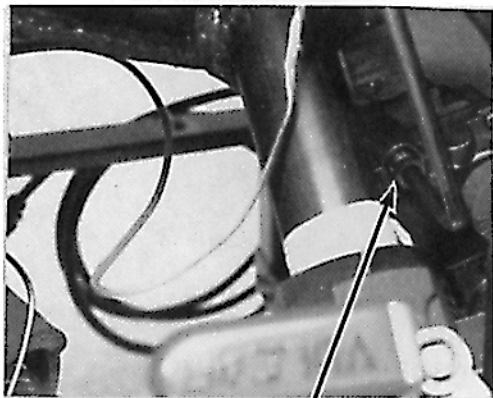
- Do not kink high limit wiring.
- Wrap threads of packing nut with teflon tape to prevent leakage.

## THERMOPILE

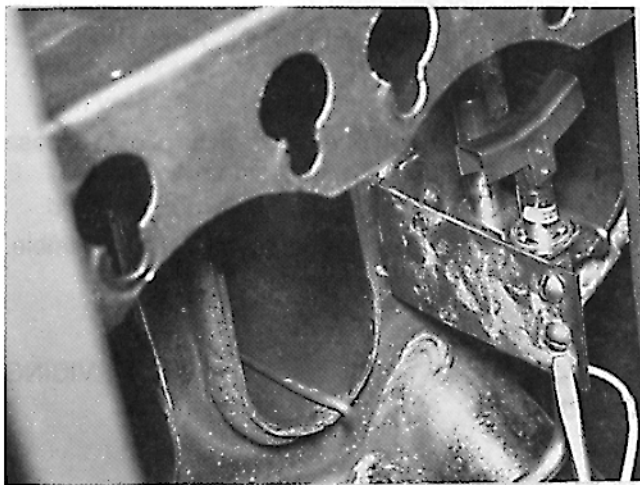
**WARNING:** SHUT OFF GAS BEFORE SERVICING THE UNIT.

- Remove door, front panel and heat shield as outlined under "COVERS AND PANELS" in "REMOVAL AND REPLACEMENT OF PARTS".

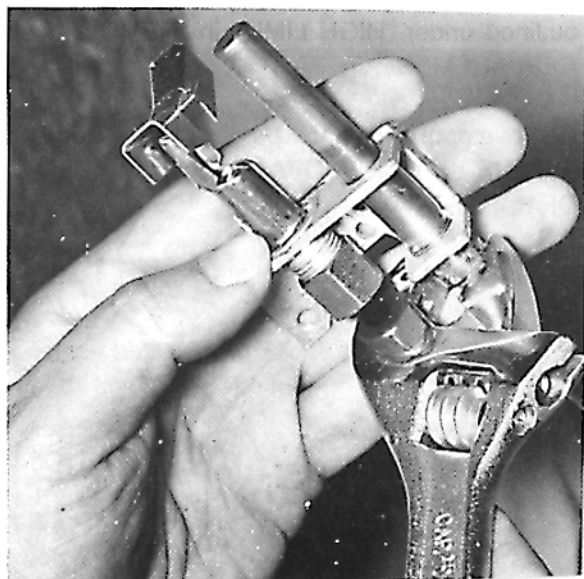
- Remove high limit from mounting bracket and disconnect thermopile lead wires from high limit as outlined under "HIGH LIMIT" in "REMOVAL AND REPLACEMENT OF PARTS".
- Remove right and center burners as outlined under "BURNERS" in "REMOVAL AND REPLACEMENT OF PARTS".
- Remove pilot tubing from pilot.



- Remove pilot assembly from pilot mounting bracket.



- Remove thermopile from pilot assembly.



- Reverse procedure to install.

## PILOT ORIFICE

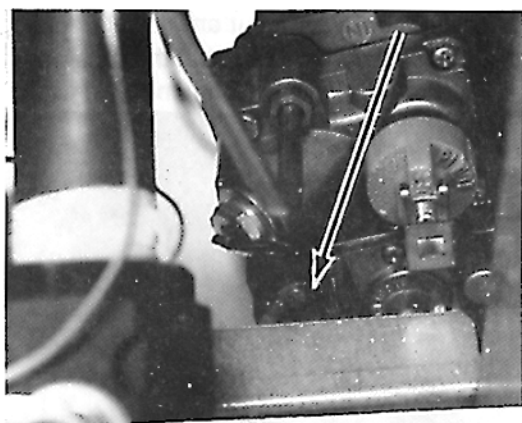
**WARNING: SHUT OFF GAS BEFORE SERVICING THE UNIT.**

- Remove pilot assembly from fryer as outlined under "THERMOPILE" in "REMOVAL AND REPLACEMENT OF PARTS".
- Remove hex nut on the bottom of the pilot to expose the orifice.
- Replace orifice and reverse procedure to assemble.

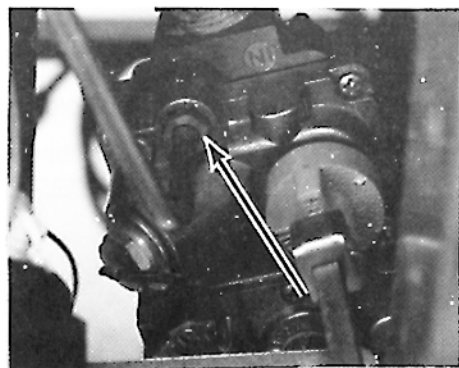
## COMBINATION VALVE

**WARNING: SHUT OFF GAS BEFORE SERVICING THE UNIT.**

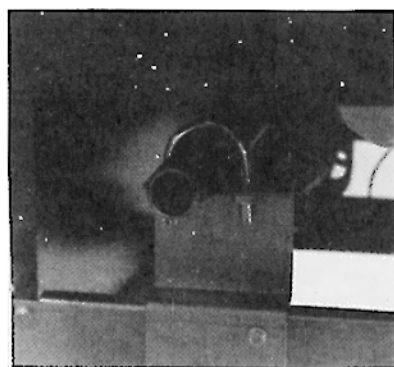
- Disconnect fryer from main gas supply.
- Remove door, front panel and heat shield as outlined under "COVERS AND PANELS" in "REMOVAL AND REPLACEMENT OF PARTS".
- Remove right burner as outlined under "BURNERS" in "REMOVAL AND REPLACEMENT OF PARTS".
- Disconnect lead wires from combination valve and mark for reconnection.



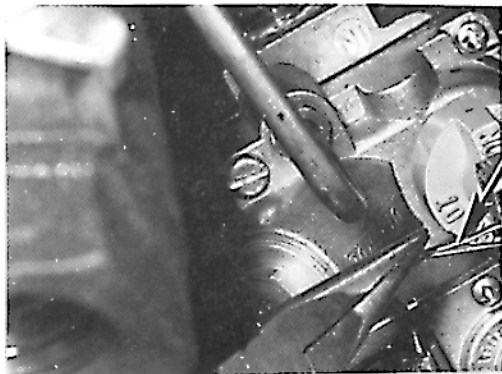
- Disconnect pilot tubing from combination valve.



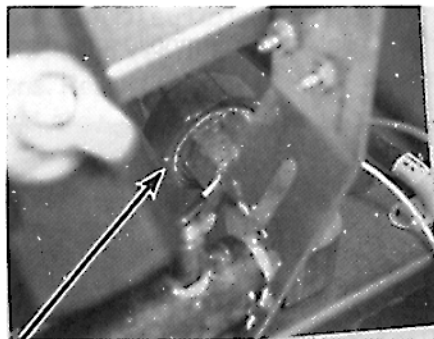
- From rear of unit, remove u-bolt holding the gas supply line in place.



- Remove cotter pin connecting the combination valve extension arm to the combination valve.



- Disconnect combination valve from burner manifold by disconnecting the union located between the two components.



- Remove the combination valve from the fryer.
- Remove the holding bracket for the extension arm from the combination valve for installation to the new valve.
- Reverse procedure to install.

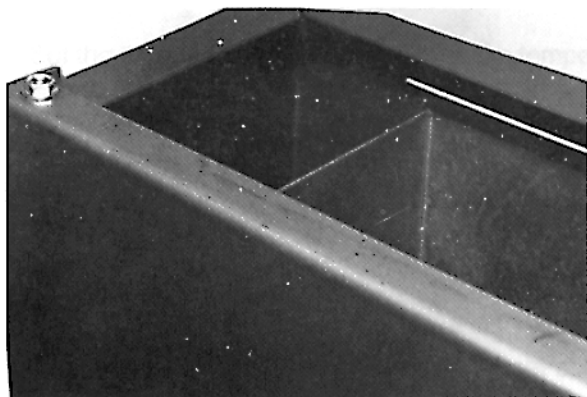
**WARNING:** ALL GAS JOINTS DISTURBED DURING SERVICING MUST BE CHECKED FOR LEAKS. CHECK WITH A SOAP AND WATER SOLUTION (BUBBLES). DO NOT USE AN OPEN FLAME.

- CHECK ALL JOINTS PRIOR TO GAS VALVE (SOLENOID) BEFORE LIGHTING UNIT.
- CHECK ALL JOINTS BEYOND GAS VALVE (SOLENOID) AFTER UNIT IS LIT.

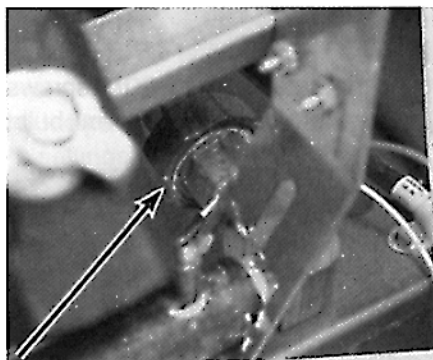
## FRYTANK

**WARNING:** SHUT OFF GAS BEFORE SERVICING THE UNIT.

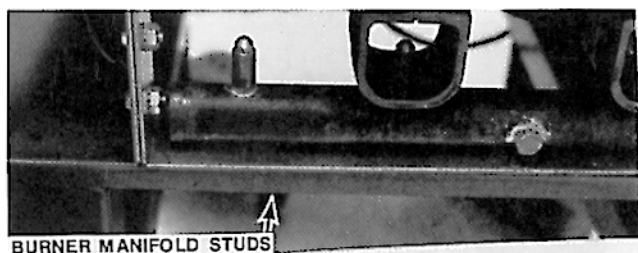
- Disconnect fryer from main gas supply.
- Drain oil from tank.
- Remove baskets, fryer basket hanger and crumb screen.
- Remove door, front panel and heat shield as outlined under "COVERS AND PANELS" in "REMOVAL AND REPLACEMENT OF PARTS".
- Remove screws holding frytank to tank wrap.



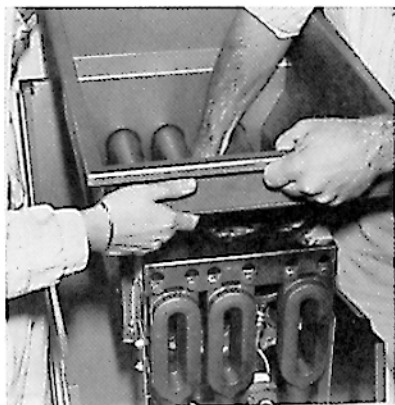
- Remove burners as outlined under "BURNERS" in "REMOVAL AND REPLACEMENT OF PARTS".
- Disconnect lead wires and pilot tubing from combination valve. Mark lead wires for reconnection.
- Disconnect combination valve from burner manifold by disconnecting the union located between the two components.



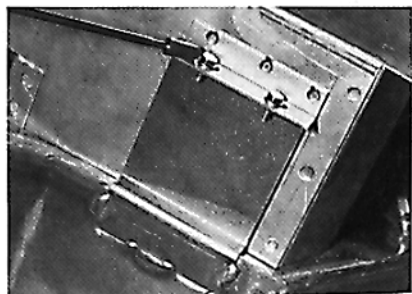
9. Remove nuts from burner manifold studs.



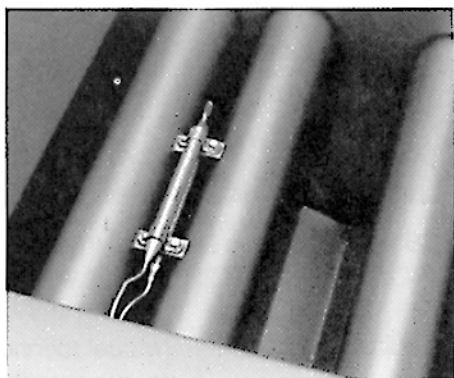
10. Using two people, lift frytank and controls up and out of cabinet. Carefully place the tank assembly on the floor.



11. Remove bolts holding the flue box to the tank assembly.



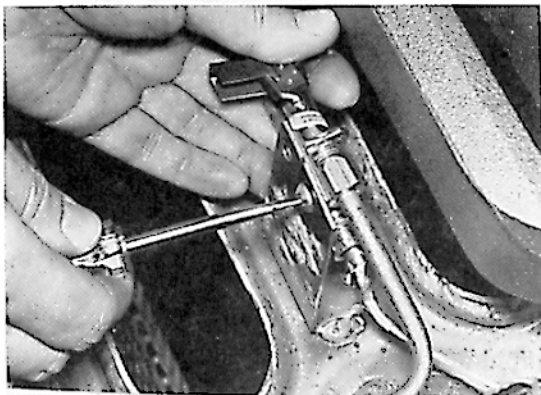
12. From the tank interior, remove the screws and clips holding the thermostat and high limit bulbs in place.



13. Disengage thermostat and high limit ferrules from underside of tank. Remove both bulbs from the tank being careful not to crimp the capillary tubes.



14. Remove pilot and thermopile mounting bracket from tank.



15. Remove the manifold bracket from the tank assembly.



16. Remove the tank ball valve.

17. Reverse the procedure to install

**NOTE:** Retain old tank for prorated refund. Prorated warranty good for ten years.

# SERVICE PROCEDURES AND ADJUSTMENTS

## MILLIVOLT CONTROLS TEST

1. Verify proper gas (natural or propane) is present and pilot flame is adjusted properly as outlined under "PILOT ADJUSTMENT" in "SERVICE PROCEDURES AND ADJUSTMENTS".
2. Check for correct wiring and secure connections.
3. If the pilot is not lit, light pilot as outlined under "LIGHTING PILOT" in "GENERAL". Allow the pilot to burn for 3-4 minutes to stabilize.
  - A. If the pilot remains lit, proceed to step 5.
  - B. If the pilot will not remain lit, proceed to step 4.
4. Connect DC voltmeter to terminals "TH TP" and "TP" of combination valve. Use schematic for terminal locations. Relight the pilot and hold in on extension arm and allow the pilot to burn for 3-4 minutes to stabilize.
  - A. If the voltage measures **450 millivolts or greater** and the pilot will not stay lit, replace the combination valve.
  - B. If the voltage is **less than 450 millivolts**, measure the voltage at terminals "NO" and "C" of high limit.
    - (1) If the voltage is **500 millivolts or more**, replace the high limit.
    - (2) If the voltage is **less than 500 millivolts**, disconnect the lead wire from terminal "TH TP" of the combination valve and re-measure voltage at the high limit terminals.
      - a. If the voltage is **less than 500 millivolts**, replace the thermopile.
      - b. If the voltage is **500 millivolts or more**, replace the combination valve.
5. Connect DC voltmeter to terminals "TP" and "TH" of combination valve.
6. Turn combination valve to "on". Turn thermostat to a setting higher than the shortening temperature.
  - A. If the voltage measures **150 millivolts or more** but the burners do not ignite, replace the combination valve.
  - B. If the voltage is **less than 150 millivolts**, measure the voltage between terminals "NO" of the high limit and "TP" of the combination valve.

- (1) If the voltage is **200 millivolts or greater**, replace the thermostat.
- (2) If the voltage is **less than 200 millivolts**, replace the combination valve.

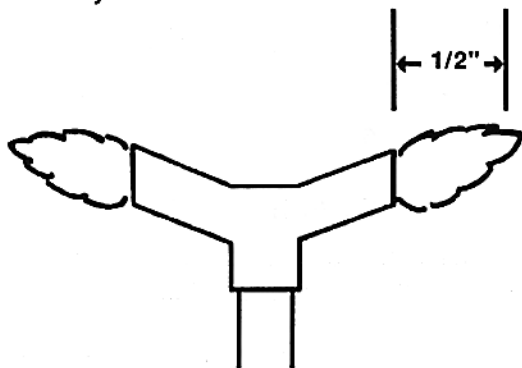
## THERMOSTAT CALIBRATION

1. Place temperature tester probe in the frytank near the area of the thermostat probe.
  2. Set the thermostat to 300°F and allow the temperature to stabilize.
  3. Check the temperature tester reading against the thermostat dial reading. If there is a variance of more than  $\pm 20^{\circ}\text{F}$  (280° to 320°F), calibration is required.
  4. To calibrate:
    - A. Remove thermostat knob from shaft.
    - B. Using a small screwdriver, rotate the set screw inside the hollow shaft counterclockwise to increase the temperature or clockwise to decrease the temperature.
- NOTE:** 1/4 turn equals approximately 18°F.
- C. Allow temperature to stabilize and recheck temperature. Repeat until the temperature falls within the limits as stated in step 3.
  - D. Install thermostat knob and set dial to 350°F.
  - E. Allow temperature to stabilize at new setting and compare temperature tester to dial setting. Recalibrate if the temperature does not fall within the range of 330° to 370°F.
  - F. If the temperature does not fall within the limits at both settings, replace the thermostat.

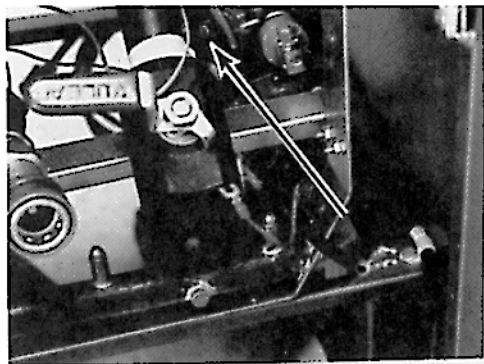
## PILOT ADJUSTMENT

1. Light pilot as outlined under "LIGHTING PILOT" in "GENERAL".

2. Compare pilot flame to Fig. 1. If the flame does not extend beyond the outer edges of the pilot shield  $1/2$ " or extends more than  $1/2$ ", an adjustment is necessary.



3. Remove the pilot adjustment cap from the combination valve. Turn the adjustment screw counterclockwise to increase the size of the flame or clockwise to decrease the size of the flame.



## BURNER SERVICE

If the burner ports become obstructed or the burner cracks, the burner will not operate properly. To check:

**WARNING: SHUT OFF THE GAS BEFORE SERVICING THE UNIT.**

1. Remove burner(s) as outlined under "BURNERS" in "REMOVAL AND REPLACEMENT OF PARTS".
2. Check burner(s) for:
  - A. Obstructions in port holes.
    - (1) Wash burner(s) in warm, soapy water. If this does not remove obstructions, a drill bit (size #37), held by hand, can be used.
  - B. Cracks in burner body.
    - (1) Burner MUST be replaced.

## BURNER ORIFICE SERVICE

**WARNING: SHUT OFF THE GAS BEFORE SERVICING THE UNIT.**

1. Remove the burner associated with the orifice to be serviced as outlined under "BURNERS" in "REMOVAL AND REPLACEMENT OF PARTS".
2. Remove the orifice tip and check for obstructions or damage.
3. If the clogging is not severe, the obstruction may be removed by carefully inserting, by hand, the proper size drill bit. If severe clogging or damage is evident, replace the orifice.
4. Reverse procedure to install.

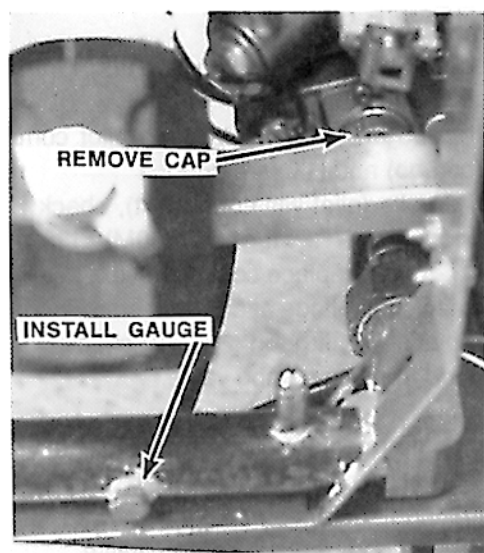
## COMBINATION VALVE REGULATOR ADJUSTMENT

The combination valve is preadjusted for natural or propane gas as specified on the rating plate. The natural gas rating is 4" W.C. and the propane rating is 10" W.C.

1. Shut off the gas to the fryer.
2. Turn the combination valve knob to "off".
3. Remove the plug from the sub-manifold and install pressure gauge to this point.
4. Turn on the gas and light the pilot as outlined under "LIGHTING PILOT" in "GENERAL".
5. Turn the combination valve "on".
6. Set the thermostat so the burners will come on.

7. To adjust:

- A. Remove the cap from the adjustment port on the combination valve.



- B. Read the pressure gauge. Turn the adjustment screw counterclockwise to decrease pressure or clockwise to increase pressure.

8. Install the cap and check for proper operation.

# ELECTRICAL OPERATION

## CONTROL SYSTEMS DESCRIPTION

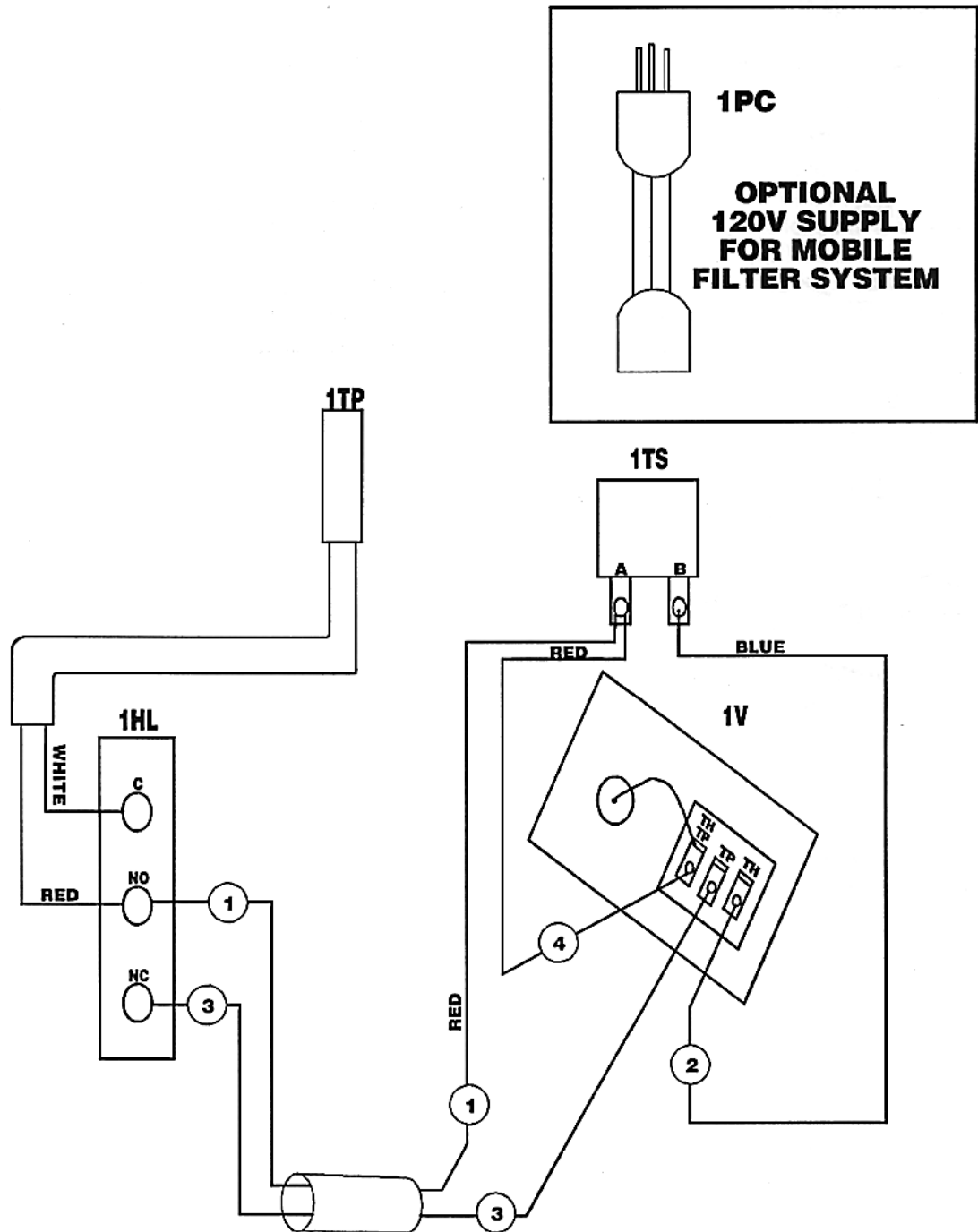
1. The thermopile (T.P.) provides the total control voltage for this system.
  - A. One side of the T.P. is connected to the common (C) of the high limit (H.L.).
  - B. The other side of the T.P. is connected to the normally open (N.O.) of the H.L.
  - C. The "C" of the H.L. (below the H.L. trip temp.) is connected through the normally closed (N.C.) contact of the H.L. through wire #3 to the combination valve pilot connection (common).
  - D. The other side of the pilot valve is connected through wire #4 to wire #1 to H.L. N.O. which holds the pilot valve open.
    - (1) If the H.L. trips, connection is made from "C" to "N.O." turning off pilot valve voltage. Gas valve closes.
2. Thermostat Control
  - A. One side of the millivolt supply is connected through the H.L. system as described above to the thermostat common (wire #3) of the combo valve.
  - B. The other side of the T.P. is connected from the "N.O." of the high limit to the thermostat through wire #1.
  - C. When the thermostat calls for heat (closed circuit) power from the T.P. is then connected to the other combination valve thermostat connection through wire #2.
  - D. If the H.L. trips, the T.P. is connected across 0 Ohms, the output voltage of the T.P. drops to 0.0 millivolts and the thermostat coil of the combination (combo) valve drops out, shutting the thermostat valve.
3. Total shutdown.
  - A. H.L. trip causes 0.0 millivolt to both coils of the combo valve, causing both valves to close.
  - B. Pilot relight can not be accomplished until oil cools sufficiently to allow H.L. to close.
  - C. Any wire in the system being cut or broken will cause shutdown of the system.

## QUICK CHECK PROCEDURAL CONDITION REFERENCE GUIDE

1. Check Millivolts (MV) @ wire #'s 3 and 4 with the pilot lighting procedure.
  - A. If good and pilot lights, then pilot combination (combo) and H.L. are good.
  - B. If 0 volts (pilot will not stay lit), check H.L. and open circuit T.P. If good (300MV) check H.L. If H.L. good, replace combo valve.
  - C. Check for voltage at disconnected T.P. If 0 volts, replace T.P. If good (300MV) check H.L. If H.L. good, replace combo valve.
2. Turn on thermostat - burners should light.
  - A. If no burner operation, check:
    - (1) Voltage at combo. valve at wire #2 and #4.
    - (2) If good, replace combo. valve.
    - (3) If 0 volts, check voltage between wire #3 of combo. valve and #1 of thermostat. If good, check resistance of thermostat and wire #2. If no voltage, check resistance of wire #1 to "N.O." of H.L.



## WIRING DIAGRAM

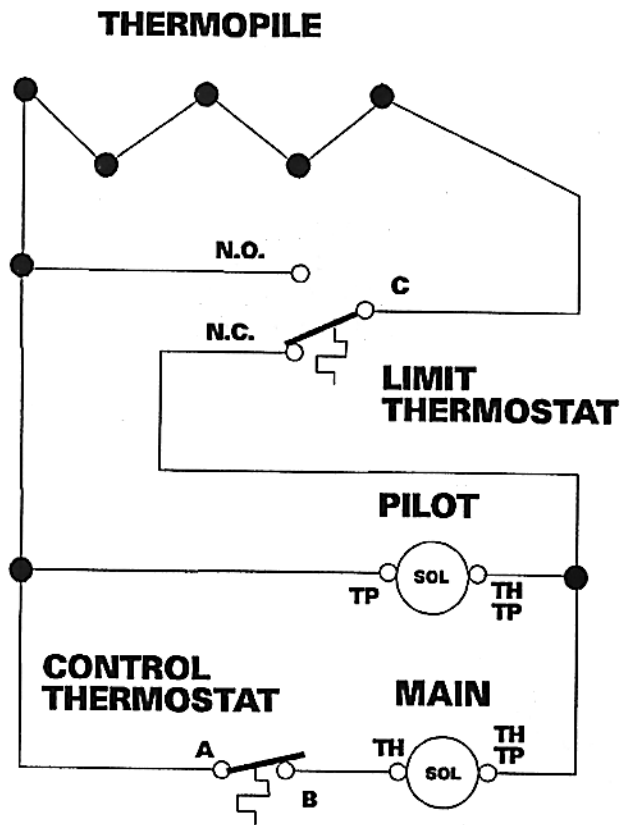


**WIRING DIAGRAM  
TK35 TK45 TK65**

10/30/90

TSP8

## SCHEMATIC



## COMPONENT FUNCTION

**THERMOSTAT** . . . Millivolt type with capillary bulb, single-throw break on temperature rise. Temperature range of 200° thru 400°F.

**THERMOPILE** . . . Millivolt control with 24" capillary. Rated to generate 500 millivolts.

**COMBINATION VALVE** . . . Regulates gas flow to burner and pilot. Provides pilot safety.

**HI-LIMIT** . . . Prevents overheating of fryer in the event of thermostat failure. Opens at 465°F and automatically resets at 415°F.

# TROUBLESHOOTING

## SYMPTOM

## POSSIBLE CAUSE

- | SYMPTOM  | POSSIBLE CAUSE   |
|--|--|
| 1. Fryer not working to normal high speed. The temperature of the frying compound drops too far and excessive recovery time is required. | <ul style="list-style-type: none"> <li>A. Insufficient gas supply to unit. Supply lines need correction.</li> <li>B. Ventilating system pulling heat out of heat exchanger and flue box. Ventilating system requires correction.</li> <li>C. Overloading capacity - need larger fryer.</li> </ul>  |
| 2. Pilot won't stay lit - shuts off fryer.   | <ul style="list-style-type: none"> <li>A. Defective thermopile or loose/dirty connection in thermopile.</li> <li>B. Defective shut-off valve.</li> <li>C. Pilot burner orifice and air openings need cleaning.</li> </ul>  |
| 3. Rapid fat breakdown - crumbs and specks in frying compound.   | <ul style="list-style-type: none"> <li>A. Excessive temperature settings (over 375°F).</li> <li>B. Frying compound not being filtered regularly.</li> <li>C. Incorrect preparation of breaded foods.               <ul style="list-style-type: none"> <li>• Do not use salt.</li> <li>• Allow breading time to adhere to food.</li> <li>• Do not allow loose flour to fall into frying compound from hands.</li> </ul> </li> <li>D. Do not add strainings or drippings from meat fats to kettle frying compound.</li> <li>E. Use correct frying oils or compound and follow temperature recommendations.</li> <li>F. Dirty fat kettle-sludge and carbon build-up gives bad taste and hastens breakdown.</li> <li>G. Take out 10 to 15% of the frying compound. Use compound taken out for other cooking. Keeps acid build-up down.</li> <li>H. Check thermostat settings with thermometer in kettle periodically. Thermostat may become out of calibration and give excess temperature at low settings.</li> </ul> |
| 4. Leaking Kettle.   | <ul style="list-style-type: none"> <li>A. Foam over by worn out frying compound permits oils to drip from the kettle surfaces, giving the appearance of a leak.</li> <li>B. Careless draining procedure without turning off burners to prevent operation with an empty tank, damages tank joints.</li> <li>C. Carbon build-up in dirty kettles causes rapid attack on kettle by promoting acid formulation.</li> </ul>   |
| 5. Unit stays on when thermostat is turned off.  | <ul style="list-style-type: none"> <li>A. Defective thermostat.</li> <li>B. Thermostat terminals touching one another.</li> </ul>  |
| 6. Pilot burner flames adjusted is properly, but fluctuate to very low and blow out easily.  | <ul style="list-style-type: none"> <li>A. Check gas pressure at sub-manifold fitting on fryer when unit in operation and with all other equipment on the same gas line in operation.</li> <li>B. Pressure at sub-manifold (pipe on which burners are mounted) should not be less than 4.0"W.C. (Nat. &amp; Mixed) or 10"W.C. for (Propane) gas. Local gas utilities will make check if requested.</li> </ul>   |

