

ROBERTSHAW INTERMITTENT PILOT IGNITION SYSTEM

I - INTRODUCTION

This Robertshaw intermittent pilot ignition system was incorporated into G11E, G12E and G12RE-7 series furnace production in the fall of 1982. It is also used in current production of retrofit kits. The -7 series system replaces the Robertshaw system used on earlier -3 and -5 series furnaces.

An optional field installed vent damper is only applicable to G11E, G12E and G12RE units. **A VENT DAMPER CANNOT BE INSTALLED ON RETROFIT APPLICATIONS.** Vent damper application and operation is the same as for the earlier -3 and -5 series.

The system uses thermal pilot flame sensing in conjunction with a spark and timer module to automatically light the pilot on heating demand. Only after pilot is proven is main burner valve opened. Upon detection of unsafe conditions, the control locks out the system and must be manually reset before trying another restart.

Figure 1 illustrates the ignition system components.

II - OPERATION (Refer to Schematic, Page 8)

A - Timer/Ignitor Module (Figure 2)

- 1 - The timer/ignitor (also called spark and timer) module is a manual relight system with an internal thermal lockout switch. This is a N.C. bimetal switch actuated in response to heat generated by its heater coil. The switch contacts will open locking out the system in 90 to 180 seconds if pilot is not proven. (When pilot is proven the lockout switch heater is de-energized for that heating cycle.) If the system locks out manual reset is required.
- 2 - This module also includes the high voltage source for pilot ignition.
- 3 - The flame switch 'plugs' onto the module. It is a S.P.D.T. (single pole-double throw) "throttling action" switch. Switch movement from the N.C. to N.O. side is caused by a pressure build-up on a diaphragm assembly. As the sensing bulb is heated by the pilot flame, the capillary charge builds pressure causing the N.C. contacts to open. As pressure continues to build, the switch will close on the N.O. contact. With proper pilot flame the switch will change position in 45 seconds maximum.

B - Gas Valve

The gas valve contains the pilot and redundant main solenoid valves and manual shutoff valve. The pilot valve solenoid has two coils, a 'pick' coil and a 'hold' coil. The hold coil is energized when thermostat contacts close, but will not open the pilot valve unless the pick coil is also energized by the control. Once the pilot valve is opened by both coils, the pick coil is de-energized and the hold coil will keep the valve open. Following, the single coil main valve can be opened.

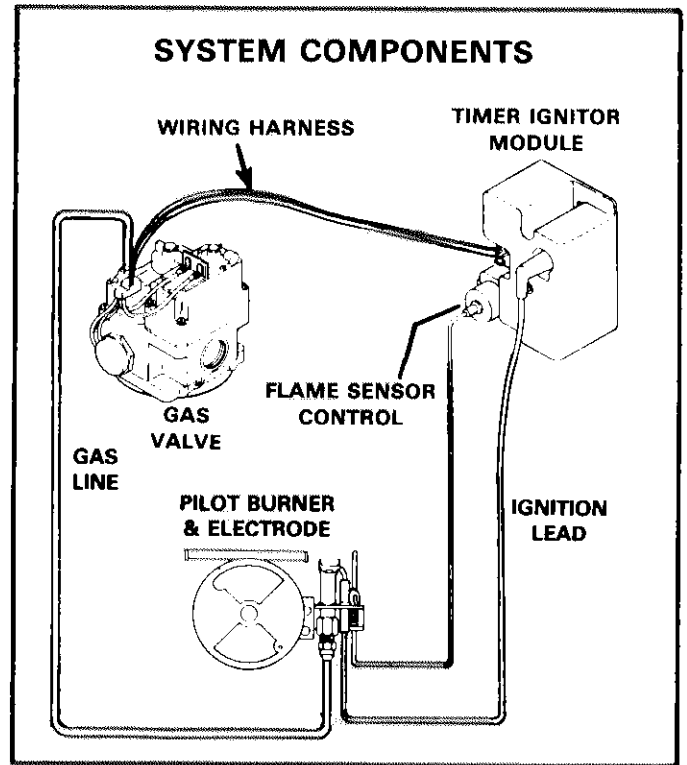


FIGURE 1

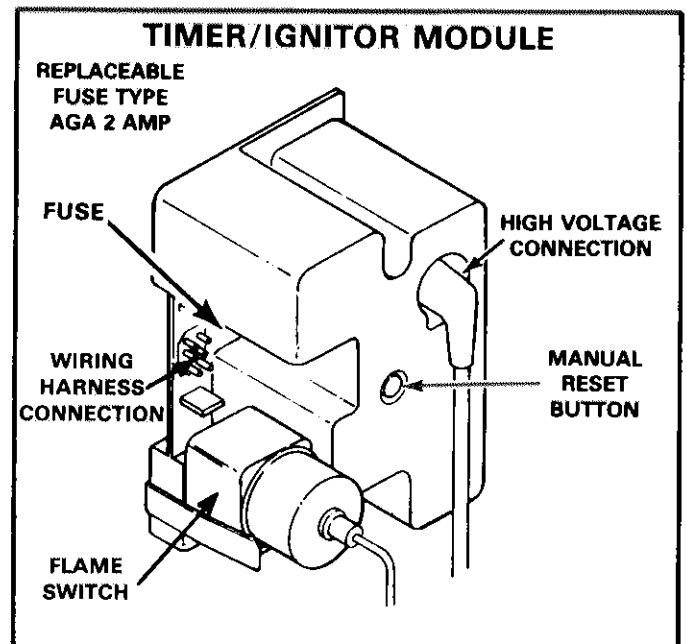


FIGURE 2

SENSING PROBE OPERATION

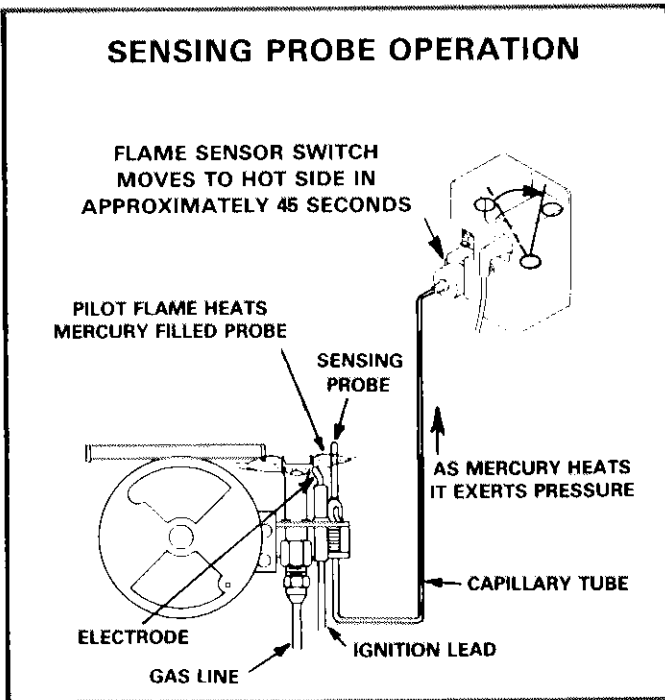


FIGURE 3

C - Sensing Probe System Operation (Figure 3)

- 1 - The thermostat calls for heat and simultaneously energizes the timer/ignitor to generate sparks and the combination pilot-redundant valve solenoid. This allows gas to flow to the pilot burner.
- 2 - When the pilot is lit and the flame is detected, sparking ceases. The pilot burner flame heats up the sensing element to move the flame switch to the hot side (Figure 3). This energizes the main valve relay and the pilot valve solenoid remains energized by its hold coil. Main gas now flows and is ignited by the pilot flame. The system is now in a running mode.

If pilot flame fails, within the 45 second time to switch to hot side, the flame switch begins to cool and the main valve is prevented from opening.

- 3 - When the thermostat is satisfied and opens the circuit, both electrically operated valves are de-energized and closed. The sensor cools and the flame switch moves to the cold side ready for another heat cycle.
- 4 - Normal timing to heat up the sensor element to move the flame switch to the hot side is approx. 45 sec. Normal timing to cool down the sensor element to move the flame switch back to the cold side is approx. 40 seconds.

NOTE - This a 100% shut-off system, if pilot fails to light in 90 to 180 seconds (depending on ambient), the system will lock-out. If this occurs turn power to system "OFF" and push manual reset button on ignition control. Wait a minimum of 5 minutes to reset and restart. If spark fails to light pilot on restart, system requires service. On gas hook-up, air must be purged from pilot line before pilot will light. If safety opens, follow above procedure until gas gets to pilot.

III - START-UP

- 1 - Turn on gas and power.
- 2 - Turn clock knob to "ON" position.
- 3 - Set room thermostat above room temperature.
- 4 - Press reset button on ignitor module.

- 5 - Electrode should spark and light pilot gas. The pilot flame should play on the electrode rod and cause sparking to stop. After the pilot flame has played on mercury bulb for approximately 45 seconds the bulb should become sufficiently heated to switch on main burner. See Figures 4 and 5.

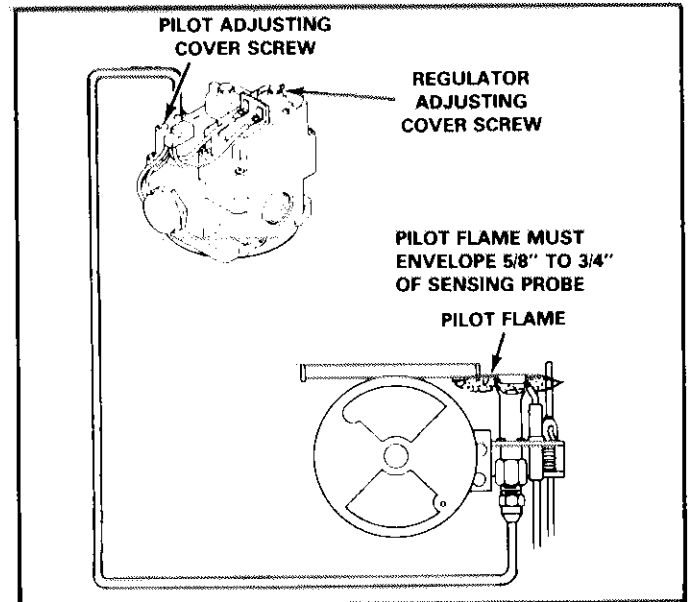


FIGURE 4

- 6 - If sparking does not stop:
 - a - Check to make sure the rod is in the pilot flame.
 - b - Check for proper ground connections to timer/ignitor module.
- 7 - Extinguish pilot several times to check instant relighting of pilot gas and spark cut-off feature.
- 8 - Use thermostat to cycle unit on and off. Check for proper pilot and main burner flame with heat demand. Pilot and main burner flame will drop out with loss of heat demand.

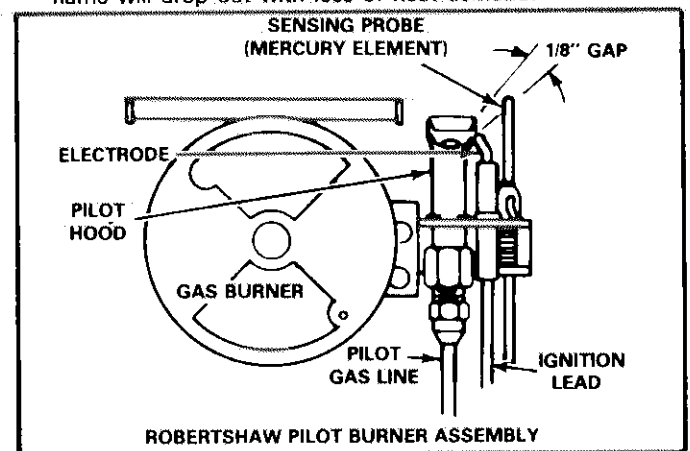


FIGURE 5

IV - TROUBLESHOOTING

The troubleshooting section consists of five flow charts and related illustrations.

- 1 - Pilot Lights - Main Gas Valve Will Not Open (Figure 6).
- 2 - Spark Present - No Pilot Gas (Figure 7).
- 3 - No Spark and No Pilot Gas (Figure 8).
- 4 - Main Burner Shuts Down Prior to Thermostat Being Satisfied (Figure 9).
- 5 - Pilot Cycles On And Off By Itself (Figure 10).

PILOT LIGHTS - MAIN GAS VALVE
WILL NOT OPEN

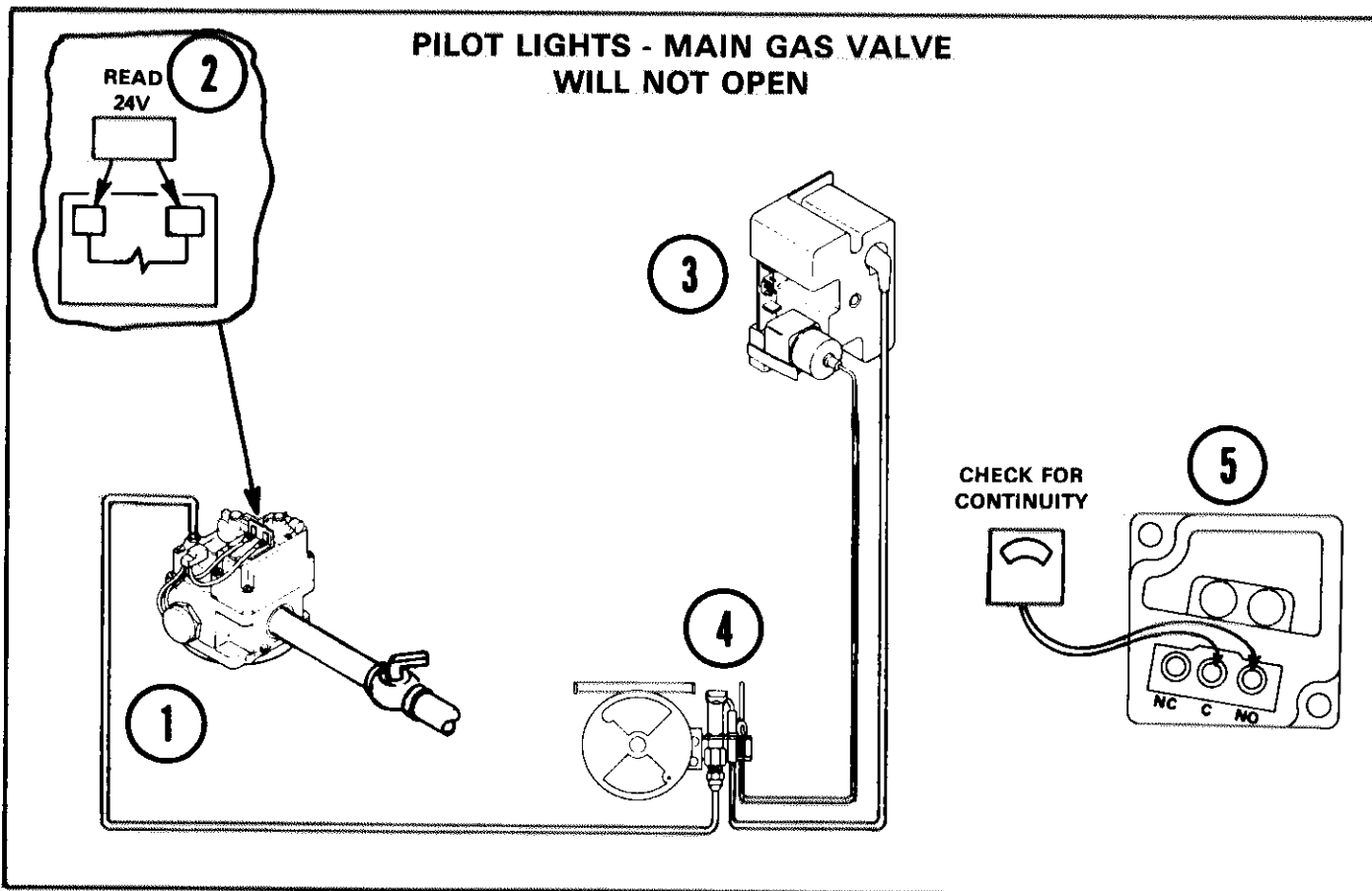
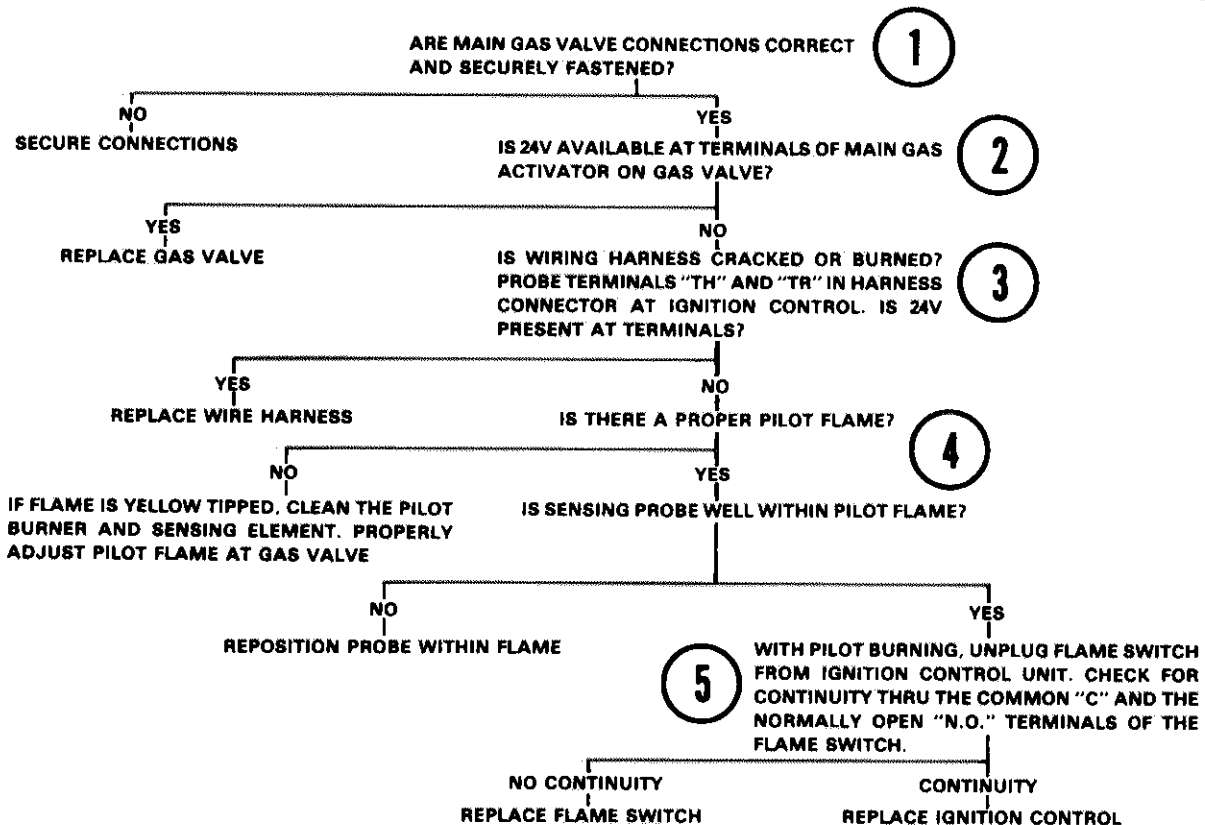


FIGURE 6

SPARK - NO PILOT GAS

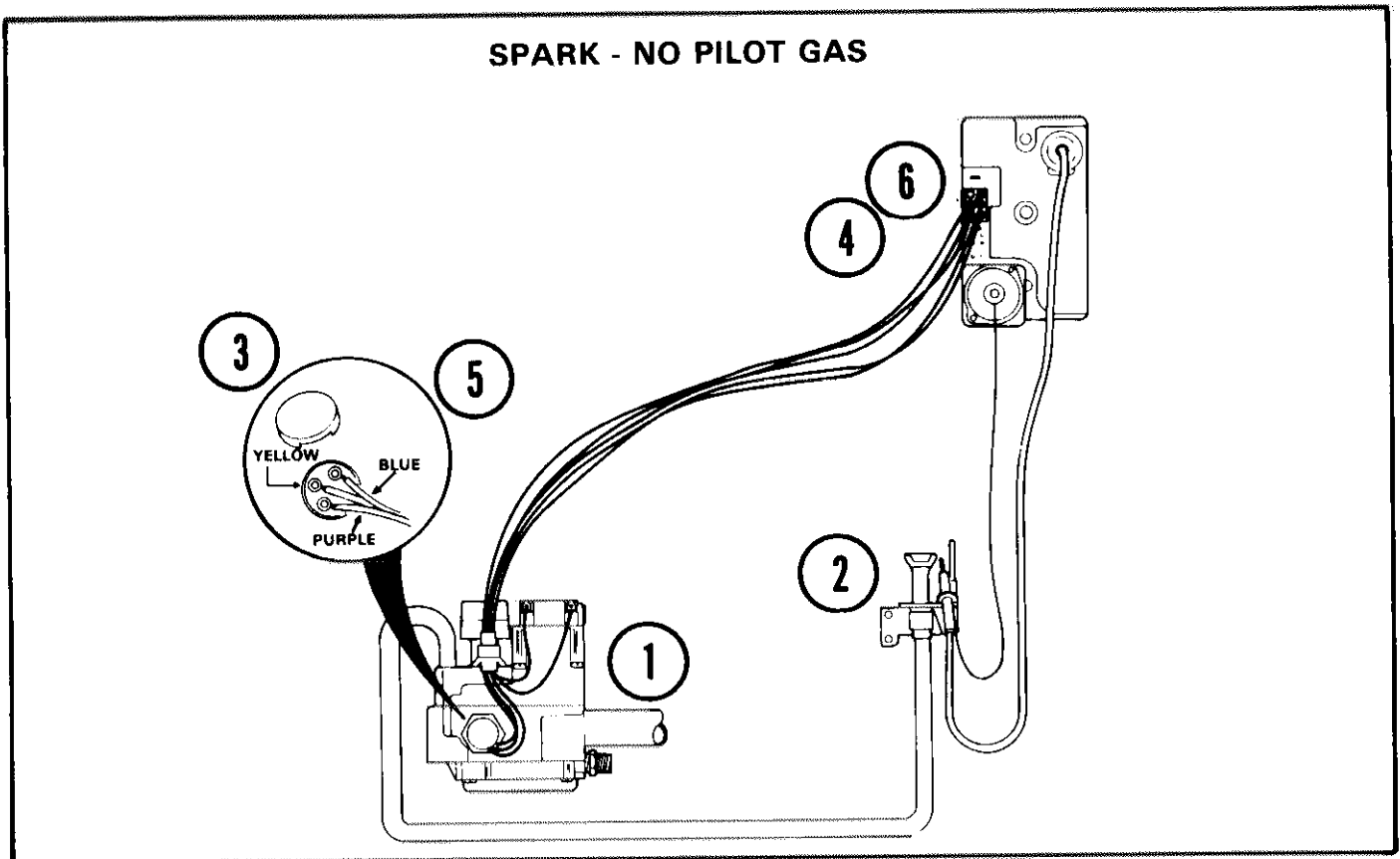
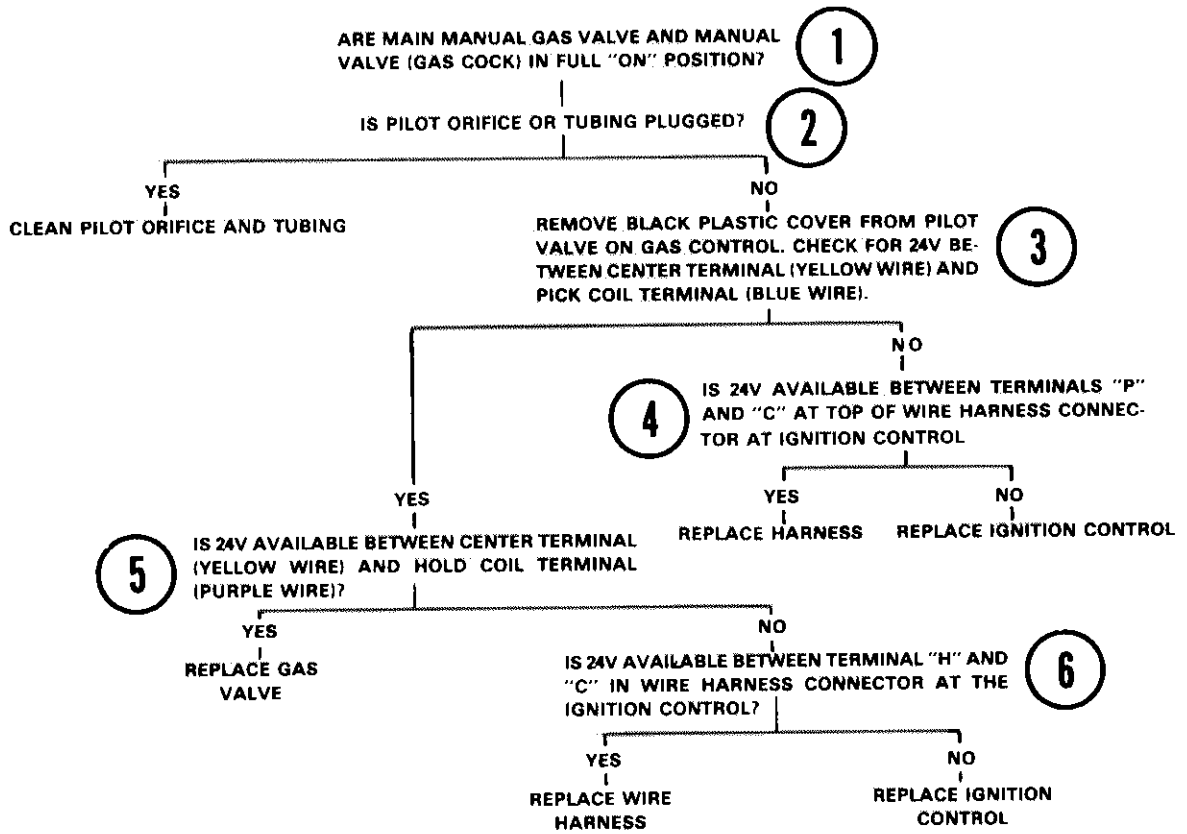


FIGURE 7

NO SPARK AND NO PILOT GAS

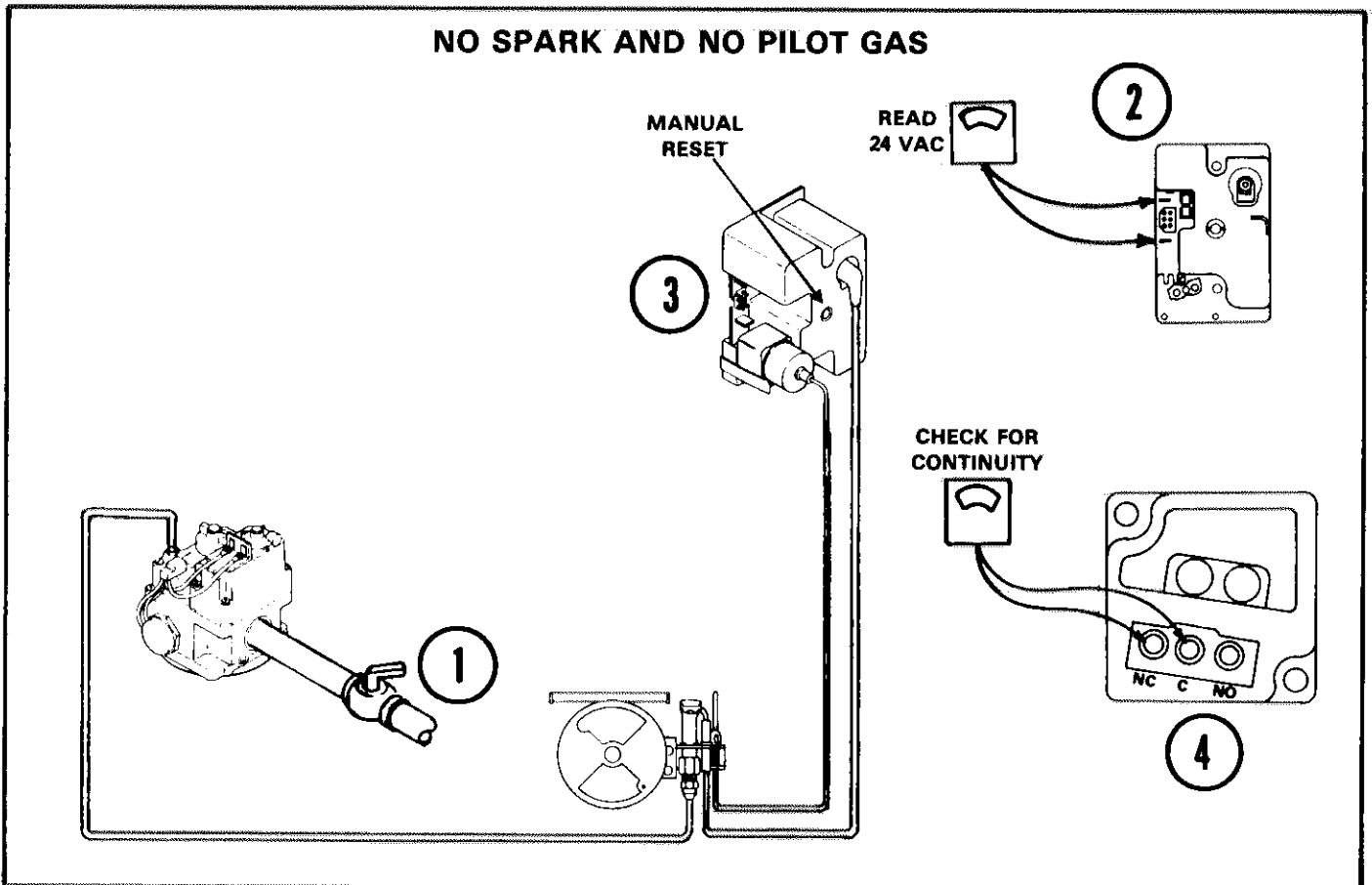
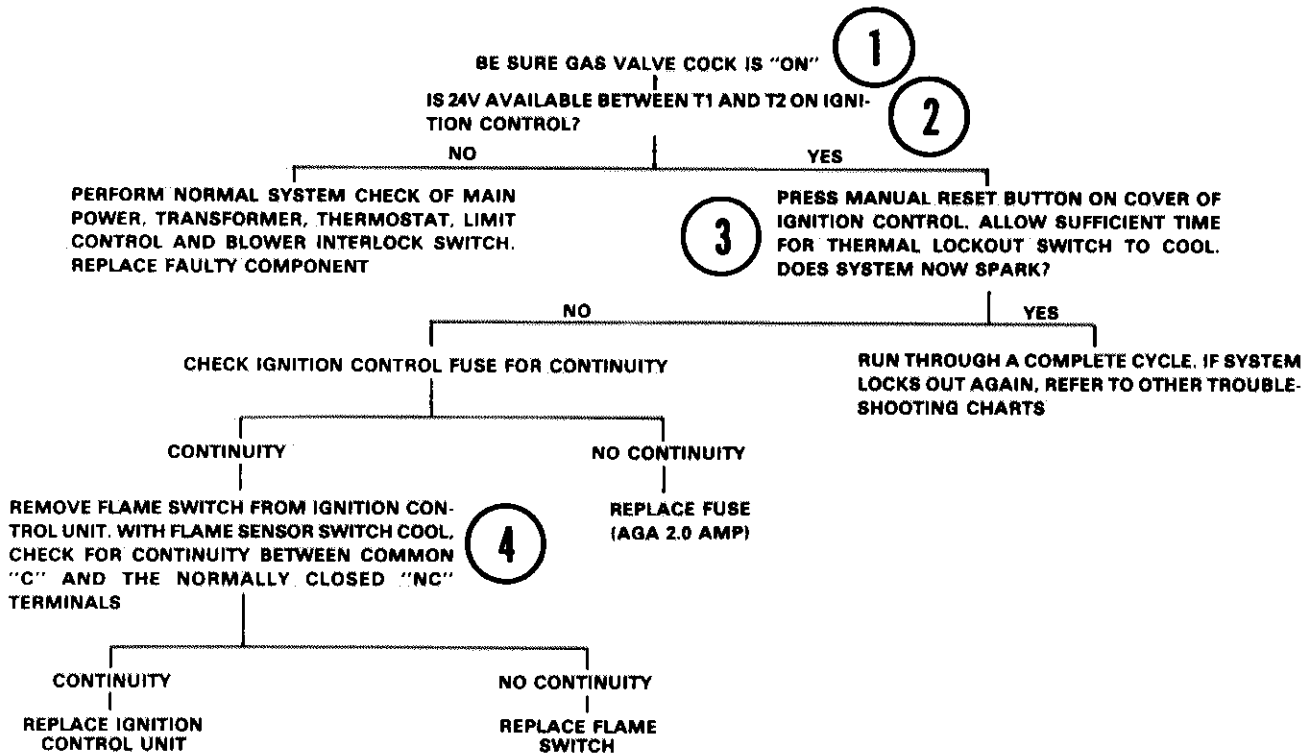


FIGURE 8

MAIN BURNER SHUTS DOWN PRIOR TO THERMOSTAT BEING SATISFIED

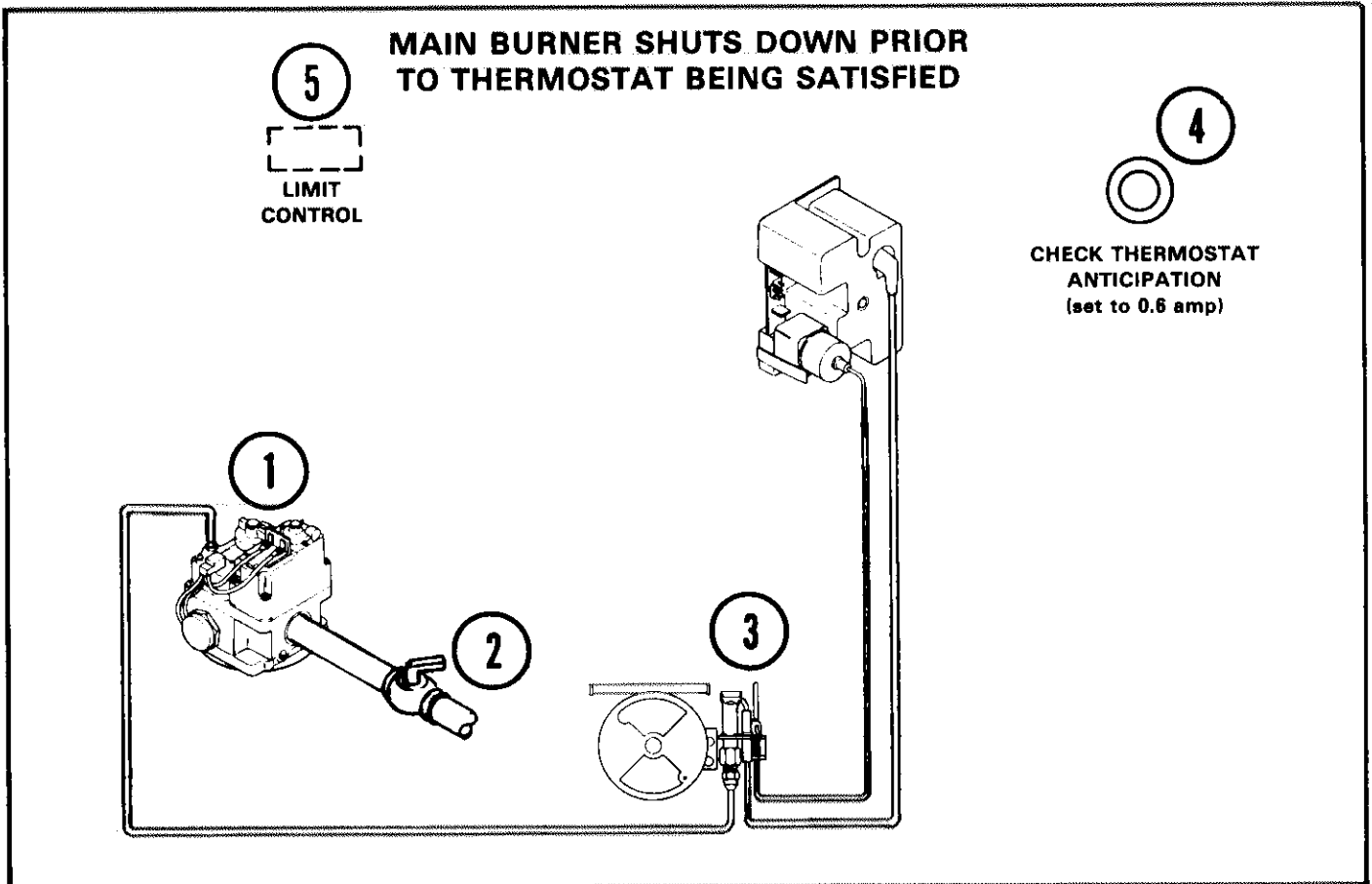
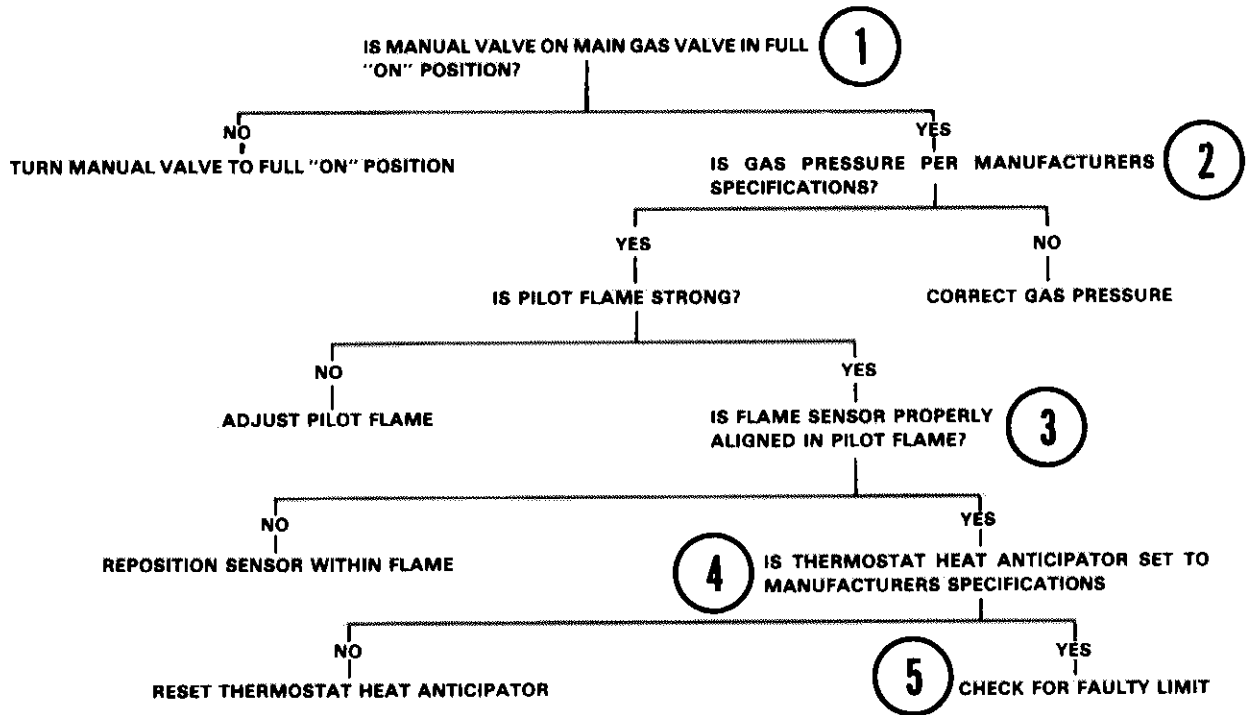
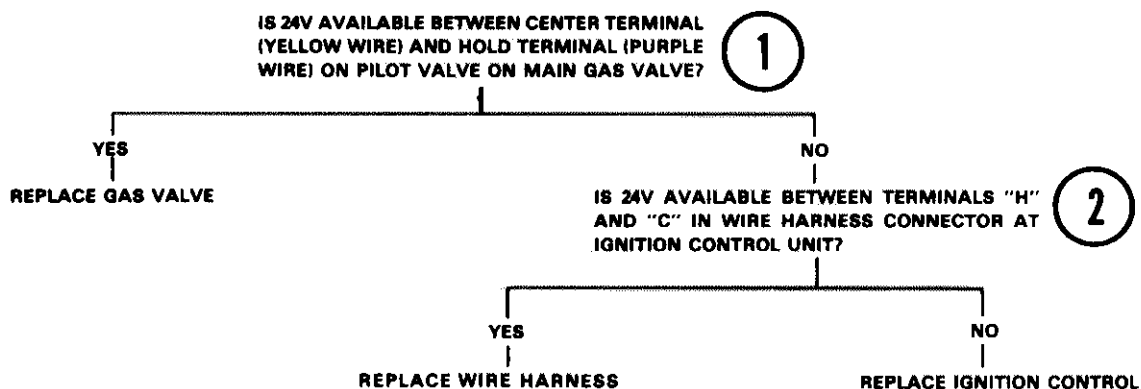


FIGURE 9

PILOT CYCLES ON AND OFF BY ITSELF



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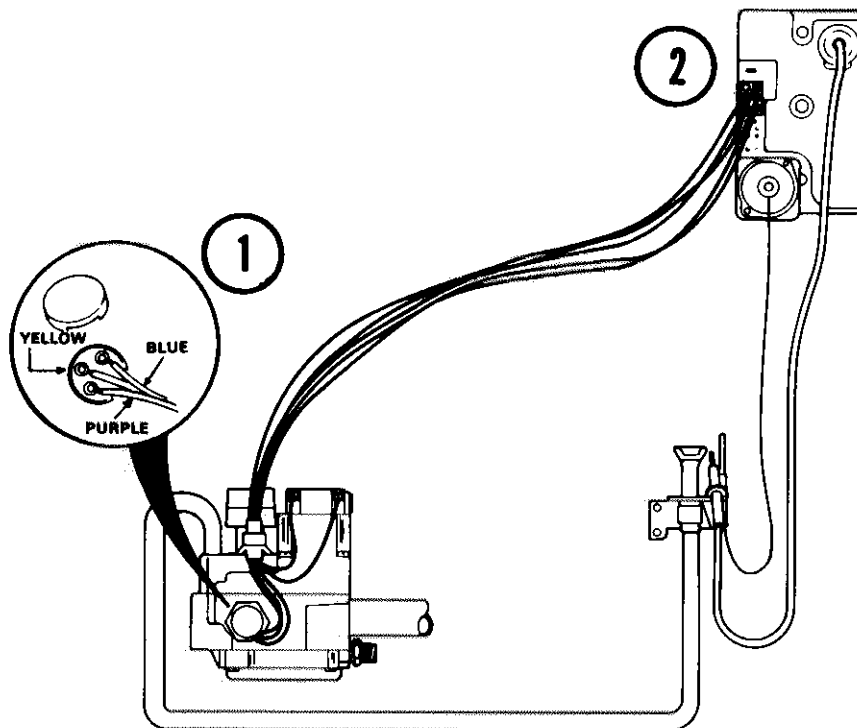


FIGURE 10

