FORM GC-117
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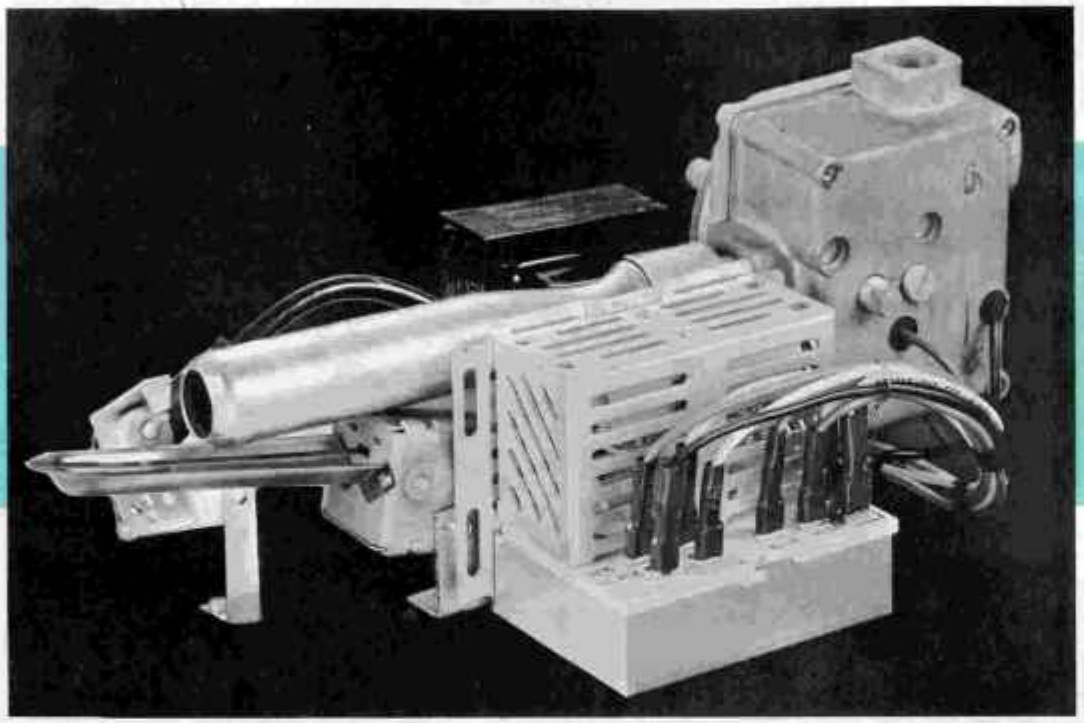
CONTROLS COMPANY OF AMERICA



# "SPARK LITE"

## AUTOMATIC DIRECT SPARK IGNITION SYSTEM FOR GAS FIRED EQUIPMENT

The fail proof DIRECT SPARK IGNITION for:

1. Laundry dryers
2. Unit heaters
3. Infra-red heaters
4. Trailer heaters
5. Through the wall space heaters and central and space heating special applications

ELIMINATES:

1. "Conventional" electric ignition systems
2. Pilot burner
3. Pilot outage problems
4. Pilot shielding problems
5. Residual heat build-up from standing pilot
6. Gas used to maintain pilot
7. Pilot smothering due to recirculated combustion products

Especially necessary on applications where "drafts" are a problem, such as unit heaters that are mounted in hard-to-get at locations, or other appliances where "blow-outs" are frequent and relighting is awkward.

**CONTROLS COMPANY OF AMERICA**
HEATING AND AIR CONDITIONING CONTROLS DIVISION
Milwaukee 45, Wisconsin

# AUTOMATIC DIRECT SPARK IGNITION SYSTEM FOR GAS FIRED EQUIPMENT

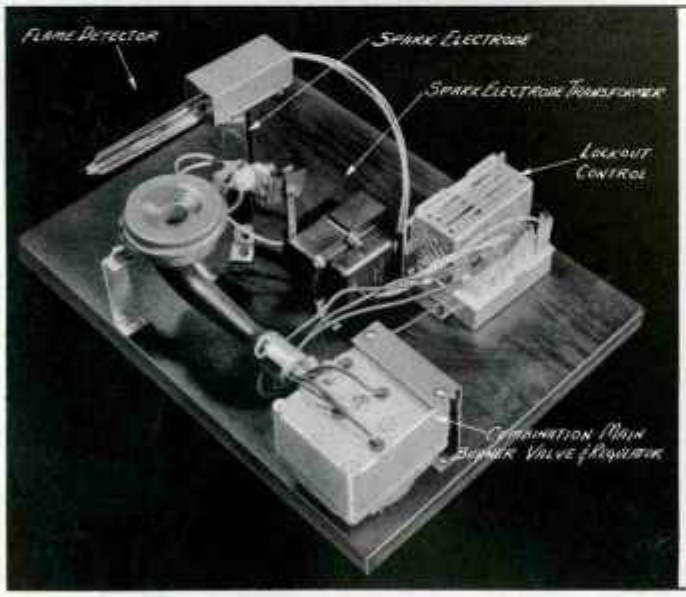
Conventional automatic ignition systems for gas fired equipment depend upon a pilot flame for the ignition of the main burner gas and provide an electric "hot wire" or glow coil as the ignition means for the pilot flame.

Gas Utility service records show that the pilot burner and its companion glow coil ignitor account for a disproportionate share of service complaints.

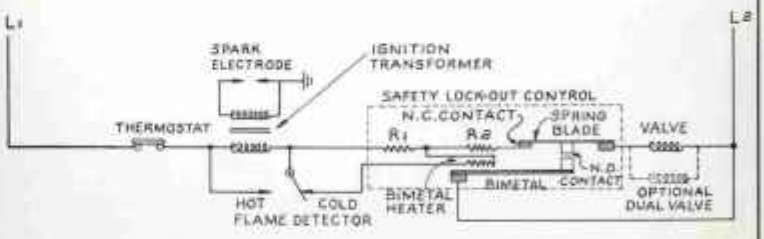
Pilot burner failures are caused by a number of conditions difficult to cope with such as, closure of primary air openings by lint, plugging of the orifice, low and erratic gas pressure, variable draft, etc. In addition to the possibility of faulty pilot burner operation there is also the possibility of malfunction and burnout of the glow coil. The performance and life of this element is effected by variations in supply line voltage, an often encountered service condition. It is common knowledge that these elements have a limited life and in many cases require frequent replacement and usually at a relatively high cost to the consumer.

In answer to the universal desire of gas utility service organizations for an improvement in these elements which would reduce these frequent service calls due to pilot and glow failures, Controls Company of America has developed an automatic ignition system which now completely eliminates these two troublesome components.

This system provides an intense electric spark as an ignition means, instead of an expendable glow coil and utilizes this spark to directly ignite the main burner gas, thereby eliminating the need of a pilot burner and flame. It incorporates all the necessary safeguards against ignition failure of the main burner gas and provides for fail-safe operation in a unique and simple manner.




CIRCUIT DIAGRAM
AUTOMATIC DIRECT SPARK IGNITION SYSTEM
FOR GAS FIRED EQUIPMENT




$R_1$ = INTERLOCK RESISTOR
$R_2$ = CURRENT LIMITING RESISTOR

## COMPONENTS OF THE AUTOMATIC DIRECT SPARK IGNITION SYSTEM

The complete system includes the following components:

Combination Main Burner Control Valve and Regulator (or less regulator).
Flame Detector
Safety Lock-Out Control
Spark Ignition Transformer
Spark Electrode

### COMBINATION MAIN BURNER CONTROL VALVE AND REGULATOR

This unit provides the dual function of a pressure regulator and gas flow control valve. The control valve is of an improved electro-magnetic type (not a solenoid) with soft seat and spring loaded to assure 100% tight shut-off. It can be mounted in any position.

## COMPONENTS OF THE AUTOMATIC DIRECT SPARK IGNITION SYSTEM (Con't)

### FLAME DETECTOR

This is a thermally actuated electric switch responsive to the presence of the main burner flame. It acts to shut-off the main burner gas in the event of ignition failure, and also controls the spark and terminates it after proving the presence of main burner flame.

The thermal element is a low mass stainless steel strip which reacts to the heat radiated from the main burner flame (it need not be in contact with the flame). The expansion and contraction of the strip is utilized to operate a switch. This switch has a single pole double throw action, amking one contact in the "cold" position and another cantact in the "hot" position.

The Flame Detector is required to respond for each burner cycle thereby proving it is in proper operating condition before main burner gas can be admitted.

### SAFETY LOCKOUT CONTROL

This is a temperature compensated, bemetal operated switch, actuated by a heater. It functions to close the main burner valve, if for any reason, the gas does not ignite, or there is no gas to the burner.

The control also contains the interlock and current limiting resistors and has a terminal board for connecting the other components in the system.

### SPARK IGNITION TRANSFORMER

This provides the necessary high voltage for the spark.

### SPARK ELECTRODE

A combination of single electrode and mounting bracket so shaped that a small portion of the main burner gas is positively directed through the spark gap to assure prompt ignition. It is of practically indestructivle construction.

## HOW THE AUTOMATIC SPARK IGNITION SYSTEM OPERATES.

The system is energized in the conventional manner through operation of the timer or thermostat.

When the circuit is completed by the timer or the thermostat calls for heat, the ignition transformer and main burner control valve are immediately and simultaneously energized through the "cold" contact of the Flame Detector. This same circuit energizes the Safety Lock-out Control heater.

When the main burner flame ignites the Flame Detector reacts to the presence of the flame and in approximately 5 seconds will switch to the "hot" contact. This de-energizes the ignition transformer and discontinues the spark. This action also opens the by-pass and heater circuit around the $R_1$ resistor which is incorporated in the Safety Lock-out Control unit. This resistor limits the current to the main burner control valve. In the event of a current interruption, for any reason, the valve will close and cannot reopen due to the limited current. When the flame detector returns to the "cold" or starting position the resistor is again bypassed and the valves will open.

Should the main burner flame fail to ignite, the Flame Detector switch would remain in the "cold" position continuing the spark and also continuing to by-pass the $R_1$ interlock resistor keeping it out of the circuit. The Safety Lockout Control heater now remains in the energized condition and in approximately 20 seconds will cause the N.O. contact to close completing a by-pass circuit around the main burner control valve causing the valve to close.

The valve remains closed as long as the Flame Detector remains in the "cold" position and the Safety Lockout Control heater is energized. The system is automatically reset when the timer period expires or the thermostat opens the circuit for a sufficient time to allow the Safety Lock-out Control heater to cool and open the by-pass circuit around the valve. In each repeated try for ignition the spark is present.

In addition, a normally closed (N.C.) contact is provided in the Safety Lock-out Control which opens the circuit to the heater periodically during the time the system is energized and the switch is in the "lock-out" position. This acts to reduce the continual build-up of heat during the lock-out period and reduces the time required for the unit to be automatically reset for the next thermostat cycle. During this cycling action, the main valve is kept from opening by the by-pass (N.O.) contact which must open before the normal thermostatic operation can start.

In normal operation, the system recycles through an ignition period for each call for heat by the thermostat.

## SAFE-GUARDED OPERATION UNDER VARIOUS UNUSUAL CONDITIONS

1. NO SPARK – Due to open circuit in the *secondary circuit* of the ignition transformer or too wide a spark gap.

   ACTION: Valve will not open. If the valve was open when failure occurred, it will immediately close.

2. NO SPARK – Due to a shorted *secondary circuit* in the ignition transformer or shorted spark gap.

   ACTION: Safety Lock-out Control will act to close valve in *shorter* time than normal ignition failure timing.

3. NO SPARK – Due to shorted ignition transformer primary.

   ACTION: Safety Lock-out Control will act to close valve in *greatly accelerated time.*

4. OPEN CIRCUIT – In either the ignition transformer primary, resistors, or Safety Lock-out Control heater.

   ACTION: Valve cannot open.

5. NORMALLY OPEN CONTACT OF SAFETY LOCK-OUT CONTROL FAILS TO MAKE

   ACTION: Lock-out Control heater being energized through normally closed contact continues to heat and bimetal continues movement and ultimately opens normally closed contact de-energizing valve.

6. NORMALLY CLOSED CONTACT OF SAFETY LOCK-OUT SWITCH FAILS TO OPEN

   ACTION: Valve is closed by normally open contact. Bimetal continues under heat until circuit is broken. During this period great force is developed by bimetal which should ultimately break normally closed contact.

7. FLAME DETECTOR FAILS TO OPEN COLD CONTACT

   ACTION: Safety Lock-out Control heater continues to be fully energized and within approximately 20 seconds (at normal line voltage) will close the normally open contact to close the valve.

8. FLAME DETECTOR FAILS TO MAKE HOT CONTACT

   ACTION: Spark continues while valve is open.

9. FLAME DETECTOR FAILS TO MAKE COLD CONTACT

   ACTION: Valve will not open on next cycle.

10. IGNITION FAILURE (MAIN BURNER FLAME)

    ACTION: Flame Detector remains in "cold" position continuing to fully energize Safety Lock-out Control heater. Switch acts to close valve within 20 seconds (at normal line voltage).

11. FLAME FAILURE – AFTER INITIAL IGNITION

    ACTION: Flame Detector responds to restore spark for prompt re-ignition.

12. POWER INTERRUPTION – Due to opening door, timer operation, power failure, etc.

    ACTION: Valve closes immediately and cannot re-open until Flame Detector returns to "cold" position and restores spark.

## PERFORMANCE AND SERVICE ADVANTAGES

1. NO PILOT BURNER – No orifice plugging or linting.
2. NO PILOT OUTAGE PROBLEM
3. NO PILOT LOCATION OR SHIELDING PROBLEM
4. NO RESIDUAL HEAT BUILD-UP PROBLEM AS WITH STANDING PILOT
5. NO GLOW COIL REPLACEMENTS
6. SPARK ELECTRODE HAS INFINITE LIFE
7. INSTANTANEOUS IGNITION – Proved for all gases and under all conditions.
8. SAFE PERFORMANCE – No gas without spark.
9. FAIL-SAFE CIRCUIT – Self checking components.
10. LOWER SERVICE COST TO CONSUMER
11. CHOICE OF SINGLE OR DUAL MAIN CONTROL VALVES
12. PROVED COMPONENT DESIGN – Backed by extensive field tests.

### SPARK IGNITION SYSTEM SPECIFICATIONS

REGULATOR ADJUSTING RANGE: 2.3"–4.2" standard adjustment 3.5" W.C. at 7.0 inlet pressure
ELECTRICAL CHARACTERISTICS: 120V 50/60 cycle 0.35 amps standard
GAS PRESSURE REGULATORS VENTING: Integral Vent Leak Limiting Orifice
MAXIMUM OPERATING OR INLET PRESSURE: 1/2 psi or 14" Water Column

FLOW RATINGS: BTU/HR. AT 1.0" W.C. PRESSURE DROP

| Model No. | With or Without Regulator | No. of Valve Seats | Gases of 800 BTU/Cu. Ft. or More |
|---|---|---|---|
| 60 V1 | With | 1 | 54,500 |
| 60 V2 | With | 2 | 54,500 |
| 60 VL1 | Without | 1 | 54,500 |
| 60 VL2 | Without | 2 | 54,500 |
| 60 J1 | Without | 1 | 162,800 |

DIMENSIONS

| | | | |
|---|---|---|---|
| LOCK OUT BOX | 2-5/8" | x 4-7/16" | x 3-1/4" |
| TRANSFORMER | 2-3/4" | x 2-1/2" | x 3" |
| SPARK ELECTRODE | 2" | x 3/4" | x 1-5/16" |
| FLAME DETECTOR | 7-1/16" | x 1-1/4" | x 1-7/16" |
| VALVE (60 V) | 3-1/4" | x 4" | x 3-7/8" |
| VALVE (60 J) | 3-1/8" | x 2" | x 3" |