

257220 505724

ELECTRONIC CONTROL SYSTEMS WITH OR LESS PANELS FOR G-40 GAS BOILERS

APPROVED BY AMERICAN GAS ASSOCIATION •

NOTICE TO INSTALLER AND OPERATOR
THIS BOOKLET MUST BE AFFIXED ON
OR ADJACENT TO THE HEATING EQUIPMENT

AMERICAN-Standard
First in heating ... first in plumbing

BP-15095 REV. 9-67

13671

PLAINTIFF'S
EXHIBIT

ASI-383

ELECTRONIC CONTROL SYSTEMS

SUPPLEMENTARY INSTRUCTIONS FOR GAS BOILERS WITH ELECTRONIC CONTROLS

CAUTION: All wiring should be installed in accordance with the National Electric Code. Reference should also be made to the electric company regulations and local codes covering the installation.

The installer should carefully study the printed forms provided with the equipment and become familiar with the terminology and purpose of the parts. Particular attention should be given to the diagram covering the location of the pilots and controls for the system adopted. The installation of the pilot gas supply line(s) is shown in the Installation, Operating and Maintenance Manual furnished with the boiler.

TYPES OF SYSTEMS:

- EG-O - This system provides electric ignition, 100% shutoff and electronic flame sensing of all pilots.
- EPG-O - Electronic Control System - Same as the EG-O System, except furnished with a prewired Master Panel with Protectorelay for one pilot and one sub-panel with a Protectorelay for each additional pilot.
- EG-OM - Electronic Control System - This system provides electronic flame sensing, 100% shutoff and constant burning pilots. (Manual ignition).
- EPG-OM - Electronic Control System - Same as EG-OM, except furnished with prewired Master Control Panel for one pilot and one sub-panel for each additional pilot.

ELECTRONIC CONTROL SYSTEMS

TERMINOLOGY:

- Non-100% Shutoff - Pilot gas supply is controlled manually.
- 100% Shutoff - Pilot gas is supplied through a valve which will automatically close upon pilot flame failure.
- Continuous Pilot - The pilot burns at all times and is manually ignited.
- Safety Pilot - Pilot with flame sensing device which prevents main burner operation in event of pilot flame failure. The flame sensing device is a thermocouple on the Baso type pilot and a flame rod on the M-H (Q-179) type pilots.
- Q-179-A Pilot - Has an igniter electrode for spark ignited gas pilot and a flame electrode. This Model is used for electric ignition, 100% pilot gas shutoff on intermittent pilot applications.
- Q-179-B Modified Pilot - Has special adapter for installing a thermocouple in place of an igniter electrode. Q-179-B modified pilot is used for manual ignition, 100% pilot gas shutoff.
- Protector relay - This control provides electronic flame safeguard protection for the boiler by supervising the control of gas valve(s).

CAUTION: Remove the circuit jumper screw located on top side of the relay base if Q-179 Continuous Flame (not electrically ignited) safety pilot(s) is used. This screw MUST BE removed before installing the relay(s) in the Prewired Panel(s).

THERMOELECTRIC PILOT VALVE - Located in the pilot line and actuated by a thermocouple. Used for 100% pilot gas shutoff. To light pilot, depress the plunger on top of pilot valve and hold approximately 30 seconds until the thermocouple becomes hot.

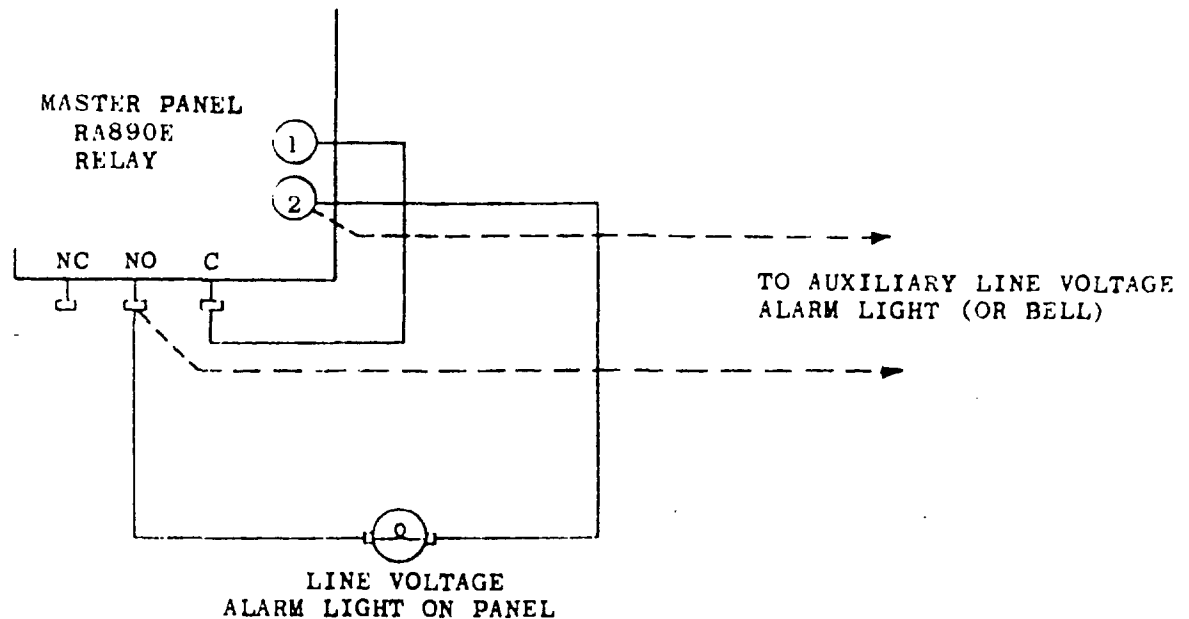
GAS PILOT VALVE - M-H No. V-495-A or No. V-495-B, 115 volt, 60 cycle. Used for Electric Ignition, 100% Pilot Gas Shutoff. Model "A", less manual opener is furnished with manual opening device packed in envelope (attached to the pilot valve) as standard equipment.

IGNITION TRANSFORMER - Used with Q-179-A pilot for automatic electric ignition. Secondary (hot) connection provides 6,000 volts and is grounded internally to the case. TO COMPLETE IGNITION CIRCUIT, CASE MUST BE GROUNDED. Transformer operates on 115 volt, 60 cycle current.

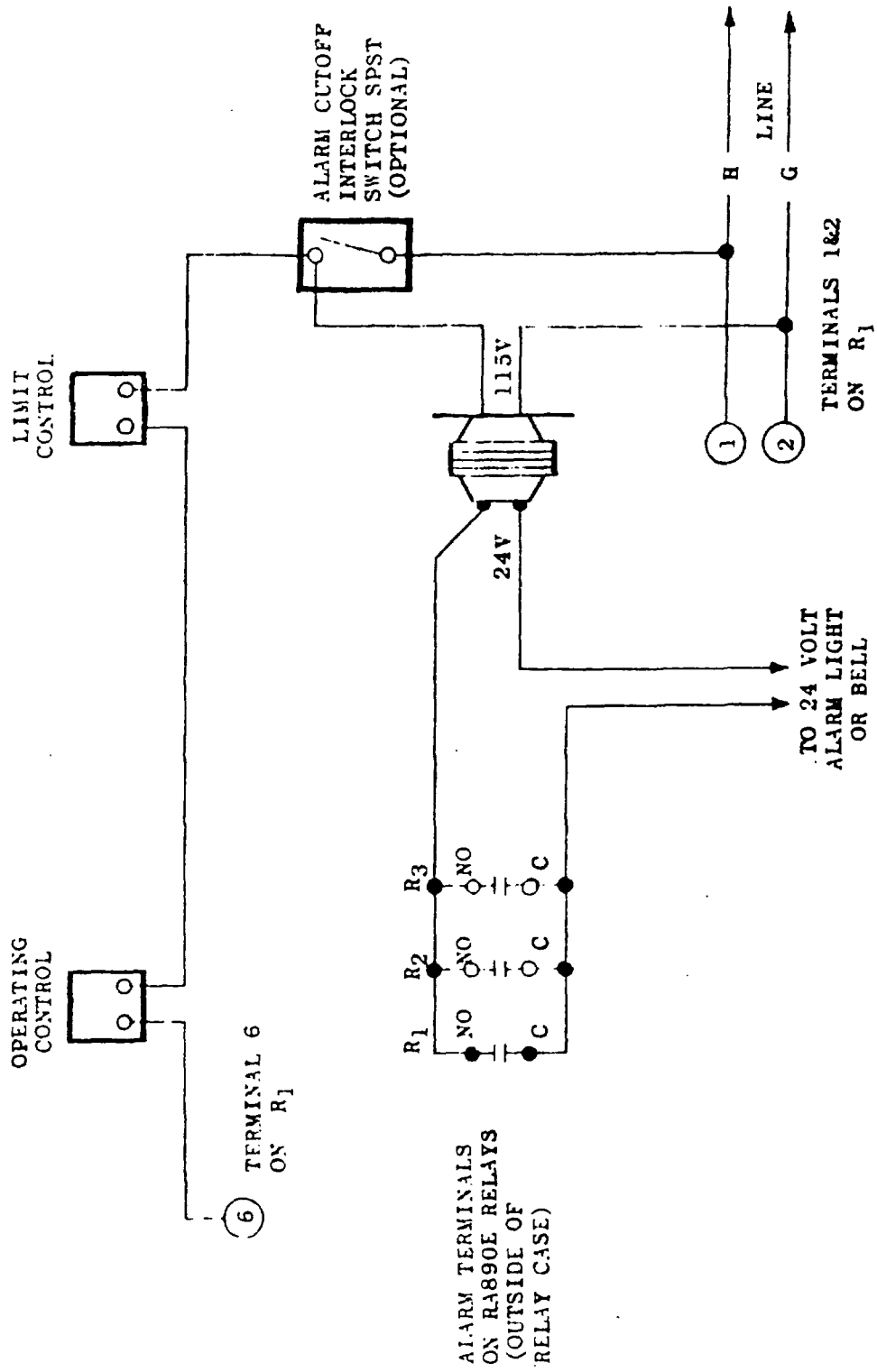
GAS VALVE TRANSFORMER - Converts 110 volt, 60 cycle current to 24 volts for use with low voltage gas valves. Must be mounted on junction box. NOTE: If line voltage gas valves are supplied, this transformer is omitted from the circuit and the valves are connected to the same terminal on the relay as shown for the transformer.

DISCONNECT SWITCH - Double pole, single throw switch should be installed in the line to the installations without a prewired panel. All power to the boiler should be supplied through the disconnect switch.

Alarm systems for Factory Mutual and Factory Insurance Association controls are shown on wiring diagrams.



REMOTE ALARM CIRCUIT WIRING FOR USE WITH PREWIRED CONTROL PANELS

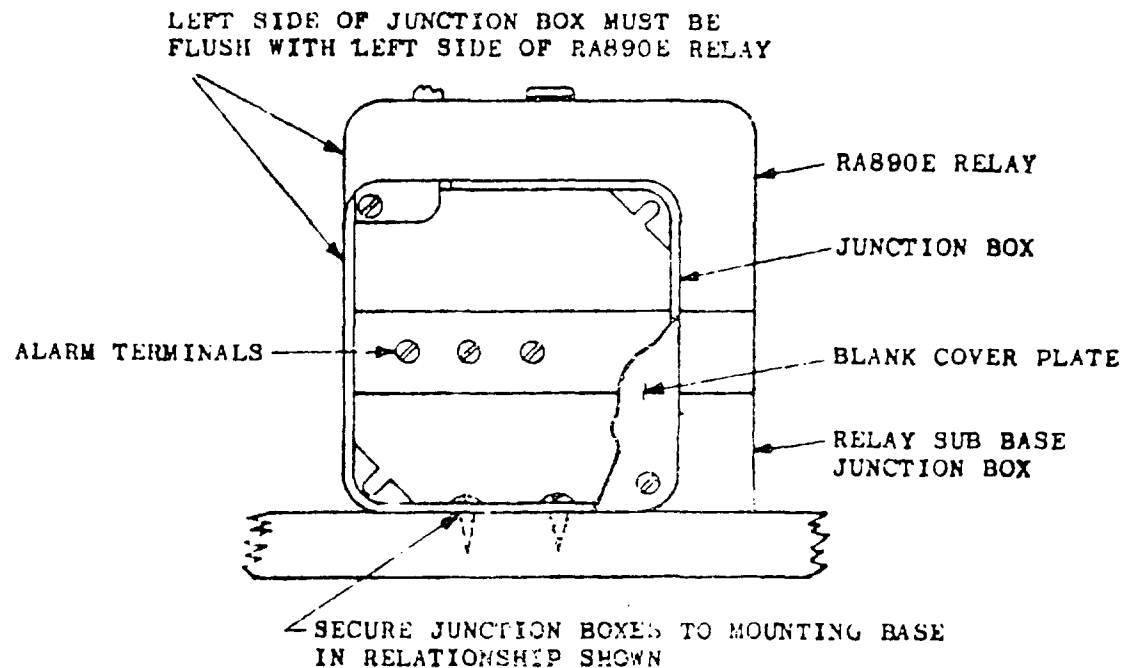


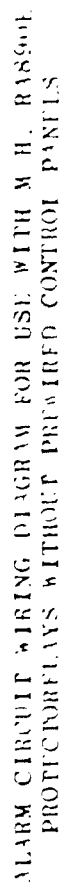
ALARM CIRCUIT WIRING DIAGRAM FOR USE WITH M.H. RA890E
 PROTECTORELAYS WITHOUT PREWIRED CONTROL PANELS
 24 VOLT ALARM SYSTEM

EG-O AND EG-OM SYSTEMS
(WITHOUT PREWIRED PANELS)

When the EG-O and EG-OM systems are used and line voltage (115 V) circuits are required to alarm terminals such as for FIA systems, the wiring and alarm terminals must be enclosed to meet the National Electric Code. If the relay is not totally enclosed in an approved cabinet, the following arrangement is necessary.

A junction box with open base is mounted as shown below to enclose the alarm terminals on the RA890E relay. This does not interfere with servicing of the relay. All connections to alarm terminals must be made with Class 1 wiring to this junction box.





INSTALLATION RECOMMENDATIONS:

Relays - The M-H RA-890 Protectorelay should be mounted on a wall or permanent fixture as close to the boiler as possible. On installations less prewired panel, it is recommended that all electrical power to the boiler be controlled by a line disconnect switch located near the relay(s). A separate disconnect switch is not needed when the prewired panel is used.

All wiring should be completed to the relay sub-base or panel before installing the relay. When prewired panels are used, the internal circuit jumper screw located on the top side of the black relay base must be removed if the Q-179 safety pilot is to burn continuously (not electrically ignited). This screw must be removed before installing the relay(s) in the prewired panel(s).

Wiring - All wiring between boiler controls and relays should be protected. Wiring to Q-179 electronic pilot flame rod should be M-H spec. 1298-1 or equivalent high temperature (350 F) wire. This wire may be spliced outside of the heat zone to standard 14 gauge wire. The splice should be a soldered connection. Wire from ignition transformer secondary (hot) connection to the Q-179-A pilot igniter electrode should be M-H spec. 1061-4. This wire may also be spliced outside of the heat zone to standard high voltage ignition cable. Wiring to pilots must be positioned and secured to prevent direct contact with burner and mixer tubes.

CAUTION: Electronic relays and transformers should not be located on inner jacket panels because higher ambient temperatures will decrease life of these components.

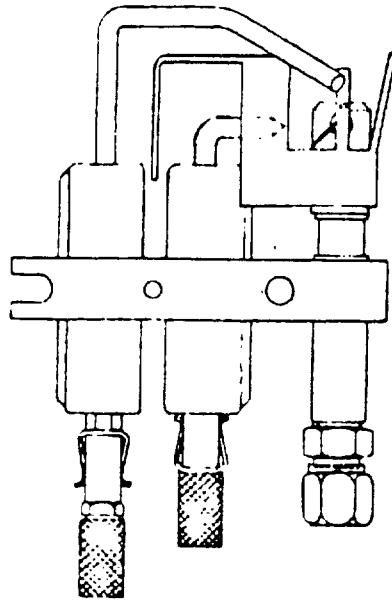
Low voltage wiring (flame rod circuit) should not be located in same conduit as line voltage wire.

START-UP PROCEDURE:

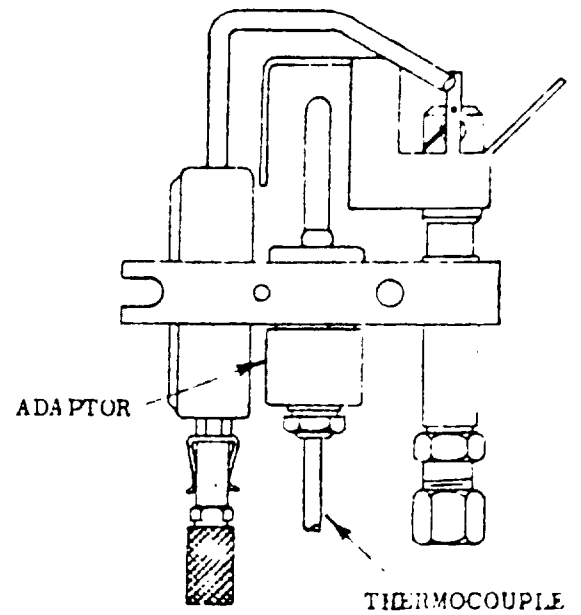
On initial start-up (or after long shutdown) it is recommended that air be eliminated from pilot lines before attempting start-up on EG-O or EPG-O systems with automatic electric ignition. When pilot lines are full of air, the electronic relay safety switch may lock out on safety (15 seconds) before gas reaches the pilot burner. If "Lock Out" occurs, wait approximately 3 or 4 minutes, actuate reset level on relay(s) and proceed with lighting sequence.

MAINTENANCE:

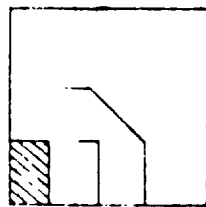
1. All limit controls should be checked for proper operation once a year.
2. Replace tube(s) in relay(s) once a year. Replacement tubes should be obtained from Minneapolis-Honeywell. In case of emergency replacement, regular tubes (with proper number) may be used; however, they should be replaced as soon as possible with M-H pretested tubes.



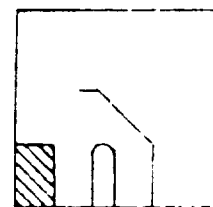
Q-179A PILOT



Q-179B MODIFIED PILOT

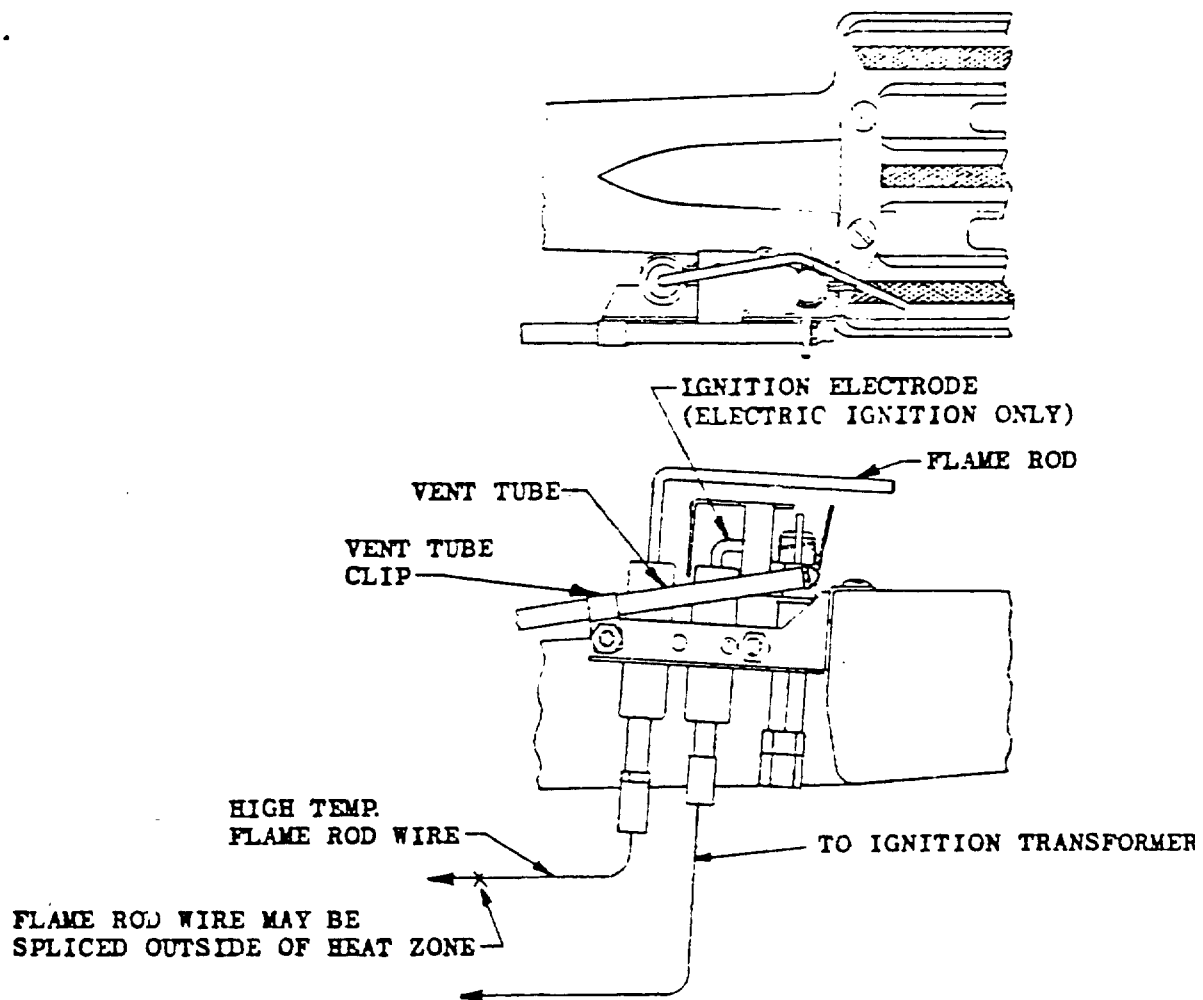


Q-179A



Q-179B MODIFIED

PILOT SYMBOLS



Q-179A PILOT MOUNTED ON
G-40 MAIN BURNER

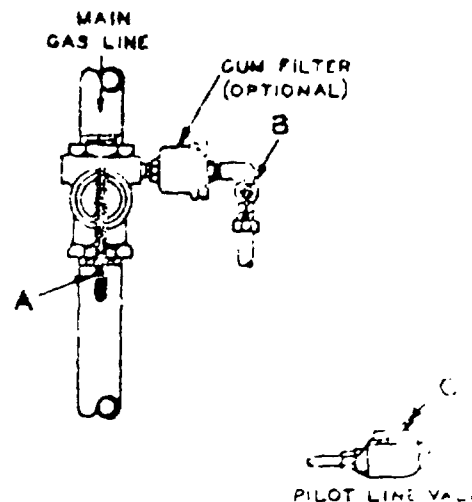
INSTRUCTIONS FOR SHUTTING OFF AND LIGHTING MANUAL IGNITION — 100% SHUTOFF

TO SHUT OFF:

1. Close Manual Shutoff Valve(s) "A" And Pilot Valve "B".
2. Open Line Switch

TO LIGHT:

1. Be Sure Manual Shutoff Valve(s) "A", Pilot Valve(s) "B" And Line Switch Have Been Shutoff For At Least 5 Minutes Before Proceeding.
2. Open Pilot Valve(s) "B".
3. Press Plunger "C" On 1st Pilot Line Valve And Light Pilot. Hold Plunger "C" For One Minute. Repeat For Additional Pilots.
4. Actuate Reset Lever(s) (Red Lever On Protectorelay)
5. Set Operating Control To Desired Temperature Or Pressure.
6. Close Line Switch.
7. Open Manual Shutoff Valve(s) "A".



1-ST-14279

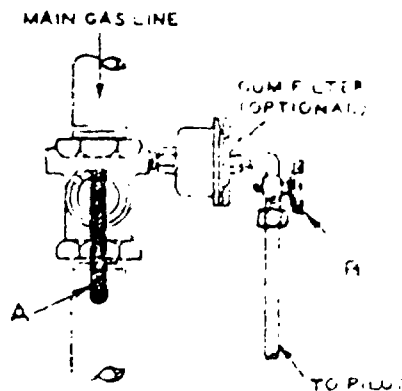
INSTRUCTIONS FOR SHUTTING OFF AND LIGHTING ELECTRIC IGNITION — 100% SHUTOFF

TO SHUT OFF:

1. OPEN LINE SWITCH
2. CLOSE MANUAL SHUTOFF VALVE(S) "A" AND PILOT VALVE(S) "B".

TO LIGHT:

1. BE SURE MANUAL SHUTOFF VALVE(S) "A", PILOT VALVE(S) "B", AND LINE SWITCH HAVE BEEN SHUT OFF FOR AT LEAST FIVE MINUTES BEFORE PROCEEDING.
2. OPEN PILOT VALVE(S) "B".
3. ACTUATE RESET LEVER(S) (RED LEVER ON PROTECTORRELAY).
4. SET OPERATING CONTROL TO DESIRED TEMPERATURE OR PRESSURE.
5. OPEN MANUAL SHUTOFF VALVE(S) "A".
6. CLOSE LINE SWITCH AND WAIT APPROX. 30 SECONDS FOR FLAME SAFETY RELAYS TO GO THRU SELF CHECK PROCEDURE. BOILER WILL NOT OPERATE AUTOMATICALLY.



1-ST-12019 REV. D

LIGHTING INSTRUCTIONSEQ-OM SYSTEM FOR FIA

1. Make sure main manual shutoff valve and manual reset gas valve have been shut off at least 5 minutes before proceeding.
2. Open alarm silencing switch and main power switch.
3. Open main manual shutoff valve.
4. Push and hold red button on pilot line valve and light pilot. When more than one pilot is provided, light pilots in sequence from left to right.
5. Reset all electronic relay flame failure switches.
6. Close main power switch. Delay timer is now energized requiring 5-minute waiting period before proceeding to Step 7.
7. Open manual reset safety shutoff valve.
8. Check to see that manual test valve(s) are open.
9. Close alarm silencing switch.
10. Adjust operating control to desired setting - boiler will automatically maintain this temperature (or pressure).

SHUTDOWN INSTRUCTIONSTEMPORARY

1. Open alarm silencing switch - this will prevent main burner operation.

PERMANENT

1. Open main power switch.
2. Close main manual shutoff valve.

POWER

PILOT

AUTO GAS VALVE

LIGHTING INSTRUCTIONS

1. **CAUTION!** BE SURE MAIN GAS SHUTOFF VALVE(S) AND MANUAL PILOT VALVE HAVE BEEN SHUT OFF AT LEAST 5 MINUTES BEFORE PROCEEDING.
2. TURN POWER SWITCH ON. (PUSH RESET LEVER IF PILOT OUTAGE OCCURRED.)
3. OPEN MANUAL PILOT VALVE.
PILOTS WILL LIGHT AUTOMATICALLY WHEN OPERATING CONTROL CALLS FOR HEAT.
4. TURN PANEL PILOT SWITCH(ES) ON. (TURN ON PILOT SWITCHES ON SUB-PANELS FIRST WHEN PROVIDED.) PILOT LAMPS WILL LIGHT ONLY WHEN ALL THE FOLLOWING CONDITIONS EXIST.
 1. ALL SAFETY PILOTS ARE LIT.
 2. OPERATING CONTROL "CALLING FOR HEAT."
 3. ALL LIMIT CONTROLS INDICATE SAFE CONDITIONS.

 RESETBE SURE CONDITION CAUSING SAFETY
LOCKOUT HAS BEEN CORRECTED.

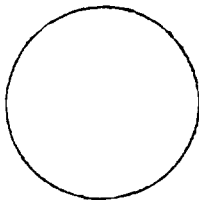
5. SET OPERATING CONTROL TO DESIRED TEMPERATURE OR PRESSURE.
6. OPEN MANUAL MAIN GAS SHUTOFF VALVE(S).
7. TURN AUTO GAS VALVE SWITCH ON TO LIGHT MAIN BURNERS

SHUTDOWN INSTRUCTIONS

1. TURN ALL SWITCHES ON PANEL TO OFF POSITION.
2. CLOSE MAIN GAS SHUTOFF VALVE(S) AND PILOT VALVE.

NOTE:

"PILOT" AND "AUTO GAS VALVE" LAMPS WILL CYCLE
"ON" AND "OFF" WITH OPERATING CONTROL.


PILOT FAILURE
ALARM LIGHT

1-ST-14261 REV. A AMERICAN-Standard PLUMBING AND HEATING DIVISION

ELECTRONIC CONTROL SYSTEMS

Gas Pressure Switches (Where Req'd.)

The Honeywell C645A gas pressure switches are normally supplied to meet FIA requirements. The same model switch is used for both "Hi" and "Lo" pressure sensing; however, the method of connection is different.

The pressure switches are located in the manifold piping as shown on page 17. Connections to the C645A pressure switch should be made as follows:

"Lo" Pressure - use terminals marked R and W. Connect gas line to 1/4 NPT tapping in bottom of housing. Set pointer to scale division representing 5 inches water column pressure. This will give safety shutdown on low line pressure of approximately 4 inch pressure.

"Hi" Pressure - use terminals marked R and G. Connect gas line to 1/4 NPT tapping in bottom of housing. Set pointer to scale division representing 5 inches water column pressure. This will give safety shutdown if gas manifold pressure to burner exceeds 5 inches pressure.

If venting of pressure switches is required, connect vent line to 1/8 NPT tapping in side of housing.

Operation - The above recommended pressure settings may have to be adjusted slightly to prevent false shutdowns due to surges in line pressure.

POWER

PILOT

AUTO GAS VALVE

LIGHTING INSTRUCTIONS

1. MAKE SURE MANUAL SHUTOFF VALVE(S) IS CLOSED AND MAIN POWER SWITCH IS OPEN FOR AT LEAST 5 MINUTES BEFORE PROCEEDING.
2. OPEN AUTO GAS VALVE SWITCH (AND ALARM INTERLOCK SWITCH IF USED).
3. OPEN MANUAL PILOT LINE VALVE.
4. PUSH AND HOLD RED BUTTON ON AUTOMATIC PILOT LINE VALVE AND LIGHT PILOT. WHEN MORE THAN ONE PILOT IS PROVIDED, LIGHT PILOTS IN SEQUENCE FROM LEFT TO RIGHT.
5. RESET PILOT FLAME FAILURE SWITCHES.
6. OPEN MANUAL SHUTOFF VALVE(S).
7. CLOSE MAIN POWER SWITCH, PANEL PILOT SWITCH(ES), AND ALARM INTERLOCK SWITCH.

RESET

BE SURE CONDITION CAUSING SAFETY LOCKOUT HAS BEEN CORRECTED.

8. CLOSE AUTO GAS VALVE SWITCH ON PANEL. BOILER WILL AUTOMATICALLY MAINTAIN TEMPERATURE OR PRESSURE SETTING OF OPERATING CONTROL.

SHUTDOWN INSTRUCTIONS

1. OPEN MAIN POWER SWITCH.
2. CLOSE MANUAL SHUTOFF VALVE(S).

NOTE:

"PILOT" AND "AUTO GAS VALVE" LAMPS WILL CYCLE "ON" AND "OFF" WITH OPERATING CONTROL.

PILOT FAILURE
ALARM LIGHT

1-ST-15954 AMERICAN-Standard PLUMBING AND HEATING DIVISION

POWER

PILOT

AUTO GAS VALVE

LIGHTING INSTRUCTIONS

1. MAKE SURE MAIN MANUAL SHUTOFF VALVE AND MANUAL RESET GAS VALVE HAVE BEEN SHUT OFF AT LEAST 5 MINUTES BEFORE PROCEEDING.
2. OPEN ALARM SILENCING SWITCH, POWER SWITCH AND AUTO GAS VALVE SWITCH.
3. OPEN MAIN MANUAL SHUTOFF VALVE.
4. PUSH AND HOLD RED BUTTON ON PILOT LINE VALVE AND LIGHT PILOT. WHEN MORE THAN ONE PILOT IS PROVIDED, LIGHT PILOTS IN SEQUENCE FROM LEFT TO RIGHT.
5. RESET PILOT FLAME FAILURE SWITCHES.
6. CLOSE MAIN POWER SWITCH. DELAY TIMER IS NOW ENERGIZED REQUIRING 5 MINUTE WAITING PERIOD BEFORE PROCEEDING TO STEP 7.
7. OPEN MANUAL RESET SAFETY SHUTOFF VALVE.
8. CHECK TO SEE THAT TEST VALVE(S) ARE OPEN.

 RESET

BE SURE CONDITION CAUSING SAFETY LOCKOUT HAS BEEN CORRECTED.

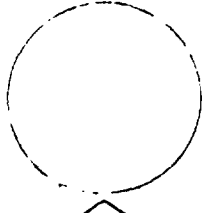
9. CLOSE ALARM SILENCING SWITCH AND PANEL PILOT SWITCH(ES).
10. CLOSE AUTO GAS VALVE SWITCH ON PANEL. BOILER WILL AUTOMATICALLY MAINTAIN TEMPERATURE OR PRESSURE SETTING OF OPERATING CONTROL.

SHUTDOWN INSTRUCTIONS

1. OPEN MAIN POWER SWITCH.
2. CLOSE MAIN MANUAL SHUTOFF VALVE.

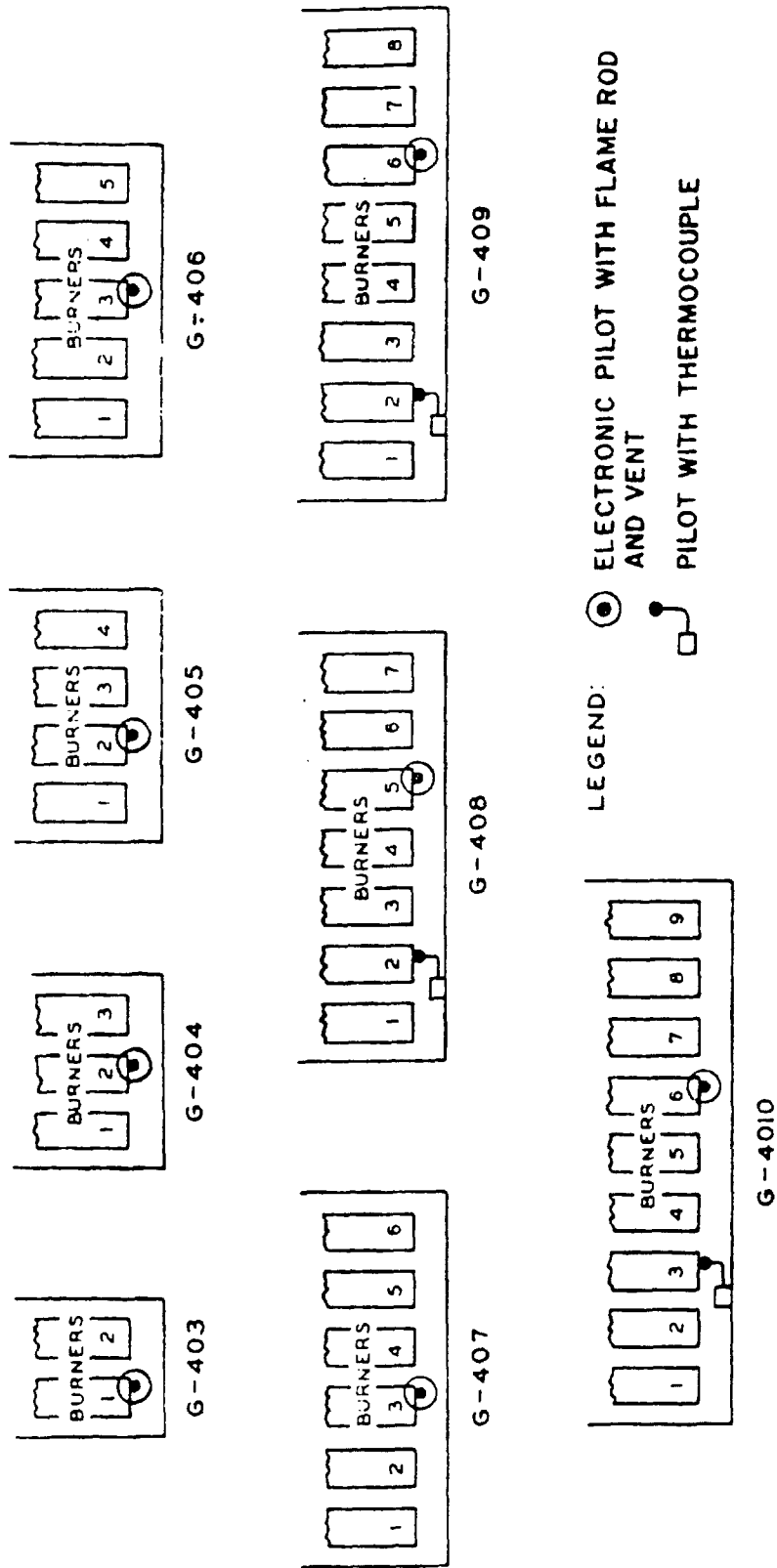
NOTE:

"PILOT" AND "AUTO GAS VALVE" LAMPS WILL CYCLE "ON" AND "OFF" WITH OPERATING CONTROL.

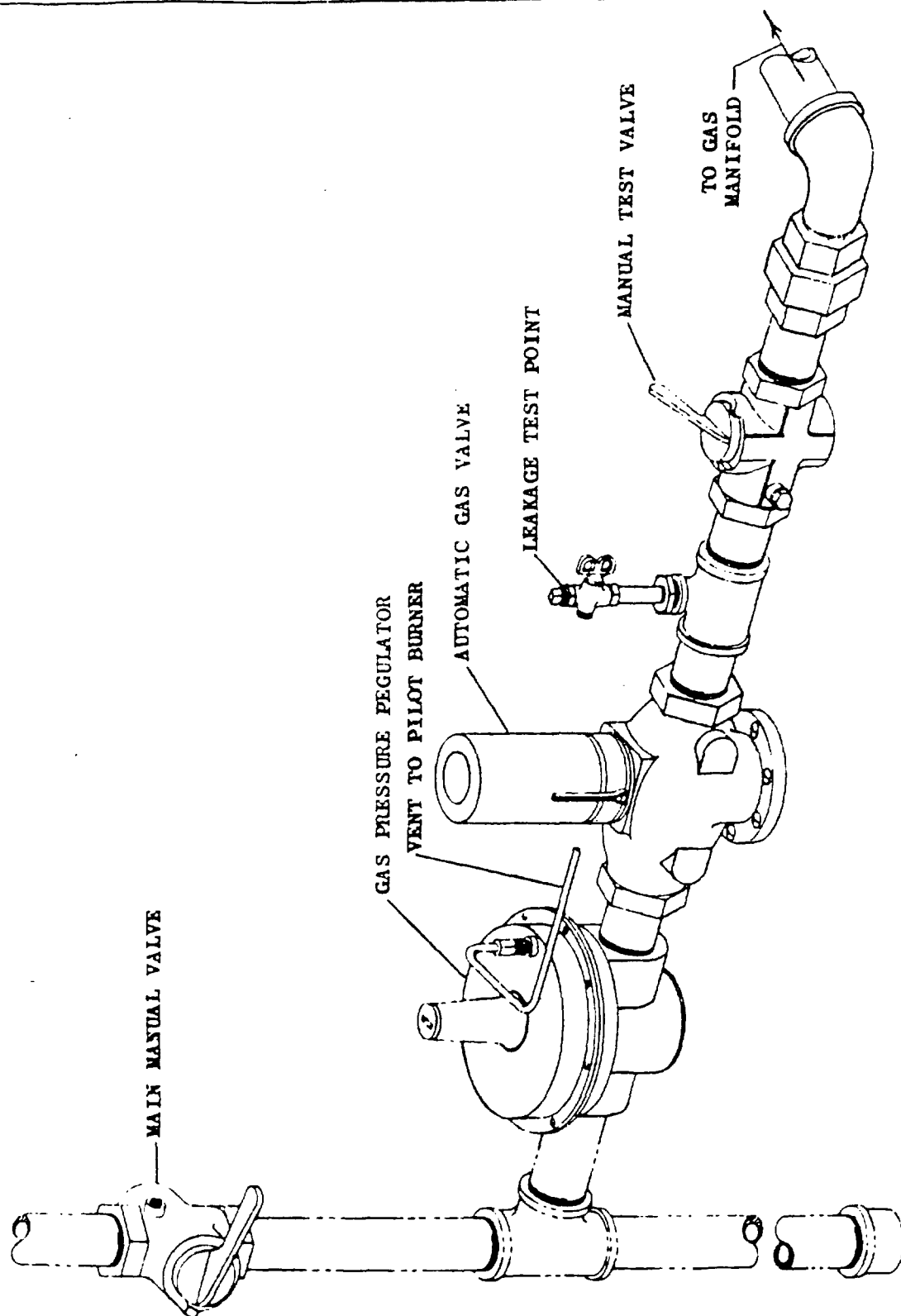

PILOT FAILURE
ALARM LIGHT

AMERICAN STANDARD PLUMBING AND HEATING DIVISION
1-ST-15953

13686



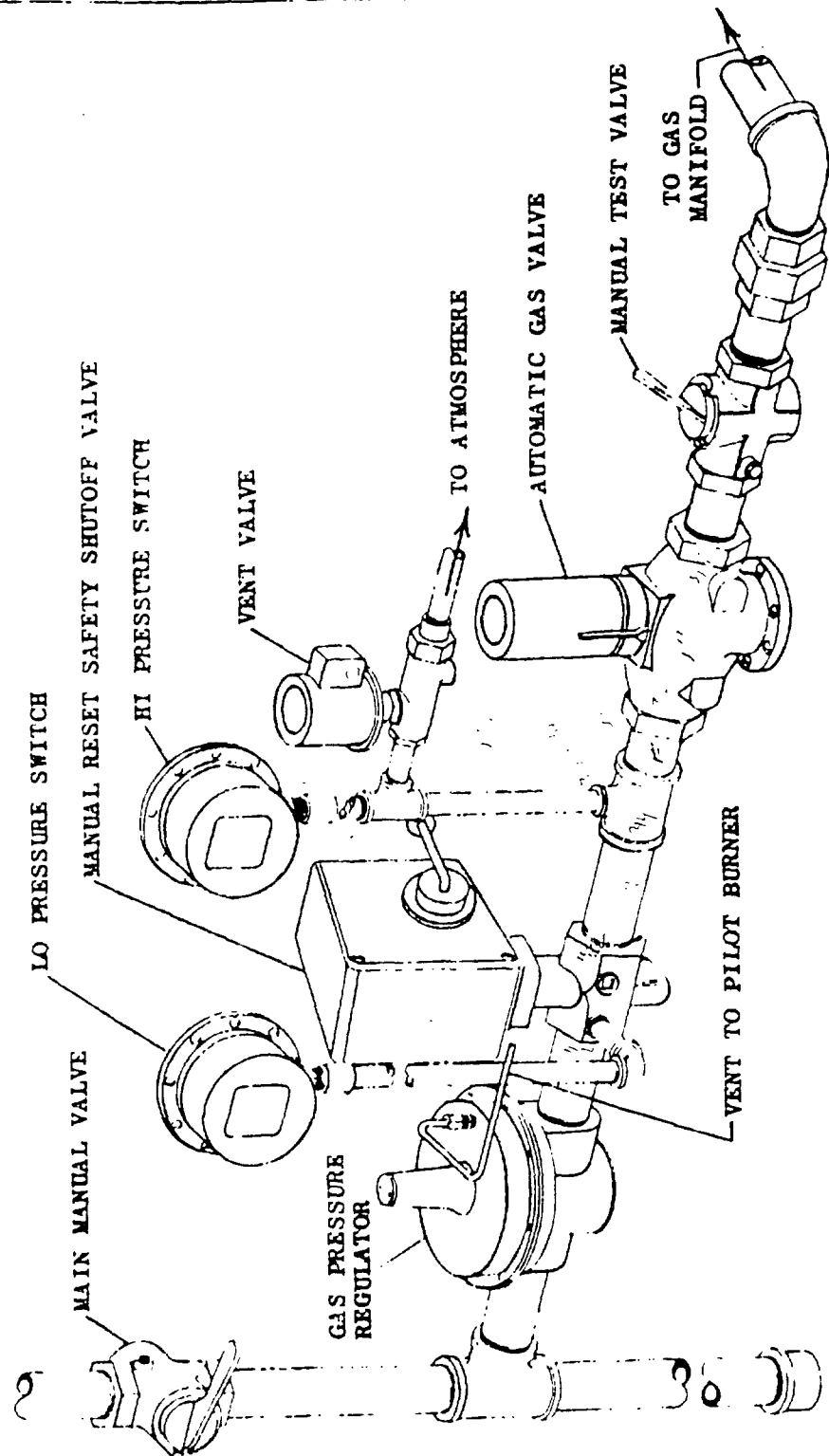
PILOT LOCATION FOR G-40 BOILERS
WITH ELECTRONIC CONTROLS



PIPING AND CONTROLS ARRANGEMENT FOR FM

40-G-15981

13688

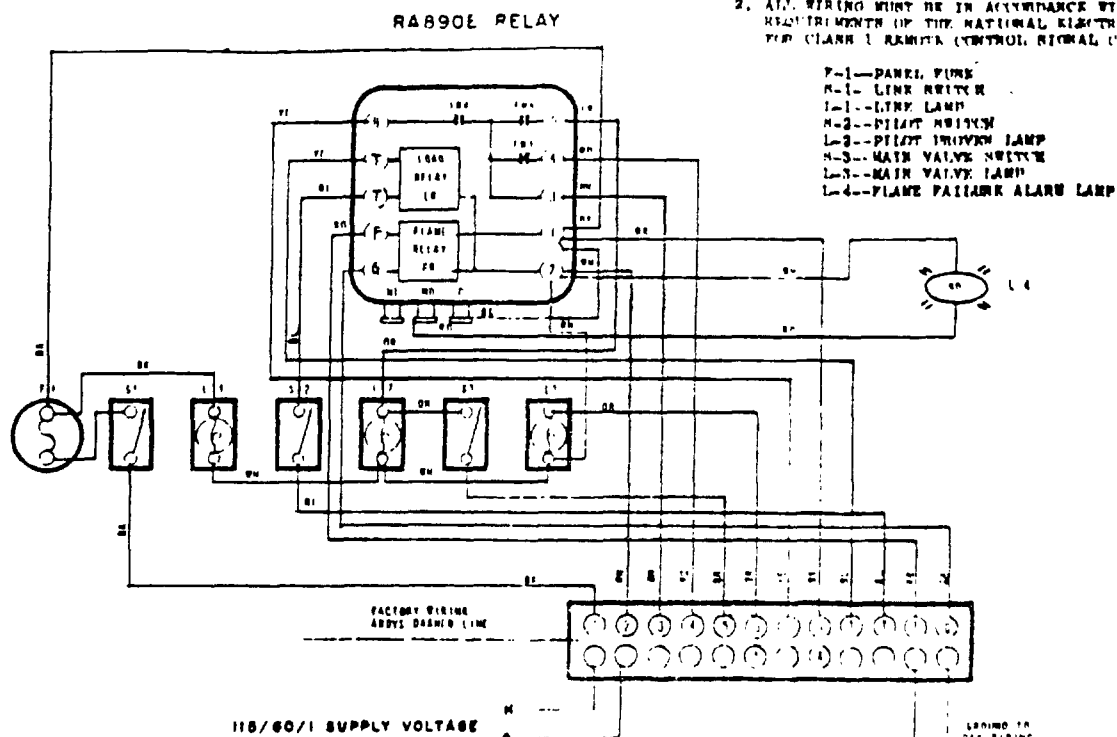


PIPING AND CONTROLS ARRANGEMENT FOR FIA

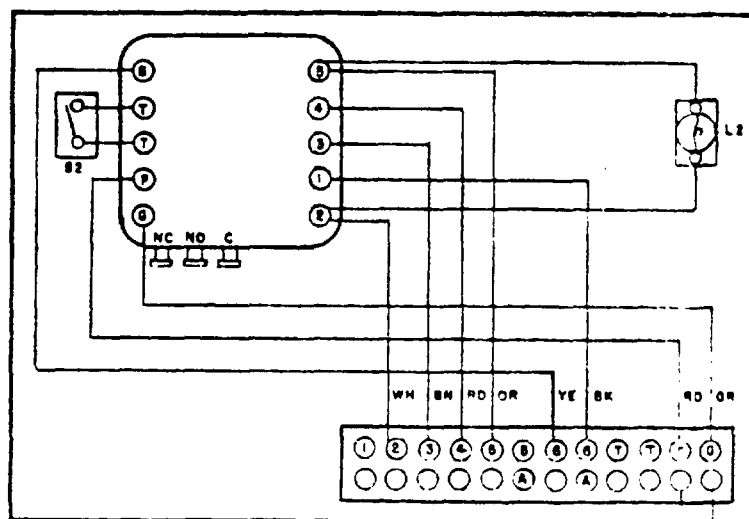
40-G-15982

13689

1. SAFETY PILOT FLAME ROD FURNISHED WITH 3' OF WHITE SILASTIC CABLE AND MAY BE APPLIED TO #14 INSULATED WIRE OUTSIDE OF HEAT ZONE.
2. ALL WIRING MUST BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE FOR CLASS 1 REMOTE CONTROL SIGNAL CIRCUITS.



**MASTER PANEL
WITH HONEYWELL RAB90E RELAY**



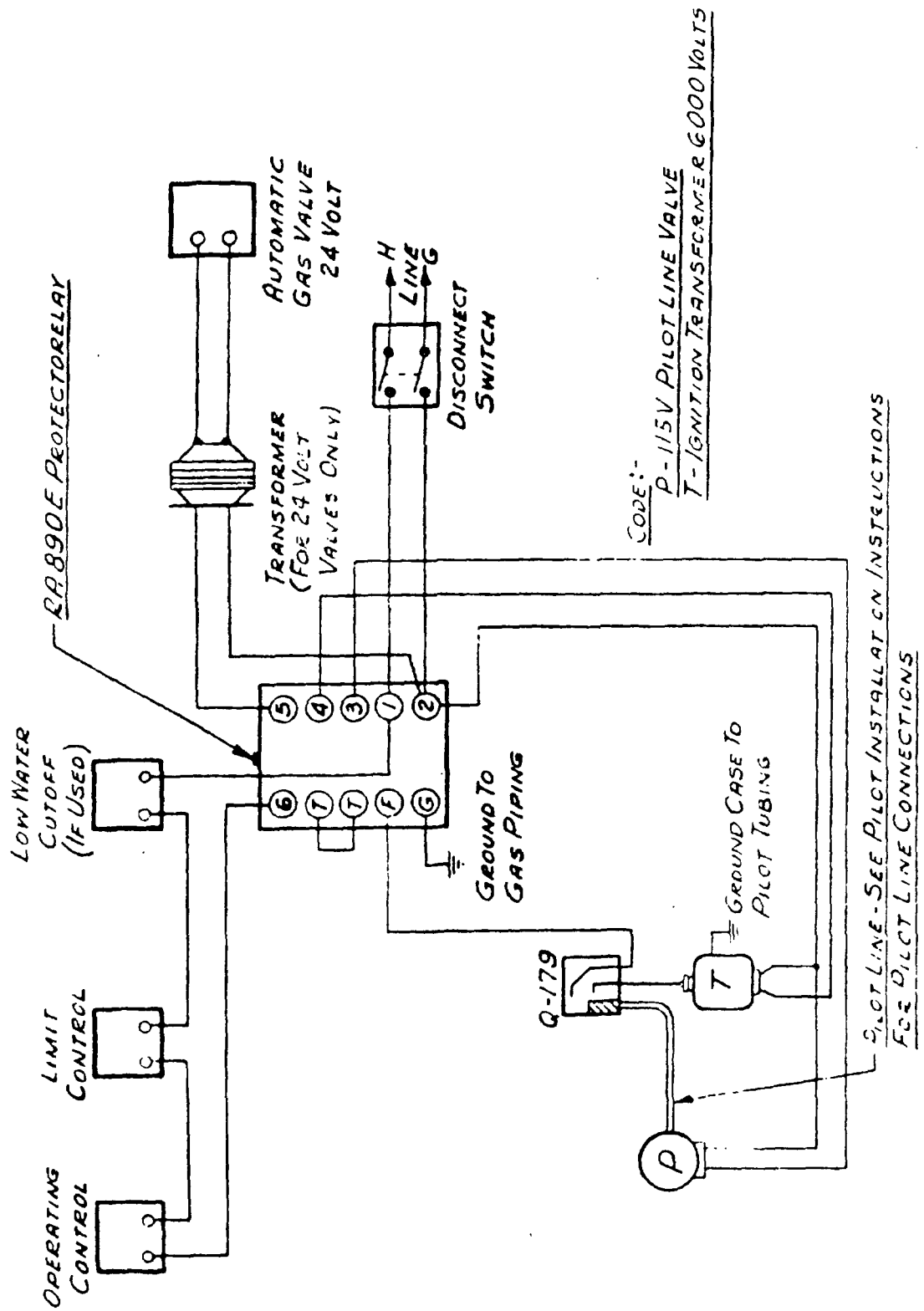
**SUB PANEL
WITH HONEYWELL RAB90E RELAY**

COLOR CODE

WH-WHITE	OR-ORANGE	BK-BLACK	DB-DARK BLUE	RD-RED
YE-YELLOW	PI-PINK	BI-BLUE	GR-GREEN	TA-TAN
	PU-PURPLE	BN-BROWN	GY-GRAY	

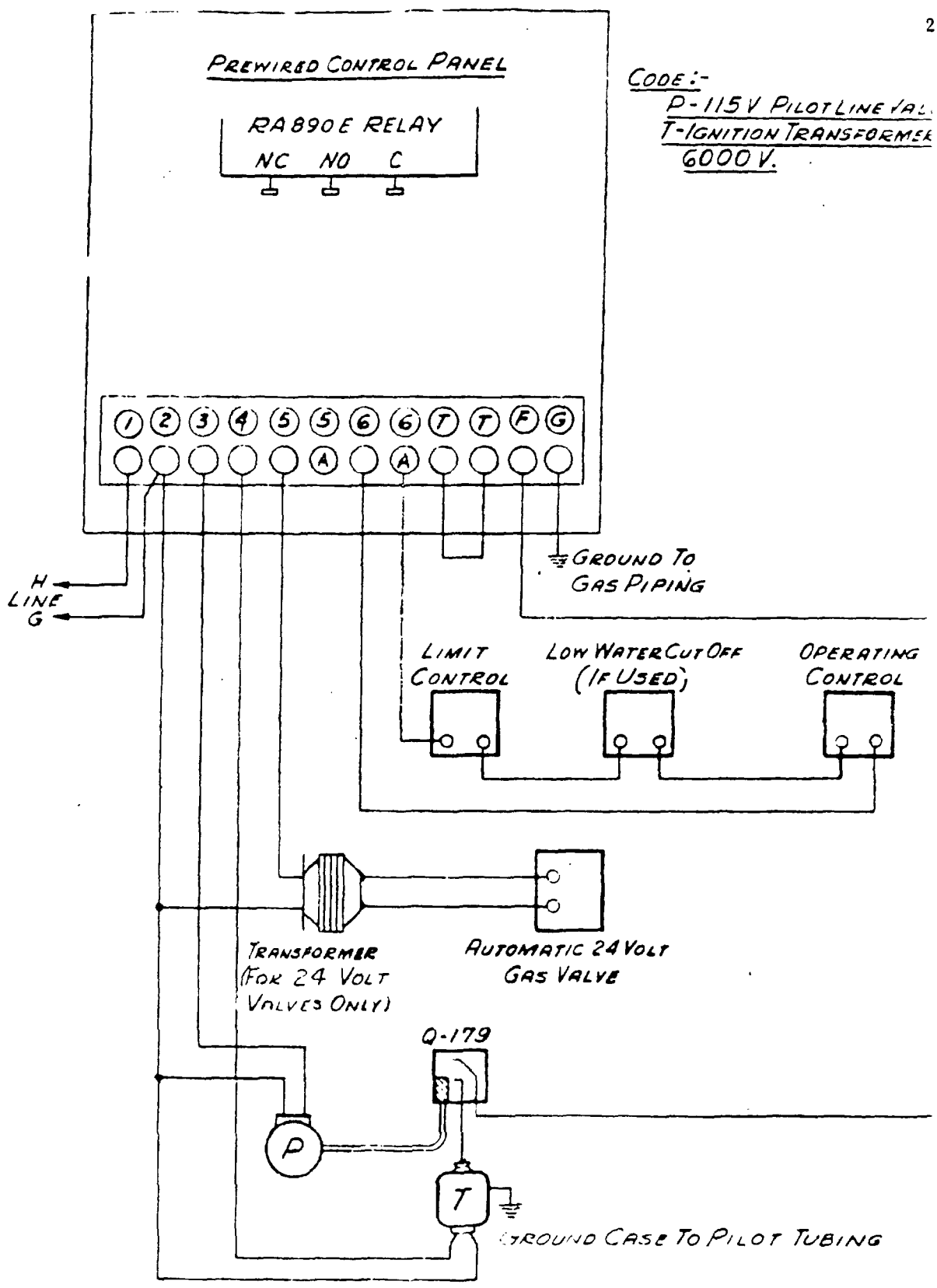
SAFETY PILOT
FLAME ROD

13690



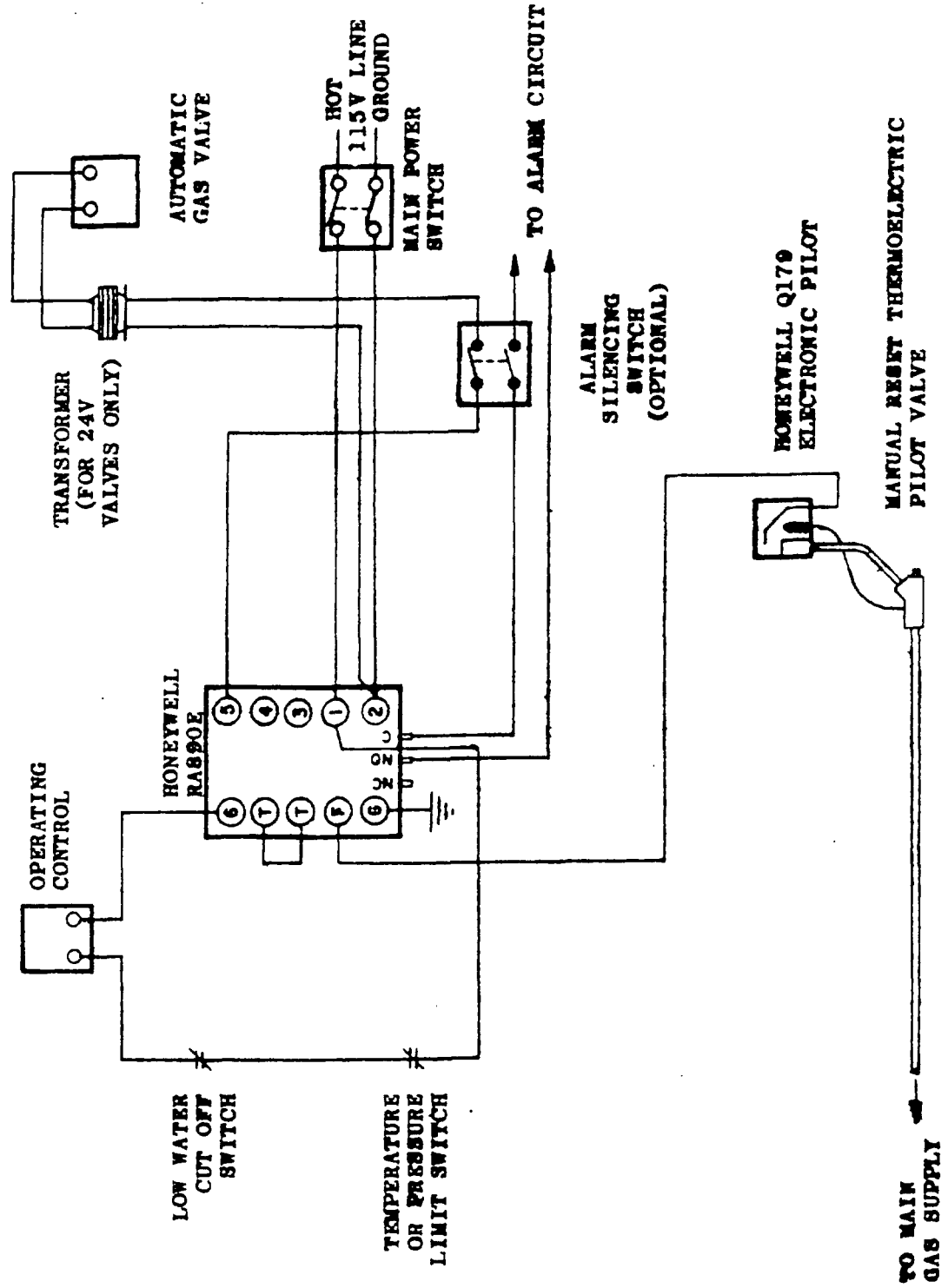
13691

EG-O ELECTRONIC CONTROL SYSTEM - ELECTRIC IGNITION - 100% SHUT OFF

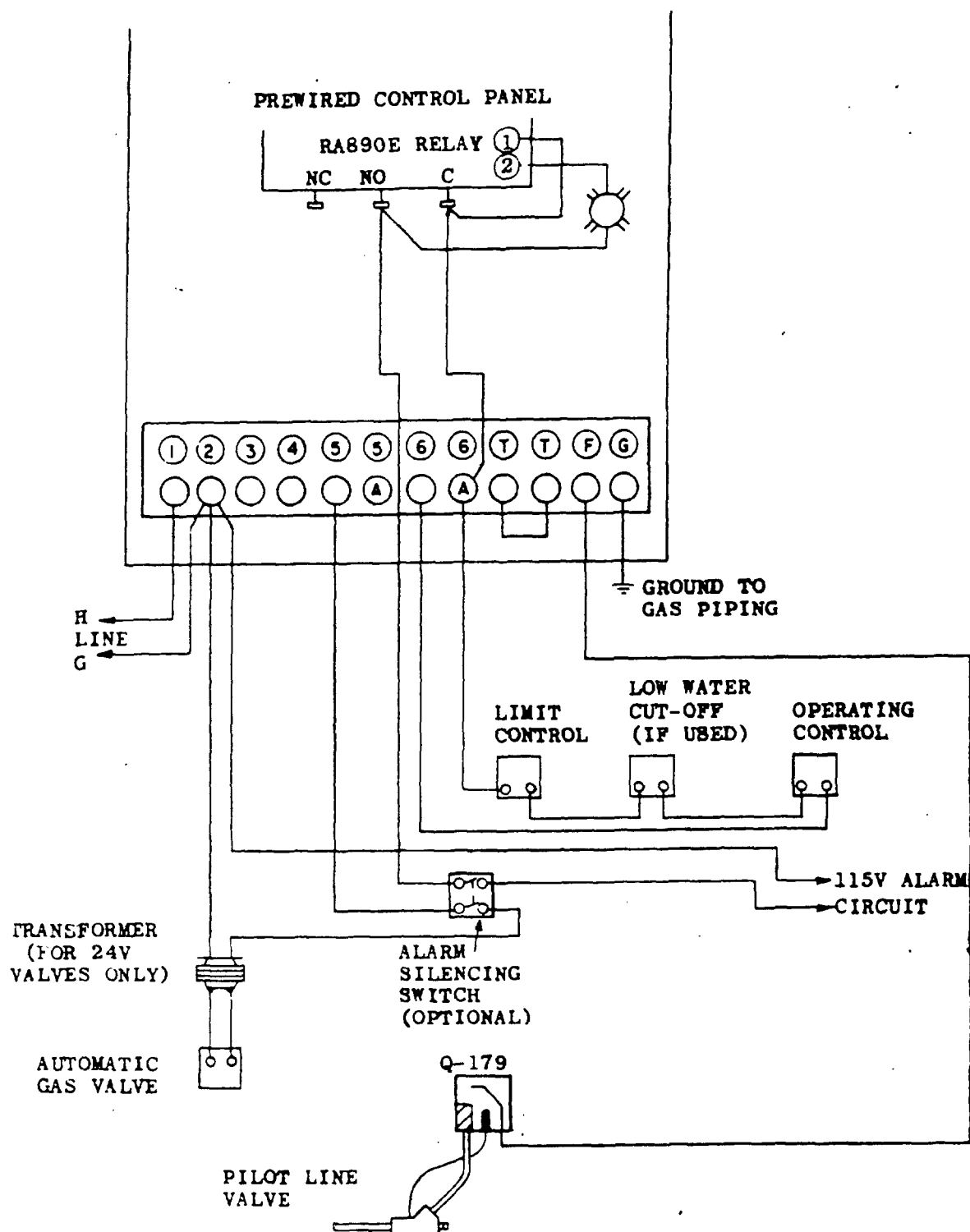


CODE:-
P-115V PILOT LINE VALVE
T-IGNITION TRANSFORMER
6000 V.

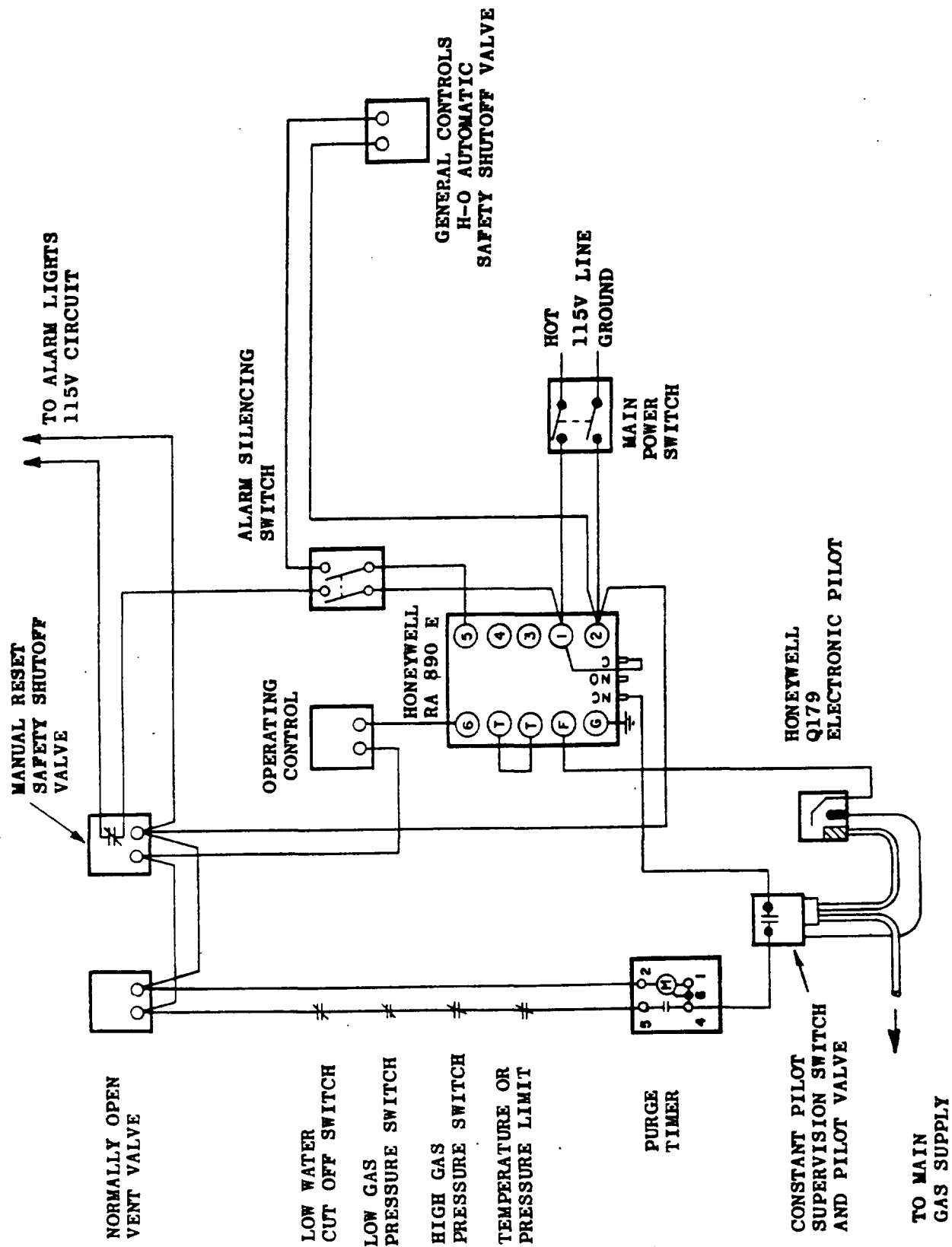
EPG-0 ELECTRONIC CONTROL SYSTEM - ELECTRIC IGNITION - 100% SHUTOFF



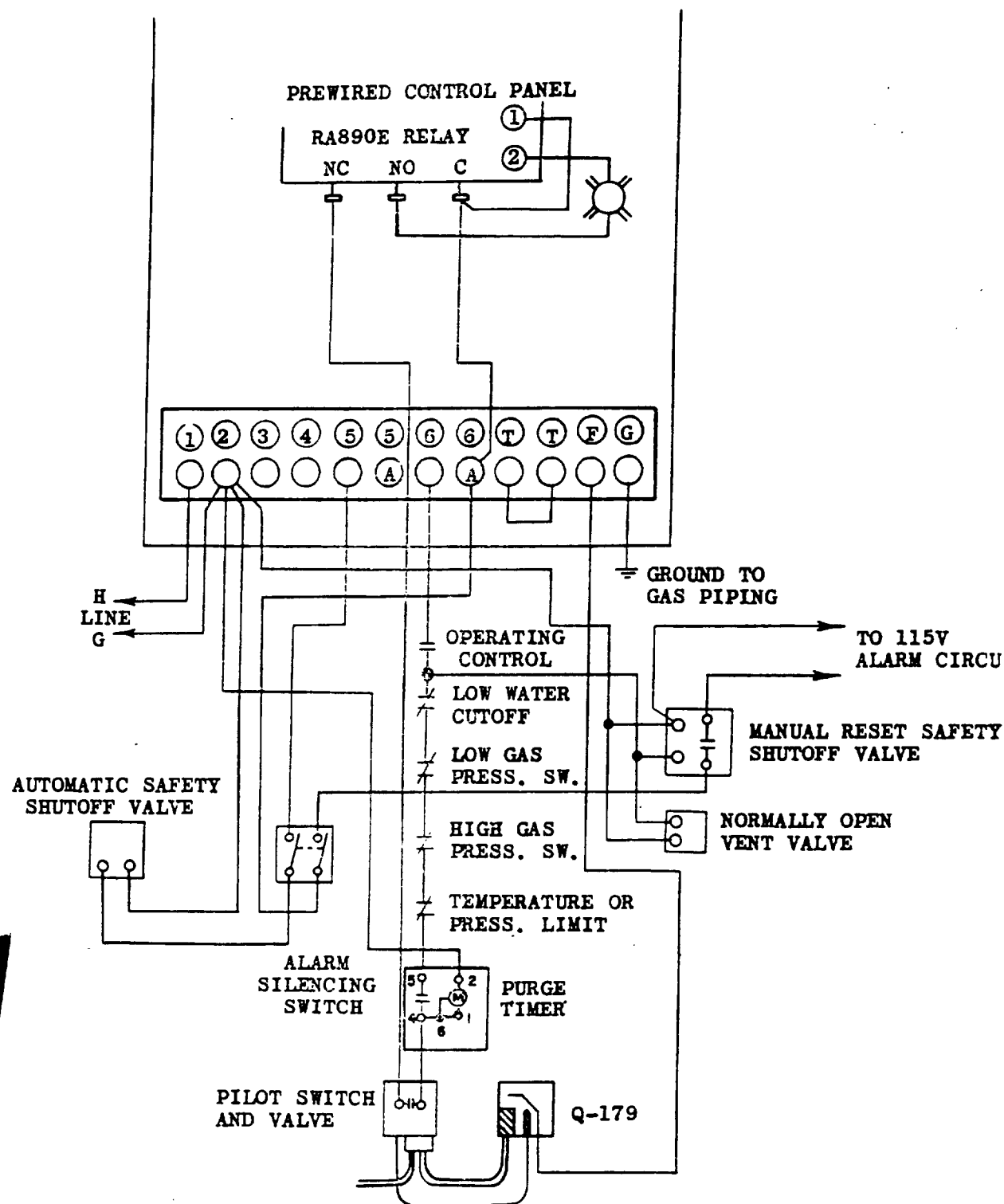
WIRING DIAGRAM FOR EQ-CM ELECTRONIC CONTROL BURNER



EPG-OM ELECTRONIC CONTROL SYSTEM - MANUAL IGNITION - 100% SHUTOFF
FOR:- G-403 THRU G-4010 BOILERS



13695



EPG-OM ELECTRONIC CONTROL SYSTEM - MANUAL IGNITION - 100% SHUTOFF
FOR:- G-403 THRU G-4010 - BOILERS

12-G-15970

(FOR FIA)

13696



PLUMBING & HEATING DIVISION

40 WEST 40TH STREET • NEW YORK, N Y 10018