

## Instructions For 123514A and 203659 Flame Simulators

### Application

Flame simulators are devices that simulate a flame by reproducing ultraviolet resistance or rectification characteristics of an actual flame. Flame simulators simplify the troubleshooting of flame safeguard controls by providing a quick method to check the flame detection function. A simulator is typically used to simplify troubleshooting when:

1. The pilot lights but the flame relay does not pull in, or
2. Shutdown occurs during the run period.

Using a flame simulator provides a quick, positive indication of the source of trouble in the flame detection circuitry. If the flame signal is unsteady or weak, a flame simulator enables the service technician to determine whether the trouble is in the flame detector, external circuitry, plug-in amplifier, or flame safeguard control itself.

### Features

- Provides a quick, positive indication of the source of trouble in the flame detection circuitry.
- Simulates flame by providing the ultraviolet resistance or rectification characteristics of the flame itself.
- Designed to plug directly into the flame signal meter jack, test jack or into direct contact on Honeywell flame safeguard controls or plug-in amplifiers.

### Specifications

#### MODELS

123514A Flame Simulator—brown, rectification type, for systems using rectifying flame rods, rectifying photocells, C7012A,C or C7020A Ultraviolet Flame Detectors. Use with flame safeguard controls. Refer to Table 1.

203659 Flame Simulator—purple, ultraviolet, type, for systems using C7027, C7035, or C7044 Minipeeper Ultraviolet Flame Detectors. Use with flame safeguard controls and Minipeeper Flame Detectors. Refer to Table 2.

### **WARNING**

A flame simulator must be used only for troubleshooting. The flame simulator must not be used for a permanent installation.

### Operation

#### OPERATING INSTRUCTIONS

Flame simulators are designed to plug directly into the flame signal meter jack, test jack or into direct contact with



terminals on Honeywell flame safeguard controls or on plug-in flame signal amplifiers.

### **CAUTION**

Remove the flame detector leadwire to terminal F (or F1) on the terminal strip or subbase while using a flame simulator.

In some cases (as shown in Fig. 5), a wire may have to be connected to the terminal strip or subbase to provide access to terminal F (or F1).

Tables 1 and 2 and Figs. 1-23 show how the flame simulator is applied. If the flame simulator is applied properly, but the flame relay in the flame safeguard control does not pull in, the plug-in amplifier or the control itself is faulty. If the flame relay *does* pull in, the trouble is in the flame

### Ordering Information

Specify—

1. Order number.

Order from—

1. Your usual source, or
2. Honeywell Inc.  
1885 Douglas Drive North  
Minneapolis, Minnesota 55422  
(612) 542-7500

(In Canada—Honeywell Controls Limited, 740 Ellesmere Road, Scarborough Road, Scarborough, Ontario, M1P 2V9). International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

detector or its circuitry. For more details, refer to the Instructions for the flame safeguard control.

NOTE: Flame simulators are not needed for self-checking flame detection systems.

#### NOTES ON USING THE FLAME SIMULATOR

1. Only momentarily hold the simulator in position on the control. Whether the flame relay pulls in or not, remove the simulator as soon as the check is made.

2. If the control or amplifier has a meter jack (or test jack) in the F circuit, use the simulator to quickly check for a flame simulating condition that is preventing a start. Proceed as follows:

- a. If the flame relay is being held in and the burner cannot start, insert the simulator lead or plug into the meter jack. Hold the simulator probe end away from all metal parts to avoid completing the circuit to ground. This disconnects the flame detector circuit.
- b. If this causes the flame relay to drop out, a flame simulating condition exists (light reaching photocell, defective vacuum tube, hot refractory hold-in or a

similar problem). If the flame relay does not drop out, replace the control.

3. See Figs. 1-23 for the procedures for checking the flame detecting function for each flame safeguard control. Refer to the Burner Control Instructions for the complete procedure for other troubleshooting problems.

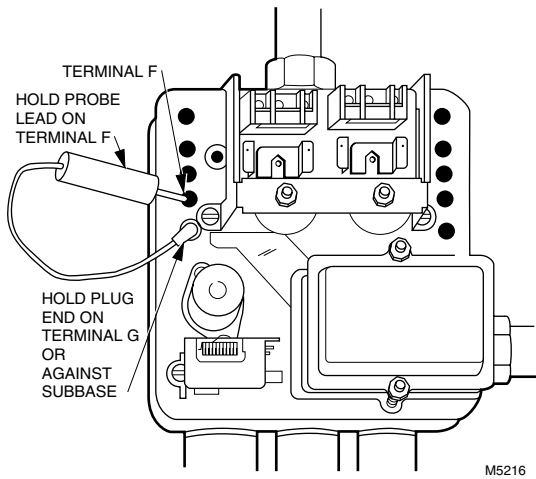
4. If trouble is determined to be in the flame detector or in the detector circuit, look for the following causes:

- Short to ground; includes high resistance shorts caused by moisture or dirt buildup at the detector or control terminals.
- Burned-off flame rod.
- Flame rod not in flame.
- Insufficient ground area at flame rod.
- Blowing or lifting flame; wrong fuel-air mixture.
- Defective photocell.
- Dirty photocell, sensing tube, filter, lens or viewing window.
- Smoky flame.
- Detector not properly sighting flame.
- Hot refractory hold-in at end of burner operation.
- Defective electron (vacuum) tubes (C7012).
- Defective ultraviolet sensing tube.

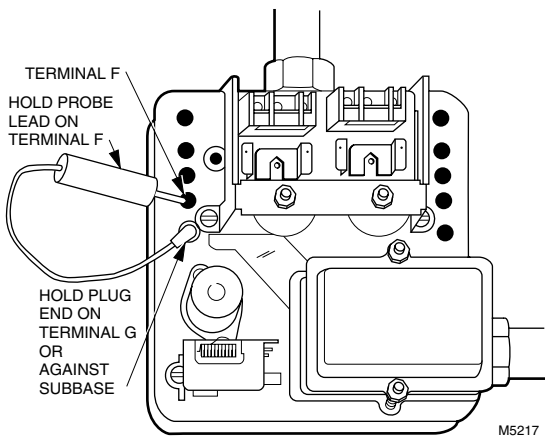
TABLE 1—APPLICATION OF THE 123514A FLAME SIMULATOR.

| Type of Flame Detection System                          | Plug-In Amplifier Model | Flame Safeguard Control(s)  | Using the Flame Simulator                 |   |          |
|---|-------------------------|---|---|---|----------|
|   |                         |   | Plug End                                  | Probe End   | Fig. No. |
| Rectification (no test jack, or test jack in F circuit) | —                       | R177, R180, R187, R190, R485A, R887, R890, R7023A, RA190, and RA890E without a test jack. | —   | Hold on terminals F and G on the control chassis. | 1        |
|   | —                       | R485B, R7023B, RA190B, RA890E with a test jack, and RA890F,H,I,J,K.                       | Plug into test jack on control chassis.   | Hold G lug against metal frame or subbase.        | 2        |
|   | R7289A (Green)          | R4795   | Plug into test jack on amplifier.         | Hold G lug against subbase.                       | 3        |
| Rectification (meter jack in G circuit)                 | R7242A (Green)          | R4075B, R4181A  | Plug into meter jack on front of control. | Hold on terminal F.                               | 4        |
|   |                         | R4138A,B  | Plug into meter jack on front of control. | Tap against terminal F about once a second.       | 4        |
|   | R7253A (Green)          | R4126, R4127  | Plug into meter jack on amplifier.        | Hold on terminal F1 on terminal strip.            | 5        |
|   |                         | R8169B  | Plug into meter jack on amplifier.        | Hold on terminal F1 on terminal strip.            | 6        |
|   | R7257A (Green)          | R4150   | Hold against R4150 chassis.               | Plug into tip jack on R4150 chassis.              | 7        |
|   |                         | Q518A, Q519A Multiburner Modules  | Plug into meter jack on amplifier.        | Hold on terminal F.                               | 8        |
|   | R7247A (Green)          | R4075C,D,E; R4138C,D  | Hold against control chassis.             | Hold on terminal F.                               | 9        |
|   |                         | R4140   | Hold against control chassis.             | Plug into tip jack on R4140 chassis.              | 10       |
| R7847A,B  | 7800 SERIES             | Plug into (COM) on amplifier.   | Plug into S on amplifier.                 | 11  |          |

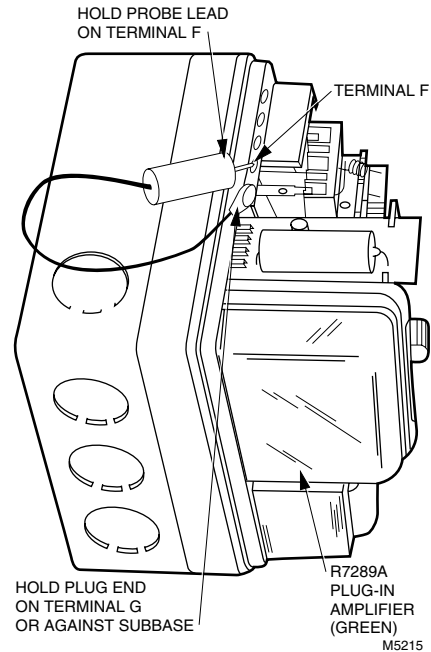
**Fig. 1—Using a 123514A Flame Simulator with an R177, R180, R187, R190, R485A, R887, R890, R7023A, RA190, or RA890E without a test jack.**



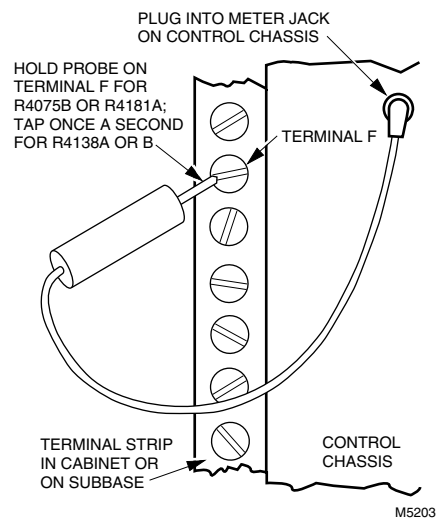
**Fig. 2—Using an 123514A Flame Simulator with an R485B, R7023B, RA190B, RA890E with a test jack, or RA890F,H,J,K.**



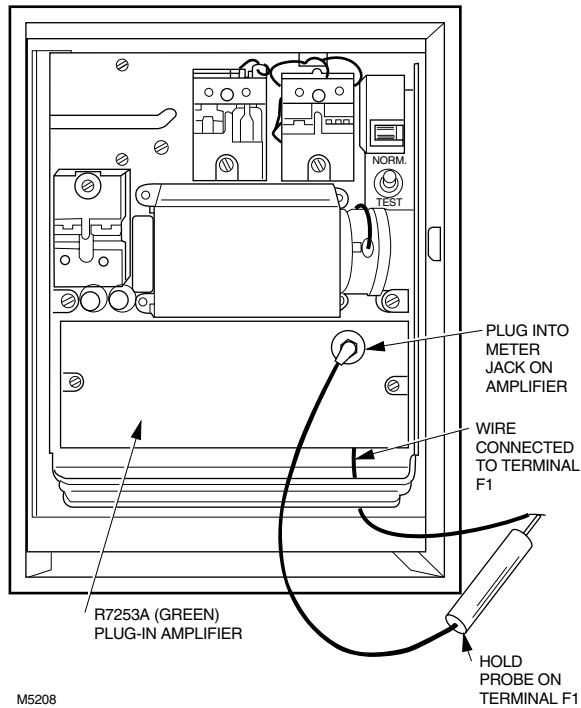
**Fig. 3—Using a 123514A Flame Simulator with an R4795 and R7289A Amplifier.**



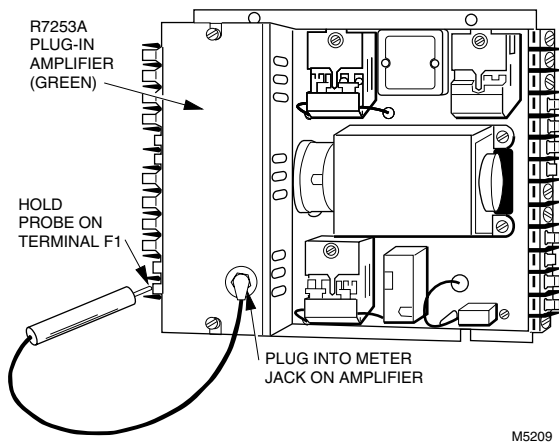
**Fig. 4—Using a 123514A Flame Simulator with an R4075B, R4138A or B, or R4181A.**



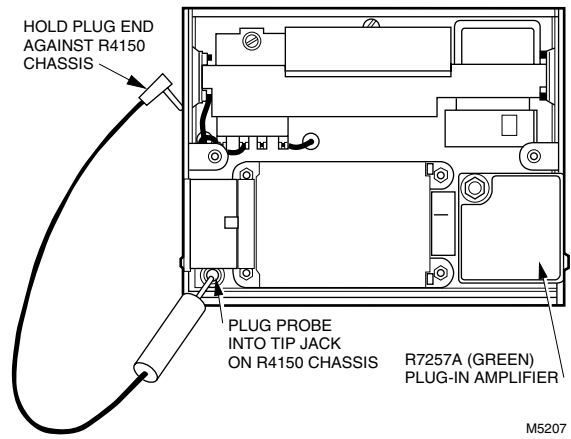
**Fig. 5—Using a 123514A Flame Simulator with an R4126 or R4127.**



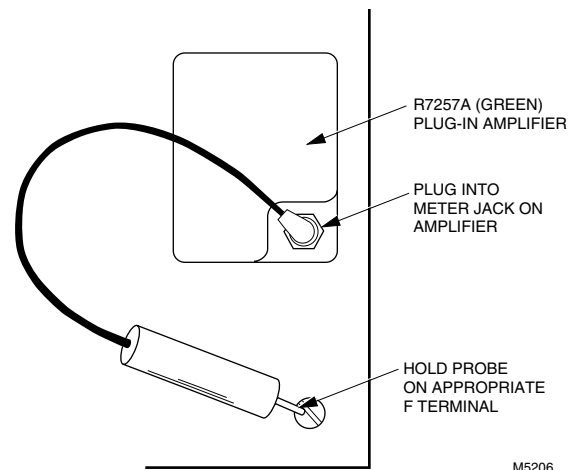
**Fig. 6—Using a 123514A Flame Simulator with an R8169B.**



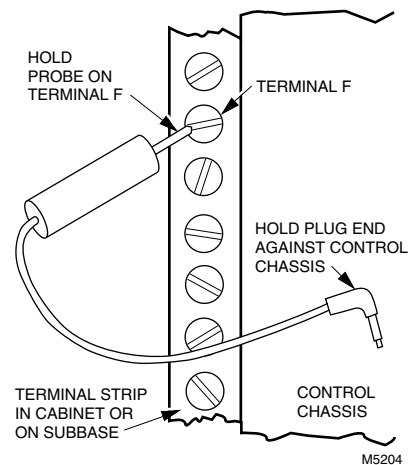
**Fig. 7—Using a 123514A Flame Simulator with an R4150.**



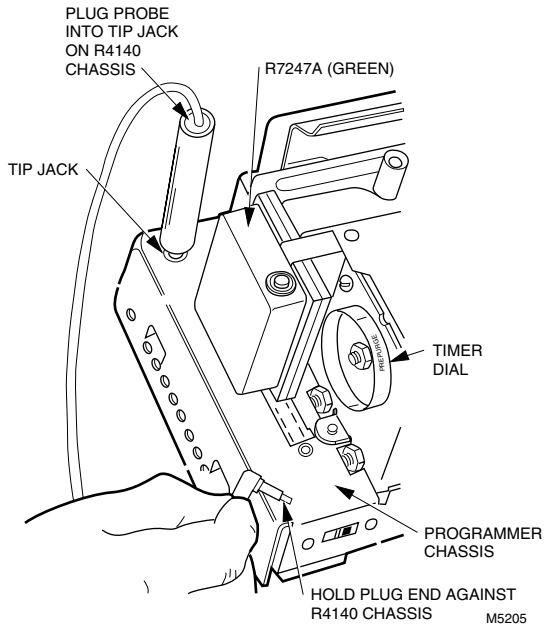
**Fig. 8—Using a 123514A Flame Simulator with a Q518A or Q519A Multiburner Module.**



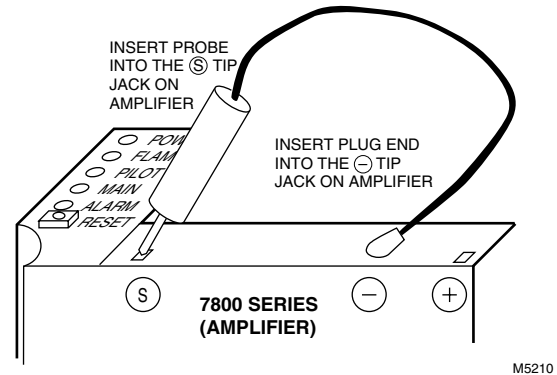
**Fig. 9—Using a 123514A Flame Simulator with an R4075C,D,E, or R4138C,D.**



**Fig. 10—Using a 123514A Flame Simulator with an R4140.**



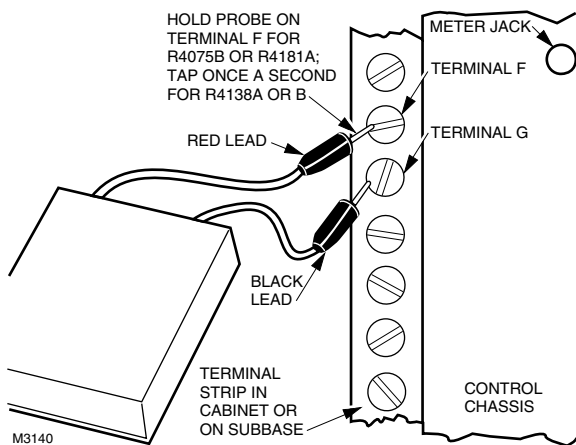
**Fig. 11—Using 123514A Flame Simulator 7800 SERIES Amplifiers.**



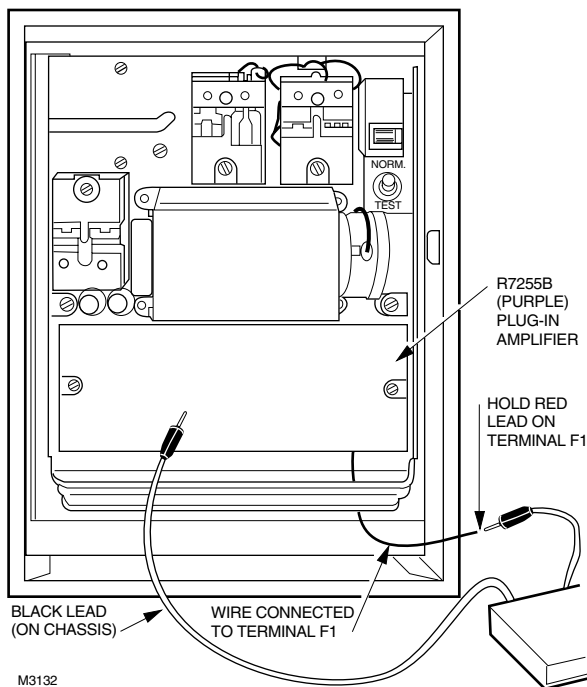
**TABLE 2—APPLICATION OF THE 203659 ULTRAVIOLET FLAME SIMULATOR.**

| Type of Flame Detection System                              | Plug-in Amplifier Model | Flame Safeguard Control(s)         | Using the Flame Simulator Black Probe          | Using the Flame Simulator Red Probe    | Fig. No. |
|---|-------------------------|------------------------------------|--|--|----------|
| Minipeeper Ultraviolet Flame Detector (C7027, C7035, C7044) |                         | RA890G                             | Hold on terminal G or against control chassis. | Hold on terminal F.                    | 18       |
|   | R7290A (Purple)         | R4795                              |  | Hold on terminal F.                    | 20       |
|   | R7255B (Purple)         | R4126, R4127                       |  | Hold on terminal F1 on terminal strip. | 13       |
|   | R7259A                  | R4150                              |  | Plug into jack on R4150 chassis.       | 15       |
|   | R7259A                  | Q518A, Q519A Multi-burner Modules  |  | Hold on terminal F.                    | 16       |
|   | R7249A                  | R4075B,C,D,E; R4181A, R4138A,B,C,D |  | Hold on terminal F.                    | 12, 17   |
|   | R7249A                  | R4140                              |  | Plug into tip jack on R4140 chassis.   | 19       |
|   | R7249A                  | BC7000                             |  | Plug into tip jack on BC7000 chassis.  | 22       |
|   | R7255B                  | R8169B                             |  | Hold on terminal F.                    | 14       |
|   |                         | R7795A,C,E,G                       |  | Hold on terminal F.                    | 21       |
|   | R7849A, R7849B          | 7800 SERIES                        | Plug into—(COM) on amplifier.                  | Plug into S on amplifier.              | 23       |

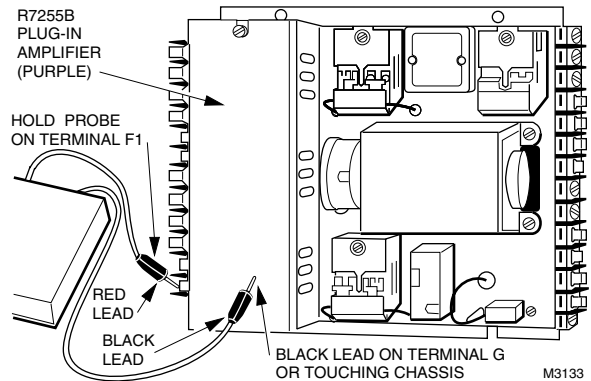
**Fig. 12—Using a 203659 UV Flame Simulator with an R4075B, R4138A,B or R4181A.**



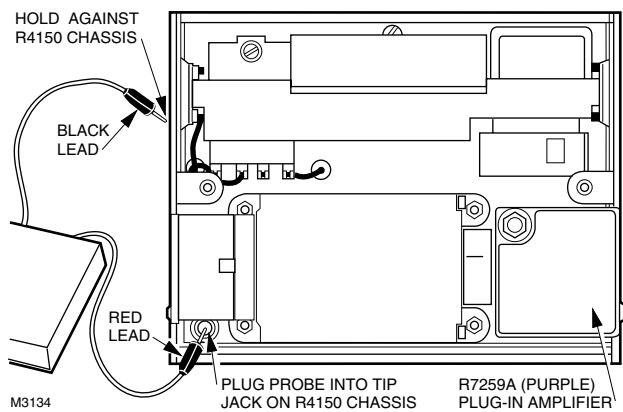
**Fig. 13—Using a 203659 UV Flame Simulator with an R4126 or R4127.**



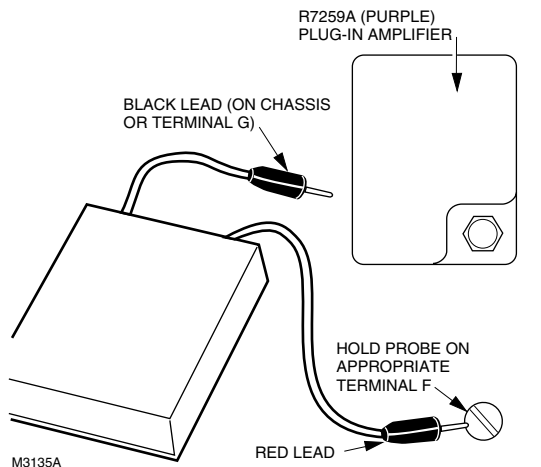
**Fig. 14—Using a 203659 UV Flame Simulator with an R8169B.**



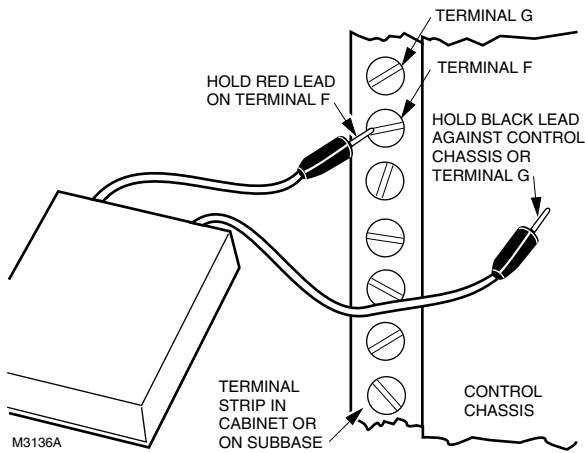
**Fig. 15—Using a 203659 UV Flame Simulator with an R4150.**



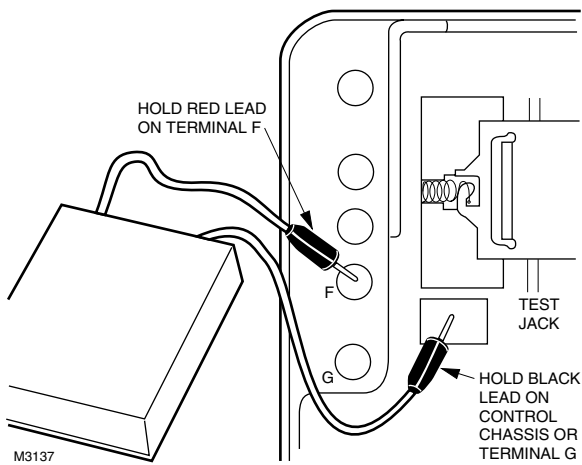
**Fig. 16—Using a 203659 UV Flame Simulator with a Q518A or Q519A.**



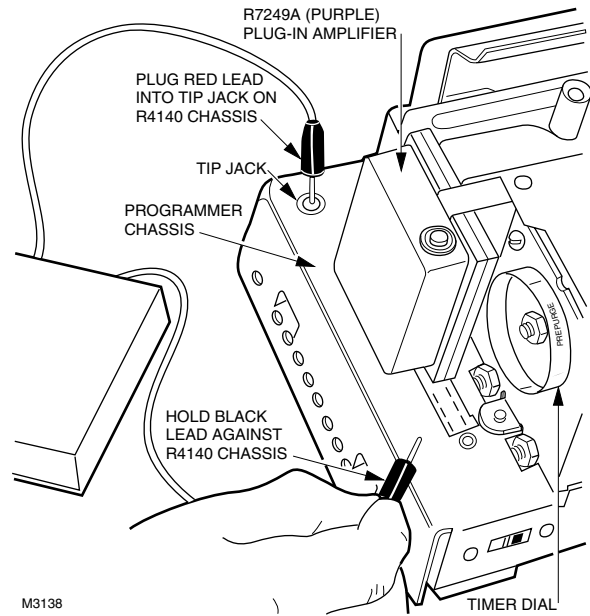
**Fig. 17—Using a 203659 UV Flame Simulator with an R4075C,D,E, or R4138C,D.**



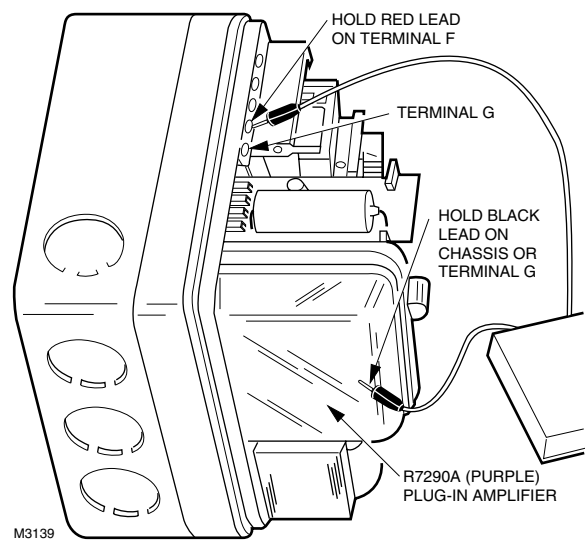
**Fig. 18—Using a 203659 UV Flame Simulator with an RA890G.**



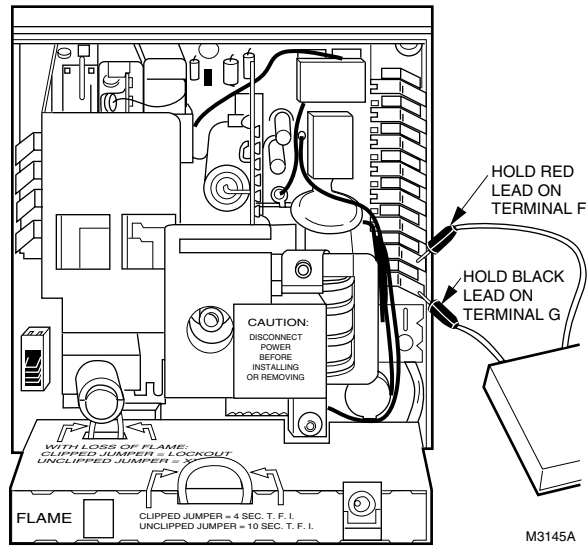
**Fig. 19—Using a 203659 UV Flame Simulator with an R4140.**



**Fig. 20—Using a 203659 UV Flame Simulator with an R4795 and R7290A Amplifier.**

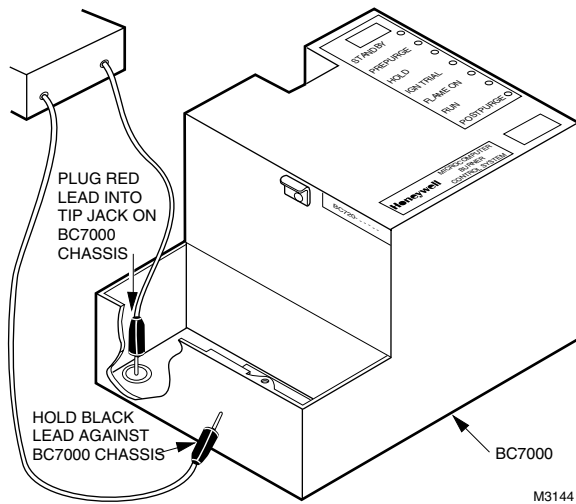


**Fig. 21—Using a 203659 UV Flame Simulator with an R7795A,C,E,G.**



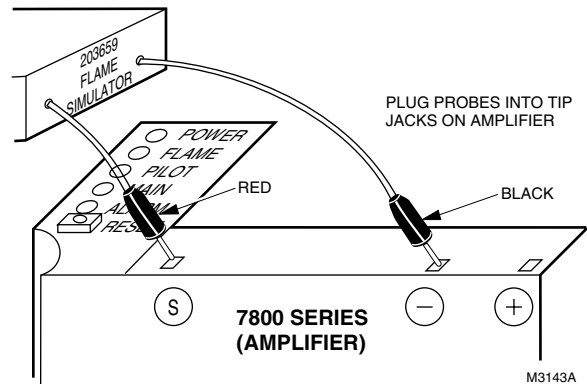
M3145A

**Fig. 22—Using a 203659 UV Flame Simulator with a BC7000.**



M3144

**Fig. 23—Using a 203659 UV Flame Simulator with 7800 SERIES Amplifiers.**



M3143A

**Honeywell**

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