

# BE1-27/59 Overvoltage Protection

Washington State University  
Hands-On Relay School

 **Basler Electric**

[www.basler.com](http://www.basler.com)

# Relay Benefits

- Simple setup
- Easy test and replace, draw-out case
- Test in case and on bench
- Long history (25 yrs)

# Style Chart

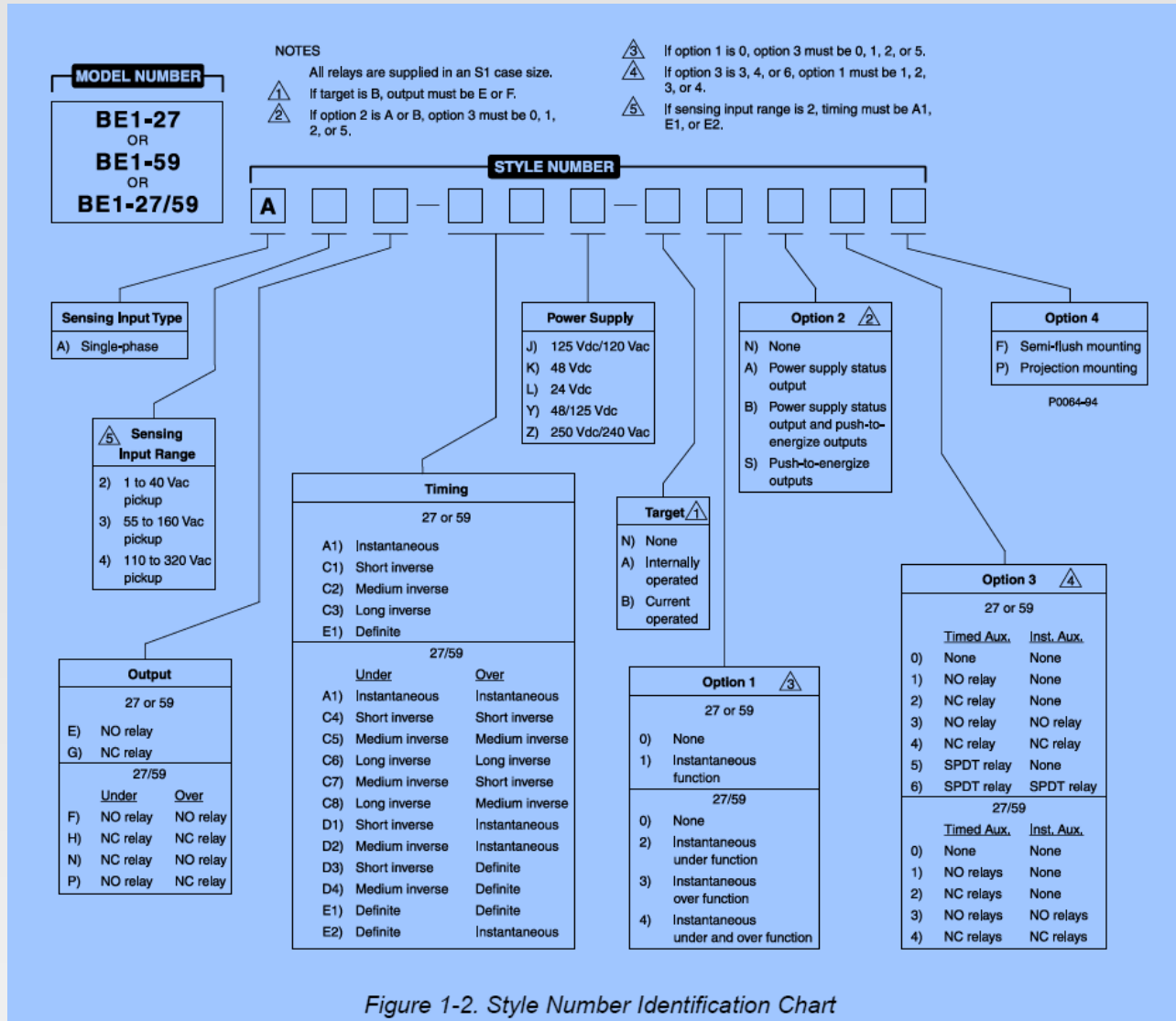


Figure 1-2. Style Number Identification Chart

# Voltage-Sensing Ratings

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## Maximum Continuous Voltage

- 360 V (120-V model)
- 480 V (240-V model)

Burden: < 1 VA

Frequency: 40–70 Hz

V Pickup Accuracy:  $\pm 2\%$  or  $\pm 0.5$  volts  
(whichever is greater)

Dropout:  $\pm 2\%$  of pickup

# Contact-Outputs Ratings

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## Resistive Ratings

- 120 Vac: Make, break, and carry 7 Aac continuous
- 250 Vdc: Make and carry 30 Adc for 0.2 s, carry 7 Adc continuous, and break 0.3 Adc

500 Vdc: Make and carry 15 Adc for 0.2 s, carry 7 Adc continuous, and break 0.3 Adc

## Inductive Ratings

- 120 Vac, 125 Vdc, 250 Vdc:  
Break 0.3 A ( $L/R = 0.04$ )  
( $L/R$  of 0.04 is about 15.1 X/R at 60-Hz inductive)

# Two Types of Targets

Pg 1-3

Internally operated or current operated targets

Internally operated–electronically latching

- Manual-reset targets indicate that a setpoint contact has energized.
- Select internally operated targets if the relay has normally closed output contacts.

Current-operated

- Require a minimum trip circuit current of 200 mA
  - › Continuous rating of 3 amperes
  - › Two-minute rating of 7 amperes
  - › One-second rating of 30 amperes

# Power Supply Options

**Wide-range, isolated, low-burden, switching**

Pg 1-3

**Input power (source voltage) is NOT polarity sensitive**

Type	Input Voltage		Burden (Nominal)
	Nominal	Range	
K (midrange)	48 Vdc	24 to 150 Vdc	3.8 W
J (midrange)	125 Vdc	25 to 150 Vdc	4.0 W
	120 Vac	90 to 132 Vac	17.1 VA
L (low range)	24 Vdc	12 to 32 Vdc*	3.9 W
Y (midrange)	48 Vdc	24 to 150 Vdc	3.8 W
	125 Vdc	25 to 150 Vdc	4.0 W
Z (high range)	250 Vdc	68 to 280 Vdc	4.1 W
	240 Vac	90 to 270 Vac	28.4 VA

\*Type L begins operation at 14 Vdc;

Once operating, voltage can be reduced to 12 Vdc

# Time Range and Accuracy

Pg 1-4

## Instantaneous

- Less than 50 ms
- $\pm 5\%$  of the setting or  $\pm 50$  ms, whichever is greater

## Definite

- 0.1 to 9.9 seconds in 0.1-second increments
- $\pm 5\%$  of the setting or  $\pm 50$  ms, whichever is greater

## Inverse

- 01 to 99 time dial in 01 increments varies curve
- 00 designates instantaneous
- $\pm 5\%$  of the setting or  $\pm 50$  ms, whichever is greater



# Inverse-Time Style (3 curves available)

Pg 3-4

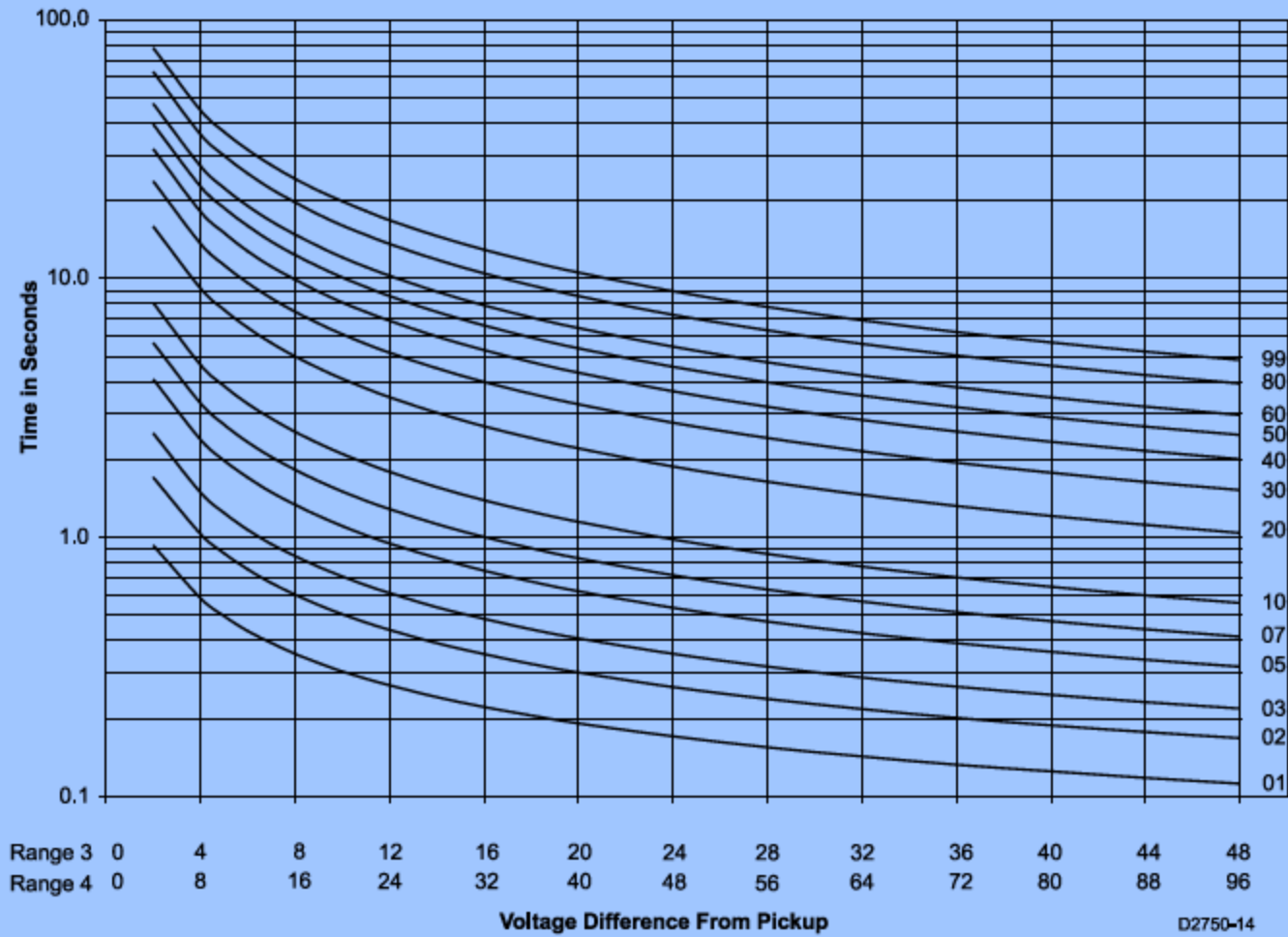


Figure 3-5. Overvoltage, Short Inverse Timing Characteristic Curve

# Front-Panel Controls

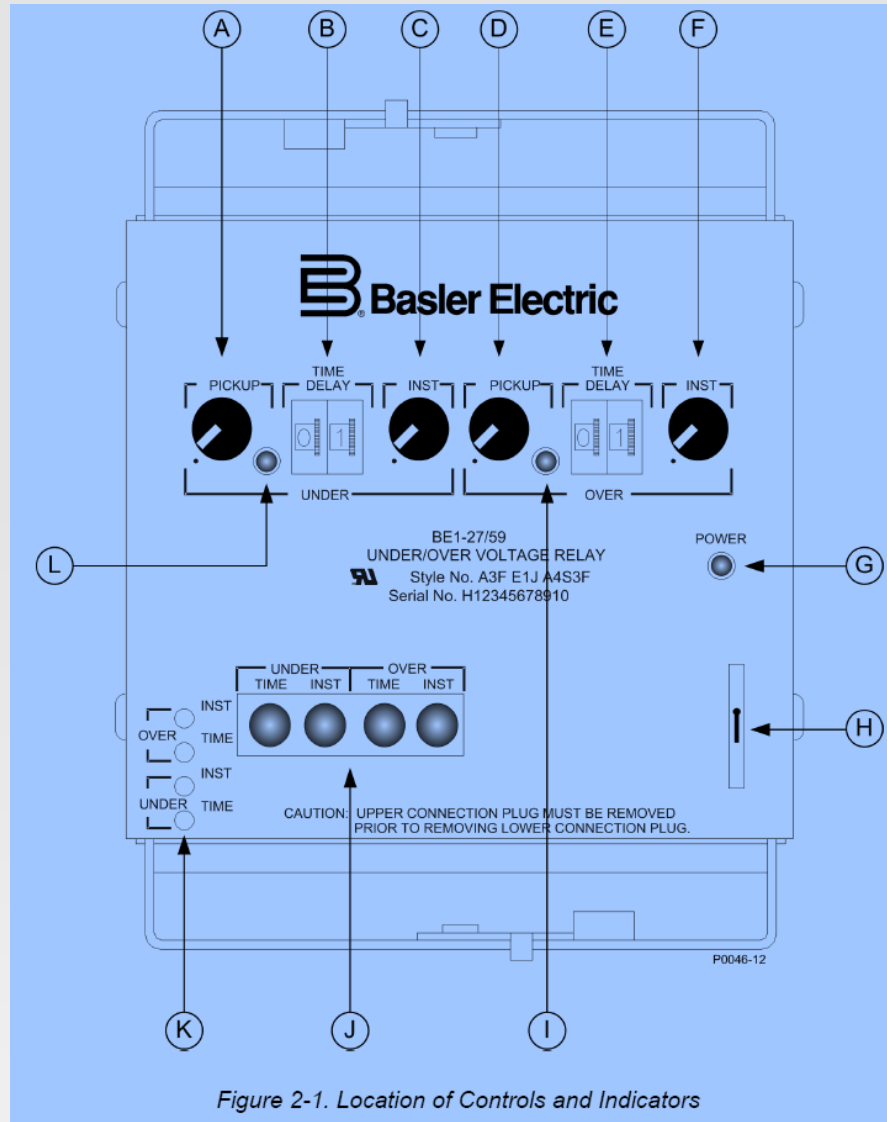


Figure 2-1. Location of Controls and Indicators

# Front-Panel Controls

Pg 2-1

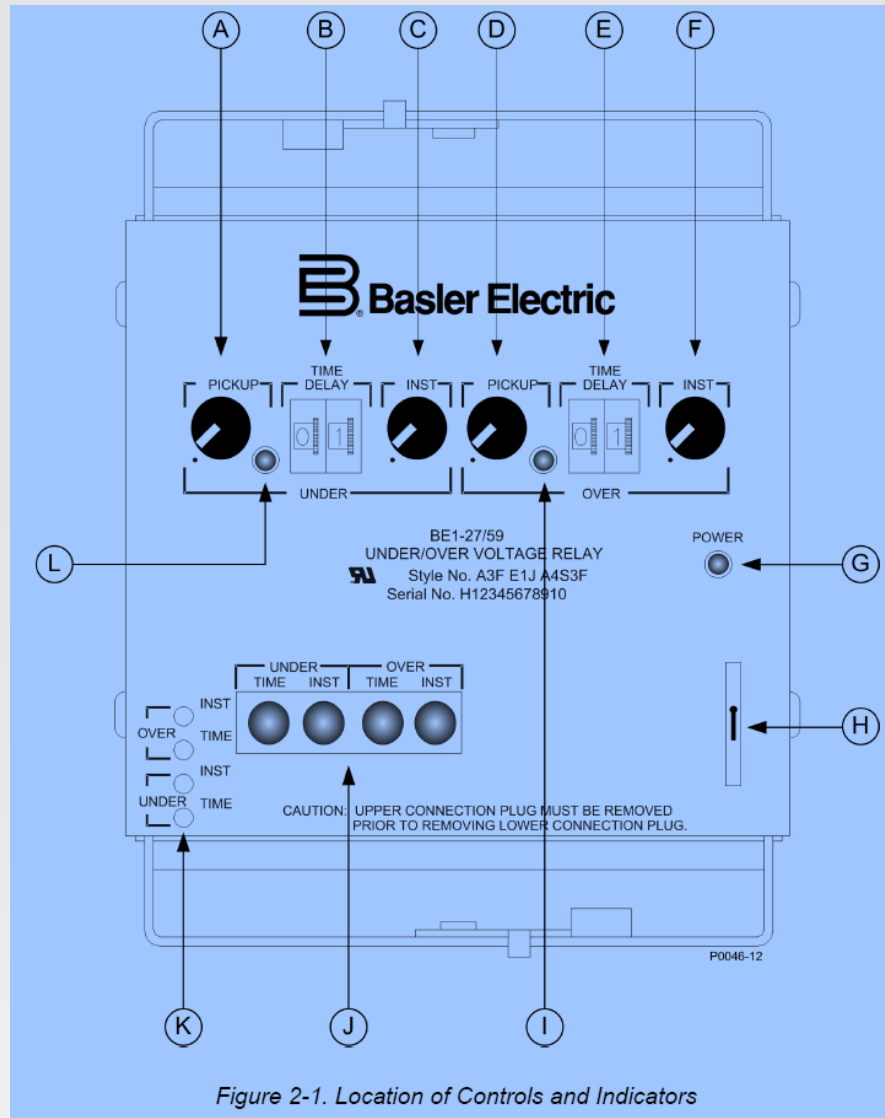
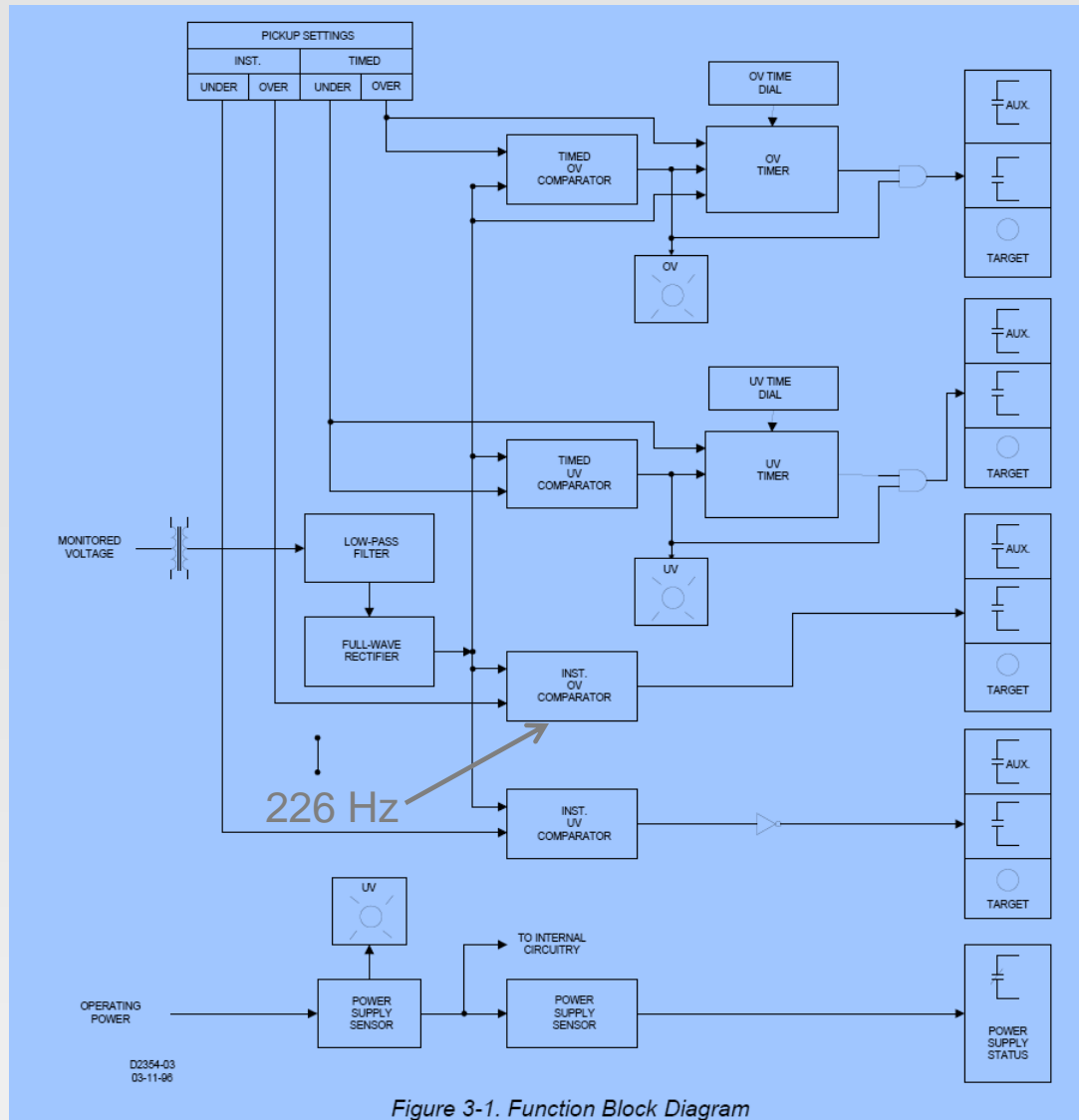


Figure 2-1. Location of Controls and Indicators

# Internal Logic



# Internal Logic

Pg 3-1

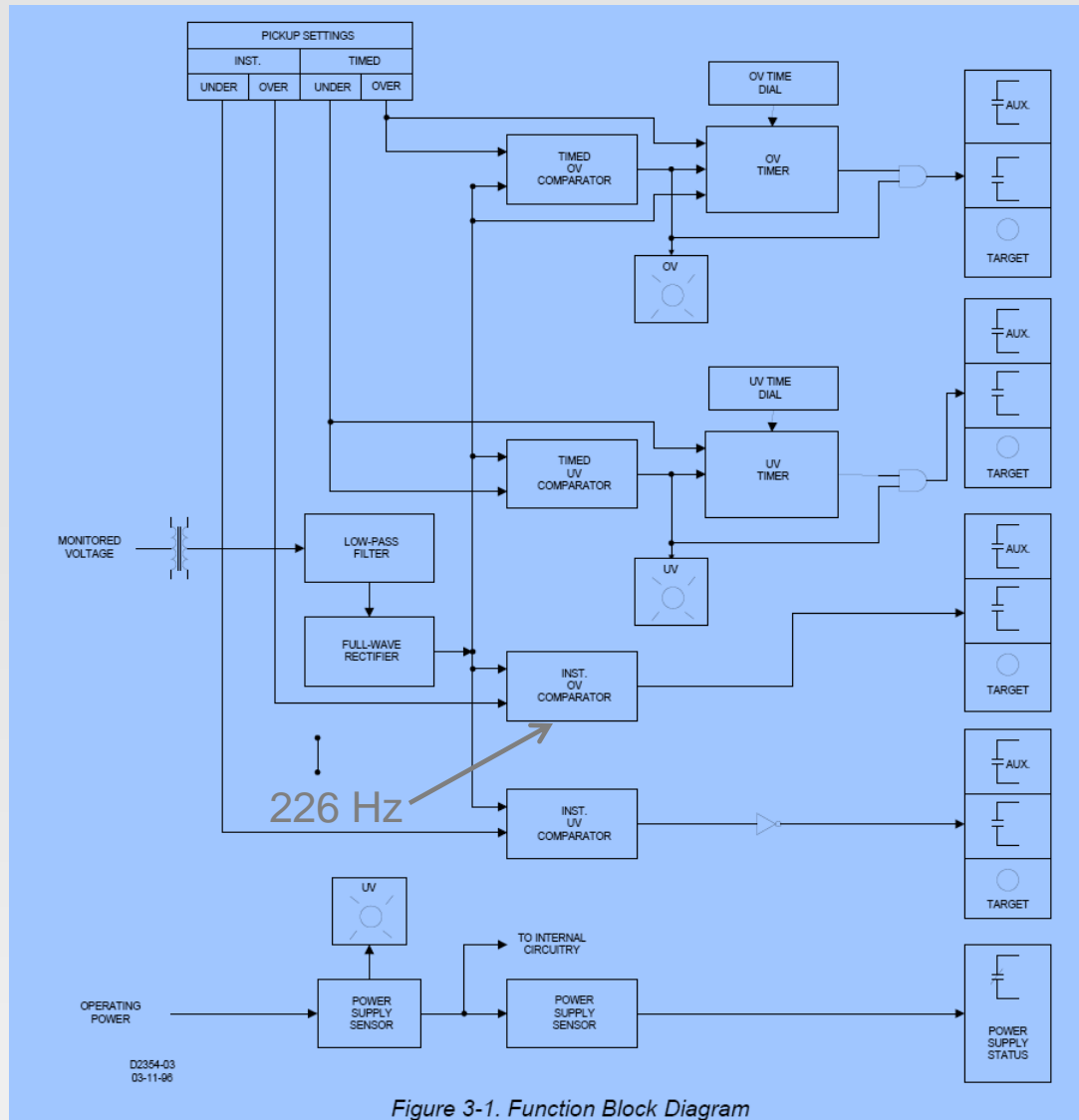
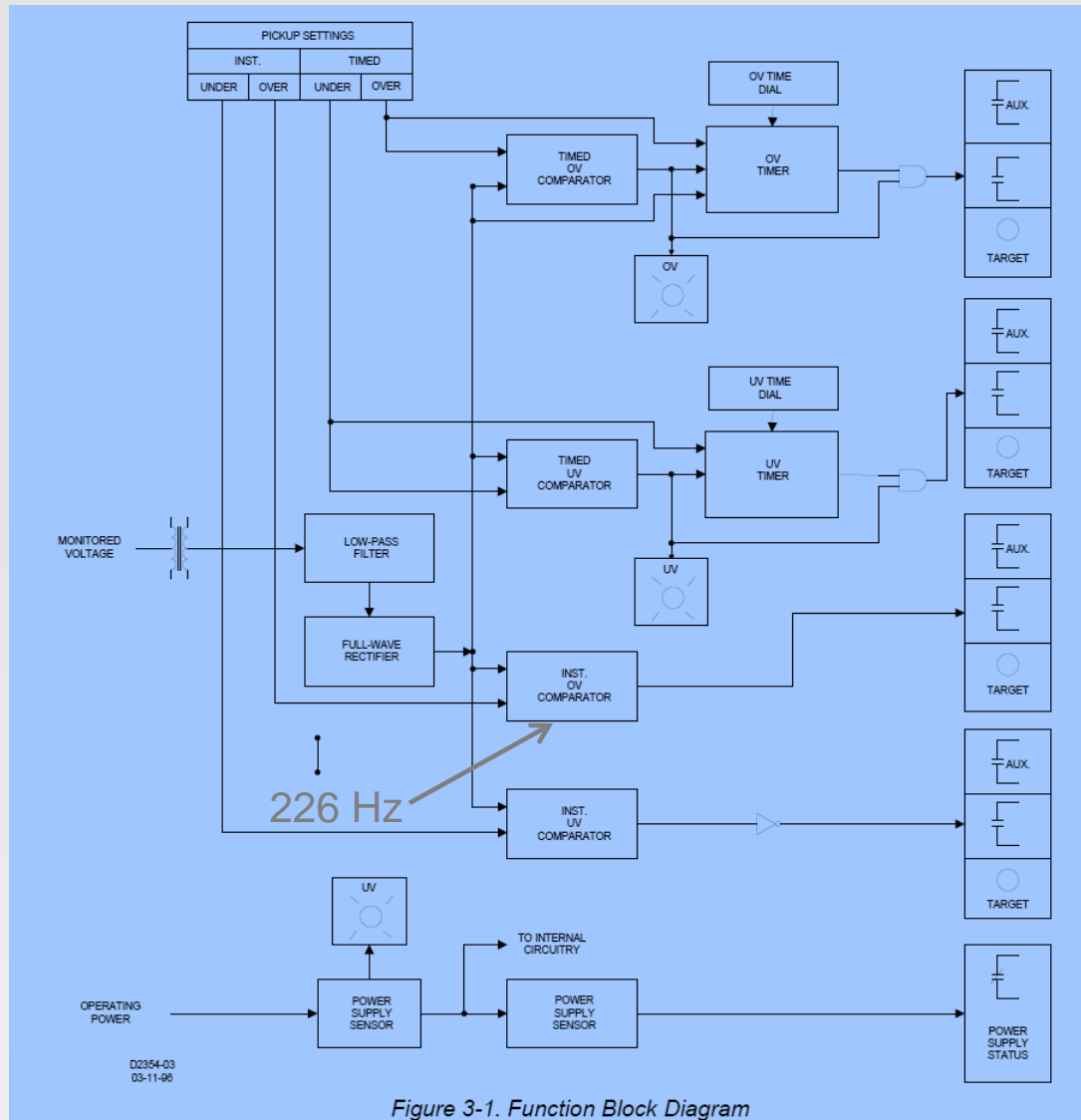


Figure 3-1. Function Block Diagram

# Internal Logic



# Relay Internal Logic

Pg 3-1

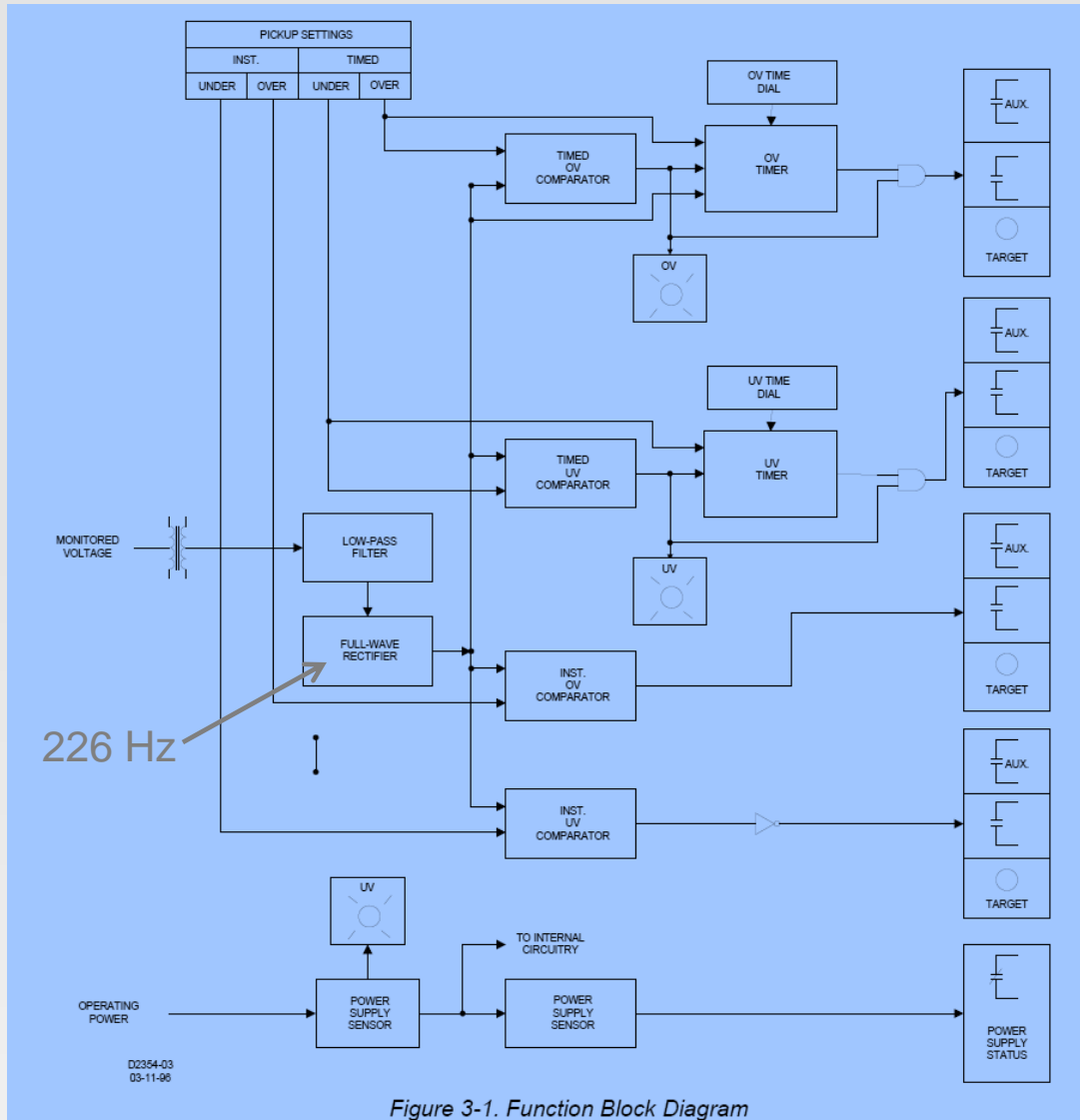


Figure 3-1. Function Block Diagram

# Relay Internal Logic

Pg 3-1

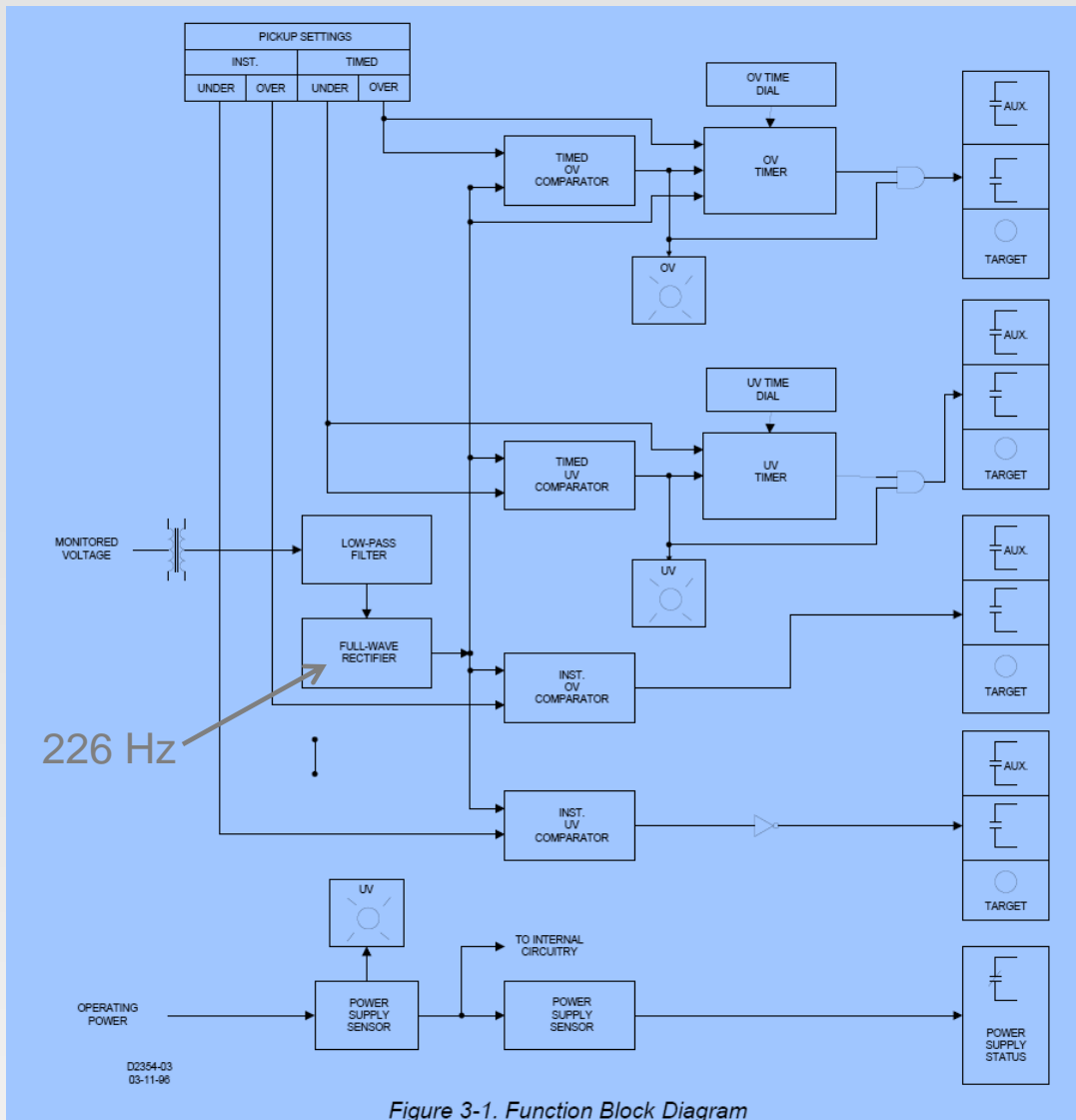


Figure 3-1. Function Block Diagram



# Relay Internal Logic

Pg 3-1

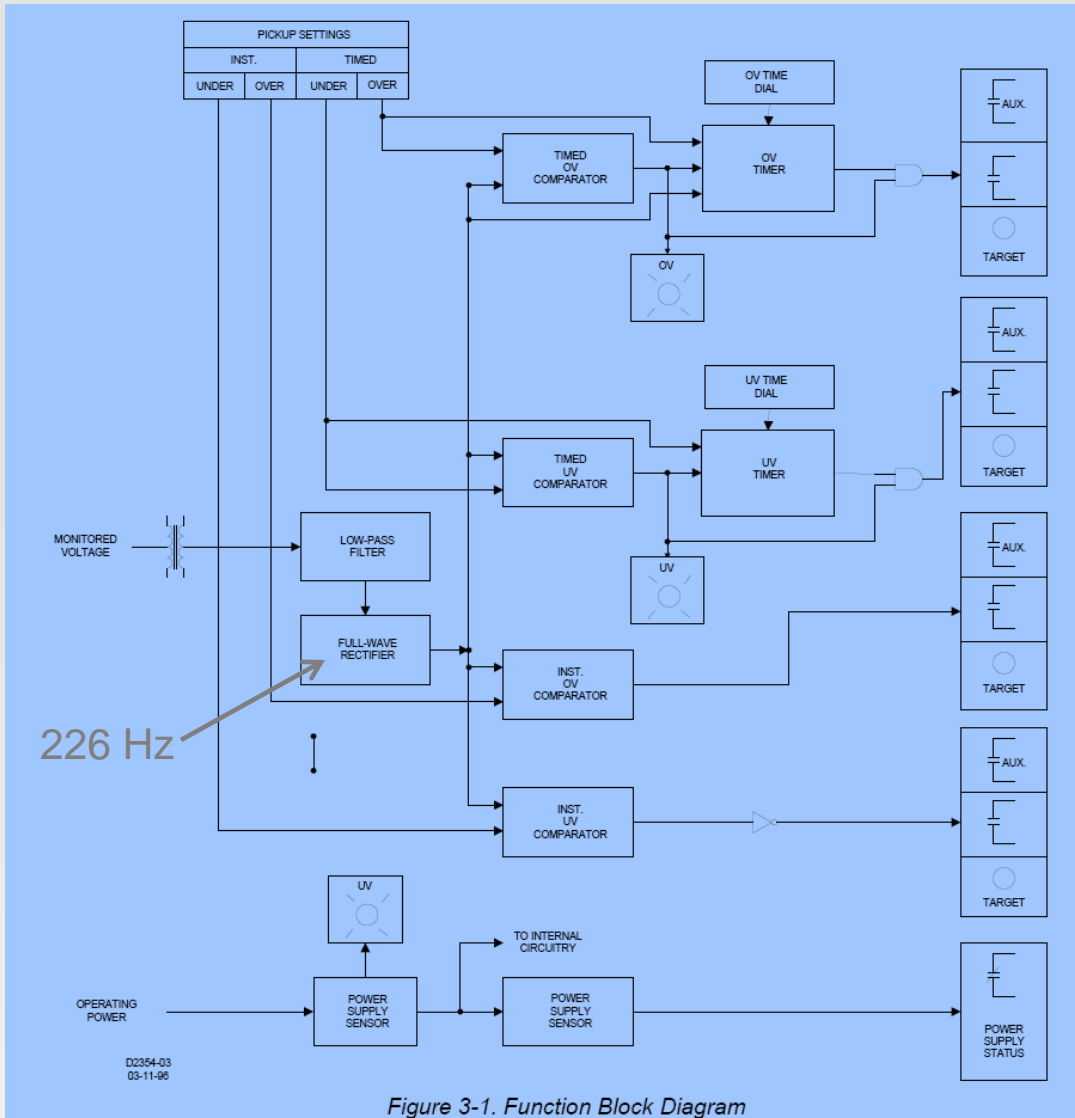


Figure 3-1. Function Block Diagram

# Internal Connections

Pg 4-14

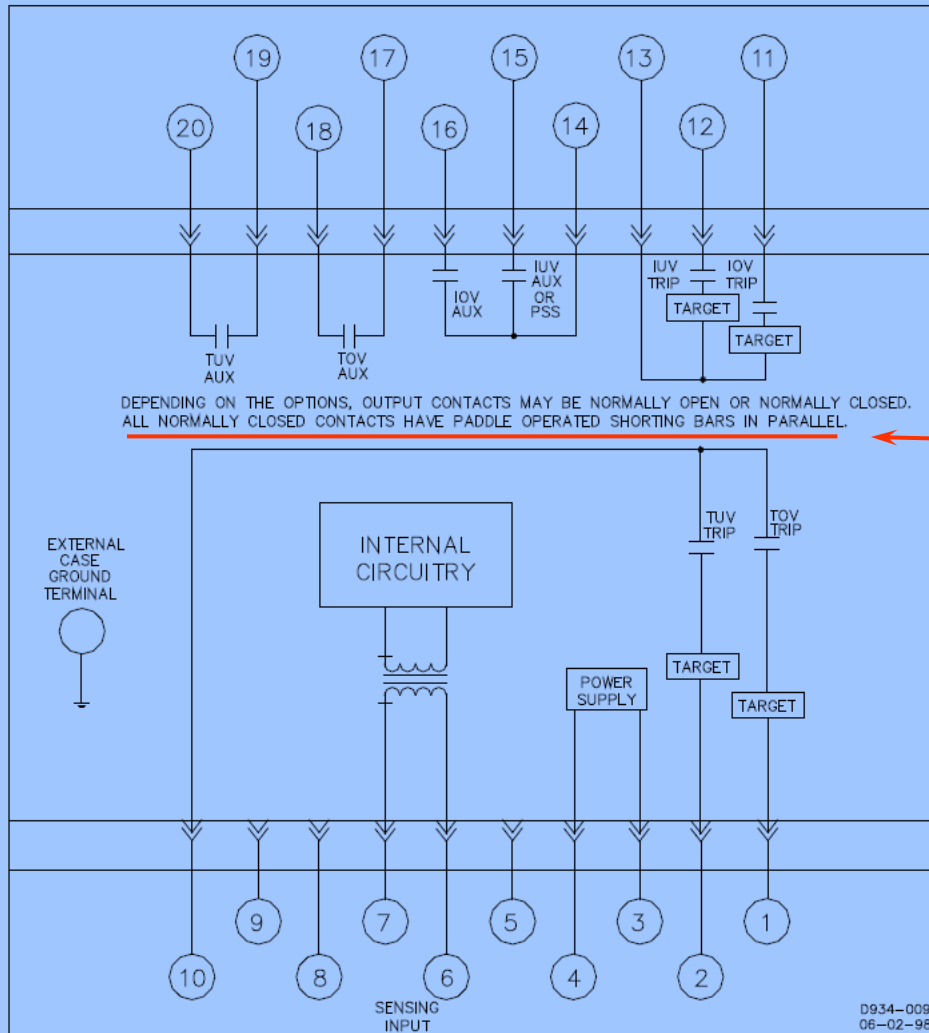


Figure 4-15. BE1-27/59 Internal Connections

- NC contacts open to trip
- Contacts closed if relay is de-energized
- Also closed when the paddle is pulled

# AC Connections

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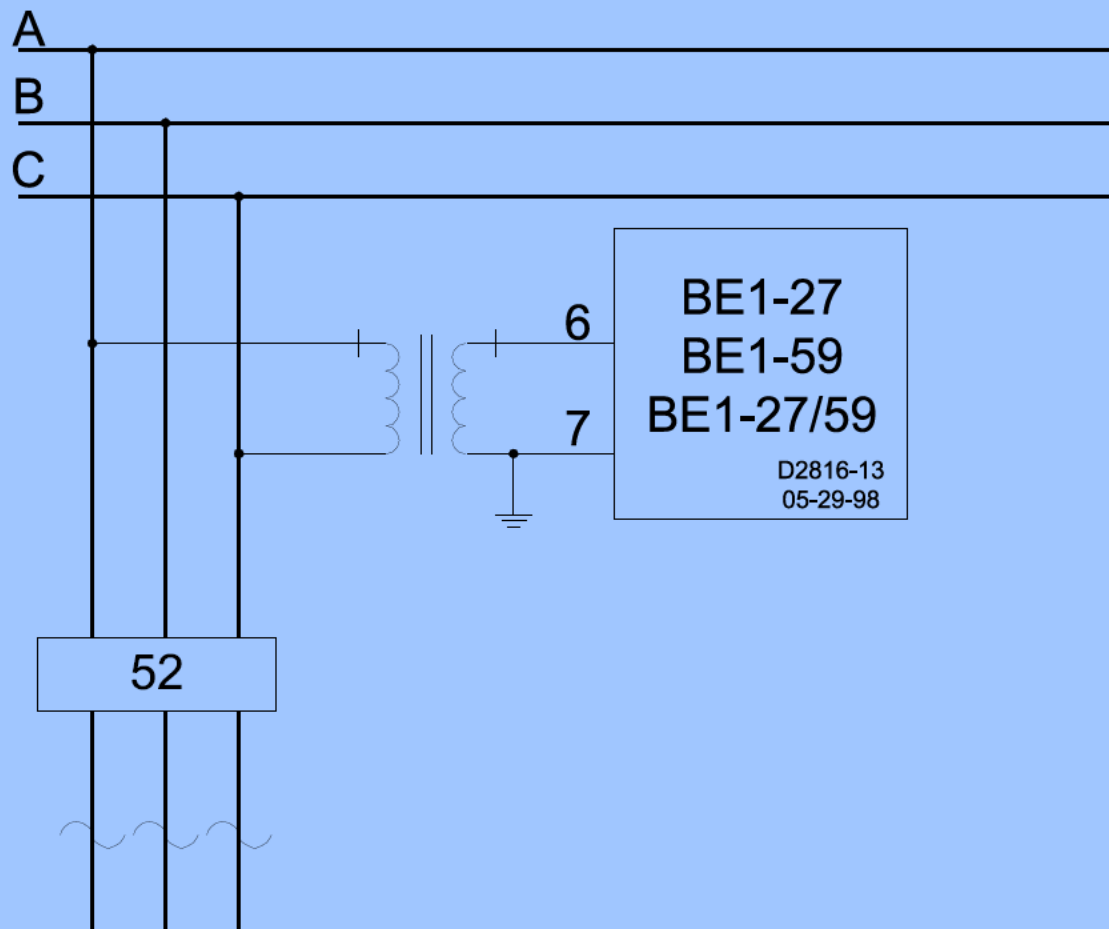


Figure 4-16. Typical AC Connections

# DC Connections BE1-27 and BE1-59

Pg 4-18

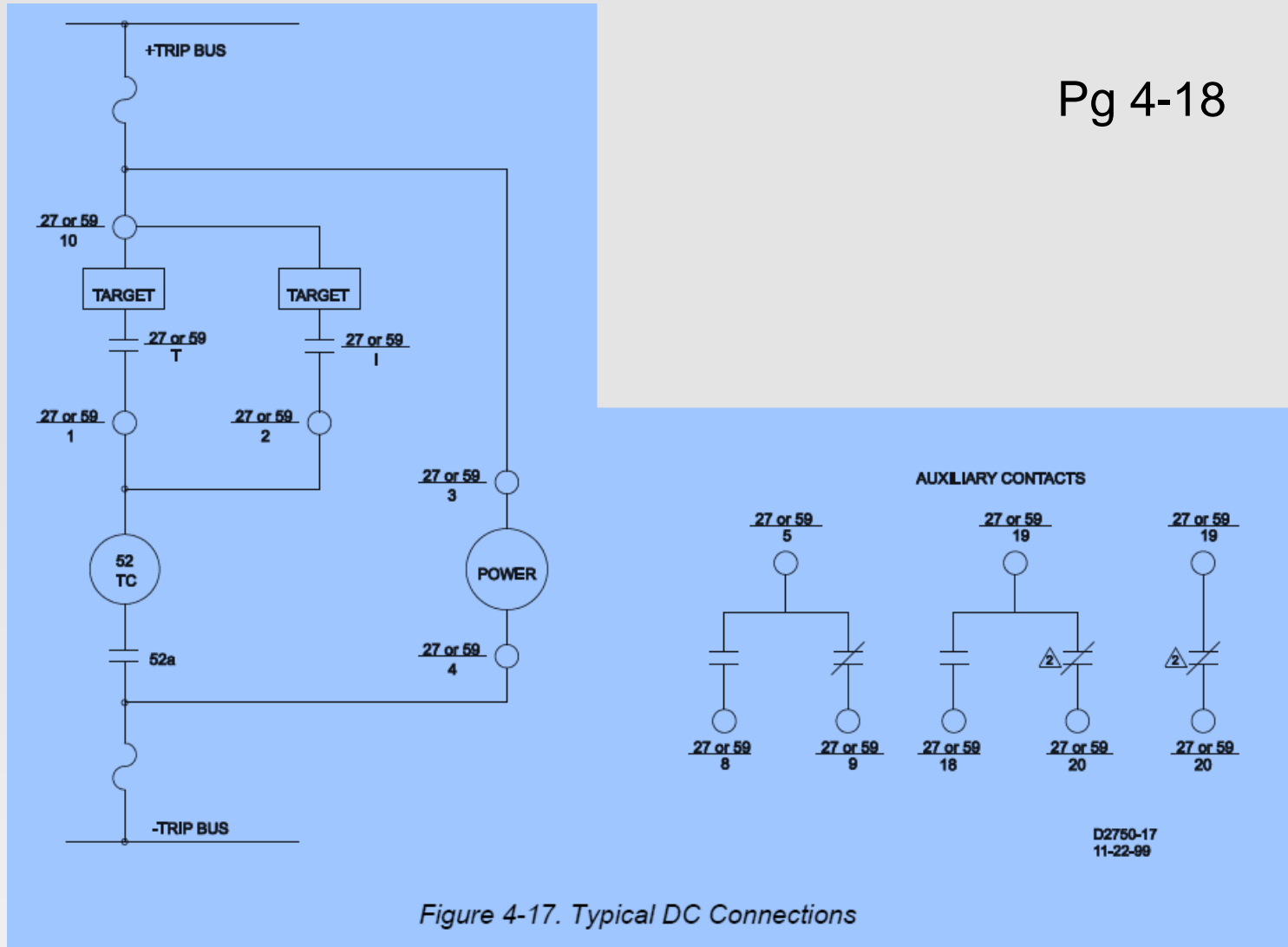
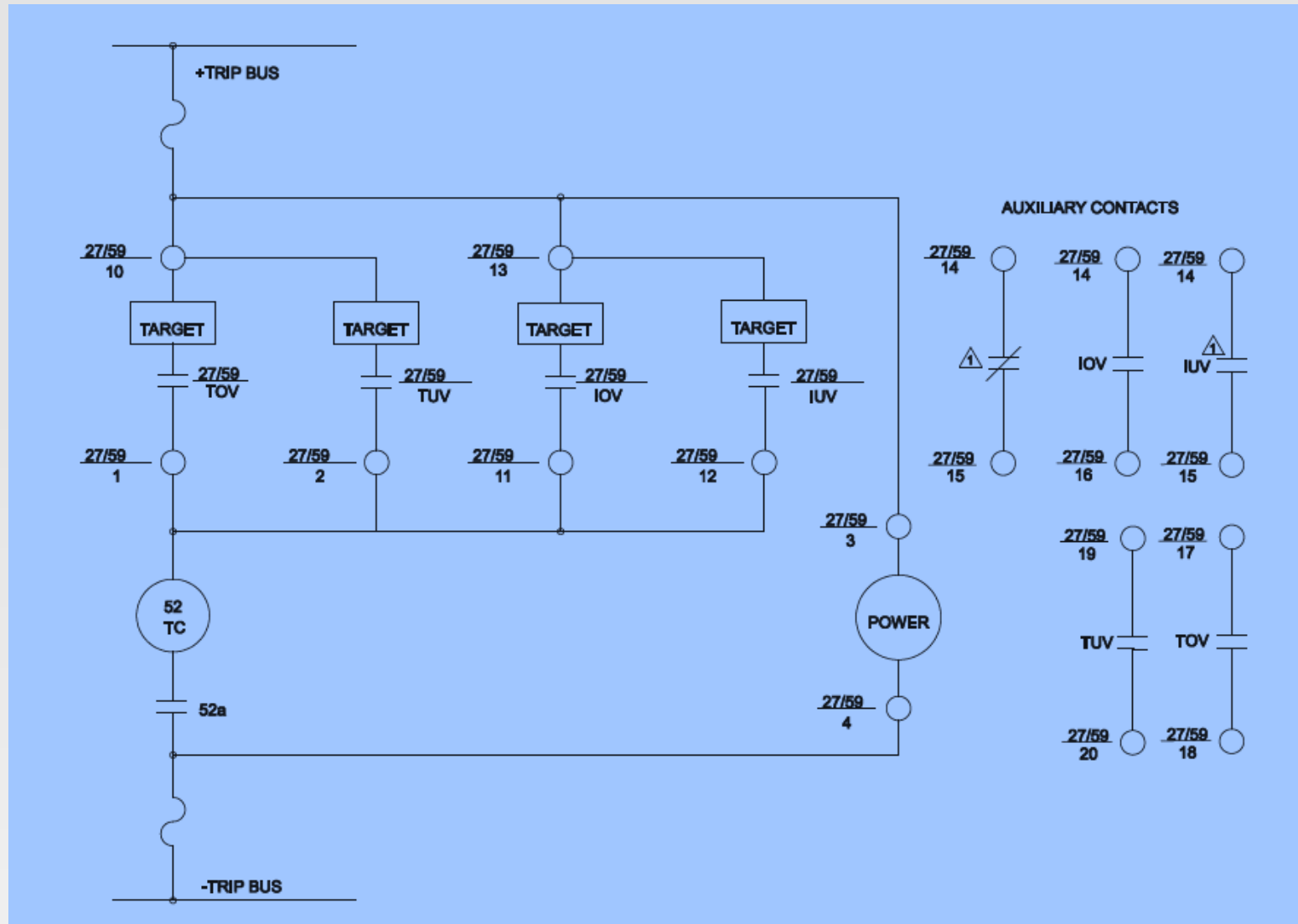


Figure 4-17. Typical DC Connections

# DC Connections BE1-27/59

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# Test Equipment

Pg 5-1

## ***Required Test Equipment***

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Minimum test equipment required for relay testing and adjustment is listed below. Refer to Figure 5-1 for the test setup.

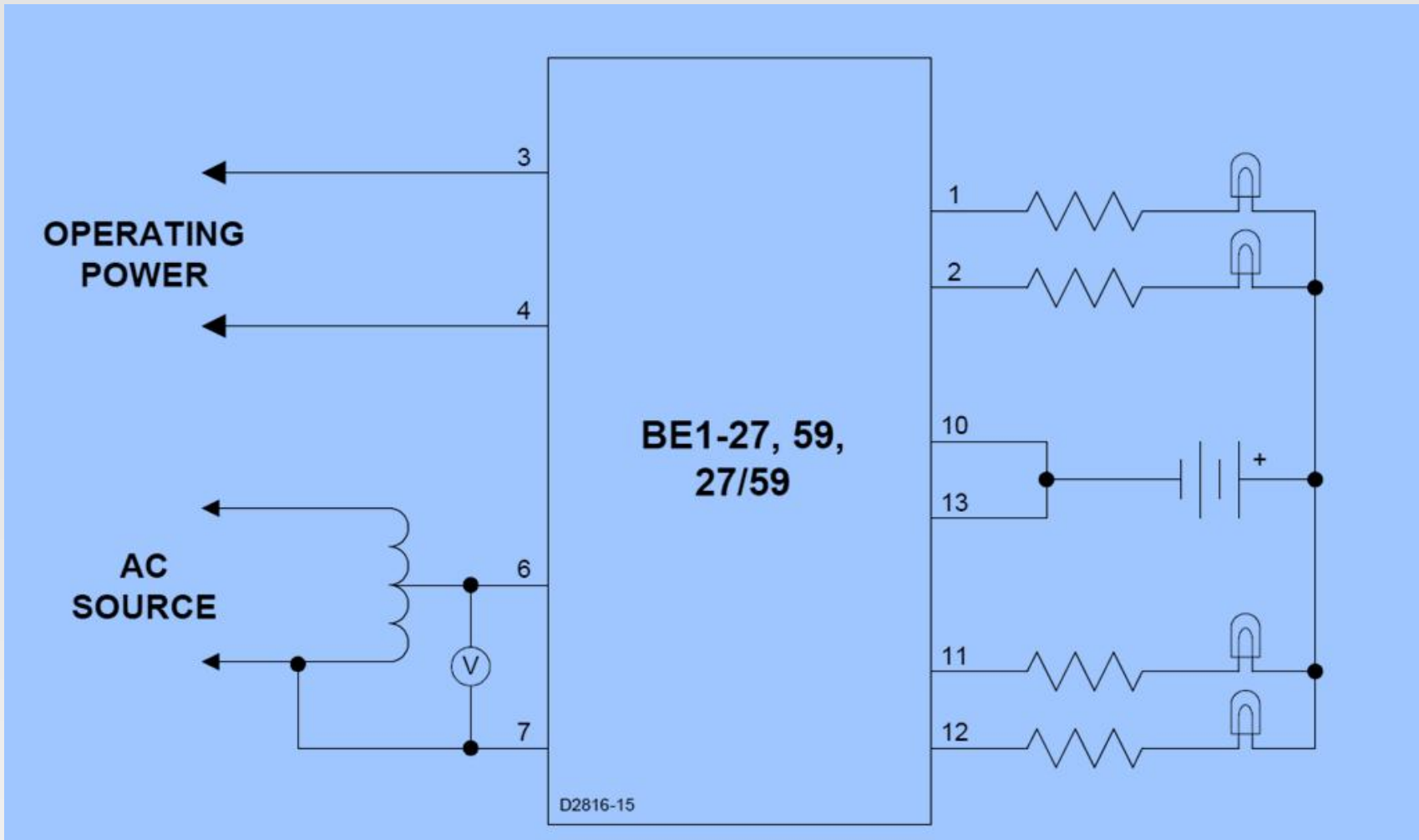
### **NOTE**

Commercially available frequency relay test sets with frequency and time generating accuracies exceeding those of the relay and including electronic switching, may be used.

- Appropriate ac or dc power source for relay operation.
- Appropriate ac source for frequency sensing. (A source with frequency stability of 0.00002 Hz must exhibit phase noise of less than 90 db for accurate measurement. The accuracy and stability of this source is necessary as the relay precisely measures the period between positive going zero-crossings of the applied waveform and responds instantaneously to the sensed condition.)
- Hardware (battery and lamp, multimeter, etc.) or method of determining that the output contacts close.

# Test Connections

Pg 5-2



# Test Connections

Pg 5-3

*Table 5-2. Output Terminals*

Pickup Function	Relay Model		
	27	59	27/59
Timed Undervoltage	1-10	—	2-10
Instantaneous Undervoltage	2-10	—	12-13
Timed Overvoltage	—	1-10	1-10
Instantaneous Overvoltage	—	2-10	11-13



**Questions?**