

# TIME DELAY RELAYS

## PRODUCT SUMMARY

Macromatic offers a wide variety of time delay relays and accessories. Each one has different features and operating characteristics, allowing you to choose the exact product to meet your needs. Our time delay relays are available in either programmable or non-programmable versions. We offer both single or multiple function time delay relays. Choose between SPDT or DPDT relay outputs & solid state outputs for high duty cycle applications. Time delay relays are available as plug-in units for use with industry standard 8 & 11 pin octal sockets. They also come in 2" x 2" encapsulated & 1/16 DIN mounting configurations. Choose between analog or digital-set time delay relays. Refer to the Selection Table on this page for more information.

Product Series		Mounting Configuration	Time Delay Setting & Ranges	Functions	Input Voltages	Output	See Pages	
	<b>THR Series Relay Output</b>	2" x 2" Encapsulated Panel Mounted with One Screw	Analog-Set 0.1 SEC - 100 HR	Single-Function	12VDC, 24VAC/DC, 120VAC/DC, 240VAC	10A SPDT Relay	43-49	
	<b>THS Series Solid State Output</b>		Analog-Set 0.01 SEC - 100 HR	Single-Function	24-240VAC, 12-48VDC	1A SPNO Solid State	50-53	
	<b>THL Series Solid State Inline (Series) Output</b>		Analog-Set 0.01 SEC - 100 HR	Single-Function	24-240VAC & 12-48VDC	1A SPNO Solid State	54-55	
	<b>TR-5 Series Standard</b>	Plug-in Utilizing Industry-Standard 8 & 11 Pin Sockets	Analog-Set 0.05 SEC - 2 HR	Single-Function	12VDC, 24VAC/DC, 120VAC/DC, 240VAC	10A DPDT 10A SPDT Relay	56-59 60-61	
	<b>TR-6 Series Time Ranger Programmable</b>		Analog-Set Multi-Range 0.1 SEC - 24 HR	Single-Function	12VAC/DC, 24VAC/DC, 120VAC/DC, 240VAC	10A DPDT Relay	62-65	
	<b>TD-8 Series Time Ranger Digital-Set Programmable</b>		Digital-Set Multi-Range 0.1 SEC - 1,023 HR	Multi-Function (16) & Single-Function	12VAC/DC, 24VAC/DC, 120VAC/DC, 240VAC	10A DPDT 10A SPDT Relay	66-68	
	<b>TD-7 Series Time Ranger Digital-Set Programmable</b>		Digital-Set Multi-Range 0.05 SEC - 999 HR	Multi-Function (10) & Single-Function	12VAC/DC, 24VAC/DC, 120VAC/DC, 240VAC	10A DPDT 10A SPDT Relay	69-71	
	<b>SS-6 &amp; SS-8 Series Compact</b>		Analog-Set 0.2 - 300 SEC	Single-Function	12VDC, 24VAC/DC, 120VAC	5A SPDT Relay	76	
	<b>TAD Series Digital-Set 1/16 DIN</b>		1/16 DIN (48mm <sup>2</sup> )	Digital-Set Multi-Range 0.01 SEC - 9,990 HR	Multi-Function (10)	24-240VAC & 24-240VDC	5A DPDT Relay	72-73
	<b>TAA Series Analog-Set 1/16 DIN</b>			Digital-Set Multi-Range 0.05 SEC - 100 HR	Multi-Function (6)--2 Versions	24-240VAC & 24-240VDC	3A DPDT & SPDT Relay	74-75

# TIME DELAY RELAYS

## TR-6 SERIES *TIME RANGER*™

### PROGRAMMABLE MULTI-RANGE PLUG-IN

ON DELAY, INTERVAL ON, FLASHER & TRUE OFF DELAY



- ◆ Each unit has 16 timing ranges built-in (8 on True Off Delay)
- ◆ Selecting a range is easy using a rotary switch (no math is required or DIP switches to set)
- ◆ Timing ranges up to 2 hours (30 minutes on True Off Delay)
- ◆ Uses industry-standard 8 pin octal sockets
- ◆ 10A DPDT output contacts



**UL LISTED** with appropriate socket

FUNCTION ■	INPUT VOLTAGE 50/60Hz.	PRODUCT NUMBER	WIRING/ SOCKETS
<b>ON DELAY</b> <b>A</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-60222 TR-60226 TR-60228 TR-60221	8 PIN OCTAL <b>70169-D</b>  <b>DIAGRAM 1</b>
<b>INTERVAL ON</b> <b>B</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-60522 TR-60526 TR-60528 TR-60521	
<b>FLASHER</b> (OFF 1st) <b>E</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-60822 TR-60826 TR-60828 TR-60821	
<b>FLASHER</b> (ON 1st) <b>F</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-60922 TR-60926 TR-60928 TR-60921	
<b>TRUE OFF DELAY</b> <b>R</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-60622 TR-60626 TR-60628 TR-60621	

■ See Pages 77-79 for definitions & explanations of Timing Functions.

### TIMING RANGES

Select one of the 8 or 16 built-in time ranges by setting the rotary switch per a chart on the unit and adjust within that range using the knob on top:

#### TR-602, 605, 608 & 609 SERIES

Dial Setting	Timing Range
A	0.1 - 0.25 Sec.
B	0.2 - 0.5 Sec.
C	0.3 - 1 Sec.
D	0.5 - 2 Sec.
E	1 - 4 Sec.
F	2 - 8 Sec.
G	4 - 15 Sec.
H	8 - 30 Sec.
I	15 - 60 Sec.
J	30 - 120 Sec.
K	1 - 4 Min.
L	2 - 8 Min.
M	4 - 15 Min.
N	8 - 30 Min.
O	15 - 60 Min.
P	30 - 120 Min.

#### TR-606 SERIES

Dial Setting	Timing Range
A	0.05 - 5 Sec.
B	0.1 - 10 Sec.
C	0.3 - 30 Sec.
D	0.6 - 60 Sec.
E	1.8 - 180 Sec.
F	3 - 300 Sec.
G	0.1 - 10 Min.
H	0.3 - 30 Min.



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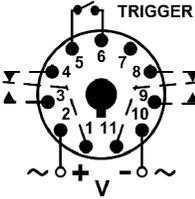
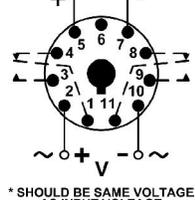
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# TIME DELAY RELAYS

## TR-6 SERIES *TIME RANGER*™

### PROGRAMMABLE MULTI-RANGE PLUG-IN OFF DELAY, SINGLE SHOT & WATCHDOG

FUNCTION ■	INPUT VOLTAGE 50/60Hz.	PRODUCT NUMBER	WIRING/SOCKETS
<b>OFF DELAY</b> Control Switch Trigger <b>C</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-61622 TR-61626 TR-61628 TR-61621	11 PIN OCTAL <b>70170-D</b> 
<b>SINGLE SHOT</b> Control Switch Trigger <b>D</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-61522 TR-61526 TR-61528 TR-61521	
<b>WATCHDOG</b> Control Switch Trigger (Retriggerable Single Shot) <b>J</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-61322 TR-61326 TR-61328 TR-61321	
<b>OFF DELAY</b> Power Trigger <b>C</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-61922 TR-61926 TR-61928 TR-61921	11 PIN OCTAL <b>70170-D</b> 
<b>SINGLE SHOT</b> Power Trigger <b>D</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-61722 TR-61726 TR-61728 TR-61721	
<b>WATCHDOG</b> Power Trigger (Retriggerable Single Shot) <b>J</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-61822 TR-61826 TR-61828 TR-61821	<small>* SHOULD BE SAME VOLTAGE AS INPUT VOLTAGE</small> <b>DIAGRAM 4</b>

■ See Pages 77-79 for definitions & explanations of Timing Functions.

### TIMING RANGES

Select one of the 16 built-in time ranges by setting the rotary switch per a chart on the unit and adjust within that range using the knob on top:

#### TR-613, 615, 616, 617, 618 & 619 SERIES

Dial Setting	Timing Range
A	0.1 - 0.25 Sec.
B	0.2 - 0.5 Sec.
C	0.3 - 1 Sec.
D	0.5 - 2 Sec.
E	1 - 4 Sec.
F	2 - 8 Sec.
G	4 - 15 Sec.
H	8 - 30 Sec.
I	15 - 60 Sec.
J	30 - 120 Sec.
K	1 - 4 Min.
L	2 - 8 Min.
M	4 - 15 Min.
N	8 - 30 Min.
O	15 - 60 Min.
P	30 - 120 Min.

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- ◆ Each unit has 16 timing ranges built-in
- ◆ Selecting a range is easy using a rotary switch (no math is required or DIP switches to set)
- ◆ Timing ranges up to 2 hours
- ◆ Uses industry-standard 11 pin octal sockets
- ◆ 10A DPDT output contacts



**UL LISTED** with appropriate socket



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# TIME DELAY RELAYS

## TR-6 SERIES *TIME RANGER*™ PROGRAMMABLE MULTI-RANGE PLUG-IN REPEAT CYCLE & DELAYED INTERVAL



- ◆ Each unit has 16 timing ranges built-in
- ◆ Selecting a range is easy using a rotary switch (no math is required or DIP switches to set)
- ◆ Timing ranges up to 24 hours
- ◆ Independently selectable & adjustable ON & OFF times
- ◆ Uses industry-standard 8 or 11 pin octal sockets
- ◆ 10A DPDT output contacts



**UL LISTED** with appropriate socket

FUNCTION ■	INPUT VOLTAGE 50/60Hz.	PRODUCT NUMBER	WIRING/SOCKET
<b>REPEAT CYCLE*</b> (OFF Time First Followed By ON Time and Repeating) <b>L</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-63122 TR-63126 TR-63128 TR-63121	8 PIN OCTAL <b>70169-D</b>  <b>DIAGRAM 1</b>
<b>REPEAT CYCLE*</b> (ON Time First Followed By OFF Time and Repeating) <b>M</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-65122 TR-65126 TR-65128 TR-65121	 <b>DIAGRAM 2</b>
<b>DELAYED INTERVAL*</b> (OFF Time Followed by ON Time Followed by OFF State Until Reset) <b>N</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-66122 TR-66126 TR-66128 TR-66121	
<b>DELAYED INTERVAL*</b> Control Switch Trigger (OFF Time Followed by ON Time Followed by OFF State Until Reset) <b>P</b>	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TR-66522 TR-66526 TR-66528 TR-66521	

\* These units have independently selectable & adjustable ON & OFF times. See [www.macromatic.com/onoff](http://www.macromatic.com/onoff) for more information.

■ See Pages 77-79 for definitions & explanations of Timing Functions.

### TIMING RANGES

Select one of the 16 built-in time ranges by setting the rotary switch per a chart on the unit and adjust within that range using the knob on top:

#### TR-631, 651, 661 & 665 SERIES

Dial Setting	Timing Range
A	0.6 - 2.5 Sec.
B	1.5 - 5 Sec.
C	2.5 - 10.5 Sec.
D	5 - 21 Sec.
E	10 - 42 Sec.
F	0.4 - 1.4 Min.
G	0.7 - 2.8 Min.
H	1.5 - 5.5 Min.
I	3 - 11 Min.
J	5.5 - 22.5 Min.
K	11 - 45 Min.
L	0.4 - 1.5 Hr.
M	0.8 - 3 Hr.
N	1.5 - 6 Hr.
O	3 - 12 Hr.
P	6 - 24 Hr.



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# TIME DELAY RELAYS

## TR-6 SERIES *TIME RANGER*™ PROGRAMMABLE MULTI-RANGE PLUG-IN APPLICATION DATA & DIMENSIONS

### APPLICATION DATA

#### Voltage Tolerance:

AC Operation: +10/-15% of nominal at 50/60 Hz.  
DC Operation: +10/-15% of nominal.

#### Load (Burden):

2 VA

#### Setting Accuracy:

Maximum Setting (Adjustable): +5%, -0%  
Minimum Setting (Adjustable): +0%, -50%

#### Repeat Accuracy (constant voltage and temperature):

> 2 Seconds Delay       $\pm 0.1\%$   
0.1 - 2 Seconds Delay    $\pm 2\%$

#### Reset Time:

On Delay/Interval/Repeat Cycle/Delayed Interval: 0.1 Seconds  
Off Delay/Single Shot/Watchdog/  
Triggered Delayed Interval: 0.04 Seconds

#### Start-up Time:

(Time from when power is applied until unit is timing)  
120 & 240V units      0.05 Seconds  
12, 24 & 48V units    0.08 Seconds

#### Maintain Function Time:

(Time unit continues to operate after power is removed)  
0.01 Seconds for all units

#### Temperature:

12-120V Input Voltage: -28° to 65°C (-18° to 150°F)  
240V Input Voltage:    -28° to 50°C (-18° to 122°F)

#### Triggering Off Delay, Single Shot or Watchdog Units:

Timing sequence must be initiated only after input voltage is applied to unit. Minimum required trigger switch closure time is 0.1 seconds.

#### Compatibility:

Using a solid state switch to initiate the time sequence is acceptable. See [www.macromatic.com/leakage](http://www.macromatic.com/leakage) or contact Macromatic for information regarding leakage current limits and other solid state design considerations.

#### Output Contacts:

(All TR-6 Series Products except TR-606 True Off Delay)  
DPDT 10A @ 240V AC/30V DC,  
1/2HP @ 120/240V AC (N.O.), 1/3HP @ 120/240V AC (N.C.)  
B300 & R300; AC15 & DC13

#### (TR-606 True Off Delay)

DPDT 10A @ 240V AC; 8A @ 28V DC,  
1/2 HP @ 240V AC, 1/4HP @ 120V AC  
B300 & R300

#### Life:

Mechanical: 10,000,000 operations (2,000,000 operations on TR-606 Series only)  
Full Load: 100,000 operations

**IMPORTANT FOR TR-606 SERIES ONLY:** These relays are shipped from the factory in the OFF state. A shock to the relay during shipping or installation may cause it to change to the ON state. It is recommended that input voltage be applied to the product for at least 0.1 second and removed to cycle the unit to the OFF state prior to use in the application. Please note that it will take as long as the OFF Delay setting to reset the unit once input voltage has been removed.

#### Approvals:

(All TR-6 Series Products except TR-606 True Off Delay)



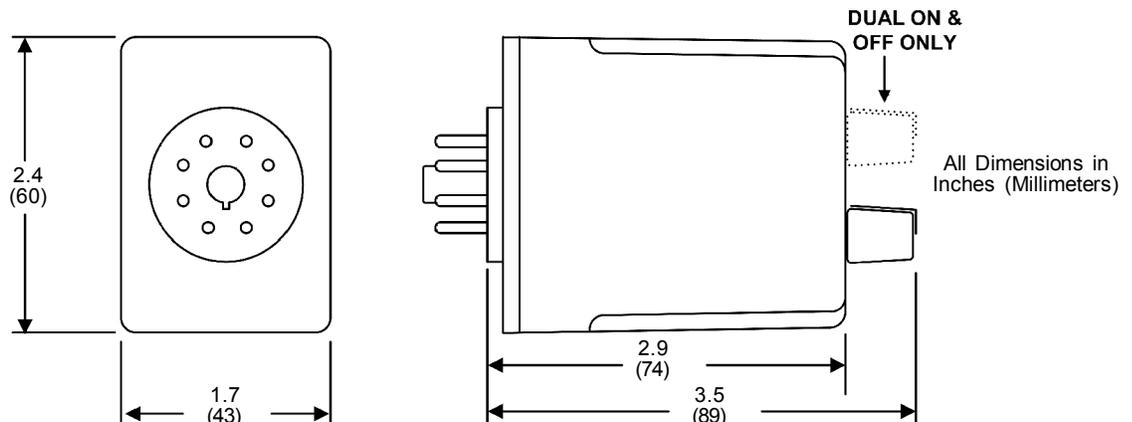
(TR-606 True Off Delay only)



(All TR-6 Series Products)



### DIMENSIONS



# TIME DELAY RELAYS

## DEFINITION OF TIMING FUNCTIONS

Understanding the differences between all the functions available in time delay relays can sometimes be a daunting task. To begin with, time delay relays are simply control relays with a time delay built in. Their purpose is to control an event based on time.

Typically, time delay relays are initiated or triggered by one of two methods, depending on the function:

- ◆ application of input voltage
- ◆ application of a trigger

These triggers can be one of two signals: a control switch (dry contact), i.e., limit switch, push button, float switch, etc., or voltage (commonly known as a power trigger).

To help understand, some definitions are important:

- ◆ Input Voltage - control voltage applied to the input terminals. Depending on the function, input voltage will either initiate the unit or make it ready to initiate when a trigger is applied.
- ◆ Trigger- on certain timing functions, a trigger is used to initiate the unit after input voltage has been applied. As noted above, this trigger can either be a control switch (dry contact switch) or a power trigger (voltage).
- ◆ Output (Load) - every time delay relay has an output (either mechanical relay or solid state) that will open & close to control the load. Note that the user must provide the voltage to power the load being switched by the output contacts of the time delay relay. In all wiring diagrams, the output is shown in the normal de-energized position.

Below and on the following pages are both written and visual descriptions on how the common timing functions operate. A Timing Chart shows the relationship between Input Voltage, Trigger (if present) and Output. If you cannot find a product to fit your requirements or have any questions, Macromatic's Application Engineers offer technical information along with product selection and application assistance. Just call us at 800-238-7474 or e-mail us at [tech-help@macromatic.com](mailto:tech-help@macromatic.com).

Function/Code	Operation	Timing Chart
<b>ON DELAY</b> Delay on Operate Delay on Make <b>A</b>	Upon application of input voltage, the time delay (t) begins. At the end of the time delay (t), the output is energized. Input voltage must be removed to reset the time delay relay & de-energize the output..	
<b>INTERVAL ON</b> Interval <b>B</b>	Upon application of input voltage, the output is energized and the time delay (t) begins. At the end of the time delay (t), the output is de-energized. Input voltage must be removed to reset the time delay relay.	
<b>OFF DELAY</b> Delay on Release Delay on Break Delay on De-Energization <b>C</b>	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the output is energized. Upon removal of the trigger, the time delay (t) begins. At the end of the time delay (t), the output is de-energized. Any application of the trigger during the time delay will reset the time delay (t) and the output remains energized.	
<b>SINGLE SHOT</b> One Shot Momentary Interval <b>D</b>	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the output is energized and the time delay (t) begins. During the time delay (t), the trigger is ignored. At the end of the time delay (t), the output is de-energized and the time delay relay is ready to accept another trigger.	

# TIME DELAY RELAYS

## DEFINITION OF TIMING FUNCTIONS

Function/Code	Operation	Timing Chart
<b>FLASHER</b> (Off First) <b>E</b>	Upon application of input voltage, the time delay (t) begins. At the end of the time delay (t), the output is energized and remains in that condition for the time delay (t). At the end of the time delay (t), the output is de-energized and the sequence repeats until input voltage is removed.	
<b>FLASHER</b> (ON First) <b>F</b>	Upon application of input voltage, the output is energized and the time delay (t) begins. At the end of the time delay (t), the output is de-energized and remains in that condition for the time delay (t). At the end of the time delay (t), the output is energized and the sequence repeats until input voltage is removed.	
<b>ON/OFF DELAY</b> <b>G</b>	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the time delay (t1) begins. At the end of the time delay (t1), the output is energized. When the trigger is removed, the output contacts remain energized for the time delay (t2). At the end of the time delay (t2), the output is de-energized & the time delay relay is ready to accept another trigger. If the trigger is removed during time delay period (t1), the output will remain de-energized and time delay (t1) will reset. If the trigger is removed during time delay period (t2), the output will remain energized and the time delay (t2) will reset.	
<b>SINGLE SHOT FALLING EDGE</b> <b>H</b>	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the output remains de-energized. Upon removal of the trigger, the output is energized and the time delay (t) begins. At the end of the time delay (t), the output is de-energized unless the trigger is removed and re-applied prior to time out (before time delay (t) elapses). Continuous cycling of the trigger at a rate faster than the time delay (t) will cause the output to remain energized indefinitely.	
<b>WATCHDOG Retriggerable Single Shot</b> <b>J</b>	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the output is energized and the time delay (t) begins. At the end of the time delay (t), the output is de-energized unless the trigger is removed and re-applied prior to time out (before time delay (t) elapses). Continuous cycling of the trigger at a rate faster than the time delay (t) will cause the output to remain energized indefinitely.	
<b>TRIGGERED ON DELAY</b> <b>K</b>	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the time delay (t) begins. At the end of the time delay (t), the output is energized and remains in that condition as long as either the trigger is applied or the input voltage remains. If the trigger is removed during the time delay (t), the output remains de-energized & the time delay (t) is reset.	

# TIME DELAY RELAYS

## DEFINITION OF TIMING FUNCTIONS

Function/Code	Operation	Timing Chart
<b>REPEAT CYCLE (OFF 1st)</b> <b>L</b>	Upon application of input voltage, the time delay (t1) begins. At the end of the time delay (t1), the output is energized and remains in that condition for the time delay (t2). At the end of this time delay, the output is de-energized and the sequence repeats until input voltage is removed.	
<b>REPEAT CYCLE (ON 1st)</b> <b>M</b>	Upon application of input voltage, the output is energized and the time delay (t1) begins. At the end of the time delay (t1), the output is de-energized and remains in that condition for the time delay (t2). At the end of this time delay, the output is energized and the sequence repeats until input voltage is removed.	
<b>DELAYED INTERVAL Single Cycle</b> <b>N</b>	Upon application of input voltage, the time delay (t1) begins. At the end of the time delay (t1), the output is energized and remains in that condition for the time delay (t2). At the end of this time delay (t2), the output is de-energized. Input voltage must be removed to reset the time delay relay.	
<b>TRIGGERED DELAYED INTERVAL</b> <b>P</b>	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the time delay (t1) begins. At the end of the time delay (t1), the output is energized and remains in that condition for the time delay (t2). At the end of the time delay (t2), the output is de-energized & the relay is ready to accept another trigger. During both time delay (t1) & time delay (t2), the trigger is ignored.	
<b>TRUE OFF DELAY</b> <b>R</b>	Upon application of input voltage, the output is energized. When the input voltage is removed, the time delay (t) begins. At the end of the time delay (t), the output is de-energized. Input voltage must be applied for a minimum of 0.5 seconds to assure proper operation. Any application of the input voltage during the time delay (t) will reset the time delay. No external trigger is required.	
<b>ON DELAY/ TRUE OFF DELAY</b> <b>S</b>	Upon application of input voltage, the time delay (t1) begins. At the end of the time delay (t1), the output is energized. When the input voltage is removed, the output remains energized for the time delay (t2). At the end of the time delay (t2), the output is de-energized. Input voltage must be applied for a minimum of 0.5 seconds to assure proper operation. Any application of the input voltage during the time delay (t2) will keep the output energized & reset the time delay (t2). No external trigger is required.	
<b>SINGLE SHOT-FLASHER</b> <b>T</b>	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the time delay (t1) begins and the output is energized for the time delay (t2). At the end of this time delay (t2), the output is de-energized and remains in that condition for the time delay (t2). At the end of the time delay (t2), the output is energized and the sequence repeats until time delay (t1) is completed. During the time delay (t1), the trigger is ignored.	
<b>ON DELAY-FLASHER</b> <b>X</b>	Upon application of input voltage, the time delay begins (t1). At the end of the time delay (t1), the output is energized and remains in that condition for the time delay (t2). At the end of this time delay (t2), the output is de-energized and remains in that condition for the time delay (t2). At the end of the time delay (t2), the output is energized and the sequence repeats until input voltage is removed.	