

# 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:

- ◆ application of input voltage (On Delay, Interval On, Flasher, Repeat Cycle & Delayed Interval)
- ◆ opening or closing of a trigger signal (Off Delay, Single Shot, Watchdog & Triggered Delayed Interval)

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

To help understand, some definitions are important:

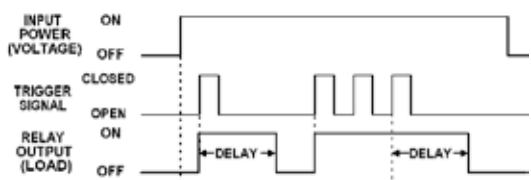
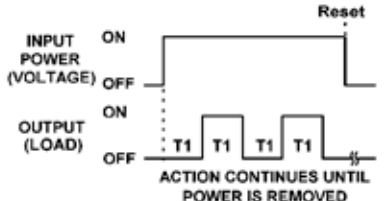
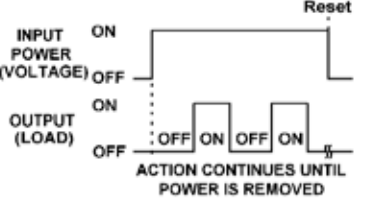
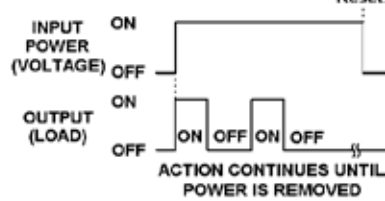
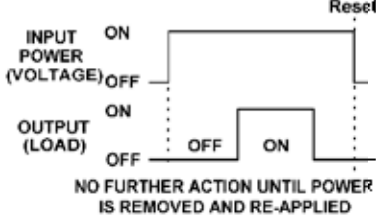
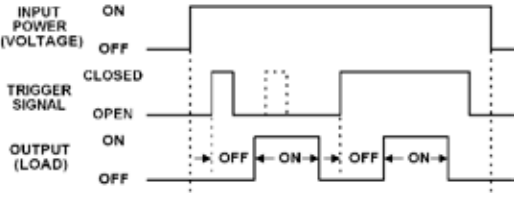
- ◆ Input Voltage - control voltage applied to the input terminals. Depending on the function, input voltage will either initiate the unit or make it ready to initiate when a trigger signal is applied.
- ◆ Trigger Signal - on certain timing functions, a trigger signal is used to initiate the unit after input voltage has been applied. As noted above, this trigger signal can either be a control switch (dry contact switch) or a power trigger (voltage).
- ◆ Output (Load) - every time delay relay has an internal relay (usually mechanical) with contacts that open & close to control the load. They are represented by the dotted lines in the wiring diagrams. Note that the user must provide the voltage to power the load being switched by the output contacts of the time delay relay.

Below and on the following page are both written and visual descriptions on how the common timing functions operate. A Timing Chart shows the relationship between Input Voltage, Trigger Signal (if present) and Output Contacts. 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	Operation	Timing Chart
<b>ON DELAY</b> Delay on Operate Delay on Make	Upon application of input voltage, the preset time begins. At the end of the preset time, the relay is energized. Input voltage must be removed and reapplied to reset the time delay & de-energize the relay.	
<b>INTERVAL ON</b> Interval	Upon application of input voltage, the relay is energized and the preset time begins. At the end of the preset time, the relay is de-energized. Input voltage must be removed and reapplied to reset the time delay.	
<b>OFF DELAY</b> Delay on Release De-Energization Delay on Drop-Out	Upon application of input voltage, the time delay relay is ready to accept trigger signals. Upon application of the trigger signal, the relay is energized. Upon release of the trigger signal, the preset time begins. At the end of the preset time, the relay is de-energized. Any application of the trigger signal during the preset time will keep the relay energized & reset the time delay.	
<b>SINGLE SHOT</b> One Shot Momentary Interval	Upon application of input voltage, the time delay relay is ready to accept trigger signals. Upon application of the trigger signal, the relay is energized and the preset time begins. During the preset time, the trigger signal is ignored. The time delay relay is reset by applying the trigger signal when the relay is not energized.	

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Function	Operation	Timing Chart
<b>WATCHDOG</b> Retriggerable Single Shot	Upon application of input voltage, the time delay relay is ready to accept trigger signals. Upon application of the trigger signal, the relay is energized and the preset time begins. At the end of the preset time, the relay is de-energized unless the trigger signal is closed and opened prior to time out (before preset time elapses). Continuous cycling of the trigger signal at a rate faster than the preset time will cause the relay to remain energized.	
<b>FLASHER</b>	Upon application of input voltage, the preset time (T1) begins. At the end of the preset time, the relay is energized and remains in that condition for the preset time (T1). At the end of this time, the relay is de-energized and the sequence repeats until input voltage is removed.	
<b>REPEAT CYCLE</b> Off/On Delay	Upon application of input voltage, a preset delay begins (OFF). At the end of the preset delay, the relay is energized and remains in that condition for a second, independently adjustable preset time (ON). At the end of this time, the relay is de-energized and the sequence repeats until input voltage is removed.	
<b>REPEAT CYCLE</b> On/Off Delay	Upon application of input voltage, the relay is energized and a preset delay begins (ON). At the end of the preset delay, the relay is de-energized and remains in that condition for a second, independently adjustable preset time (OFF). At the end of this time, the relay is energized and the sequence repeats until input voltage is removed.	
<b>DELAYED INTERVAL</b> Single Cycle	Upon application of input voltage, a preset delay begins (OFF). At the end of the preset delay, the relay is energized and remains in that condition for a second, independently adjustable preset time (ON). At the end of the second preset time, the relay is de-energized. Input voltage must be removed and reapplied to reset the time delay relay.	
<b>DELAYED INTERVAL (TRIGGERED)</b> Single Cycle	Upon application of input voltage, the time delay relay is ready to accept trigger signals. Upon application of the trigger signal, a preset delay begins (OFF). At the end of the preset delay, the relay is energized and remains in that condition for a second, independently adjustable preset time (ON). At the end of the second preset time, the relay is de-energized. During both the OFF time & the ON time, the trigger signal is ignored.	
<b>TRUE OFF DELAY</b>	Upon application of input voltage, the relay is energized. When the input voltage is removed, the preset time begins. At the end of the preset time, the relay is de-energized. Voltage must be applied for a minimum of 0.1 seconds to assure proper operation. Any application of the input voltage during the preset time will keep the relay energized & reset the time delay. No external trigger switch is required.	