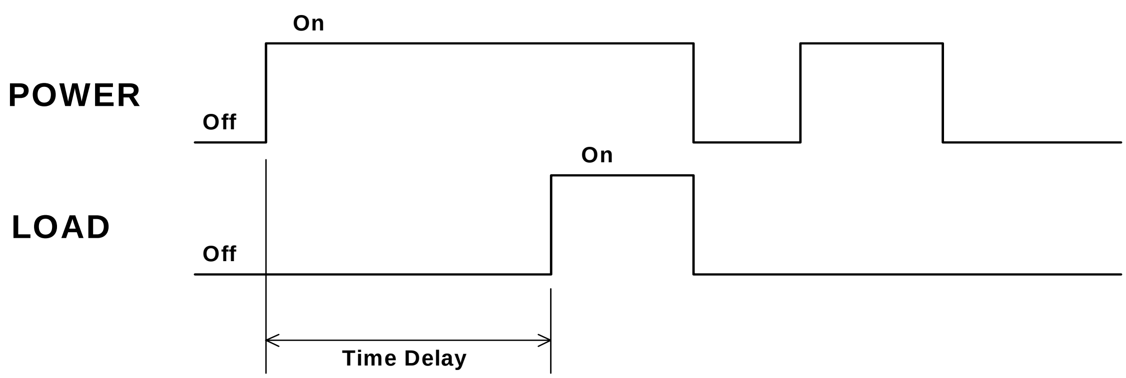
TIMER MODES AND DEFINITIONS

Delay On Make

AKA: On delay, delay on operate, delay on pickup, delay on energize.

The timing period starts upon the application of the operating voltage, control voltage, or the closure of an separate initiate switch. After the timing period expires, the load is energized. Delay-on-make models are available in both solid state and relay contact output.

Timing Diagram . . . .

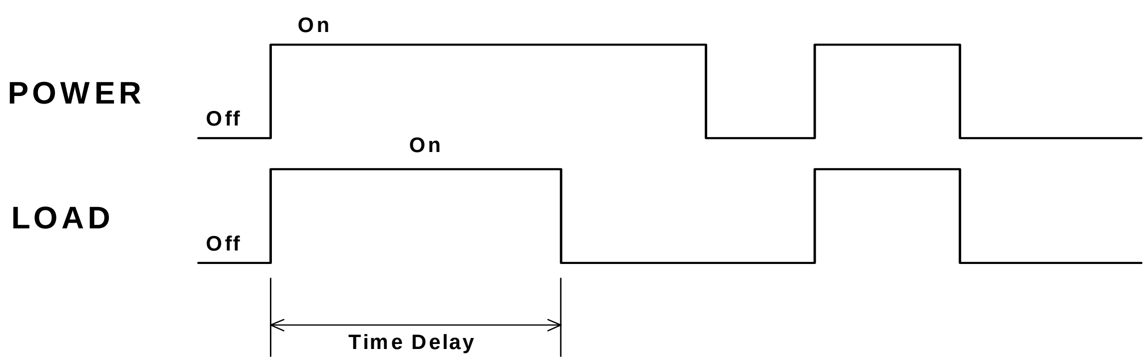


Interval

The output is energized when the operating voltage is applied, or an initiate switch is closed. The timing period (interval) also begins when the output is energized. At the end of the timing period (interval) the output de-energizes, even though the operating voltage or the initiate switch is still active.

Characteristic of an interval mode is that the operating voltage must be applied longer than the interval timing period, or the initiate switch, if required by model, must be closed longer than the timing period.

Timing Diagram . . . .



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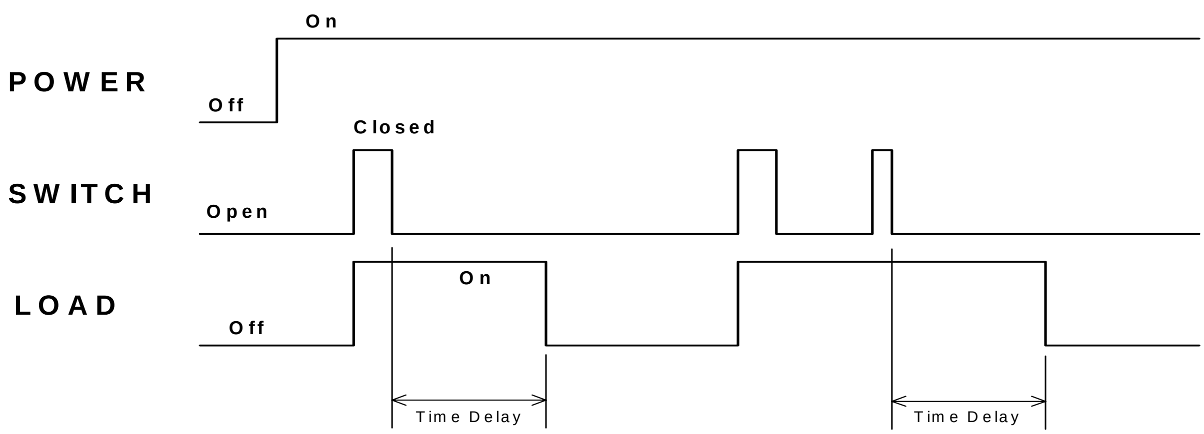
TIMER MODES AND DEFINITIONS

Delay On Break

AKA: delay-off, delay-on-release, and delay-on-dropout.

This mode of operation indicates that the output energizes first and remains energized until after the timing period which does not begin until the loss of the operating voltage, control voltage, or the opening of an separate initiate switch. After the timing period expires, the output is de-energized. This mode of operation requires power during the timing period. Delay-on-Break models are available in both solid state and relay contact output.

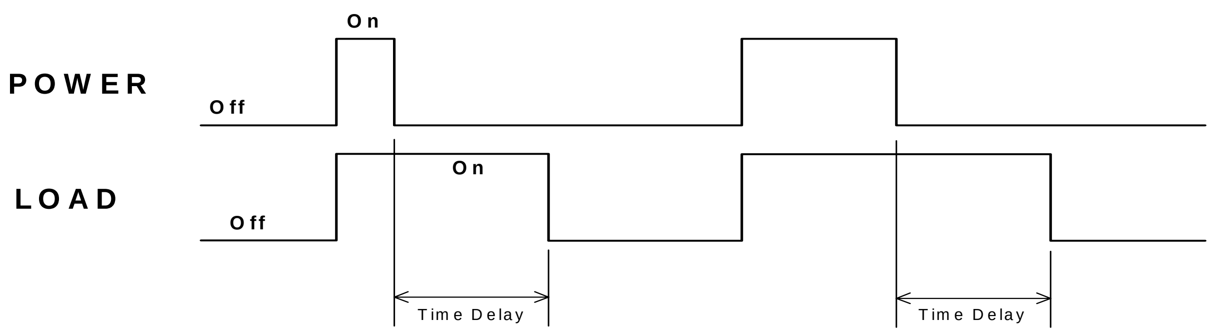
Timing Diagram ....



TRUE Delay On Break

This mode of operation is identical to the delay-on-break operation above, but the major difference is that this mode of operation power during the timing period. True Delay-on-Break models are available only in relay contact output.

Timing Diagram ....



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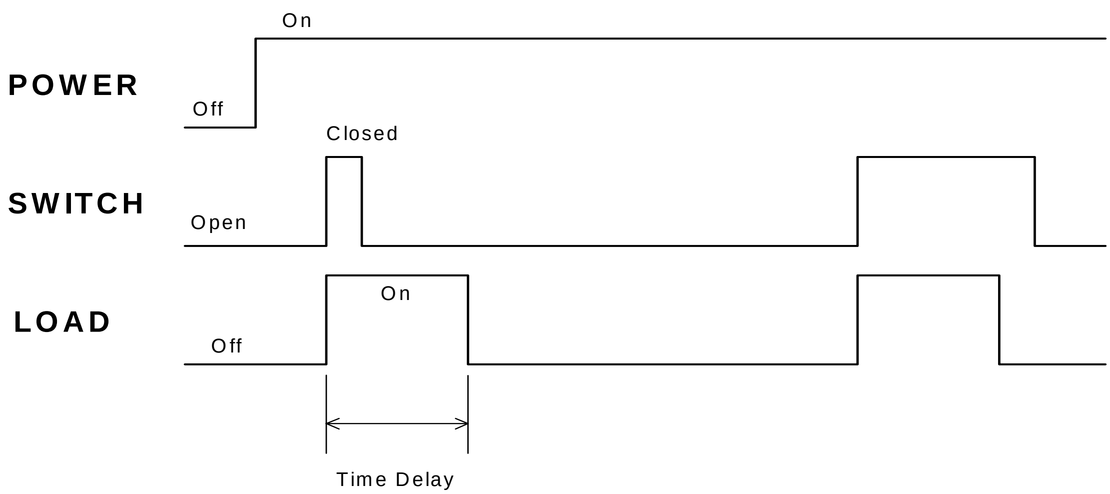
TIMER MODES AND DEFINITIONS

Single Shot

AKA: pulse stretcher.

Similar to interval, but where the interval had to have the operating voltage, or the initiate switch closed longer than the timing interval, the single-shot requires only a momentary closure of an initiate switch to energize the output and start the timing cycle.

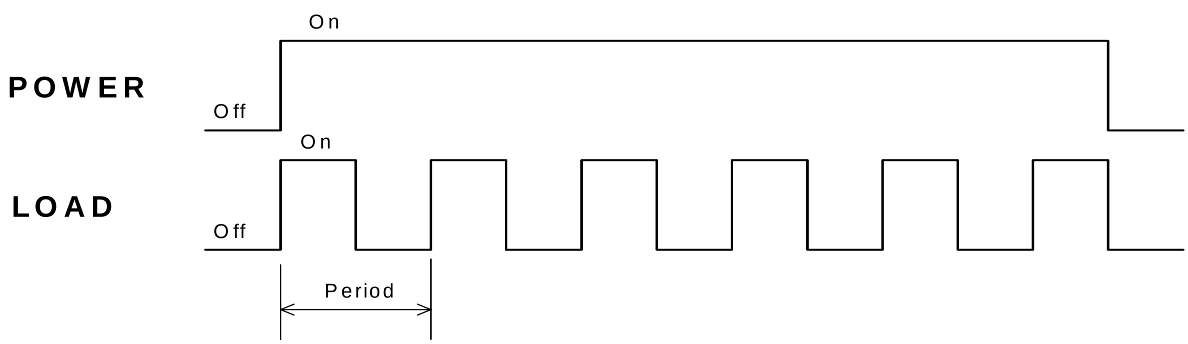
Timing Diagram . . . .



Flasher

A flasher cycles the output on and off continuously until power is removed. The on and off times are always equal (50% duty cycle), and the timing is specified in flashes per minutes.

Timing Diagram . . . .



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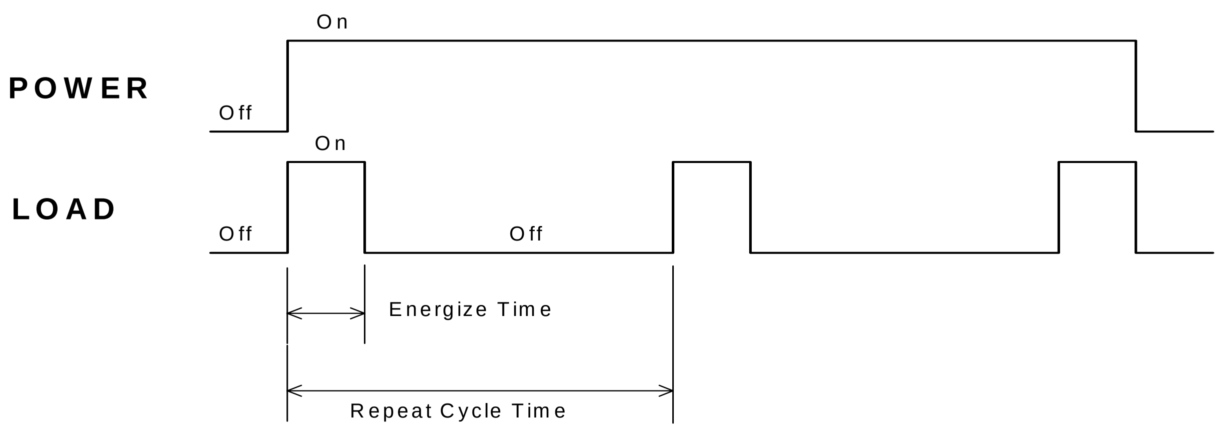
TIMER MODES AND DEFINITIONS

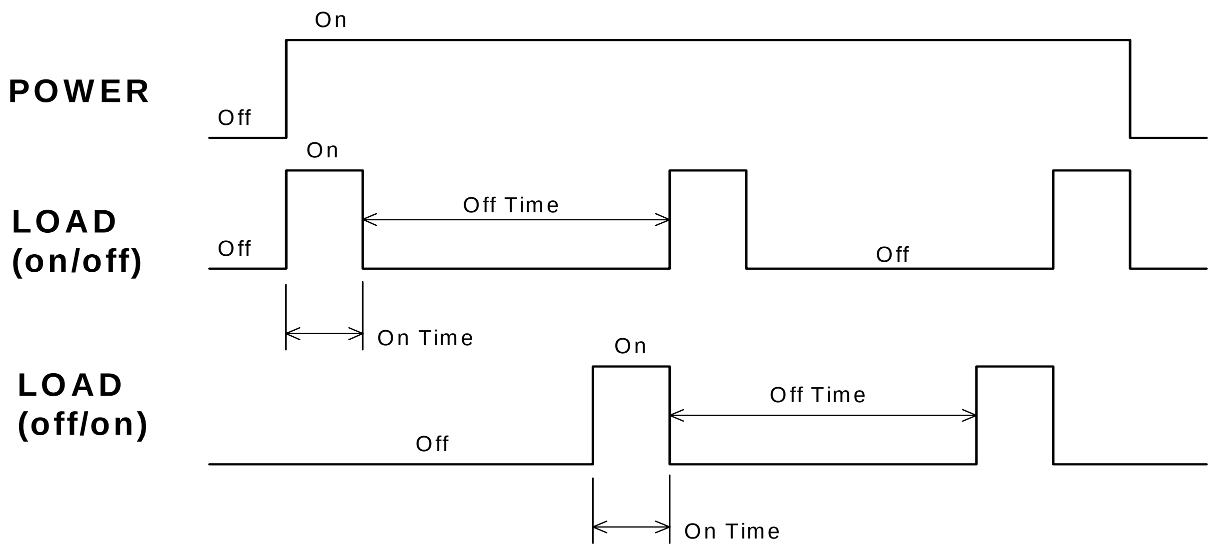
Repeat Cycle & On/Off

Repeat cycle and on/off timers are similar to flashers except that the on and off times can be different. These timers turn the load on and off continually until power is removed. The difference between an RCT and On/Off timer is the method of adjusting the time. With a repeat cycle timer you can adjust the energize time (on) and the repeat cycle time (on + off), so changing the on time does not change the overall cycle time. With an on/off timer you adjust the on time and the off time, and changing either one changes the overall cycle time.

Repeat Cycle Timing Diagram ....



On/Off Timing Diagram ....



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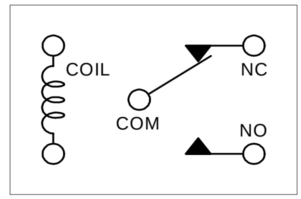
TIMER MODES AND DEFINITIONS

Outputs

Relay

A relay is an electrically controlled switch, just like the switch on your wall which turns your lights on and off. When you flip a switch, you push the lever up or down, and this lever connects or disconnects metal contacts inside the switch, thus connecting or disconnecting the power to the lamp.

A relay works the same way, except instead of your finger moving the lever up or down a coil of wire does the work. When power is connected to the coil, it acts as a magnet pulling the metal contacts. A diagram of a relay is to the right showing the coil and the contacts. COM stands for the 'common' contact, NC stands for 'normally closed', and NO means 'normally open'. The relay is shown with no power connected to the coil, the common is touching the NC contact. When the coil is powered the COM is pulled away from the NC contact and touches the NO contact.



Large relays used to control motors, large amounts of lights, or other heavy loads are also called contactors or motor starters.

Solid State

Solid state refers to a more modern way of switching loads on and off. The invention of the transistor allowed devices to be controlled without any moving parts, thus the term 'solid state'. These parts are small molded pieces of metal and plastic that switched larger electrical currents and are controlled by smaller signals, just like a relay switches larger currents by turning the coil on and off.

Comparison

Even with solid state being a more modern load switching method, both are used extensively as they each have advantages over the other depending on the application. Below are the advantages and disadvantages of these two methods

	RELAY		SOLID STATE	
High Current	✓	Can switch higher currents without needing to be cooled		Needs heatsinks and possibly fans to stay cool
High Temperature		Generally operate to 85°C (about 185°F)	✓	Generally operate to 125°C (257°F) to 150°C (300°F)
Shock & Vibration		Can cause contacts to separate or bounce causing problems	✓	Basically immune
High Voltage	No Difference under 1000V			
Inrush Current		Can cause contact welding, reduces operational life	✓	Can withstand inrush better than relays, best option
Voltage Transients	✓	Basically immune		Must add transient suppression to protect SS outputs
Switching life		100,000 to 500,000 cycles	✓	> 25,000,000 cycles
Leakage Current	✓	None		Protection circuits can leak current (<3mA), AC only
Voltage Drop	✓	None		Up to 4V dependant on current level and AC/DC type of output

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