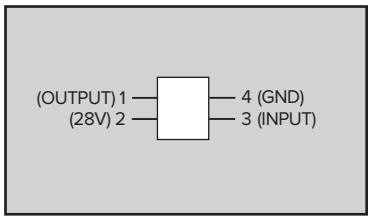
# TIME DELAY

## PRODUCT DESCRIPTION




The TIME DELAY from Applied Avionics is a 4-pin device which can output a delayed Ground or Open signal initiated after a specified input trigger event. The changed output signal will persist until the trigger condition is reversed. The input trigger event can be a change of state on the INPUT line or a unit power-up. This device is part of our NEXSYS® Component Technology products and is configurable inside of a VIVISUN® switch/annunciator or a NEXSYS Module.

The TIME DELAY is designed, tested and qualified to applicable military standards. The TIME DELAY also meets the environmental requirements of DO-160.

There are two primary types of TIME DELAYs:

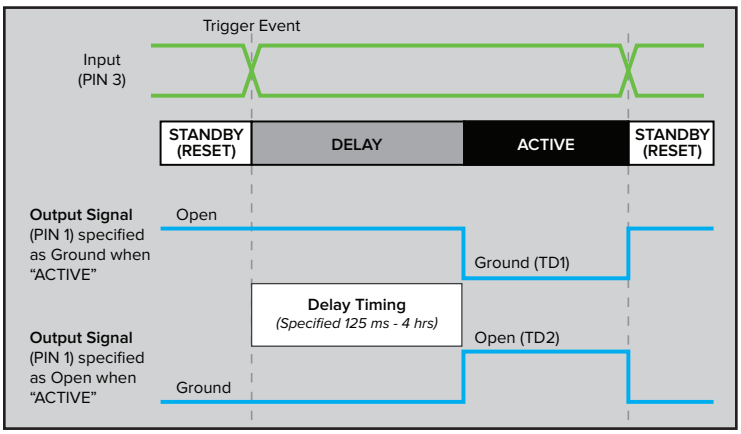
- **Time Delay on Trigger:** Delay timer starts after a level change of the INPUT line. Typical applications can be for "battery-saver" when a delayed power-off condition or delayed activation of a control is desired. *See Application Example 1: Delayed Control Activation (Battery Saver)*
- **Time Delay on Power-Up:** Delay timer starts upon power-up. Typical applications include using the timer to stagger various system start-ups to avoid spikes that occur when multiple systems are energized simultaneously. *See Application Example 2: Staggered Power-up*

For each TIME DELAY, the output signal (PIN 1) can be specified as either Ground or Open when the unit is "ACTIVE." The TIME DELAY requires constant power (+28 VDC) on PIN 2 and Ground on PIN 4 for proper operation. If power is removed from PIN 2, the output signal (PIN 1) will be Open.

There is a wide range of timing options available in: milliseconds 125*, 250*, 500; seconds: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 30, 45; minutes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 30, 45; or hours 1, 2, 3, 4. *These delay timings are not available with the Time Delay on Power-up.

## FUNCTIONALITY

For **Time Delay on Trigger**, there are three operating states of the TIME DELAY.




- **"STANDBY" (RESET)** – Unit is powered, input (PIN 3) is at the standby level. Output (PIN 1) is the opposite polarity to the specified output when unit is "ACTIVE." The timer is held RESET at 0 until the STANDBY is released.
- **"DELAY"** – Unit has received an input trigger event starting the time delay. During "DELAY" the Output (PIN 1) remains the same as "STANDBY." The trigger event to change the state from STANDBY to DELAY is when INPUT changes from the STANDBY level to the DELAY/ACTIVE level. There are four unique specifiable operating states for the INPUT line (See table below). Also, the DELAY state will be automatically triggered on power up if the Input (PIN 3) is at the DELAY/ACTIVE level. The output will return immediately to the STANDBY condition and the timer will be reset to 0 whenever the INPUT is at the STANDBY level.

| Operating State for INPUT (PIN 3) Level | | |
|---|---|---|
| CODE | STANDBY (RESET) | DELAY/ACTIVE |
| W | +28 VDC or Open | Ground |
| P | +28 VDC<br>Must be same power source as PIN 2 | Ground or Open |
| D | Ground or Open | +28 VDC<br>Must be same power source as PIN 2 |
| G | Ground | +28 VDC or Open |

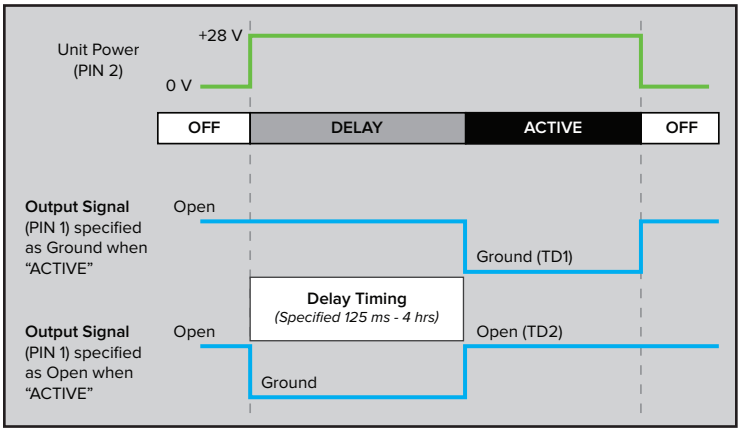
- **"ACTIVE"** – Output (PIN 1) is the specified output signal (Ground or Open) once time delay has been completed.

| Operating State for OUTPUT (PIN 1) | | |
|---|---|---|
| CODE | STANDBY (RESET)/DELAY | ACTIVE |
| TD1 | Open | Ground |
| TD2 | Ground | Open |

Continued

## FUNCTIONALITY (CONT'D)

**Time Delay on Power-Up**, there are two operating states of the TIME DELAY. INPUT (PIN 3) is not used (operating state code X).




- **"DELAY"** – Powering up the unit (+28V applied to PIN 2) acts as the trigger and delay timer starts running. Output (PIN 1) during "DELAY" is the opposite polarity to the specified output when unit is "ACTIVE." PIN 1 will transition to "ACTIVE" state when time delay is completed. If power is cycled when unit is in "DELAY," the timer will restart. If desired "ACTIVE" state is Open, Output will become Ground at power-up; if desired "ACTIVE" state is Ground, Output will remain Open (non-powered state) at power-up.
- **"ACTIVE"** – Output (PIN 1) is the specified output signal (Ground or Open) once time delay has been completed.

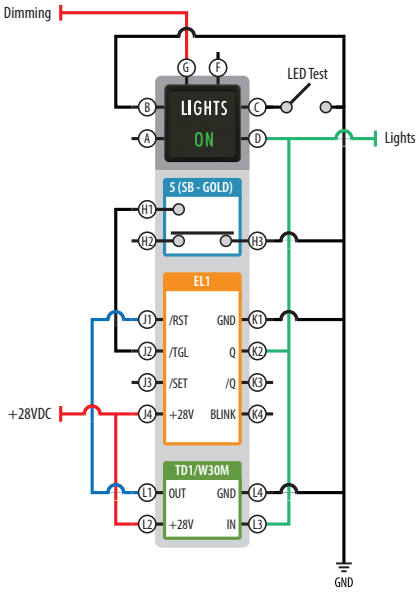
## PARAMETRIC TABLE

| Description | Parameters |
|---|---|
| Operating Parameters | |
| Operating Voltage (Max./Nom./ Min.) | +32 VDC /+28 VDC/+18 VDC |
| Power Supply Input Current | 4 mA maximum |
| Reset From Power Loss | 5 second minimum @ +25°C |
| Hold Up On Power Loss | 200 ms minimum |
| INPUT<br>Input Timing<br>Low Level Input Current ($I_{IL}$)<br>Low Level Input Voltage ($V_{IL}$)<br>High Level Input Voltage ($V_{IH}$) | <br>10 ms maximum<br>1 mA maximum<br>< +1.5 VDC<br>> +8 VDC |
| Low Level Output Voltage @ 1A ($V_{OL}$) | +0.4 VDC typical, +0.6 VDC maximum |
| High Level Output Voltage ($V_{OH}$) | Open Drain<br>+32 VDC maximum pull-up allowed |
| Output Load Capacity | |
| Resistive / Inductive / Incandescent | 0.5 A maximum / 0.5 A maximum |
| Temperature | |
| Operating | -55°C to +85°C |
| Non-operating | -55°C to +125°C |
| Reliability<br>MIL-HDBK-217F, Notice 2 | |
| Airborne Inhabited Cargo (AIC)<br>at +40°C Continuous Operation | MTBF = 321,986 Hrs. |

## APPLICATION EXAMPLES

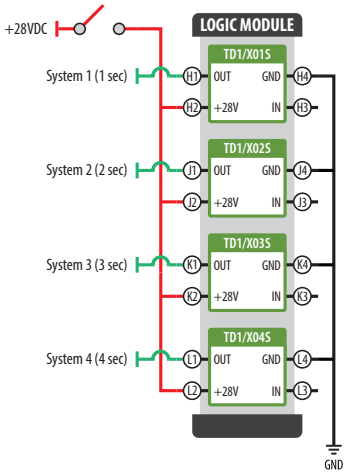
### Ex. 1: Delayed Control Activation (Battery Saver)

The following schematic demonstrates functionality that is commonly used in lighting applications (i.e. Cabin, Baggage, Boarding, Galley, etc.) or other systems requiring a normal ON/OFF operation with a dropout function after a specified amount of time expires. Likewise, the momentary ground from the switch activates an electronic latch EL1 component, allowing the VIVISUN push-button cap to always remain in the "out" position. Once the specified time expires, the Time Delay provides a ground to the / RST Input of the EL1 which automatically drops out the lighting system relay and Time Delay.




### Ex. 2: Staggered Power-up

The following schematic demonstrates how multiple Time Delay components can be combined and integrated inside of a NEXSYS Module to provide a sequenced power-up circuit. As depicted, all four Time Delay components are wired in parallel yet each component provides an output after the specified time has expired. This feature provides an aircraft-buffered, multi-phase power-up circuit which may be useful in diagnostic boot up modes or applications in which buffered electronic stability control is essential.





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