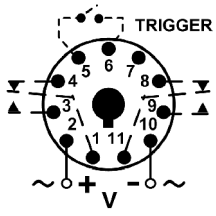
# TIME DELAY RELAYS

## TD-7 SERIES *TIME RANGER*™ DIGITAL-SET PROGRAMMABLE MULTI-RANGE PLUG-IN

The TD-781 Series offers an easy and accurate way to select a function & any time delay between 50ms & 999 hours. Programming is accomplished by using a pushbutton thumbwheel to select one of seven built-in time ranges and three pushbutton thumbwheels to digitally set the time delay required. This method provides a greater setting accuracy than is found on other units with an analog potentiometer. These units have a fifth pushbutton thumbwheel to select one of ten built-in functions. An LED indicates timing mode and time out condition.

See Page 70 for selected single-function versions.

**Multi-Function Product**

| FUNCTION ■ | INPUT VOLTAGE | PRODUCT NUMBER | WIRING/ SOCKETS |
|---|---|---|---|
| **MULTI-FUNCTION**<br>(10 Functions in One Unit)<br>◆ On Delay<br>◆ Interval On<br>◆ Off Delay *<br>◆ Single Shot *<br>◆ Flasher (OFF 1st)<br>◆ Flasher (ON 1st)<br>◆ On/Off Delay *<br>◆ Single Shot Falling Edge *<br>◆ Watchdog *<br>◆ Triggered On Delay * | 120V AC/DC<br>12V AC/DC<br>24V AC/DC<br>240V AC | TD-78122<br>TD-78126<br>TD-78128<br>TD-78121 | 11 PIN OCTAL<br>**70170-D**<br>  <br>**DIAGRAM 121** |



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

* These are the only functions requiring use of the Control Switch shown in Wiring Diagrams above.

**Application Data & Dimensions**–Page 71
**Sockets & Accessories**–Pages 80 & 81

- ◆ Ten user-selectable modes in one unit
- ◆ Pushbutton Thumbwheels for digital set of time delay & function
- ◆ 50ms - 999 hour programmable time range
- ◆ Uses industry-standard 11 pin octal socket
- ◆ 10A DPDT output contacts
- ◆ LED indicates timing mode and time out conditions
- ◆ cULus CSA CE

UL LISTED with appropriate socket

MACROMATIC
**800-238-7474**
**www.macromatic.com**
**sales@macromatic.com**

## APPLICATION DATA

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

**Load (Burden):**
3 VA

**Setting Accuracy:**
±1% of set time or ±50ms, whichever is greater.

**Repeat Accuracy** (constant voltage and temperature)**:**
±0.1% of set time or ±0.02 seconds, whichever is greater.

**Reset Time:**
On Delay/Interval/Flasher: 0.1 Seconds
Functions with Control Switches: 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 149°F)
240V Input Voltage: -28° to 50°C (-18° to 122°F)

**Insulation Voltage:**
2,000 volts

**Output Contacts:**
DPDT 10A @ 240V AC/30V DC,
1/2HP @ 120/240V AC (N.O.), 1/3HP @ 120/240V AC (N.C.)
B300 & R300; AC15 & DC13

**Life:**
Mechanical: 10,000,000 operations
Full Load: 100,000 operations

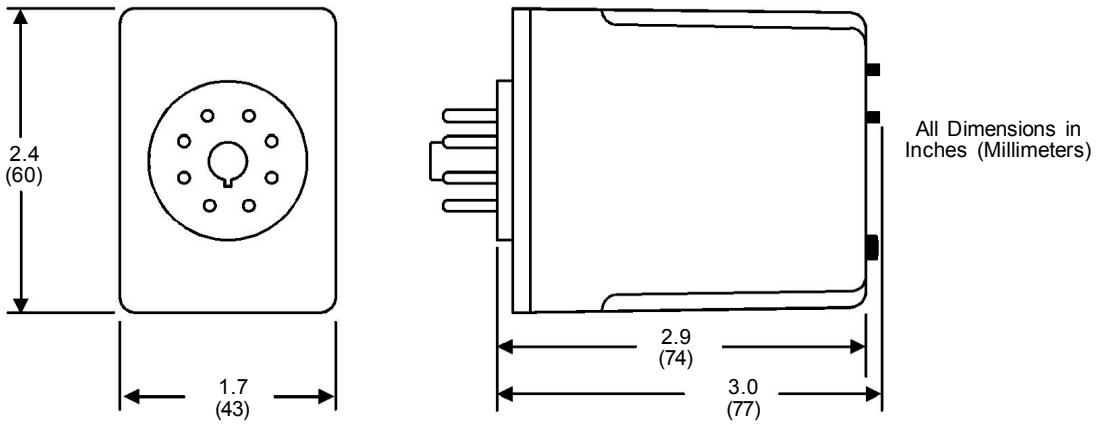
**Compatibility:**
Using a solid state switch to initiate the time sequence is acceptable. See ***www.macromatic.com/leakage*** or contact Macromatic for information regarding leakage current limits and other solid state design considerations.

**Initiating Units with Control Switch Triggers:**
Timing sequence must be initiated only after input voltage is applied to unit. Minimum required trigger switch closure time is 0.1 seconds.

**LED:**
Red LED. Refer to instruction sheet provided with product to determine code for relay & timing status.

**Approvals:**
File #E109466 File #LR45565 Low Voltage & EMC Directives EN60947-1, EN60947-5-1 LISTED IND. CONT. EQUIP. 80U7 with appropriate socket File #E109466

## 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:

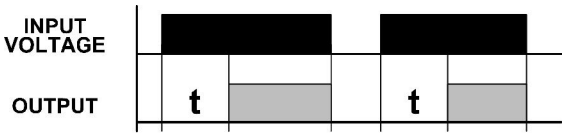
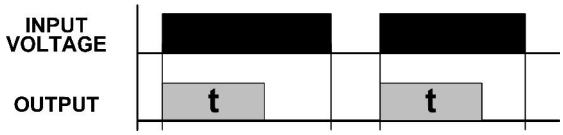
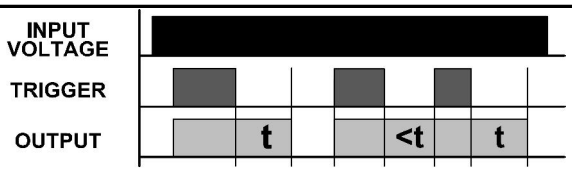
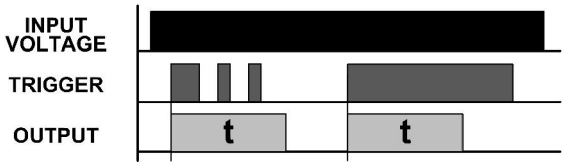
- application of input voltage
- application of a trigger

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:

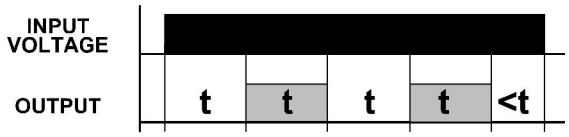
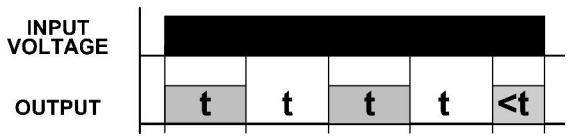
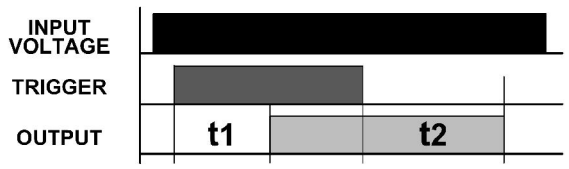
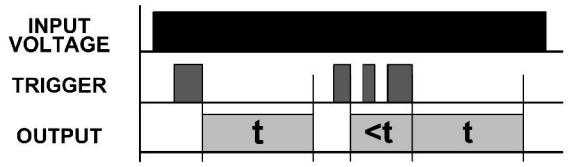
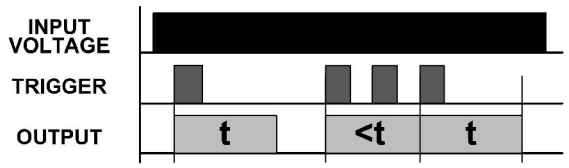
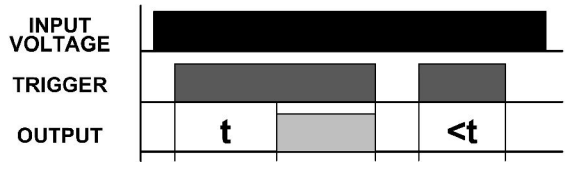
- Input Voltage - control voltage applied to the input terminals. Depending on the function, input voltage will either initiate the unit or make it ready to initiate when a trigger is applied.
- Trigger- on certain timing functions, a trigger is used to initiate the unit after input voltage has been 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.

| Function/Code | Operation | Timing Chart |
|---|---|---|
| **ON DELAY**<br>Delay on Operate<br>Delay on Make<br>**A** | 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.. |  |
| **INTERVAL ON**<br>Interval<br>**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. |  |
| **OFF DELAY**<br>Delay on Release<br>Delay on Break<br>Delay on De-Energization<br>**C** | 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. |  |
| **SINGLE SHOT**<br>One Shot<br>Momentary Interval<br>**D** | 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. |  |

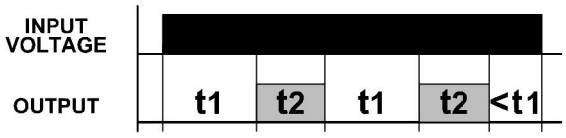
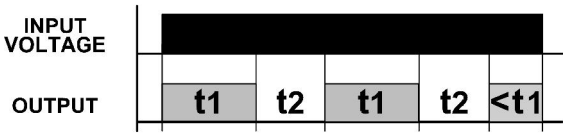
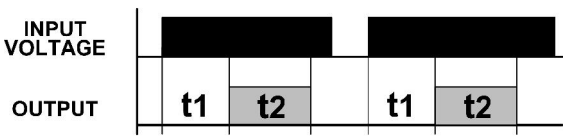
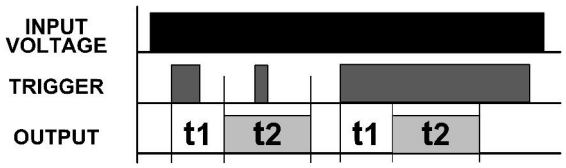
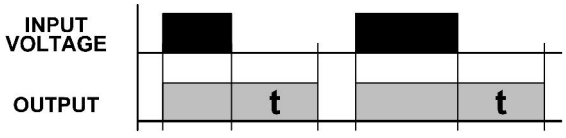
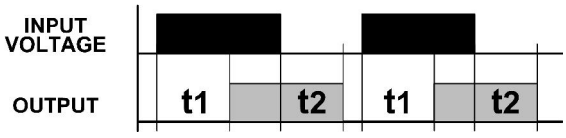
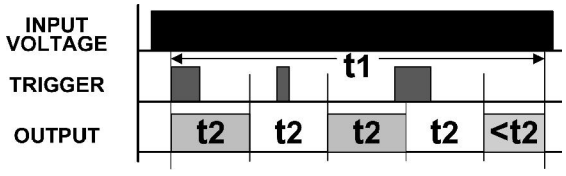
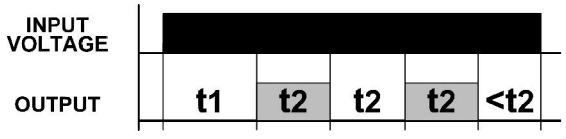
# TIME DELAY RELAYS

## Definition of Timing Functions

| Function/Code | Operation | Timing Chart |
|---|---|---|
| **FLASHER** (Off First) **E** | 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. |  |
| **FLASHER** (ON First) **F** | 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. |  |
| **ON/OFF DELAY** **G** | 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. |  |
| **SINGLE SHOT FALLING EDGE** **H** | 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. |  |
| **WATCHDOG Retriggerable Single Shot** **J** | 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. |  |
| **TRIGGERED ON DELAY** **K** | 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 |
|---|---|---|
| **REPEAT CYCLE (OFF 1st)** **L** | 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. |  |
| **REPEAT CYCLE (ON 1st)** **M** | 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. |  |
| **DELAYED INTERVAL Single Cycle** **N** | 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. |  |
| **TRIGGERED DELAYED INTERVAL** **P** | 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. |  |
| **TRUE OFF DELAY** **R** | 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. |  |
| **ON DELAY/ TRUE OFF DELAY** **S** | 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. |  |
| **SINGLE SHOT-FLASHER** **T** | 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. |  |
| **ON DELAY-FLASHER** **X** | 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. |  |