TIME DELAY RELAYS
TD-8 Series DIP-Switch Digital-Set Plug-in
Multi-Function Programmable

The TD-881 Series offers the digital-set accuracy of DIP-switch setting as well as the flexible programmability of a multi-function & multi-time range relay. These products provide an easy & accurate method to select any of 16 time delay functions and any time delay between 100ms and 1,023 hours (31 hours maximum for Dual Mode functions). Programming is accomplished through the use of two 10-position DIP-switches. This product can literally replace hundreds of different catalog numbers, thereby reducing inventory requirements.
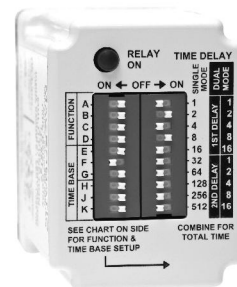
See Page 68 for instructions on how to program functions & time delay.

MULTI-FUNCTION ■
(16 Functions in One Unit)

Single Mode
◆ On Delay
◆ Interval On
◆ Flasher (OFF 1st)
◆ Flasher (ON 1st)
◆ Off Delay *
◆ Single Shot *
◆ Watchdog *
◆ Single Shot (Trailing Edge) *
◆ Triggered On Delay *

Dual Mode
◆ Repeat Cycle (OFF 1st)
◆ Repeat Cycle (ON 1st)
◆ Delayed Interval
◆ Triggered Delayed Interval *
◆ On/Off Delay *
◆ Single Shot-Flasher *
◆ On Delay/Flasher

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

◆ Sixteen user-selectable modes in one unit

◆ DIP-Switches for accurate digital set of time delay & selection of function

◆ 100ms - 1,023 hours programmable time delay (Single Mode functions only)

◆ Uses industry-standard 11 pin octal socket

with appropriate socket

OUTPUT	INPUT VOLTAGE	PRODUCT NUMBER	WIRING/ SOCKETS
11 Pin DPDT	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TD-88122 TD-88126 TD-88128 TD-88121	11 PIN OCTAL **70170-D** DIAGRAM 121
8 Pin SPDT	120V AC/DC 12V AC/DC 24V AC/DC 240V AC	TD-88162 TD-88166 TD-88168 TD-88161	8 PIN OCTAL **70169-D** DIAGRAM 169

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

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Application Data & Dimensions–Page 68
Sockets & Accessories–Pages 80 & 81

8/11

TIME DELAY RELAYS
TD-8 SERIES DIP-SWITCH DIGITAL-SET PLUG-IN
APPLICATION DATA & DIMENSIONS FOR MULTI- & SINGLE-FUNCTION PRODUCTS

PROGRAMMING FUNCTION & TIME DELAY
(TD-881 Series Multi-Function Only)

Programming is accomplished through the use of two 10-position DIP-switches (see drawings at right). Switches A-D of the left-mounted DIP-switch are used to select a function (see the descriptions of how each function operates on Pages 77-79 as a guide). Switches E-K of the same DIP-switch are used to select the time base. A convenient chart is on the side of the relay to clearly illustrate how to set both the function & time base.

The right-mounted 10-position DIP-switch is used to select the time delay within the time base selected with switches E-K from the first DIP-switch. Each position on the second DIP-switch is marked with a binary time increment. The required delay is selected by moving the switch of each increment to the ON position & adding their corresponding values (see diagram above). Note that dual mode products can either have the same or different ON & OFF times. For more information, see **www.macromatic.com/onoff**.

Top Image
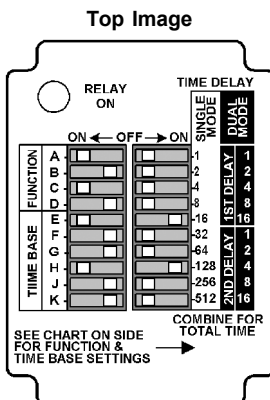
Side Nameplate

SELECT FUNCTION				
FUNCTION	A	B	C	D
ON DELAY	OFF	OFF	OFF	OFF
INTERVAL ON	ON	OFF	OFF	OFF
OFF DELAY	OFF	ON	OFF	OFF
TR. ON DELAY	ON	ON	OFF	OFF
FLASHER (ON)	OFF	OFF	ON	OFF
FLASHER (OFF)	ON	OFF	ON	OFF
WATCHDOG	OFF	ON	ON	OFF
ONE SHOT T. EDGE	ON	ON	ON	OFF
SINGLE SHOT	OFF	OFF	OFF	ON
CYCLE (ON)	ON	OFF	OFF	ON
CYCLE (OFF)	OFF	ON	OFF	ON
DELAYED INTERVAL	ON	ON	OFF	ON
ON/OFF DELAY	OFF	OFF	ON	ON
TR. DELAYED INT.	ON	OFF	ON	ON
ONE SHOT-FLASHER	OFF	ON	ON	ON
ON DELAY/FLASHER	ON	ON	ON	ON

(Left margin: SINGLE MODE / DUAL MODE)

SELECT TIME BASE — SINGLE MODE (1ST DELAY):

BASE	E	F	G
0.1 S	ON	OFF	OFF
1S	OFF	ON	OFF
0.1M	OFF	OFF	ON
1M	ON	ON	OFF
0.1H	ON	OFF	ON
1H	OFF	ON	ON

SELECT TIME BASE — DUAL MODE (2ND DELAY):

BASE	H	J	K
0.1 S	ON	OFF	OFF
1S	OFF	ON	OFF
0.1M	OFF	OFF	ON
1M	ON	ON	OFF
0.1H	ON	OFF	ON
1H	OFF	ON	ON

NOTE: SWITCHES H, J & K ARE ONLY USED ON DUAL RANGE PRODUCTS

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:
±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:
All Functions Triggered by a Control Switch: 0.04 Seconds
All Other Functions: 0.1 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

Insulation Voltage: 2,000 volts

Temperature: -28º to 65ºC (-18º to 149ºF)

Output Contacts:
DPDT 10A @ 240V AC/30V DC,
1/2HP @ 120/240V AC (N.O.), 1/3HP @ 120V 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.

Control Switch Triggered Units:
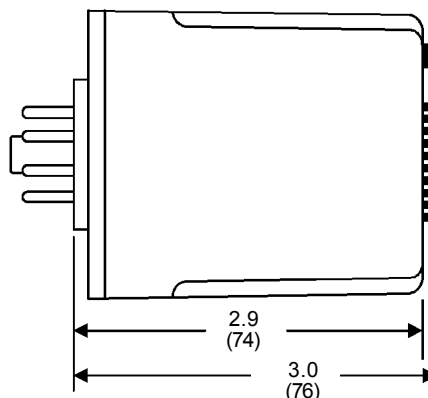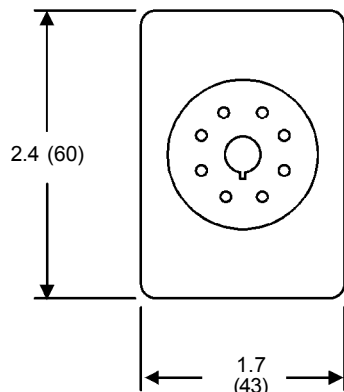Minimum required trigger switch closure time is 0.02 seconds.

Approvals:

File #E109466

UL LISTED IND. CONT. EQUIP. 50U7 with appropriate socket File #E109466

Low Voltage & EMC Directives EN60947-1, EN60947-5-1

DIMENSIONS

2.4 (60)
1.7 (43)
2.9 (74)
3.0 (76)

All Dimensions in Inches (Millimeters)

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:
◆   <u>Input Voltage</u> - 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.
◆   <u>Trigger</u>- 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).
◆   <u>Output (Load)</u> - 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 Delay on Operate Delay on Make **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 Interval **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 Delay on Release Delay on Break Delay on De-Energization **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 One Shot Momentary Interval **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.	

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.	INPUT VOLTAGE / OUTPUT: t1 · t2 · t1 · t2 · <t1
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.	INPUT VOLTAGE / OUTPUT: t1 · t2 · t1 · t2 · <t1
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.	INPUT VOLTAGE / OUTPUT: t1 · t2 · t1 · t2
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.	INPUT VOLTAGE / TRIGGER / OUTPUT: t1 · t2 · t1 · t2
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.	INPUT VOLTAGE / OUTPUT: t · t
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.	INPUT VOLTAGE / OUTPUT: t1 · t2 · t1 · t2
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.	INPUT VOLTAGE / TRIGGER / OUTPUT: t1 ; t2 · t2 · t2 · t2 · <t2
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.	INPUT VOLTAGE / OUTPUT: t1 · t2 · t2 · t2 · <t2