FEATURES

- Small size and weight
- High-reliability design
- Hermetically sealed
- High transient immunity
- Long life
- Low-power consumption
- Adjustable Time Delays
- Reverse Polarity Protection

PRINCIPLE TECHNICAL CHARACTERISTICS

Seal: Hermetic Tested per MIL-STD-883, Method 1014 Condition B, C
Finish: per MIL-T-10727
Terminals:
TDH 7061 (Tin Plate)
TDH 7060 (Gold Plate)
Weight
1x10^-8 atm, cm^3/s max leakage
Tin Plate
Solder-lug
Plug-In
3.0 Ounce max.

APPLICATION NOTE:
101
APPLICABLE SOCKET:
SO-1056-8691

DESCRIPTION

The TDH-7060/61 Time Delay Relays have been designed with thick film hybrid microelectronics timing circuits and MIL-PRF-6106 relays, packaged in a hermetically sealed military style enclosure. The TDH-7060/61 series are designed to withstand severe environmental conditions encountered in military/aerospace applications. These relays are suited for use in power control, communication circuits and many other applications where power switching and high reliability are required over a wide temperature range.

Data sheets are for initial product selection and comparison. Contact Esterline Power Systems prior to choosing a component.

Date of issue: 3/06
### Input (Control) Parameters

<table>
<thead>
<tr>
<th>Timing:</th>
<th>Operate</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Operation, Time Delay on</td>
<td>Adjustable Period</td>
</tr>
<tr>
<td>b. Method</td>
<td>0.1 to 600 Seconds [6]</td>
</tr>
<tr>
<td>c. Range</td>
<td>±10% [1]</td>
</tr>
<tr>
<td>d. Accuracy</td>
<td></td>
</tr>
</tbody>
</table>

| Recycle Time                 | 50 ms, Max [5]           |

| Operations: (X1-X2)          |                           |
| a. Input & Control Voltage   | 20-30 Vdc                 |
| b. Operating Current         | 150 mA, Max @ 25° C       |

| Transients:                  |                           |
| a. Positive, MIL-STD-704A, Figure9, Limit 1 | +80 Volts Max |
| b. Spike, MIL-STD-704A, 0-10 µs           | ±600 Volts Max |
| c. Self-Generated             | ±50 Volts Max             |
| d. Susceptibility             | +80; -600 Volts Max       |

| Electromagnetic Interference Per MIL-STD-461A | Class 1D [3] |

| Power Loss                   | 500 Microseconds [2]     |

### Output (Load) Parameters

| Contact Form                  | 4 PDT                    |
| Contact Rating:               |                          |
| a. Resistive                 | 10 Amperes               |
| b. Inductive                 | 8 Amperes                |
| c. Motor                     | 4 Amperes                |
| d. Lamp                      | 2 Amperes                |

| Dielectric Strength:          |                           |
| a. @ Sea Level, 60 Hz         | 1000 Vrms [4]             |
| b. @ 80,000 ft., 60 Hz        | 350 Vrms                  |

| Insulation Resistance @ 500 Vdc | 1000 M Ω [4] |

### GENERAL CHARACTERISTICS

| Ambient Temperatures Range:  |                           |
| a. Operating                 | -55 to +125° C            |
| b. Non-Operating             | -65 to +125° C            |

| Vibration:                   |                           |
| a. Sinusoidal, 10-3000 Hz    | 30 G                      |
| b. Random: 50-2000 Hz, MIL-STD-810 | 0.4 G²/Hz       |

| Shock @ 6 ± 1 MS, 1/2 Sine, 3 Axis | 100 G          |

| Acceleration, in any Axis     | 15 G            |

| Life at Rated Resistive Load; Minimum | 100,000 operations |

### NUMBERING SYSTEM

<table>
<thead>
<tr>
<th>Plug-in Terminal</th>
<th>Solder Hook Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDH-7060 - 1001</td>
<td>TDH-7061 - 1001</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

1. Model Number.
2. Pin Style Number.
3. Timing Range, Fixed: 100 milliseconds to 600 seconds. (See Note 6).
NOTES

[1] The accuracy specification applies for any combination of operating temperature and voltage.
[2] The accuracy will not be affected by power interruptions up to 1 millisecond, spaced at least 10 milliseconds apart. Transient and power loss specifications are based on a maximum duty cycle of 1/50.
[3] EMI test limits will not be exceeded during the timing interval or when continuously energized under steady state conditions, per paragraph 3.23, MIL-PRF-83726B.
[4] Terminals X1, X2, R1, R2 and L must be connected together during the test. Dielectric withstanding voltage and insulation resistance are measured at sea level between all mutually insulated terminals and between all terminals and case.
[5] Recycle time is defined as the maximum time power must be removed from terminal X1 to assure that a new cycle can be completed within the specified timing tolerance.
[6] A four digit number defines the time delay in seconds (or milliseconds). The first three digits are significant figures, used to define the specific time delay. The fourth digit represents the number of zeros to follow the first three digits.

**SPECIFY STANDARD DECADE RANGE**

- 1001 = 0.1 to 1 second (100 to 1000 milliseconds)
- 1002 = 1.0 to 10 seconds
- 5002 = 5 to 50 seconds
- 5003 = 50 to 500 seconds

An external resistor is used to obtain a specific time delay within the specified decade range. The formula below provides the proper resistance value to achieve the desired time delay:

\[
R_{\text{ext}} = \left(\frac{T_0}{T_1} - 1\right) \times 100,000 \text{ Ohms}
\]

Where: \(R_{\text{ext}}\) = External resistance value (Ohms)
\(T_0\) = Desired time in seconds
\(T_0\) = Minimum time (low end of the decade range) in seconds.

As an example, if using a 5 to 50 second adjustable timer and a 30 second delay is desired, the calculation is:

\[
R_{\text{ext}} = \left(\frac{5}{30} - 1\right) \times 100,000 \text{ Ohms} = 500 \text{ K Ohms}
\]

Recommended resistors IAW MIL-R-55182 1/8 Watt, 1% (RNC60HXXXXFS). External resistor not supplied.
DERATING OF CONTACTS FOR DC VOLTAGES ABOVE NOMINAL RATING

To establish a standard for the derating of relay contacts is, at best, a subjective practice. Limitations are governed by the type of relay, contact gap, maximum voltage capabilities of the relay contact system, and the contact material.

The most common method is to derate the contacts by use of the Power Formula, using the known current and voltage.

This method is valid only for Resistive Loads, and is an approximation only; keeping in mind the limitations mentioned above.

\[
\text{Power} = IE \quad (\text{Current} \times \text{Voltage})
\]

\[
I_2 E_2 = 2/3 I_1 E_1
\]

Example:
A designer is working with a 55 volt DC system and has a relay rated at 10 amps resistive at 28 volts DC. What is the maximum current that can be switched at 55 Vdc.

\[
\begin{align*}
I_1 &= 10 \text{ Amperes} \\
E_1 &= 28 \text{ VDC} \\
E_2 &= 55 \text{ VDC}
\end{align*}
\]

\[
I_2 = ? \quad (\text{Current ratings at 55 VDC Resistive})
\]

\[
\begin{align*}
I_2 E_2 &= 2 I_1 E_1/3 \\
I_2 &= 2 I_1 E_1/E_2^3 \\
&= 2 (10 \times 28)/55 \times 3 \\
&= 560/165 \\
I_2 &= 3.4 \text{ Amperes at 55VDC}
\end{align*}
\]

In addition, the user should always be concerned about the following:

1. Derating contacts that are rated for less than 10 Amperes at nominal voltage.

2. Derating contacts for use in system voltages above 130 Volts DC.
ENGINEERING DATA SHEET

SO-1056-8691

RELAY SOCKET

12 AMP

BASIC SOCKET SERIES DESIGNATION FOR:

Series KL
Series TDH-7050, TDH-7060, TDH-7070

MEETS THE REQUIREMENTS OF:

MIL-DTL-12883

GENERAL CHARACTERISTICS

1. Supplied with mounting hardware No. 16 contacts, No. 16 crimp.
2. Standard tolerances .xx ±.01; xxx ±.005
3. Weight .118 lb. max
4. Temperature range -70° C to +125° C

Data sheets are for initial product selection and comparison. Contact Esterline Power Systems prior to choosing a component.

Date of issue: 8/09