



## Standard Test Method for Determining the Contact Bounce Time of a Membrane Switch<sup>1</sup>

This standard is issued under the fixed designation F 1661; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the determination of the contact bounce time of a membrane switch.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

- 2.1 ASTM Standards:  
D 2240 Test Method for Rubber Property—Durometer Hardness<sup>2</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *contact bounce*—intermittent contact opening and contact closure that may occur after switch operation.

3.1.2 *contact bounce time (break),  $T_{CBB}$* —the time period measured from the first instant  $V_M$  is equal to the SLTV until the first instant it again falls below the SLTV after the last instant it rises above the SUTV. If  $V_M$  does not rise above SUTV during the time interval,  $T_{CBB} = 0$ , (see Fig. 1).

3.1.3 *contact bounce time (make),  $T_{CBM}$* —the time period measured from the first instant  $V_M$  is equal to the SUTV until the first instant it again rises above the SUTV after the last instant it falls below the SLTV. If  $V_M$  does not fall below SLTV during the time interval,  $T_{CBM} = 0$ , (see Fig. 2).

3.1.4 *lower transition voltage, LTV*—the voltage at which the switched logic device transitions to an “off” state.

3.1.5 *membrane switch*—a momentary switching device in which at least one contact is on, or made of, a flexible substrate.

3.1.6 *resistor, load,  $R_L$* —load resistance in series with switch under test.

3.1.7 *specified lower transition voltage, SLTV*—minimum allowable LTV.

3.1.8 *specified resistance,  $R_S$* —maximum allowable resis-

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 09.01.

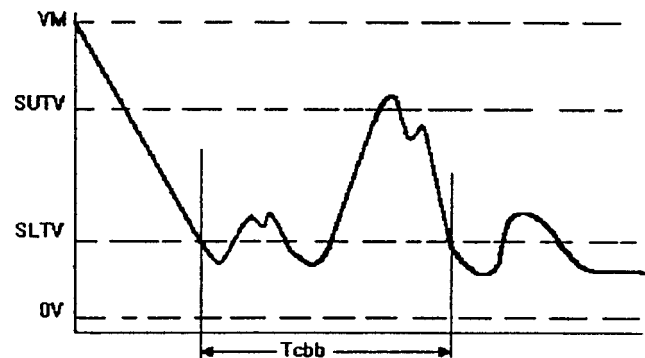


FIG. 1 Contact Bounce on Switch Break

tance measured between two terminations whose internal switch contacts, when held closed, complete a circuit.

3.1.9 *specified upper transition voltage, SUTV*—minimum allowable UTV.

3.1.10 *upper transition voltage, UTV*—the voltage at which the switched logic device transitions to an “on” state.

3.1.11 *voltage, measured,  $V_M$* —voltage measured across load Resistor ( $R_L$ ) by the oscilloscope and measured on its screen or voltage measured across the switch under test when a contact bounce measuring device is used.

### 4. Significance and Use

4.1 Contact bounce time is essential to manufacturers and users when designing interface circuitry because it specifies the time delay necessary in the decoder circuitry to avoid any false signals caused by contact bounce. Allowing for time delay makes the switch operation considerably more reliable.

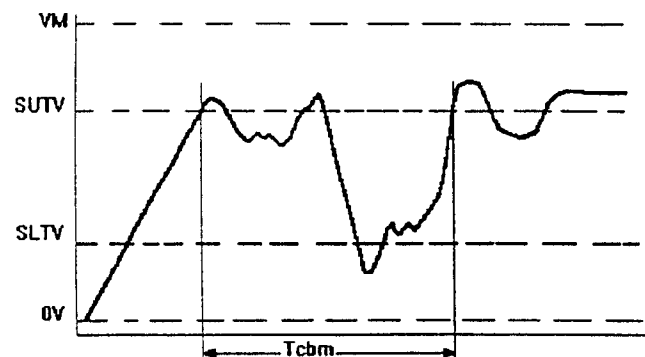


FIG. 2 Contact Bounce on Switch Make