Designation: F 1682 – 02

# Standard Test Method for Determining Travel of a Membrane Switch [1]

This standard is issued under the fixed designation F 1682; 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 (ε) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers the determination of the travel 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:* [2]

F 1570 Test Method for Determining the Tactile Ratio of a Membrane Switch

## 3. Terminology

3.1 *Definitions:*

3.1.1 *circuit resistance*—electrical resistance as measured between two test points whose internal contacts, when held closed, complete a circuit.

3.1.2 *contact closure*—the event at which a specified resistance is achieved on a membrane switch.

3.1.3 $F_{max}$(actuation force)—maximum force measured prior to or including point at which contact closure ($F_{min}$) is achieved (see Fig. 1 and Fig. 2).

3.1.4 $F_{min}$—minimum force seen between $F_{max}$ and point at which probe movement ceases. $F_{max}$ can equal $F_{min}$. $F_{min}$ is the ideal location for contact closure (see Fig. 1 and Fig. 2).

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 *non-tactile switch*—a switch assembly that provides a tactile ratio equal to zero (see Test Method F 1570).

3.1.7 *specified resistance*—maximum allowable circuit resistance as measured between two test points whose internal contacts, when held closed, complete a circuit.

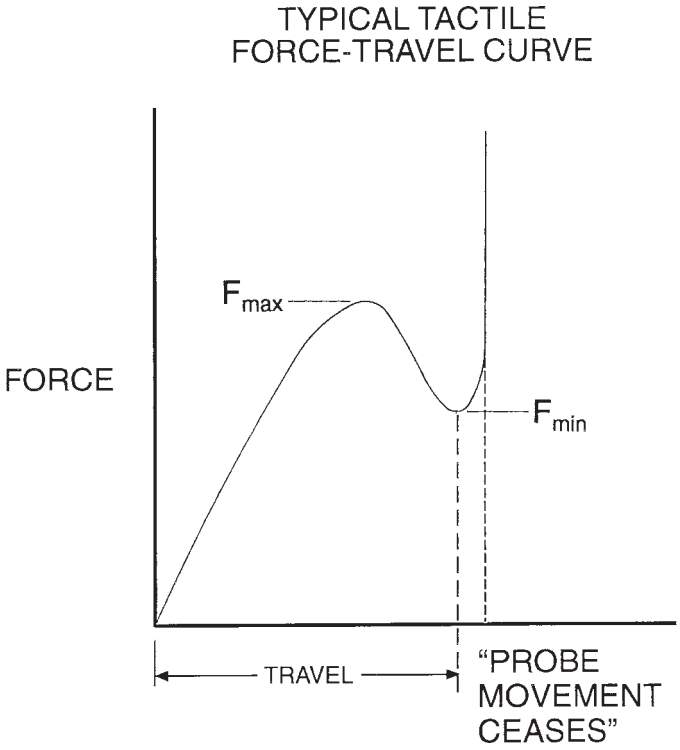


**FIG. 1 Typical Tactile Force—Travel Curve**

3.1.8 *tactile switch*—a switch assembly that provides a tactile ratio greater than zero (see Test Method F 1570).

3.1.9 *test points*—two preselected conductive points in a circuit loop, possibly including a switch.

3.1.10 *travel*—distance moved by the surface in contact with the test probe.

## 4. Significance and Use

4.1 Switch travel is one factor used to quantify the feel of a membrane switch.

## 5. Apparatus

5.1 *Test Probe*, made of nonelastic material with shape and size to be specified.

5.2 *Device*, to hold probe securely and provide perpendicular movement into and away from switch under test.

5.3 *Monitoring Device*, suitable to detect $F_{max}$ and $F_{min}$.

---

[1] This test method is under the jurisdiction of ASTM Committee F01 on Electronics and is the direct responsibility of Subcommittee F01.18 on Membrane Switches.

Current edition approved Jan. 10 2002. Published March 2002. Originally published as F 1682–96. Last previous edition F 1682–96.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

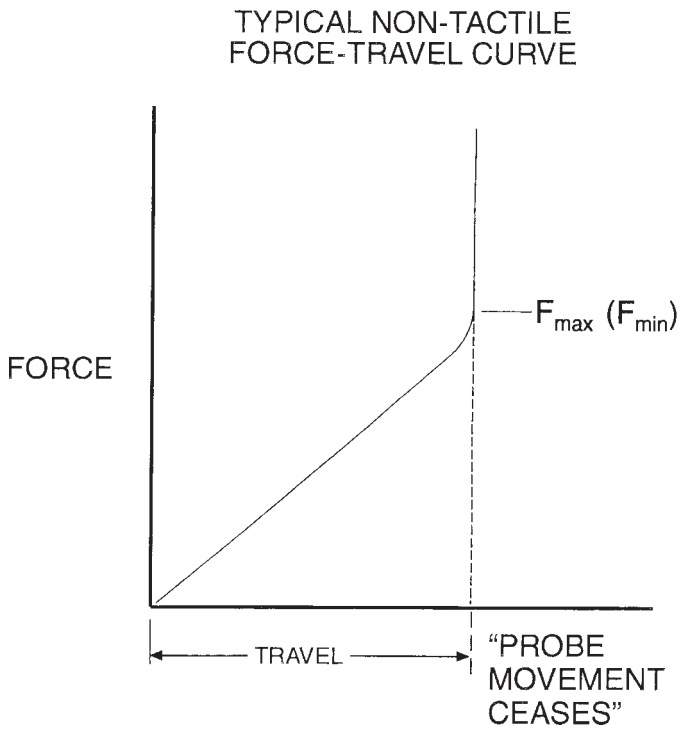


**FIG. 2 Typical Non-Tactile Force Travel Curve**

5.4 *Test Surface*, flat, smooth, unyielding and larger than switch under test.

5.5 *Suitable Monitoring Device*, to measure travel.

## 6. Procedure

6.1 *PreTest Setup*:

6.1.1 Determine if switch is "tactile" or" non-tactile". If unknown, measure in accordance with Test Method F 1570 (see Fig. 1 and Fig. 2).

6.1.2 Precondition switch by depressing manually 25 times.

6.1.3 Secure switch on test surface.

6.1.4 Position test probe over desired area of switch.

6.1.5 Attach travel monitoring device to probe.

6.1.6 Position probe until tip is just touching top surface of switch.

6.1.7 Set travel monitoring device to zero.

6.2 *In-Process Test, Tactile Switch (Tactile Ratio > 0) (see* Fig. 1*)*:

6.2.1 Begin by activating test probe movement down at a rate not to exceed 13 mm/s.

6.2.2 Continue probe movement past $F_{max}$ until reaching $F_{min}$ (see Fig. 1), record travel.

6.2.3 Reverse direction of test probe until it is no longer touching the top surface of the switch.

6.2.4 Repeat 6.2.1 thru 6.2.3 four times.

6.3 *In-Process Test, Non-Tactile Switch (Tactile Ratio = 0) (see* Fig. 2*)*:

6.3.1 Begin by activating test probe movement down at a rate not to exceed 13 mm/s.

6.3.2 Continue travel until probe movement stops ($F_{max} = F_{min}$; see Fig. 2), record travel.

6.3.3 Reverse direction of test probe until it is no longer touching the top surface of the switch.

6.3.4 Repeat 6.3.1 thru 6.3.3 four times.

## 7. Calculations

7.1 Determine the average of five readings and record as" Travel."

## 8. Report

8.1 Report the following information:

8.1.1 Temperature,

8.1.2 Relative humidity,

8.1.3 Barometric pressure,

8.1.4 Shape and size of probe,

8.1.5 Description of probe holding fixture and monitoring device,

8.1.6 Part number or description of switch, or both,

8.1.7 Date of test, and

8.1.8 Travel.

## 9. Precision and Bias

9.1 The precision and bias of this test method are under investigation.

## 10. Keywords

10.1 displacement; membrane switch; travel