Subject: Touch Panel Reliability

Overview

There have been reports from some customers that the Resistive Touch Panel on a LCD/Touch Display are failing earlier in their life than expected. After investigating several of these reports, it is apparent that the method of specification expected use are not well understood. Therefore this document is intended to explain and should be used to initiate additional customer/operator training where needed.

This information is generic to Resistive Touch technology and will affect all such displays to some point, regardless of supplier. Any examples used will be for the D22/D25 display as they are the current production models, however this information is generic to all released Resistive Touch displays, A12/D12, D15, D22, and D25. IR Touch is a completely different technology and thus this does not apply. For customers that are concerned with this issue on Resistive Touch should consider IR Touch as an alternative. This also does not apply to the older Capacitive Touch displays which has a hard glass surface.

Touch Panel

The Touch Panel consists of a thick polyester coversheet that is tightly suspended over the top of the glass, separated by small, transparent insulating dots. The coversheet has a hard, durable coating on the outer side and a conductive coating on the inner side. The act of touching the panel will depress the coversheet which allows the conductive coating on the coversheet to contact the coating on the glass which is then measurable to identify the contact location. However, the larger the force and the smaller the touch area used to activate the touch panel, the more likely that the useful life of the touch panel will be reduced.

From the Suppliers Web Site:

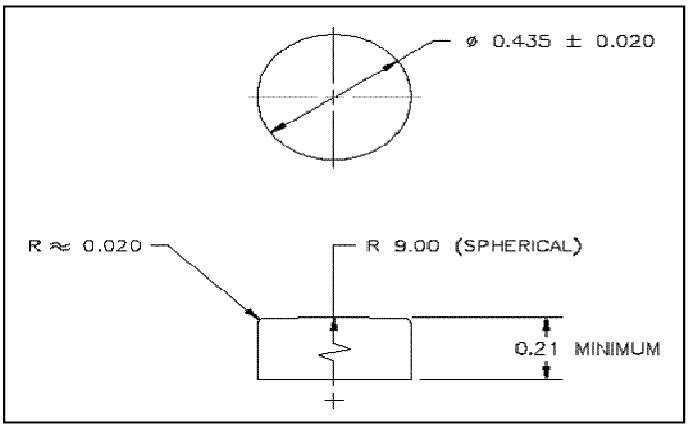
Touch Activation Force

When activated by a Standard Finger (See Below), the activating force is typically less than 4 ounces (113 grams). This means that our product typically requires ~ 113 grams to activate

If the touch screen is activated by other harder objects with different geometries the product life is likely to be reduced (example – the tip of a pen – reminder the force applied to the surface of the touch screen is inversely proportional to the square of the surface area of the object that is put in contact with the coversheet – a pen has a very small surface area – therefore it will apply a very high force).

The above referenced 'Standard Finger' is a specification of the typical or standard device used to measure function and reliability as defined below:

The standard finger is approximately the size of a pencil eraser. Exact dimensions are shown below. The standard finger is made from silicone rubber with a hardness of 50 (measured by a Shore "A" Durometer). Actuation force when "standard finger" contacts the coversheet needs to be between 10 – 12 ounces, Touch rate is ~ 2/second, 0.5 inch stroke cylinder.



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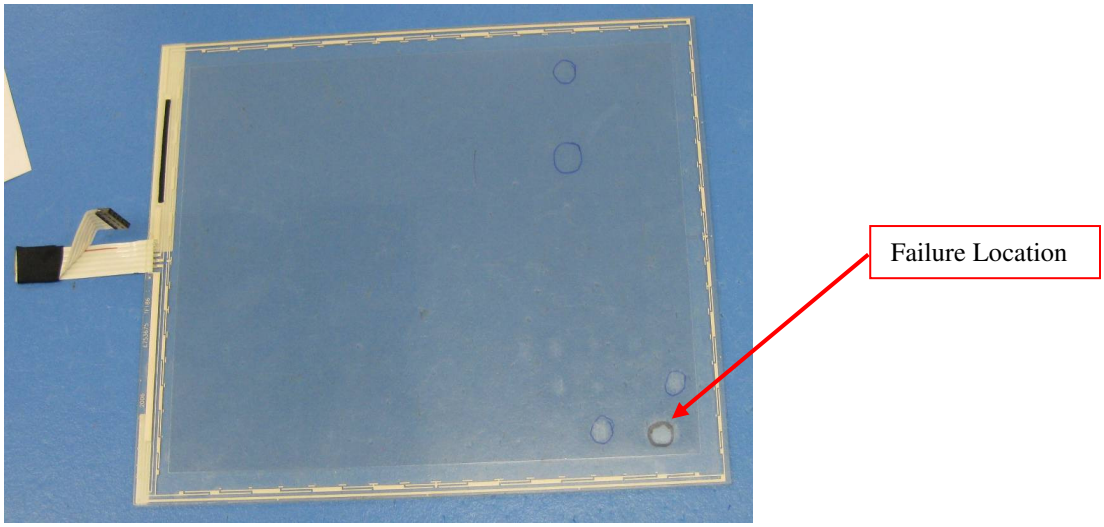
Failure Mode

The Touch Panel will typically fail in 2 ways:

- Completely stop functioning, when isolated to the panel itself, this is typically a major contact or broken connection within the panel or pig-tail connector. This failure is **NOT** the subject of this document.
- Failure of the Touch to function within a relatively small area. The remainder of the panel will continue to function, either accurately or with calibration skewed due to the faulty location. This **IS** the subject of this document.

This localized failure of the Touch Panel will typically be located at a specific point(s) on the display that correspond to an application driven virtual key on the display. These locations can usually be seen as buffed or visually warn spots on the panel (see below). This visual wear is not an issue, simply a visual queue. Many panels will show these wear spot with no issues. The illustrated panel below has a failure spot approx 1/4" in diameter located at a commonly used location for a virtual 'Enter' key on the display.



The failure to function (within the small identified area) is due to cracks in the conductive coating on the inside of the Cover Sheet layer. While there is sometimes no evidence of abuse (cuts, scratches, etc), this type of failure is typically seen when hard and typically small objects are used to contact the Touch Panel.

Root Cause

When pressing the Touch Panel with a finger, even if excess force is applied, the amount of give and physical size of the contact area do not adversely affect the panel reliability. However if other objects are used, the small size and hardness will have a dramatic affect (reduction) in the panel reliability. The small size causes the panel to flex much sharper to the shape, and the amount of pressure actually applied is much greater due to the small size. As stated above: "the force applied to the surface of the touch screen is inversely proportional to the square of the surface area of the object that is put in contact with the coversheet".

Some example objects that are often used are (though not limited to): Pen/Pencil, Fingernail, Credit Card Corner, Tooth Pick, or Key tip. As an example, a finger tip is approx 10mm in diameter while a Pen tip is approx 1mm in diameter. If the same pressure is applied, the Pen will actually exert 100 times more pressure than the finger.

Prevention

Training

Communications and training of the operators needs to be updated to include both recommended and 'do not use' methods. With this information the operators will more clearly understand the impact of using these other types of devices and the cost to their business.