

General Information

Your specific application, the operating environment in which this switch will be exposed, and the perceived usage all play a major part in the materials and construction best suited to meet your requirements. The Hall Company is most willing to offer suggestions concerning materials considered operationally correct for your applications. Please feel free to contact our customer service department should questions arise.

1. Customer Part Number

For our reference please indicate the identifying part or reference number of the component to be quoted.

2. Dimensions of Component

Identify all dimensions such as length, width, and overall assembly thickness restrictions, if any. Detailed drawings, similar to the examples herein, provide the clarity needed to produce an assembly to your exact requirements.

Tolerances

In most instances the components which make up a membrane switch assembly are cut with steel rule dies. Length and width tolerances can be held to ± 0.015 inches.

Through-holes are cut with standard $\frac{1}{4}$ " increment round punches with hole to hole tolerances of .010". Rectangular cutouts can be held to $\pm .010$ also. All through-holes and cutouts should be at least .125 from each outer edge.

3. Circuit Configuration

The Hall Company prefers to utilize a two-layer switch design rather than a fold-over construction due to potential cosmetic and functional problems which could occur with the latter. Indicate whether an XY matrix, a common bus circuit arrangement or other special

circuit design is required. (**XY matrix** — column and row interconnect, **Common Bus** — individual key traces)

4. Operating Environment

Indicate whether this switch assembly will be used indoors or outdoors, and whether it will face unusual humidity or chemical exposure conditions. With this knowledge we can recommend special materials and coatings needed to assure proper graphic and electrical stability.

5. Type of Assembly

The Hall Company can provide three types of constructions:

- A. Flexible Film Assembly with Adhesive Backing
- B. Printed Circuit Board Backed Assemblies
- C. Flexible Film Assembly with Aluminum Backing

Please refer to the sample backplate drawing herein. Be certain to identify and dimension all holes and cutouts, as well as the number of studs, standoffs, and PEM nuts required, and their lengths. State the required thickness of the panel, and whether it is to be painted, anodized, or chemically treated in any other way.

Tolerances

Registration of the backplate to the switch assembly is typically ± 0.030 inches. The switch may be registered to a reference edge or a through-cut hole, but not both. Window openings (rectangular or square cuts) in the backplate should be at least $\frac{1}{2}$ " larger on all 4 sides than the corresponding opening in the switch assembly.

6. Tail Exit Location and Length

The term "TAIL" refers to the extension of the circuit layer which carries the conductive traces to the termination point. This "TAIL" extension is not usually restricted to one exit

point on the assembly, and is left to the customer's discretion as to the specific area best suited to his requirements. It is critical for quotation purposes to know this location — and the **length** of the tail assembly, including connector.

Standard conductive ink traces are 0.060 inches wide on 0.100 inch centers. The exit position **cannot** be located within the switch array. Remember, tail length is extended an additional 0.300 inches (approximate) by the addition of a male or female crimp-on connector such as Dupont's (Berg) #65801 Clincher series.

7. Type of Switch Termination

The Hall Company is equipped to provide several types of terminations dependent upon your requirements. Both male and female crimp connectors, as well as solder tabs are available for flexible switch constructions. PC Board terminations are numerous, and should be identified by manufacturer and part number on your drawings. The Hall Company typically installs Dupont's Berg, and AMP connectors.

8. Pinouts

The Hall Company would prefer to determine the switch trace (pinout) locations. In most instances we are faced with minimal space, and are able to properly design the most feasible and cost effective configurations. If you do elect to specify the pinout, it is critical that you identify the location of Pin #1 on your drawing.

9. Shielding Requirements

ESD (Electrostatic Discharge)

EMI (Electromagnetic Interference)

RFI (Radio Frequency Interference)

Shielding methods most commonly used are:

A. Metalized Polyester

Aluminum clad polyester placed beneath the graphic layer can be grounded by extending a separate tail for this purpose, or by channeling two aluminum traces through pin locations in the connector. Another option is electrically connecting the shield tail to the backplate. (Meets all requirements.)

B. Printed Silver

By printing silver ink either in solid or grid form on the top surface of the upper switch layer, an effective barrier can be accomplished against both ESD and EMI.

C. Printed Carbon Inks

In place of silver inks, carbon inks can also be an effective shield against ESD.

If there is any question concerning the need for shielding, we highly recommend that you incorporate shielding into your design.

10. Actuation Force Requirements

The decision to create a tactile feedback or non-tactile switch assembly should be determined by the perceived end user's requirements. If, for instance, the user is wearing gloves to enter commands, or a visual or audible feedback indicates closure of the circuit, you may elect to create a non-tactile assembly. Tactile feedback may be deemed necessary where visual/audible indicators are absent, or the user is accustomed to a touch response when entering a command.

The Hall Company manufactures its own stainless steel tactile domes in three distinct sizes for varied applications.

1. .350" Circular Dimple Dome
2. .410" Triangular Dimple Dome
3. .500" Circular Dimple Dome

The .410" Triangular Dimple Dome is available in two different trip forces — 8 oz. and 12 oz. A triangular dome provides the space necessary to use an LED lamp in the corner of a key — if required.

NOTE — When a tactile stainless steel dome is utilized the snap-through and return of the dome, when depressed, does not provide a 100% reliable indication that the switch circuit has been closed. Should a break occur in the circuit path anywhere in the flexible switch or circuit board, closure may not be complete. Also, although highly infrequent, a tactile dome may be "teased" until it snaps without actually closing the switch contacts.

11. Circuit Resistance

Please identify the maximum allowable resistance this switch can withstand.

12. Graphic Overlay Materials

There are two basic types of materials available for graphic overlays:

Polycarbonate

If exposure to chemicals is not critical, we recommend the use of polycarbonate films due to their inherent resistance to scratching (due to hardness) and the availability of textured surfaces (LEXAN® — VELVET and SUEDE textures).

Polyester

This material has high chemical resistance, but is softer and more easily scratched. Polyester is not available in manufacturer

applied textured surfaces (MYLAR® — Standard clear polyester).

Selectively textured overlays can be created through screen-printing techniques at The Hall Company. This allows for certain areas to remain clear to enhance the readability of LED/LCD displays.

Samples of either material (Polycarbonate or Polyester) and selectively textured graphics can be provided for your test purposes.

13. Color Matching

Color Matching Systems such as the PANTONE MATCHING SYSTEM swatches will, over time and exposure to light, vary from book to book. If feasible, and where specific matches are critical, we recommend that you provide a specific color chip. Also, the specific lighting which affects this product in its normal operating environment should be identified. As part of the color mixing/matching process a MacBeth light booth which simulates varied lighting will be used, as well as **natural** lighting to achieve an exacting color match. When using textured materials, or screen printed textured treatments, a slight visual loss of color will occur.

14. Graphic Embossing

Embossing of the graphic layer can perform three functions:

- A. Creates a locator for each individual key by touch.
- B. Allows a tactile dome more freedom of movement.
- C. Visually enhances the appearance of the switch assembly.

Two types of embossing are available:

Perimeter Key Emboss — raising the border around each key.

Full Pillow Emboss — raising the entire key cap (recommended when using

