

# Hall Effect Keyboards

## SD16 Keyswitch Modules

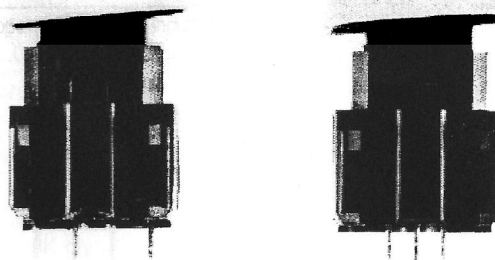
*SD Series*

### FEATURES

- Module design conserves behind panel space
- Metal plate grid mounting panel simplifies keyboard design
- High reliability and long life
- Time-proven Hall effect solid state switching
- Logic scan modules

### TYPICAL APPLICATIONS

- Keyboard building blocks for:
  - Point-of-sale
  - Personal computer
  - Word processing
  - Interactive display
  - Intelligent terminals
- Discrete pushbuttons for:
  - Control panels
  - Effort indication
  - Push-to-test signal
  - Multiplex ready signal
  - Circuit status symbol



SD modules are the answer for direct control of solid state logic (TTL, CMOS, etc.) with no special buffering or electronic circuitry required. The heart of every module is a magnetically actuated Hall effect transducer. The transducer is a combination of a Hall element, trigger circuit and amplifier integrated on a single silicon chip, approximately forty thousandth of an inch square. Operation is produced by an integral magnet mounted on the plunger.

SD modules are panel mounted. A simple metal plate grid supports the switch modules and is designed to ensure good keytop alignment between stations and rows. The holes for mounting the module must be  $.620 \pm .002$ " square before coating and precisely located to assure the module's terminals will align with the PC board. Modules should be spaced on  $3/4$ " centers.

Whether the application calls for a simple pushbutton, a control panel or a complete keyboard, SD modules will meet the requirements. SD modules accept CT keytops. For keytop information contact your nearest MICRO SWITCH sales office.

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# Hall Effect Keyboards

## SD16 Keyswitch Modules

### GENERAL FOUR-TERMINAL SD MODULE ELECTRICAL INFORMATION

The charts at right contain the general electrical data on MICRO SWITCH SD Hall effect modules.

#### Logic Scan Modules

Logic scan modules have one isolated input and one isolated output. They are designed to interface readily with logic devices for microcomputer control. The module's output signal is valid when the input interrogation signal (clock pulse) is low and the key is depressed. The input signal (at ground) will enable a logic gate; the output will reflect the normal performance of a level sinking output. When the input is at a high level, the output is inhibited by forcing the output transistor into the OFF state.

### LOGIC SCAN

Power Requirements	4.5 to 5.5 VDC
Input	Input High Voltage: 2.0VDC min. Current: .060mA max. at 2.4VDC
	Input Low Voltage: 0.8VDC max. Current: 10 $\mu$ A max. at 0.4VDC
output	Unoperated and/or input high 1.0 $\mu$ A max. leakage to ground at 10.0VDC
	Operated (input low) 0.4VDC max. while sinking 4.0mA max.
Rise and Fall Time	10 $\mu$ sec max.
Propagation Delay*	1.1 $\mu$ sec $R_L = 1.6K\ ohm\ C_L = 50pf$

### TEMPERATURE

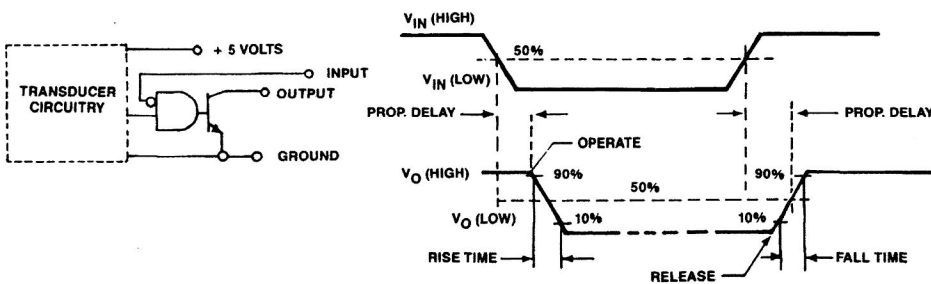
Storage	-40°F to +150°F (-40°C to +66°C)
Operating	+32°F to +125°F (0°C to +52°C)

### OPERATING CHARACTERISTICS

The function of a scan module is to provide an interface between the Hall chip (transducer) and a microprocessor or scanning encoder. An output signal is valid when the input interrogation signal (clock pulse) is low and the key is

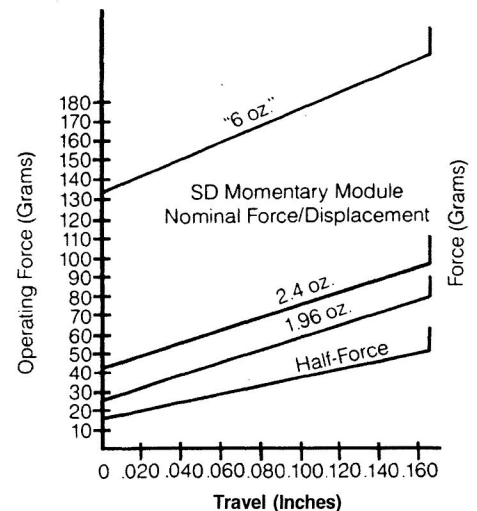
depressed. The input signal (when at ground) will enable a logic gate; the output will reflect the normal performance of a level sinking output. When the input is at a high level, the output is inhibited by forcing the output transistor into the OFF state.

#### Logic Scan Output



Handwritten note: A box containing the numbers 1, 2, 3, 4, with a +5V label to the right.

### TYPICAL FORCE DISPLACEMENT CURVES SD MODULES



## GENERAL THREE-TERMINAL SD MODULE ELECTRICAL INFORMATION

## PERFORMANCE SPECIFICATIONS

Temperature	Operating: 0° to 55°C (32° to 131°F) Storage: -40° to 60°C (-40° to 140°F)
Humidity	Up to 90% RH
Vibration (nonoperating)	10 to 59 Hz at .005 in /0.13mm displacement. 56 to 500 Hz at 5 Gs
Mechanical Shock (nonoperating)	15 Gs, 11mA duration

## ELECTRICAL DATA

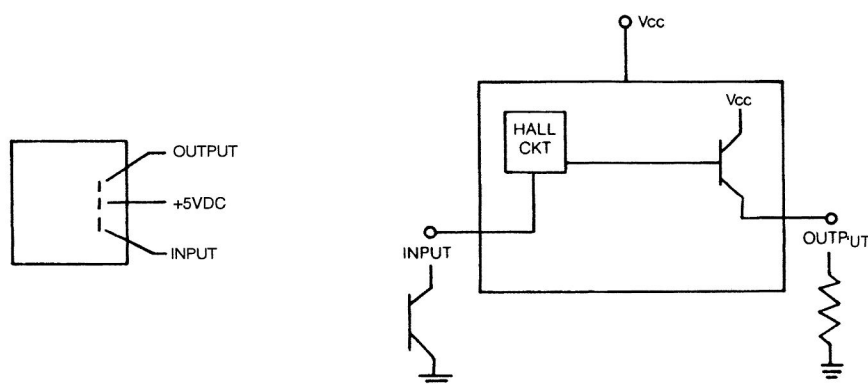
Power Requirements	+5VDC regulated $\pm 5\%$ @ 30mA typical 4.8mA max. power supply current drain with input at 0.0VDC
Input Current	-2.5mA typical, -3.8mA max. input at Logic "0" (0.6VDC max.)
Output Voltage	Logic "1" (high) 2.4VDC min; 3.7VDC typical at 5mA current sourcing
Leakage	Logic "0"; 1.0 $\mu$ A max.
Rise time	0.1 $\mu$ sec typical, 1.5 $\mu$ sec max.
Fall time	0.4 $\mu$ sec typical, 1.5 $\mu$ sec max.
Propagation Delay*	0.5 $\mu$ sec typical, 2.5 $\mu$ sec max.

\* Input change to output stable level

## THREE-TERMINAL MODULE

MICRO SWITCH three-terminal Hall effect modules can interface directly with a port expander and microcomputer to operate either in a scanned mode or in a level sourcing mode as a function switch. The function mode is similar to any level switching four-terminal SD module with the normal performance of a level sourcing signal (emitter follower). Operate point, full overtravel and release point are virtually the same as any four-terminal module.

In the scanned mode, the minus supply connection becomes the scanning input connection. When the input is high, the module is de-energized and does not consume power. When the scan input is low, the module will draw current as it normally does when energized. If the plunger is depressed when the scan input is low, the output will be high. The output will remain low if the plunger is not depressed during the scan cycle. This scanning technique significantly reduces the total power supply requirements when used in a scan matrix since the module requires power only during the period of time it is being strobed in the scan sequence.



## SD SWITCH MODULE OPERATING CHARACTERISTICS

N = Newtons (.278 x oz.)

75°F ( $\pm 24^\circ\text{C}$ ) and with 5VDC  $\pm .5$  regulated supply voltage

\*For use under multistation keytops

		Half Force*	Standard
Total Travel	mm in.	4,1 $\pm 0,51$ .160 $\pm 0,020$	4,1 $\pm 0,51$ .160 $\pm 0,020$
Force at .090"/2,3mm Travel (nom.)	N oz	0,38 1.3	0,69 2.5
Force at Full Travel	N oz	0,42 1.5	0,83 3.0
Operating Point	mm in.	1,5 to 3,0 .06 to .12	1,5 to 3,0 .06 to .12
Release Point (min.)	mm in.	110 .04	1,0 .04

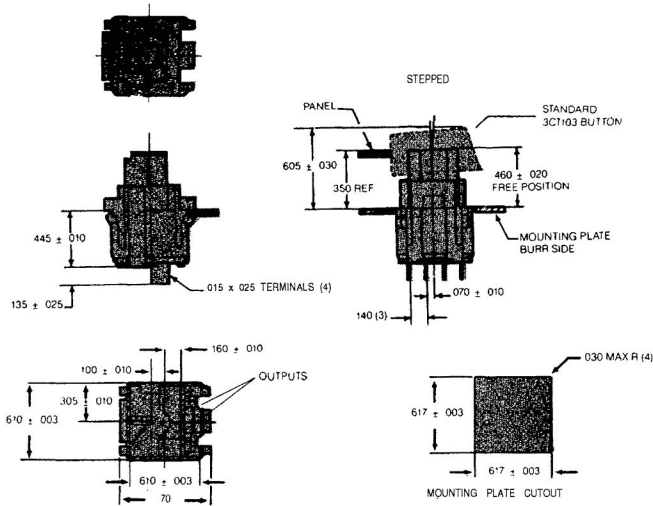
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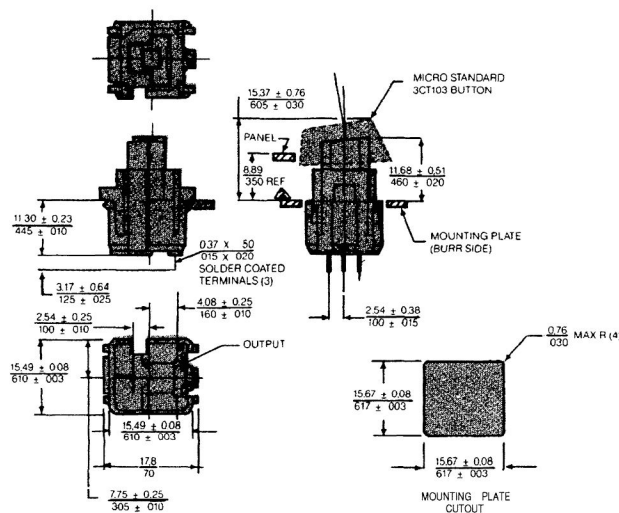
SD Series

### MOUNTING DIMENSIONS (For reference only)

#### Four-Terminal SD Module



#### Three-Terminal SD Module



### SALES AND SERVICE

MICRO SWITCH serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of nearest Authorized

Distributor, contact a nearby MICRO SWITCH sales office. Or, contact:

**MICRO SWITCH**  
Honeywell inc.  
11 W. Spring Street  
Freeport, Illinois 61032  
Tel: 800-537-6945

While we provide assistance on MICRO SWITCH products, personally and through our literature, it is up to the customer to determine the suitability of the product in the application.

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