

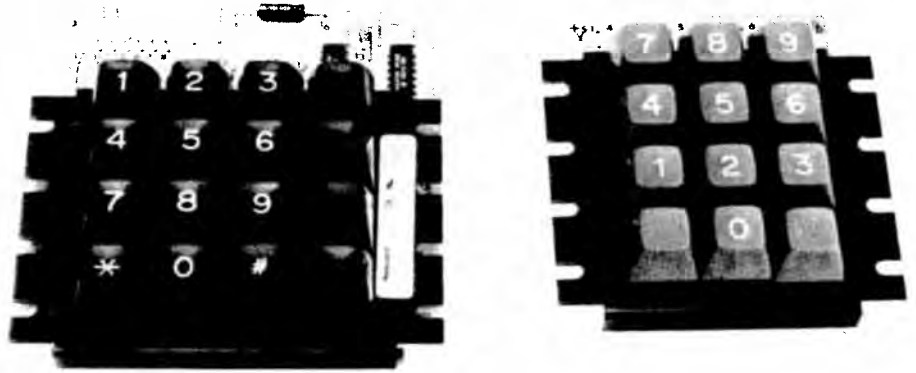
# Hall Effect Keyboards

*SD Series*

## 12SD/16SD Numeric Keyboards

### FEATURES

- Solid state Hall effect modules with current sinking level or scan output
- Bounce-free output
- Choice of keytops — LED, relegendable or double-shot molded
- Choice of output interface — solder pads, gold card edge (BCD encoded only) or 40-pin header
- N-key lockout (16SD1-1 and 16SD1-2)
- Operates on single 5 VDC supply
- Full travel (0.160 in./4.1 mm nominal)



MICRO SWITCH 12SD/16SD Series includes wired-only or BCD (Binary Coded Decimal) encoded solid state Hall effect numeric keyboards. These keyboards are especially suited to microcomputer or numerical control applications where high speed numeric entry is required.

The wired-only keyboards are available with either current sinking level or scan output modules. The level modules have two isolated outputs and provide a non-encoded signal that stays on as long as the key is depressed.

The scan modules have one isolated input and one isolated output. The module's output signal is valid when the input interrogation signal (clock pulse) is true 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.

Since the scan module is a true solid state switch with a digital output, it will interface directly with a microcomputer. There is no need for debouncing routines or diode isolation for N-key rollover as required for mechanical switches.

All modules are supported by a rigid steel mounting panel attached to a high quality printed circuit board. This ensures long, trouble-free keyboard performance.

To increase versatility, there is a choice of either solder pad, gold card edge or 40-pin header termination. In addition, double-shot molded, relegendable and LED keytops are offered. Relegendable keytops enable customizing at the job site, which is especially important for new installations.

The 16SD1-1 and 16SD1-2 are BCD encoded keyboards that feature gold card edge termination and N-key lockout. N-key lockout is valid when reading strobe on the negative-to-positive logic level transition. The strobe is produced when the first key is depressed. Any subsequent key depressed prior to release of the first key will not produce a strobe.

**MICRO SWITCH**  
a Honeywell Division

# Hall Effect Keyboards

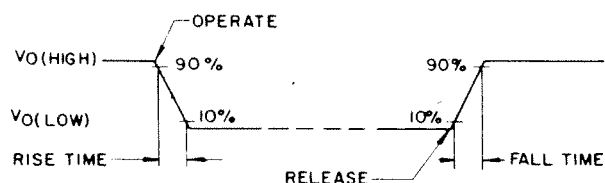
## 12SD/16SD Numeric Keyboards

### ELECTRICAL DATA

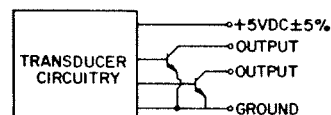
Note: The keyboard panel must be electrically tied to system chassis ground to prevent electrostatic damage and noise pickup.

<b>WIRED ONLY</b>	<b>Level Output</b>	<b>Power Requirements</b>	+5 VDC $\pm$ 5% @ 50 mA. (All LEDs On: +5 VDC $\pm$ 5% at 130 mA)
		<b>Output Capacity</b>	Unoperated: 10 $\mu$ A max. collector leakage to ground Operated: +0.4 VDC max. sinking 4 mA per output
		<b>Rise Time and Fall Time</b>	1.0 $\mu$ sec. max.
	<b>Scan Output</b>	<b>Power Requirements</b>	+5 VDC $\pm$ 5% @ 80 mA
		<b>Input Requirements</b>	Input High Voltage: 2.0 VDC min. Current: 50 $\mu$ A max. at 2.4 VDC
			Input Low Voltage: 0.8 VDC max. Current: 10 $\mu$ A max. at 0.4 VDC
		<b>Output Capacity</b>	Unoperated and/or Input High 10.0 $\mu$ A max. collector leakage to ground Operated (Input Low) 0.4 VDC max. sinking 4 mA
		<b>Rise Time and Fall Time</b>	1.0 $\mu$ sec. max.
		<b>Propagation Time</b>	1.0 $\mu$ sec. max.
		<b>ENCODED (16SD1-1 &amp; 16SD1-2)</b>	<b>Power Requirements</b>
<b>Data Key Outputs (Negative Logic)</b>	Logic "0": 2.4 VDC min. @ 0.4 mA (sourcing) Logic "1": 0.4 VDC max. @ 16 mA (sinking)		
	<b>Strobe</b>		Key Unoperated Logic "0": 0.4 VDC max. @ 16 mA (sinking)
Key Operated Logic "1": 2.4 VDC min. @ 0.4 mA (sourcing) N-key lockout when reading the leading edge of strobe			

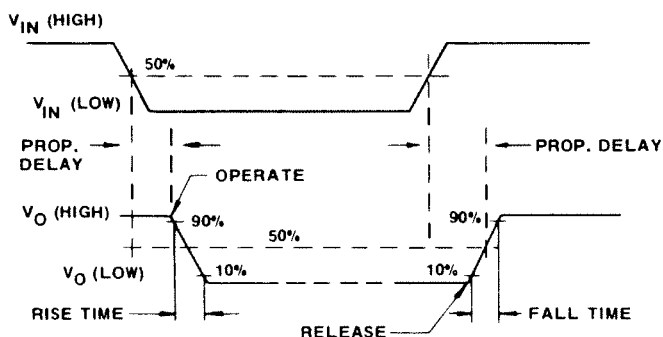
**CURRENT SINKING LEVEL CHARACTERISTICS**



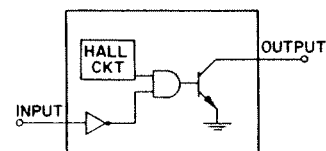
**TYPICAL LEVEL OUTPUT DIAGRAM**



**SCAN CHARACTERISTICS**



**LOGIC REPRESENTATION OF SCAN MODULE**



**OPERATING CHARACTERISTICS (All keyboards)**

Total Travel	0.160 in. (4,1 mm) nom.
Force at operating point	2.8 oz. (78 g) nom.
Pretravel	0.090 in. (2,3 mm) nom.
Release point at 5 VDC and 75°F (24°C) (With respect to free position)	0.040 in. (1,0 mm) min.

**KEYTOPS**

Listings with standard keytops use double-shot molded truncated keytops, gray (1-9) with white (1-2) legends and gray (1-9) blank, matte finish (except 16SD1-1). 16SD1-1 uses black (1-7) keytops with white (1-2) legends for stations 1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, and 15; black (1-7) keytops for stations 4, 8, 12 and 16. Other legends and keytop colors are available. Contact your nearest MICRO SWITCH sales office for details.

Relegendable keytops are gray (1-9) without legends. LED keytop indicators are red and can only be ordered for the key stations shown in the mounting dimension drawing.

**KEY SPACING**

Key spacing is 3/4-inch center-to-center, in accordance with best human factors.

**WEIGHT**

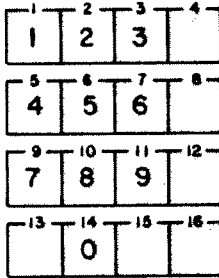
12SD Listings: 9 oz. (255 g)  
16SD Listings: 12 oz. (330 g)

# Hall Effect Keyboards

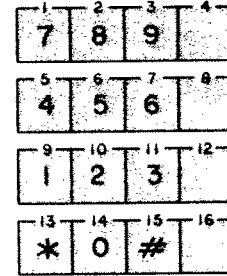
## 12SD/16SD Numeric Keyboards

### CHARACTER ASSIGNMENT

Telephone Format  
16SD1-2



Adding Machine Format  
16SD1-1



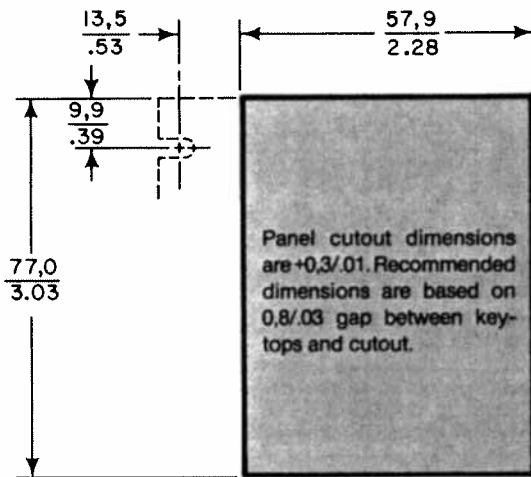
### BINARY CODED DECIMAL ASSIGNMENT

Station No.	Bits						
	7	6	5	4	3	2	1
1	0	1	1	0	0	0	1
2	0	1	1	0	0	1	0
3	0	1	1	0	0	1	1
4	0	1	1	1	1	0	0
5	0	1	1	0	1	0	0
6	0	1	1	0	1	0	1
7	0	1	1	0	1	1	0
8	0	1	1	1	1	0	1
9	0	1	1	0	1	1	1
10	0	1	1	1	0	0	0
11	0	1	1	1	0	0	1
12	0	1	1	1	1	1	0
13	0	1	1	1	0	1	0
14	0	1	1	0	0	0	0
15	0	1	1	1	0	1	1
16	0	1	1	1	1	1	1

Station No.	Bits						
	7	6	5	4	3	2	1
1	0	1	1	0	1	1	1
2	0	1	1	1	0	0	0
3	0	1	1	1	0	0	1
4	0	1	1	1	1	0	0
5	0	1	1	0	1	0	0
6	0	1	1	0	1	0	1
7	0	1	1	0	1	1	0
8	0	1	1	1	1	0	1
9	0	1	1	0	0	0	1
10	0	1	1	0	0	1	0
11	0	1	1	0	0	1	1
12	0	1	1	1	1	1	0
13	0	1	1	1	0	1	0
14	0	1	1	0	0	0	0
15	0	1	1	1	0	1	1
16	0	1	1	1	1	1	1

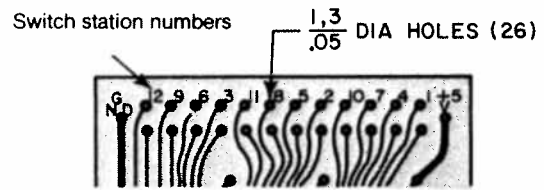
**12SD MOUNTING DIMENSIONS**

(For Reference Only)

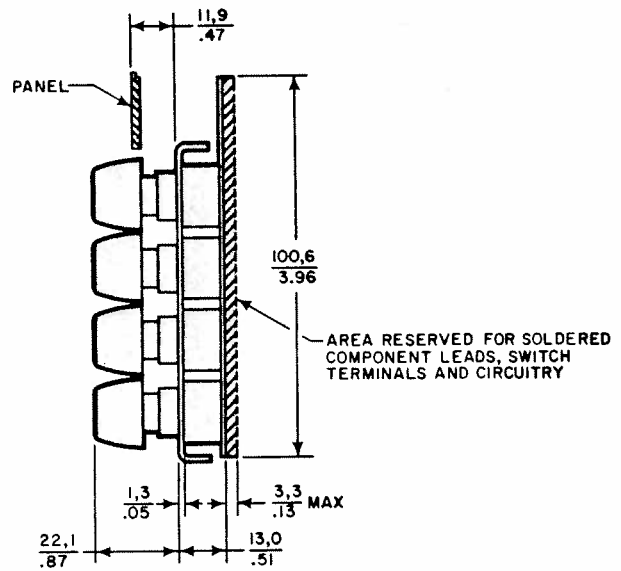
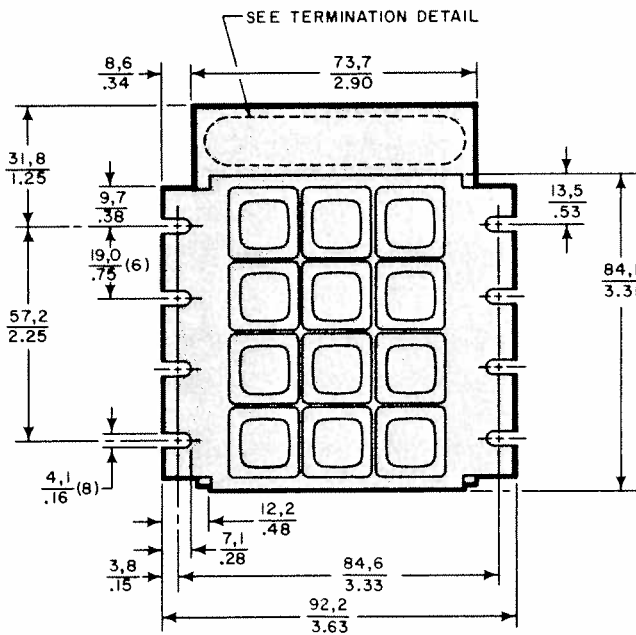


**TERMINATION DETAIL**

(Bottom Side of Board)



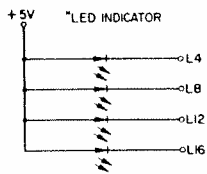
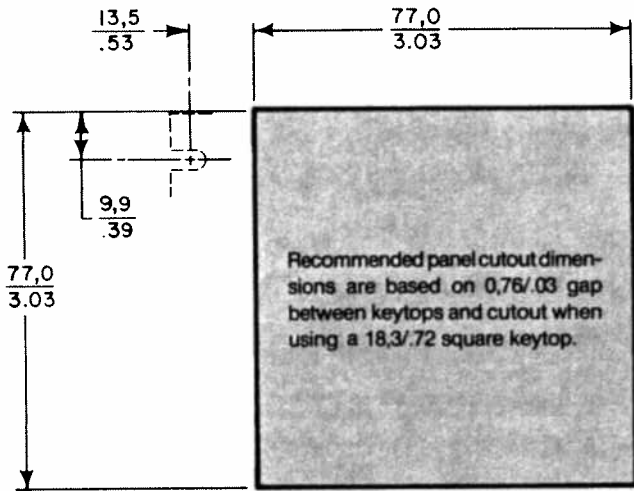
Solder pad termination provides two isolated outputs per switch.



# Hall Effect Keyboards

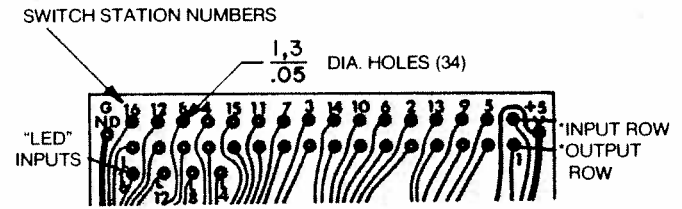
## 12SD/16SD Numeric Keyboards

### 16SD WIRED-ONLY MOUNTING DIMENSIONS (For Reference Only)



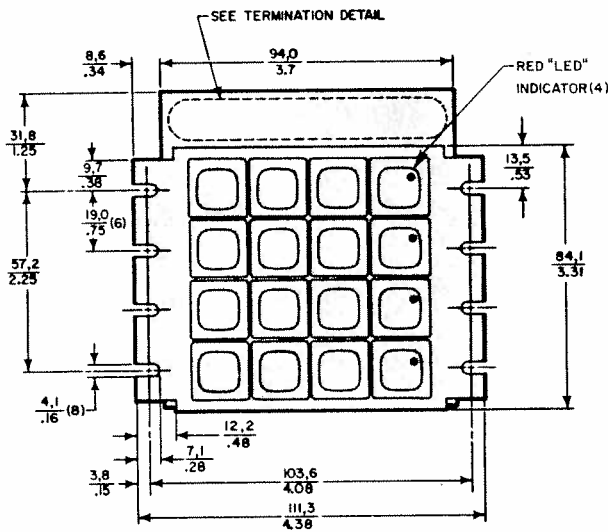
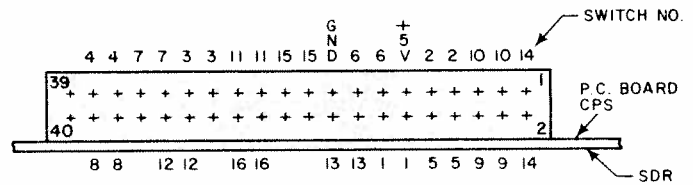
Use a current-limiting resistor of 150 ohms.

### SOLDER PAD TERMINATION DETAIL (Bottom side of board)

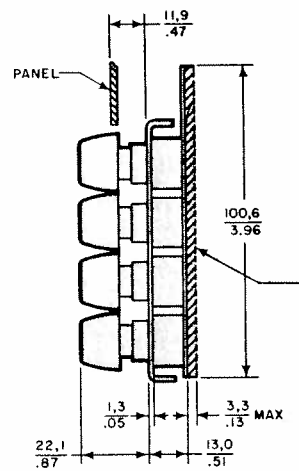


\*Solder pad termination provides one isolated input and one isolated output per switch on keyboards for scan interface. Two isolated outputs per switch provided on level keyboards.

### 40-PIN HEADER TERMINATION DETAIL 3M-3417-0000 or equivalent

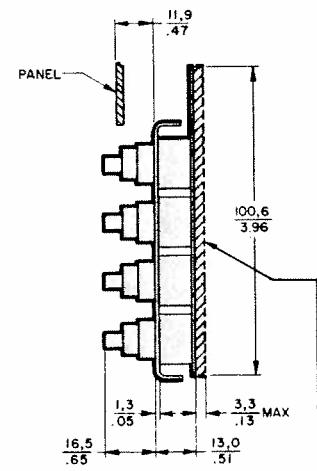


### With Keytops



Area reserved for soldered component leads, switch terminals and circuitry.

### Without Keytops



Area reserved for soldered component leads, switch terminals and circuitry.



# Hall Effect Keyboards

## 12SD/16SD Numeric Keyboards

*SD Series*

### ORDER GUIDE

Catalog Listing	Number of Keys	Output Signal (See page 2)	Keypops	Connector
12SD3-1	12	Level	Standard	Solder Pad
16SD1-1	16	Encoded (see page 4)	Standard	Gold Card Edge
16SD1-2	(Same as 16SD1-1 except telephone format)			
16SD3-4	16	Level	Standard	Solder Pad
16SD3-5	16	Level	Relegendable	Solder Pad
16SD3-6	16	Level	Standard/LED	Solder Pad
16SD3-15	(Same as 16SD3-6 except stationary LED)			
16SD3-7	16	Level	None	Solder Pad
16SD3-12	16	Level	Standard	40-Pin Header
16SD17-1	16	Scan	Relegendable	Solder Pad
16SD17-2	16	Scan	None	Solder Pad

### 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: 815/235-6600

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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*Helping you control your world*