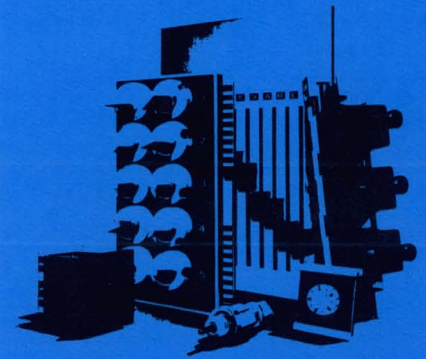


# 20

## SWITCHES & RELAYS

AMP offers an extensive line of standard and special switches for commercial and industrial electronic equipment applications. Slide, rotary, rocker, thumbwheel and keyboard types are available, each designed to deliver long switch service and performance reliability at reasonable cost.

|   |       |
|---|-------|
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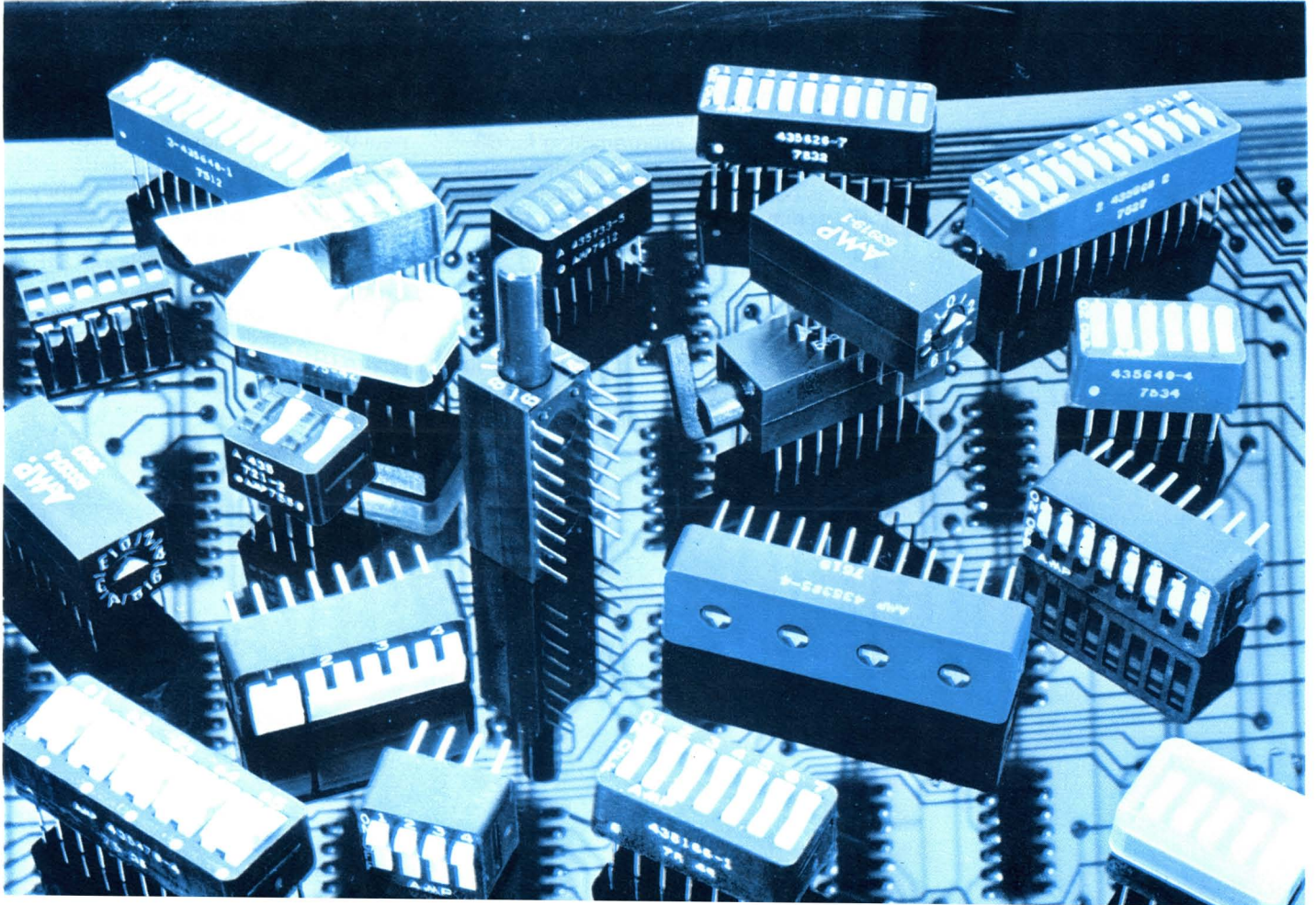






Switches

## Dual In-Line Package Switches



## Dual In-Line Package Switches

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### General Information

Today's Electronic Packaging Engineer automatically thinks .100 x .300 [2.54 x 7.62] centerline when designing his printed circuit board layout. This standardization provided the vehicle which led to the dual in-line package switch. These switches are ideally suited for a multiplicity of programming functions in such diversified applications as computers, test equipment, communications equipment, process controls, ground support and instrumentation.

When mounted to the board these unique devices present a very low profile, completely compatible with other packaging components. By direct mounting to the pc board

many advantages are realized — in performance and economy. Expensive interconnect wiring is eliminated, reducing the probability of line failure. Once inserted into the board they can be quickly and easily flow wave or dip soldered or for applications requiring quick disconnect they can be mounted to the board in a variety of AMP Dual In-Line Package Sockets. Since they mount directly to the board no mounting hardware is required. The fully enclosed design of all AMP DIP Switches when using a processing boot or tape protects the contact surfaces from dust, dirt and other environmental hazards and provides the assurance of excellent electrical and mechanical performance.



## Dual In-Line Package Switches

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 7000, 7010, 7020, 7030 and 7040 Series Dual In-Line Package Standard Switches

AMP Dual In-Line Package Switches are available in a variety of circuitry to meet your application.

These series represent the AMP standard rocker actuated, single-pole, single-throw DIP Switches. They are designed for maximum cycle life — up to 7,000 cycles per pole and feature contacts of beryllium copper with .000030 [0.00076] gold over .00005 [0.00127] nickel plating. The 7030 series has the added feature of recessed cams to prevent accidental change of rocker position and facilitate the use of AMP sealing tape for complete protection. The 7010 and 7020 series switches have the same specifications but provide for multipole

operation. The AMP Multipole Switch is a unique combination of single pole switches mechanically coupled to provide switching of various poles simultaneously. This provides flexibility in programming the switch combination to your requirement. Multipole switches are available in a variety of configurations in addition to those listed. The maximum number of poles that can be ganged is six. The 7040 series is a momentary version of the 7000 series. For all specifications refer to page 20-7.

### 7100 and 7130 Series Dual In-Line Package Economy Switches

The AMP 7100/7130 Series Dual In-Line Package Switches are recommended for programming where the number of cycles each pole will be subjected to are limited. These single-pole, single-throw switches have been designed for a life of

2,000 cycles per pole and feature contacts of copper alloy with .000030 [0.00076] nominal gold over nickel plating in the contact area. For all specifications refer to page 20-12.

### LED 7200, 7240 and 7250 Series Dual In-Line Package Switches

This line of versatile switches provides the ultimate in miniature DIP switching capability. Depending on your application many combinations of switches and LED's are available. The 7200 series has standard 7000 series switches and LED's. The 7240 series combine momentary 7040 series switches and

LED's. The 7250 series assemblies provide a compact unit of only LED's. For other combinations contact AMP Incorporated. LED Switches feature long cycle life — 7,000 cycles per pole (min.). LED's are epoxy encapsulated GaAsp or GaP Diodes (color is red). For complete specifications see page 20-14.

### 7400 Series Dual In-Line Package Double Pole, Double Throw Switches

The AMP Miniature Double Pole, Double Throw Switches, in configurations of 1 to 5 positions, are designed for high density, low profile board mount applications requiring a wide range of logic level switching operation. A small screw-

driver is all that is necessary to position the actuator. The actuator is bidirectional and continuously rotatable. For positive positioning, each setting has built-in detent action. For complete specifications see page 20-17.



## Dual In-Line Package Switches

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 7600 Series Programmable Dual In-Line Package Shunts

AMP DIP Shunts are highly reliable, low cost means of manually programming various types of electrical/electronic equipment. The shunt consists of a series of conductive straps packaged in a DIP configuration. The straps can be retained intact or cut with a hand tool to pro-

duce a closed or open circuit. DIP Shunts are available in 4 through 8 position configurations. All shunts can be supplied either unprogrammed or preprogrammed. For complete specifications see page 20-19.

### Rotary Printed Circuit Board (PCB) Switches

The AMP Rotary PCB Switches feature 4 Form "C" Switches operated by encoded cams and packaged in one DIP configuration. Three actuating methods are offered — lever, screwdriver slot or extended D shaft to suit your application.

Regardless of actuating method the cams are bidirectional and have positive detent settings. AMP Rotary PCB Switches are available in 2, 10 and 16 position configurations. For complete specifications see page 20-21.

### Accessories

For added protection against contamination and accidental rocker changes a wide range of protective covers are available for most Dual In-Line Package Switches. Covers are made of translucent nylon and permit complete readout of switch position without removing the cover. For added protection of recessed cam type switches AMP manufactures a special sealing tape. This

pressure sensitive tape is supplied in sheets with predetermined slits and tabs for ease of application. Made of transparent polyester the AMP sealing tape provides an effective environmental seal while maintaining complete readout capability. Reuseable processing boots are also available for protection during the flux cleaning process. For complete specifications see page 20-23.



**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

**7000, 7010, 7020, 7030 and  
7040 Series**

**Electrical**

|                                  |   |
|----------------------------------|---|
| Current and Voltage Rating:      | Non-switching — 1.5 amps max. at 50 VDC<br>Switching — 100 milliamperes max. at 5.0 VDC (resistive load)<br>25 milliamperes max. at 24.0 VDC (resistive load) |
| Contact Resistance, Dry Circuit: | 100 milliohms max. (end of life) and 50 milliohms (initial) at 50 MV open circuit, 10 MA.   |
| Insulation Resistance:           | 1 x 10 <sup>11</sup> ohms min. at 100 VDC (initial)   |
| Dielectric Withstanding Voltage: | 500 VDC min. at standard atmospheric conditions.  |
| Capacitance:                     | 5 picofarads max.   |

**Physical and Environmental**

|                                |   |
|--------------------------------|---|
| Temperature Rating:            | Non-Operating: - 100°F [- 73.3°C] to 275°F [135°C]<br>Operating: 0°F [- 17.8°C] to 190°F [87.8°C]   |
| Vibration:                     | Discontinuities shall not exceed 1 microsecond when subjected to 10-2000-10 Hz traversed in 20 min. at .06 in. total excursion.   |
| Shock:                         | No physical damage or discontinuities greater than 1 microsecond when tested with .10 amp current applied per AMP Spec. 109-26, Condition A.                                  |
| Humidity:                      | Withstands an environment of 104°F [40°C] and 95% RH for 96 hrs.  |
| Durability:                    | No physical damage or contact resistance greater than 100 milliohms after 7,000 cycles of actuation with a resistive load of 24 VDC and 25 milliamperes max. current applied. |
| Terminal Strength (Bend Test): | Two 45° bend cycles per MIL-STD-202, Method 211, Condition B.   |

**Materials**

|                            |   |
|----------------------------|---|
| Housing:                   | Black glass filled polyester, 94V-0 rated.      |
| Rocker:                    | White polyester, 94V-0 rated.                   |
| Spring Contacts and Leads: | Beryllium copper with gold over nickel plating. |

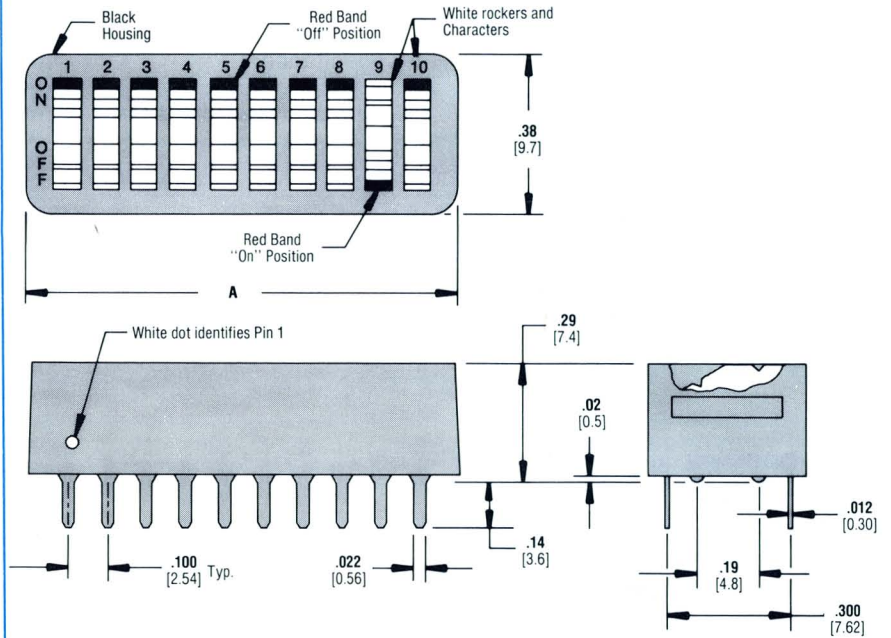
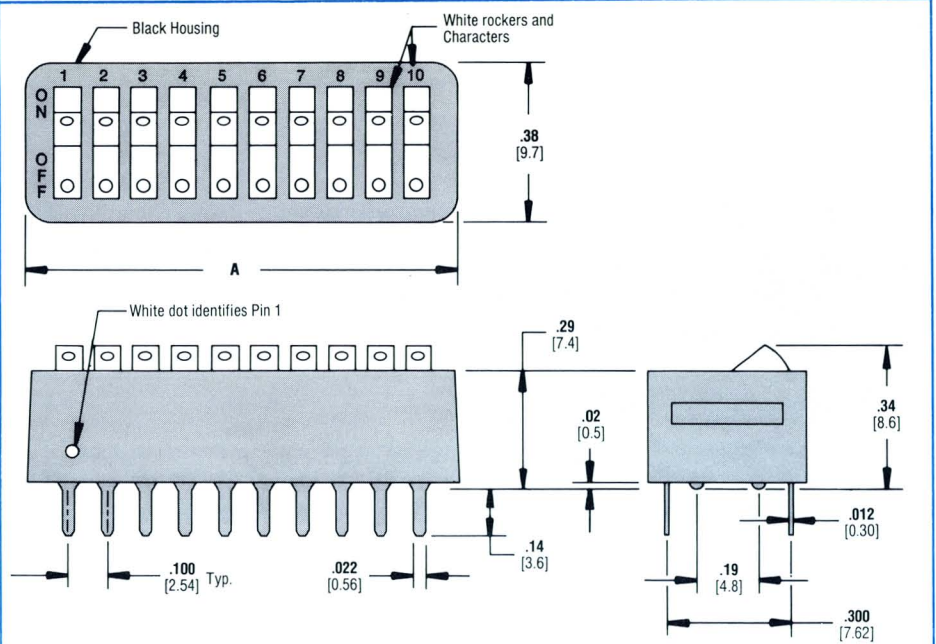
Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 7000 Series Single Pole Single Throw

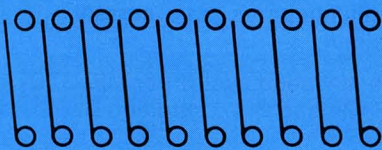
Note: For protective cover and sealing boot specification, refer to page 20-23.

### 7030 Series Single Pole Single Throw Low Profile

Note: For protective cover, sealing boot and sealing tape specification, refer to pages 20-18 and 20-23.



Contact Arrangement



(Switches shown in open position)

| No. of Switch Positions | A    |      | Part Numbers |                             |                                   |
|-------------------------|------|------|--------------|-----------------------------|-----------------------------------|
|                         | Inch | mm   | 7000 Series  | 7030 Series<br>Plain Rocker | 7030 Series<br>Red Band on Rocker |
| 1                       | .28  | 7.1  | 435665-2     | 435665-6                    | 435665-5                          |
| 2                       | .28  | 7.1  | 2-435166-9   | 1-435626-5                  | 1-435626-9                        |
| 3                       | .38  | 9.7  | 3-435166-0   | 1-435626-6                  | 2-435626-0                        |
| 4                       | .48  | 12.2 | 435166-2     | 435626-8                    | 435626-1                          |
| 5                       | .58  | 14.7 | 435166-3     | 435626-9                    | 435626-2                          |
| 6                       | .68  | 17.3 | 435166-4     | 1-435626-0                  | 435626-3                          |
| 7                       | .78  | 19.8 | 435166-1     | 1-435626-1                  | 435626-4                          |
| 8                       | .88  | 22.4 | 435166-5     | 1-435626-2                  | 435626-5                          |
| 9                       | .98  | 24.9 | 435166-6     | 1-435626-3                  | 435626-6                          |
| 10                      | 1.08 | 27.4 | 435166-7     | 1-435626-4                  | 435626-7                          |
| 11                      | 1.18 | 30   | 3-435166-1   | 1-435626-7                  | 2-435626-1                        |
| 12                      | 1.28 | 32.5 | 3-435166-2   | 1-435626-8                  | 2-435626-2                        |



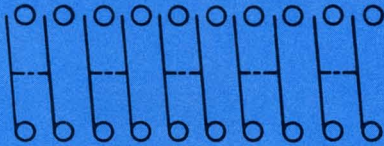
**Standard Switches**

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

**7010 Series Multiple  
2 Pole Single Throw**

**Note:** For protective cover and sealing boot specification, refer to page 20-23.

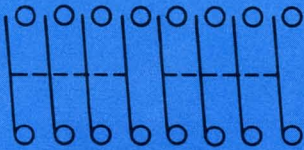
**Contact Arrangement**



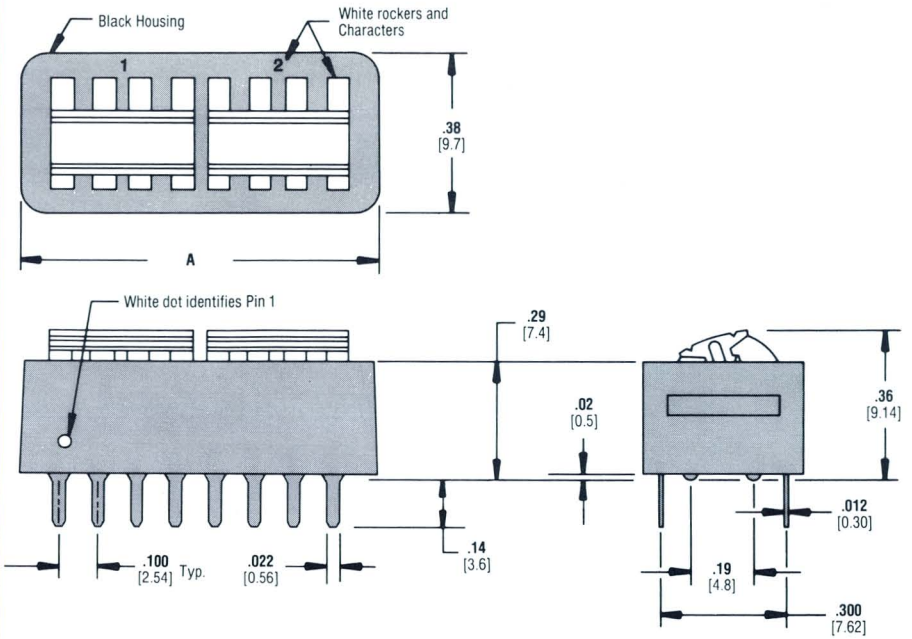
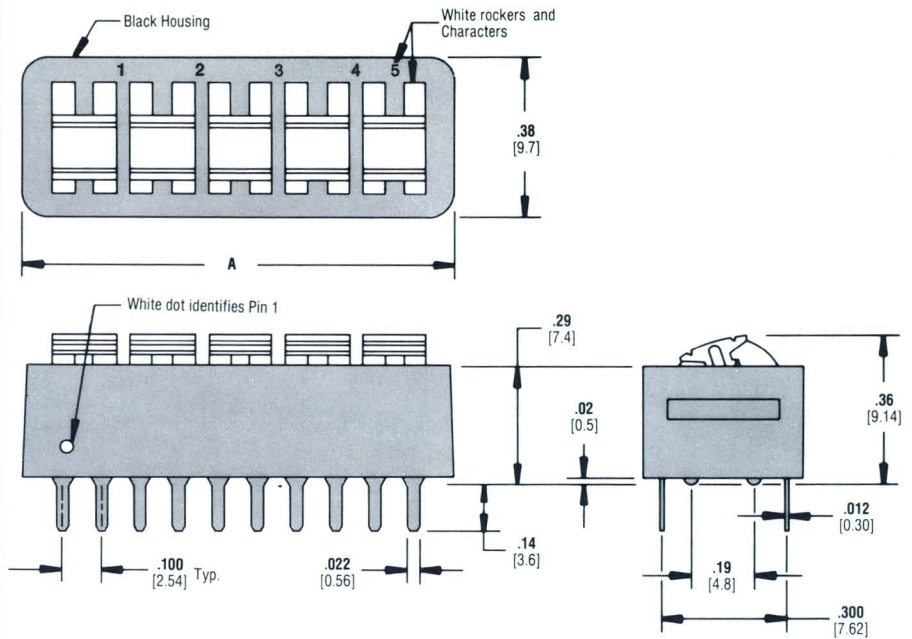
(Switches shown in open position)

**4 Pole Single Throw**

**Contact Arrangement**



(Switches shown in open position)



| No. of Switches | 2 Pole Single Throw Part No. | A    |      | 4 Pole Single Throw Part No. | No. of Switches |
|-----------------|------------------------------|------|------|------------------------------|-----------------|
|                 |                              | Inch | mm   |                              |                 |
| 1               | 435469-9                     | .28  | 7.1  | —                            | —               |
| 2               | 435469-1                     | .48  | 12.2 | 435469-7                     | 1               |
| 3               | 435469-2                     | .68  | 17.3 | —                            | —               |
| 4               | 435469-3                     | .88  | 22.4 | 435469-6                     | 2               |
| 5               | 435469-4                     | 1.08 | 27.4 | —                            | —               |
| 6               | 1-435469-0                   | 1.28 | 32.5 | 435469-8                     | 3               |

**Note:** For switching combinations consult AMP Incorporated.



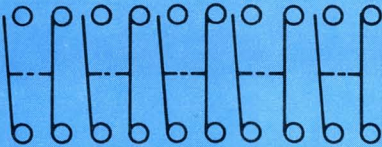
## Standard Switches

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 702u Series Single Pole Double Throw

**Note:** For protective cover and sealing boot specification, refer to page 20-23.

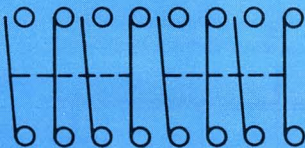
**Contact Arrangement**



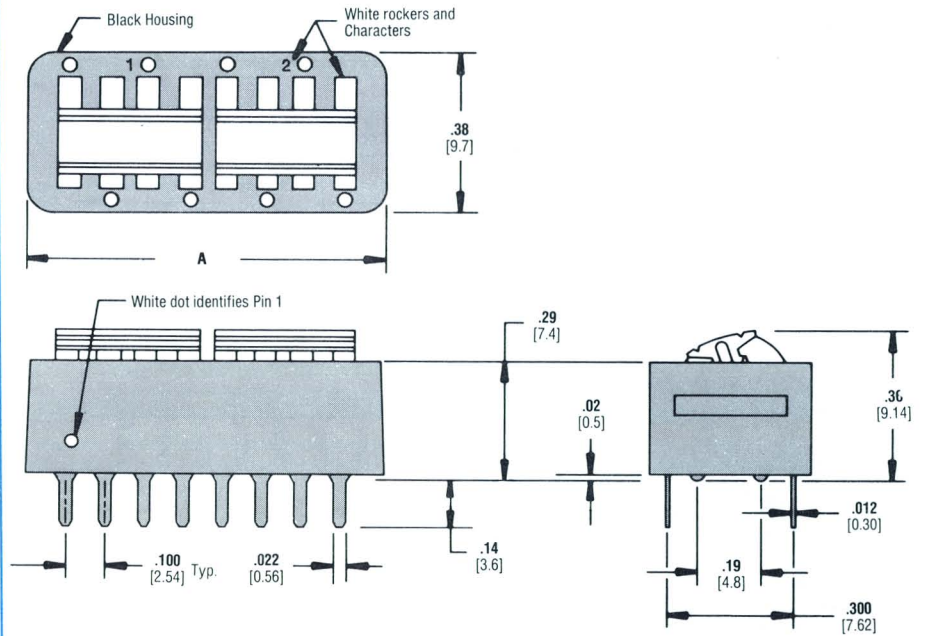
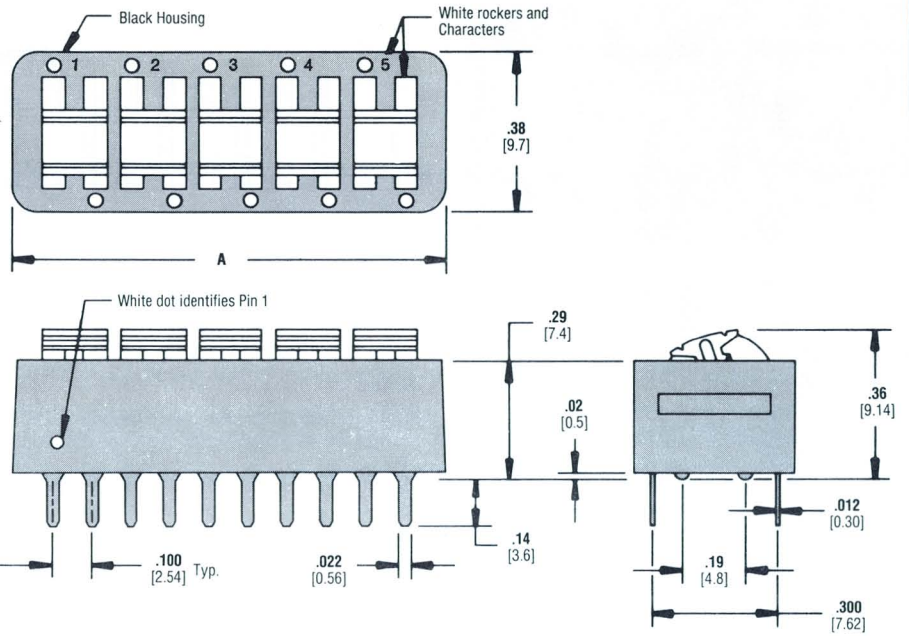
(Switch positions are closed when rockers are down toward white dots.)

### Double Pole Double Throw

**Contact Arrangement**



(Switch positions are closed when rockers are down toward white dots.)



| No. of Switches | Single Pole Part No. | A    |      | Double Pole Part No. | No. of Switches |
|-----------------|----------------------|------|------|----------------------|-----------------|
|                 |                      | Inch | mm   |                      |                 |
| 1               | 435470-7             | .28  | 7.1  | —                    | —               |
| 2               | 435470-1             | .48  | 12.2 | 435470-5             | 1               |
| 3               | 435470-2             | .68  | 17.3 | —                    | —               |
| 4               | 435470-3             | .88  | 22.4 | 435470-9             | 2               |
| 5               | 435470-4             | 1.08 | 27.4 | —                    | —               |
| 6               | 435470-8             | 1.28 | 32.5 | 1-435470-0           | 3               |



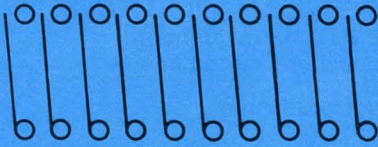
Standard Switches

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

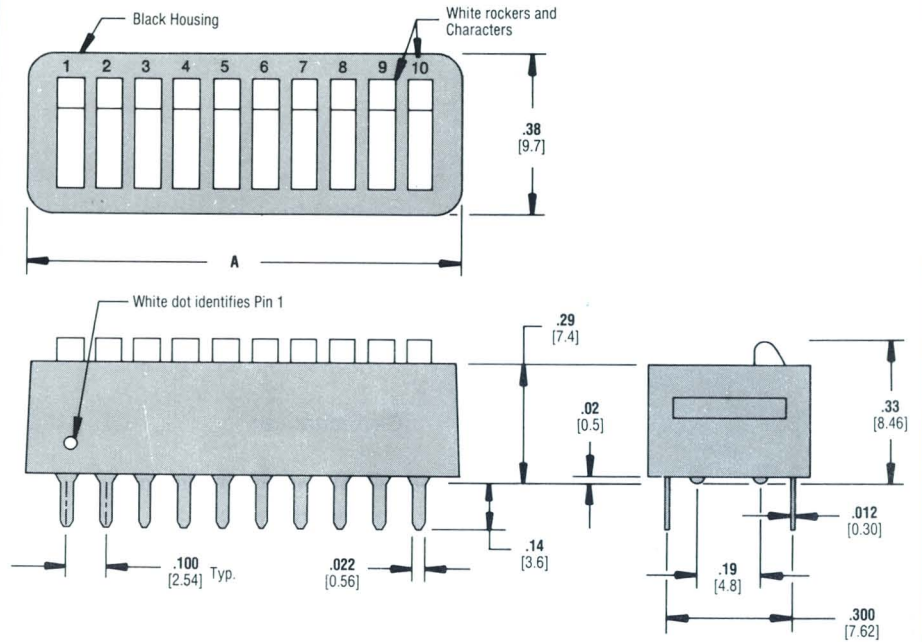
**7040 Series  
Single Pole  
Single Throw  
Momentary Switch**

**Note:** For protective cover and sealing boot specification, refer to page 20-23.

Contact Arrangement



(Switches shown in open position)



| No. of Switch Positions | A    |      | 7040 Series Part Number |
|-------------------------|------|------|-------------------------|
|                         | Inch | mm   |                         |
| 1                       | .28  | 7.1  | 435673-1                |
| 2                       | .28  | 7.1  | 435673-2                |
| 3                       | .38  | 9.7  | 435673-3                |
| 4                       | .48  | 12.2 | 435673-4                |
| 5                       | .58  | 14.7 | 435673-5                |
| 6                       | .68  | 17.3 | 435673-6                |
| 7                       | .78  | 19.8 | 435673-7                |
| 8                       | .88  | 22.4 | 435673-8                |
| 9                       | .98  | 24.9 | 435673-9                |
| 10                      | 1.08 | 27.4 | 1-435673-0              |
| 11                      | 1.18 | 30   | 1-435673-1              |
| 12                      | 1.28 | 32.5 | 1-435673-2              |

## Economy Switches

### 7100 and 7130 Series

#### Electrical

|                                  |  |
|----------------------------------|--|
| Current and Voltage Rating:      | Non-switching — 1.0 amps max. at 40 VDC<br>Switching — 60 milliamperes max. at 5.0 VDC (resistive load)<br>15 milliamperes max. at 24.0 VDC (resistive load) |
| Contact Resistance, Dry Circuit: | 100 milliohms max. (end of life) and 50 milliohms (initial) at 50 MV open circuit, 10 MA.  |
| Insulation Resistance:           | 1 x 10 <sup>9</sup> ohms min. at 100 VDC (initial)   |
| Dielectric Withstanding Voltage: | 500 VDC min. at standard atmospheric conditions.   |
| Capacitance:                     | 5 picofarads max.  |

#### Physical and Environmental

|                                |   |
|--------------------------------|---|
| Temperature Rating             | Non-Operating: -67° [-55°C] to 250°F [121.1°C]<br>Operating: 0°F [-17.8°C] to 190°F [87.8°C]  |
| Vibration:                     | Discontinuities shall not exceed 10 microseconds when subjected to 10-2000-10 Hz traversed in 20 min. at .06 in. total excursion.   |
| Shock:                         | No physical damage or discontinuities greater than 10 microseconds when tested with .10 amp current applied per AMP Spec. 109-26, Condition A.                                |
| Humidity:                      | Withstands an environment at 104°F [40°C] and 95% RH for 96 hrs.  |
| Durability:                    | No physical damage or contact resistance greater than 100 milliohms after 2,000 cycles of actuation with a resistive load of 24 VDC and 15 milliamperes max. current applied. |
| Terminal Strength (Bend Test): | Two 45° bend cycles per MIL-STD-202, Method 211, Condition B.   |

#### Materials

|                            |   |
|----------------------------|---|
| Housing:                   | Polyester, glass filled, 94V-0 rated        |
| Rocker:                    | Polyester, 94V-0 rated                      |
| Spring Contacts and Leads: | Copper alloy with gold over nickel plating. |



# Economy Switches

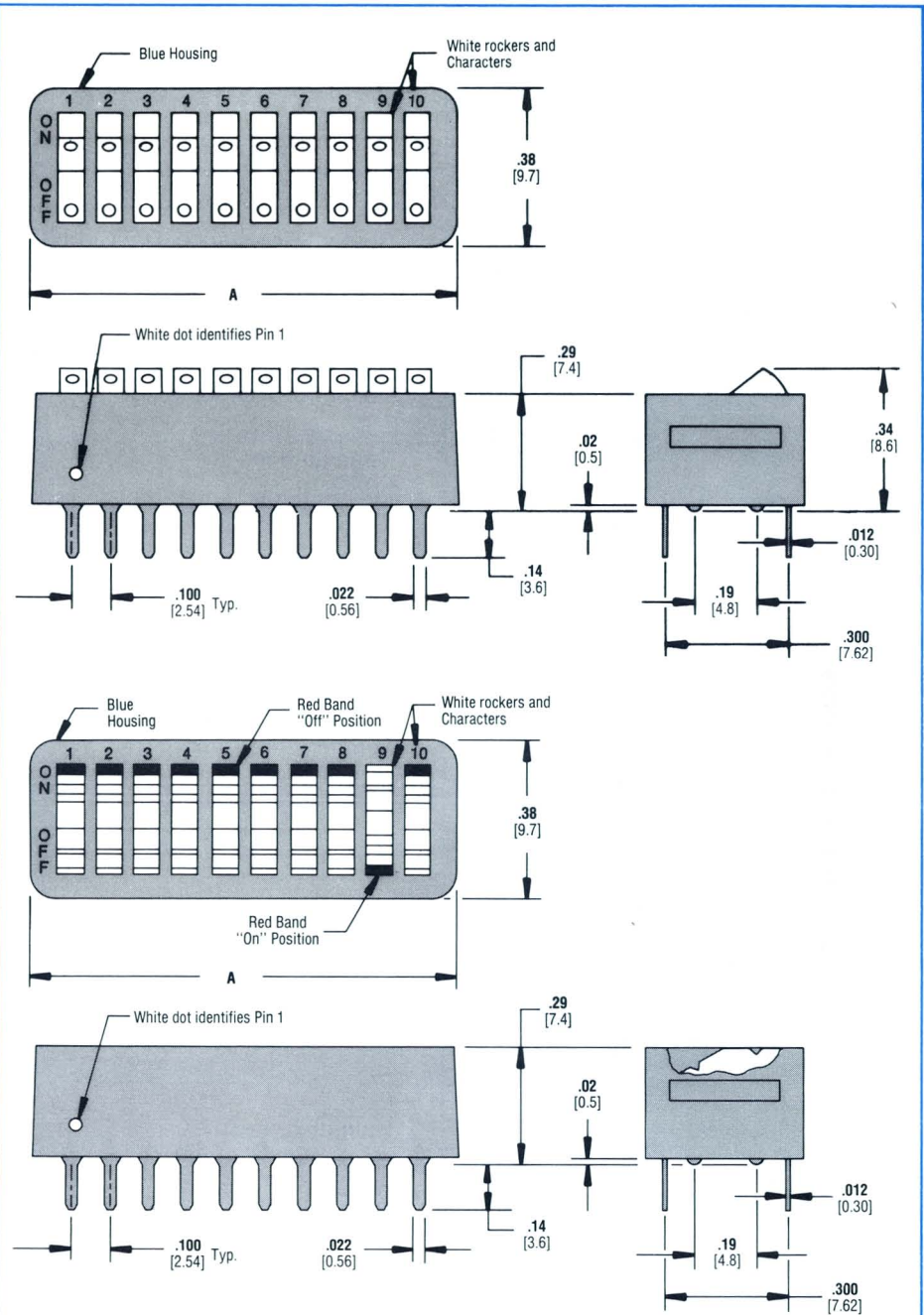
**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

## 7100 Series Single Pole Single Throw

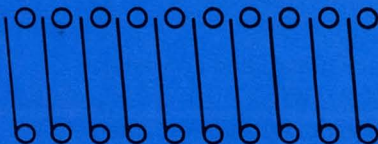
**Note:** For protective cover and sealing boot specification, refer to page 20-23.

## 7130 Series Single Pole Single Throw Low Profile

**Note:** For protective cover, sealing boot and sealing tape specification, refer to page 20-23.



**Contact Arrangement**



(Switches shown in open position)

| No. of Switch Positions | A    |      | Part Number |                             |                    |
|-------------------------|------|------|-------------|-----------------------------|--------------------|
|                         | Inch | mm   | 7100 Series | 7130 Series<br>Plain Rocker | Red Band on Rocker |
| 1                       | .28  | 7.1  | 435665-1    | 435665-4                    | 435665-3           |
| 2                       | .28  | 7.1  | 2-435640-9  | 1-435668-2                  | 435668-1           |
| 3                       | .38  | 9.7  | 3-435640-0  | 1-435668-3                  | 435668-2           |
| 4                       | .48  | 12.2 | 435640-2    | 1-435668-4                  | 435668-3           |
| 5                       | .58  | 14.7 | 435640-3    | 1-435668-5                  | 435668-4           |
| 6                       | .68  | 17.3 | 435640-4    | 1-435668-6                  | 435668-5           |
| 7                       | .78  | 19.8 | 435640-1    | 1-435668-7                  | 435668-6           |
| 8                       | .88  | 22.4 | 435640-5    | 1-435668-8                  | 435668-7           |
| 9                       | .98  | 24.9 | 435640-6    | 1-435668-9                  | 435668-8           |
| 10                      | 1.08 | 27.4 | 435640-7    | 2-435668-0                  | 435668-9           |
| 11                      | 1.18 | 30   | 3-435640-1  | 2-435668-1                  | 1-435668-0         |
| 12                      | 1.28 | 32.5 | 3-435640-2  | 2-435668-2                  | 1-435668-1         |

## LED Switches

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 7200, 7240 and 7250 Series

#### Electrical

|                                  |   |
|----------------------------------|---|
| Current and Voltage Rating:      | Non-switching — 1.5 amps max. at 50 VDC<br>Switching — 100 milliamperes max. at 5.0 VDC (resistive load)<br>25 milliamperes max. at 24.0 VDC (resistive load)                 |
| Contact Resistance, Dry Circuit: | 100 milliohms max. (end of life) and 50 milliohms (initial) at 50mv open circuit, 10ma  |
| Insulation Resistance:           | 1 x 10 <sup>11</sup> ohms min. at 100 VDC (initial)   |
| Dielectric Withstanding:         | 500 VDC min. at standard atmospheric conditions.  |
| Capacitance:                     | 5 picofarads max.   |
| LED Ratings:                     | Forward Voltage Drop: 1.85V at 20ma<br>Reverse Voltage: 5V max. at 100 microamps<br>Power Dissipation: 230mw max. at 77°F [25°C]<br>Lumination: .4 millicandella min. at 20ma |

#### Physical and Environmental

|                                |   |
|--------------------------------|---|
| Temperature Rating:            | Non-Operating: -100°F [-73.3°C] to 275°F [135°C]<br>Operating: 0°F [-17.8°C] to 190°F [87.8°C]  |
| Vibration:                     | Discontinuities shall not exceed 1 microsecond when subjected to 10-2000-10 Hz traversed in 20 min. at .06 in. total excursion.   |
| Shock:                         | No physical damage or discontinuities greater than 1 microsecond when tested with .10 amp current applied per AMP Spec. 109-26, Condition A.                                  |
| Humidity:                      | Withstands an environment of 104°F [40°C] and 95% RH for 96 hrs.  |
| Durability:                    | No physical damage or contact resistance greater than 100 milliohms after 7,000 cycles of actuation with a resistive load of 24 VDC and 25 milliamperes max. current applied. |
| Terminal Strength (Bend Test): | Two 45° bend cycles per MIL-STD-202, Method 211, Condition B.   |

#### Materials

|                            |  |
|----------------------------|--|
| Housing:                   | Black glass filled polyester, 94V-0 rated      |
| Rocker:                    | White polyester 94V-0 rated                    |
| Spring Contacts and Leads: | Beryllium copper with gold over nickel plating |
| LEDS:                      | Epoxy encapsulated GaAsP or GaP diodes         |



LED Switches

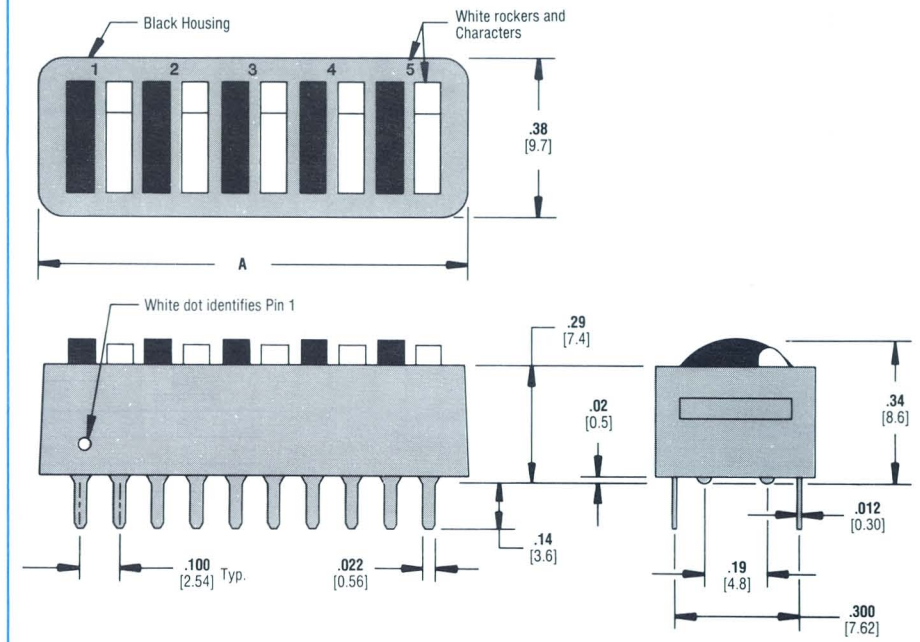
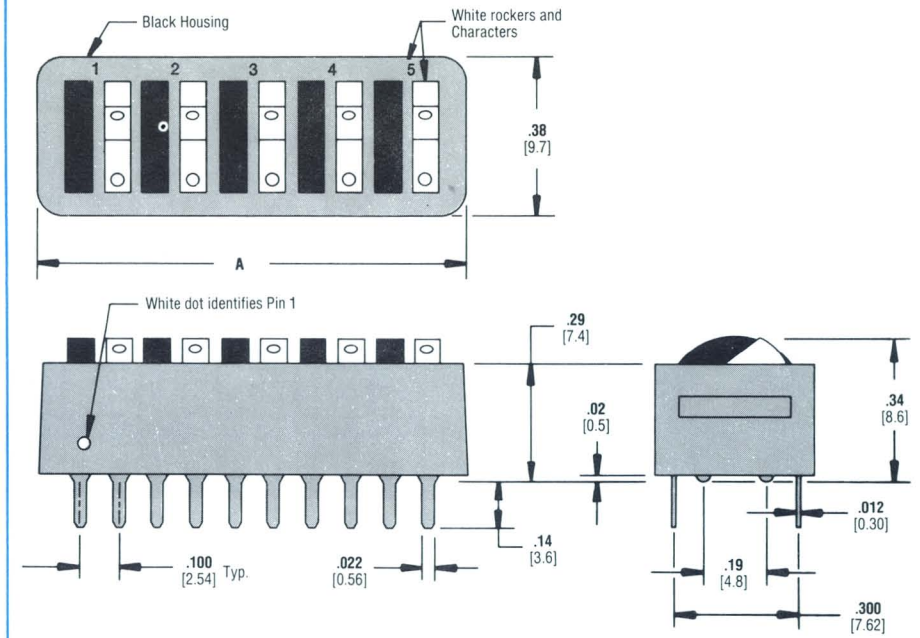
Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

**7200 Series  
Single Pole  
Single Throw**

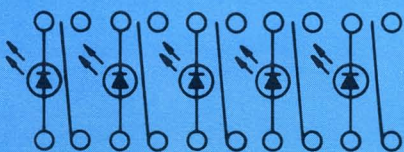
**Note:** For protective cover and sealing boot specification, refer to page 20-23.

**7240 Series  
Single Pole  
Single Throw  
Momentary Switch**

**Note:** For protective cover and sealing boot specification, refer to page 20-23.



Contact Arrangement



(Switches shown in open position)

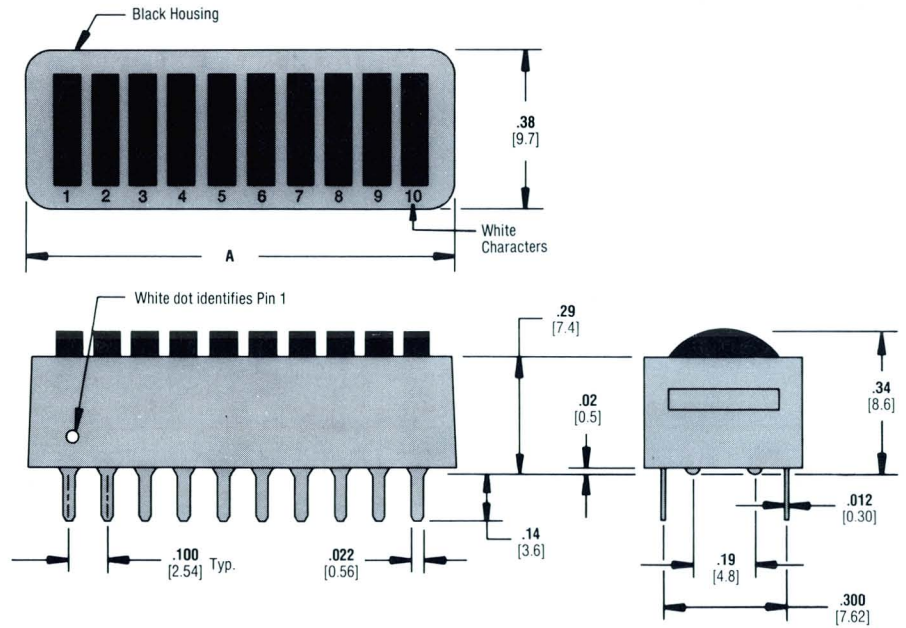
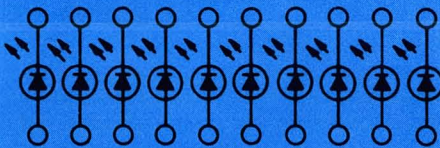
| No. of Pairs | A    |      | Part Numbers |             |
|--------------|------|------|--------------|-------------|
|              | Inch | mm   | 7200 Series  | 7240 Series |
| 1            | .28  | 7.1  | 435721-1     | 435722-1    |
| 2            | .48  | 12.2 | 435721-2     | 435722-2    |
| 3            | .68  | 17.3 | 435721-3     | 435722-3    |
| 4            | .88  | 22.4 | 435721-4     | 435722-4    |
| 5            | 1.08 | 27.4 | 435721-5     | 435722-5    |
| 6            | 1.28 | 32.5 | 435721-6     | 435722-6    |

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 7250 Series LED Assembly

**Note:** For protective cover and sealing boot specification, 20-18 and 20-23.

**Contact Arrangement**



| No. of LED Positions | A    |      | 7250 Series Part Number |
|----------------------|------|------|-------------------------|
|                      | Inch | mm   |                         |
| 2                    | .28  | 7.1  | 435733-1                |
| 3                    | .38  | 9.7  | 435733-2                |
| 4                    | .48  | 12.2 | 435733-3                |
| 5                    | .58  | 14.7 | 435733-4                |
| 6                    | .68  | 17.3 | 435733-5                |
| 7                    | .78  | 19.8 | 435733-6                |
| 8                    | .88  | 22.4 | 435733-7                |
| 9                    | .98  | 24.9 | 435733-8                |
| 10                   | 1.08 | 27.4 | 435733-9                |
| 11                   | 1.18 | 30   | 1-435733-0              |
| 12                   | 1.28 | 32.8 | 1-435733-1              |



## Double Pole Double Throw Switches

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 7400 Series

#### Electrical

|                                  |   |
|----------------------------------|---|
| Current and Voltage Rating:      | Non-switching — 1.0 amps max. at 50 VDC<br>Switching — 100 milliamperes max. at 5.0 VDC (resistive load)<br>25 milliamperes max. at 24.0 VDC (resistive load) |
| Contact Resistance, Dry Circuit: | 50 milliohms max. at 50mv open circuit, 10ma  |
| Insulation Resistance:           | 1 x 10 <sup>9</sup> ohms min. at 100 VDC (initial)  |
| Dielectric Withstanding Voltage: | 500 VDC min. at standard atmospheric conditions.  |
| Capacitance:                     | 5 picofarads max.   |

#### Physical and Environmental

|                     |   |
|---------------------|---|
| Temperature Rating: | Operating: 0°F [−17.8°C] to 190°F [87.8°C]  |
| Vibration:          | Discontinuities shall not exceed 1 microsecond when subjected to 10-2000-10 Hz traversed in 20 min. at .06 in. total excursion.   |
| Shock:              | No physical damage or discontinuities greater than 1 microsecond when tested with .10 amp current applied per AMP Spec. 109-26, Condition A.                                  |
| Humidity:           | Withstands an environment of 104°F [40°C] and 95% RH for 96 hrs.  |
| Durability:         | No physical damage or contact resistance greater than 100 milliohms after 2,000 cycles of actuation with a resistive load of 24 VDC and 15 milliamperes max. current applied. |

#### Material

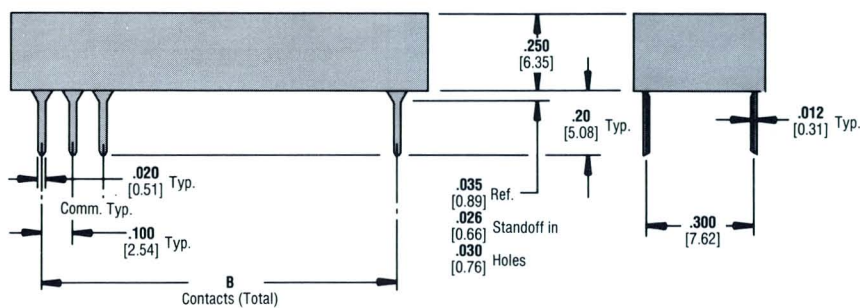
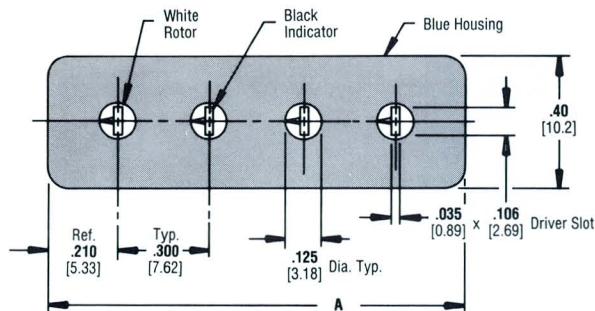
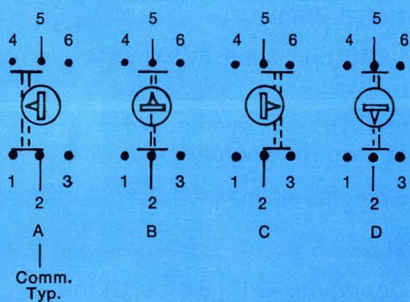
|           |                                       |
|-----------|---------------------------------------|
| Housing:  | Polyester, glass filled 94V-0 rated   |
| Actuator: | Polyester 94V-0 rated                 |
| Contacts: | Copper-nickel alloy with gold plating |

## Double Pole Double Throw Switches

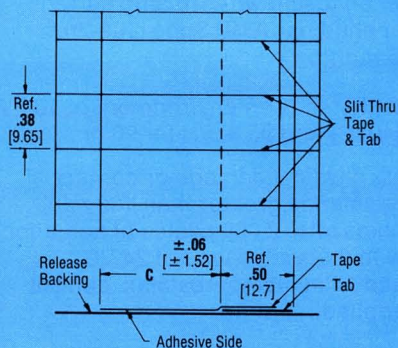
**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 7400 Series Miniature Double Pole, Double Throw Switch (DPDT) Dual In-Line Package Type (DIP)

Switching Schematic For 4 Pos. Switch Shown  
(Each Switch (& Ass'y) is Symmetrical.)



### Sealing Tape



| Switch Size   | C    |       | Sealing Tape <sup>**</sup> Part Number |
|---------------|------|-------|--|
|               | Inch | mm    |  |
| 1-2 Positions | .82  | 20.83 | 435682-1                               |
| 3-4 Positions | 1.38 | 35.05 | 435682-2                               |

<sup>\*\*</sup>Material: Transparent Polyester .002 [0.05] thick.

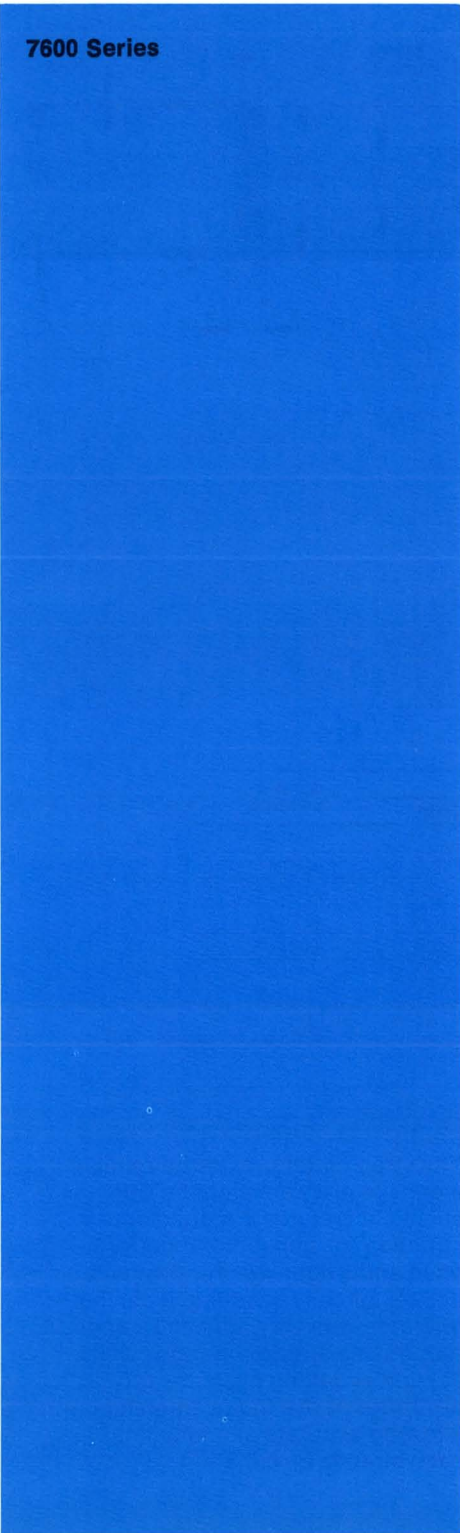
| No. of Positions | Switch |       |    | Part Number |
|------------------|--------|-------|----|-------------|
|                  | A      |       | B  |             |
|                  | Inch   | mm    |    |             |
| 1                | .41    | 11.2  | 6  | 435385-1    |
| 2                | .71    | 18.03 | 12 | 435385-2    |
| 3                | 1.01   | 25.65 | 18 | 435385-3    |
| 4 <sup>*</sup>   | 1.31   | 33.27 | 24 | 435385-4    |
| 5                | 1.61   | 40.89 | 30 | 435385-5    |

<sup>\*</sup>Four position presently available. Other sizes will be proposed upon request.



# Dual In-Line Package Shunt

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.



## 7600 Series

### Electrical

|                                  |  |
|----------------------------------|--|
| Current Rating:                  | 5 amps for 20° rise above ambient<br>(one conductor per shunt) |
| Insulation Resistance:           | 1 x 10 <sup>11</sup> Ohms (min.) at 100 VDC                    |
| Dielectric Withstanding Voltage: | 1000 VDC (min.)  |
| Capacitance:                     |  |
| (Between adjacent straps)        | 2 picofarads max.  |
| (Across cut strap)               | 5 picofarads max.  |

### Physical and Environmental

|                                 |   |
|---------------------------------|---|
| Temperature:                    | -85°F [-65°C] to<br>392°F [200°C]   |
| Humidity:                       | Withstands an environment of<br>104°F [40°C] and 95% RH for 96 hrs.   |
| Terminal Strength (Blend Test): | Two 45° bend cycles per<br>MIL-STD-202, Method 211,<br>Condition B.   |
| Resistance to Soldering Heat:   | Cut straps can be reconnected by<br>solder bridging. Solder bridging<br>recommendations are:<br>— Use low temperature solder.<br>— Use solder tip approximately<br>1/32" [0.79 mm] diameter.<br>— Do not let solder tip come in<br>contact with plastic material. |

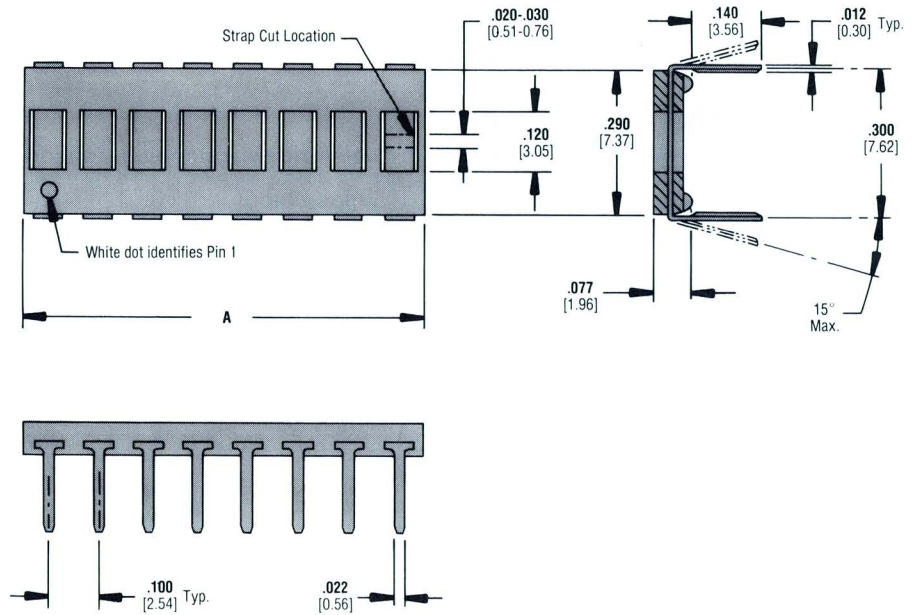
### Materials

|              |  |
|--------------|--|
| Housing:     | UL recognized, 94V-0 rated, Glass-<br>Filled Thermoplastic Polyester;<br>color, black (other colors available) |
| Metal Parts: | Brass with Electroplated Tin Finish<br>(gold plated I/O legs are optional.)                                    |

## Dual In-Line Package Shunt

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 7600 Series Programmable Dual In-Line (Dip) Shunt



| No. of Positions | A    |       | 7600 Series Part Number |
|------------------|------|-------|-------------------------|
|                  | Inch | mm    |                         |
| 4                | .400 | 10.16 | 435704-4                |
| 5                | .500 | 12.7  | 435704-5                |
| 6                | .600 | 15.24 | 435704-6                |
| 7                | .700 | 17.78 | 435704-7                |
| 8                | .800 | 20.32 | 435704-8                |

The DIP shunt shown above is an 8-position with uncut straps. AMP can supply DIP shunts in various other sizes and preprogrammed (with straps cut in any combination desired).



Strap Cutter, Part No. 435705

The strap cutter provides a reliable means of programming the DIP shunts. It features a rugged construction for dependable performance and a light-weight, compact design for easy handling. It can be operated with very little effort and requires no special operator skills. The lower cutting die of the tool protrudes above the positioning bar, allowing accurate alignment of each strap to be cut.



# Rotary Printed Circuit Board Switches

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

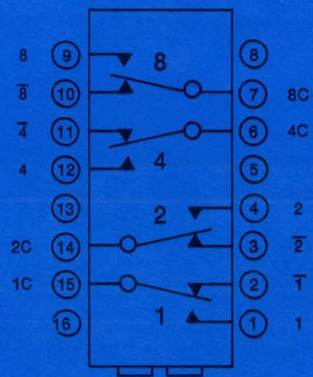
### Electrical Specifications

|                           |                      |
|---------------------------|----------------------|
| Voltage Rating:           | 120 volts RMS (max.) |
| Current Rating:           | 1.0 Ampere (max.)    |
| Contact Resistance:       | 100 Milliohms (max.) |
| Dielectric Strength:      | 300 VAC 60 Hz        |
| Dc Insulation Resistance: | 1,000 Megohms        |

### Mechanical Specification

|                        |  |
|------------------------|--|
| Contact Material:      | Phosphor Bronze, Gold-over-Nickel Plated |
| Detent Release Torque: | 1 Oz.-In. (min.)                         |
| Life Expectancy:       | 2,000 Revolutions                        |

Pin Configuration Schematic  
(Position 0)



Binary Weights 8-4-2-1

Truth Table  
(BCD and BCD Complement)

| Pole Position | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 |
|---------------|---|---|---|---|---|---|---|---|
| 0             |   |   |   |   | ● | ● | ● | ● |
| 1             |   |   |   | ● | ● | ● | ● |   |
| 2             |   |   | ● |   | ● | ● |   | ● |
| 3             |   |   | ● | ● | ● | ● |   |   |
| 4             |   | ● |   |   | ● |   | ● | ● |
| 5             |   | ● |   | ● | ● |   | ● |   |
| 6             |   | ● | ● |   | ● |   |   | ● |
| 7             |   | ● | ● | ● | ● |   |   |   |
| 8             | ● |   |   |   |   | ● | ● | ● |
| 9             | ● |   |   | ● |   | ● | ● |   |
| 10 or A       | ● |   | ● |   |   | ● |   | ● |
| 11 or B       | ● |   | ● | ● |   | ● |   |   |
| 12 or C       | ● | ● |   |   |   |   | ● | ● |
| 13 or D       | ● | ● |   | ● |   |   | ● |   |
| 14 or E       | ● | ● | ● |   |   |   |   | ● |
| 15 or F       | ● | ● | ● | ● |   |   |   |   |

● = CONNECTION

## Rotary Printed Circuit Board Switches

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### Typical Body Dimensions

### Hole Pattern

### Screwdriver Slot Hexadecimal Type

16 Position

### Stamping Details

Style I  
Part Number 53137-1

Style II  
Part Number 53137-2

### Screwdriver Slot BDC Type

10 Position  
Part Number 53919-1

### Extended Shaft BDC Type

10 Position  
Part Number 54308-1

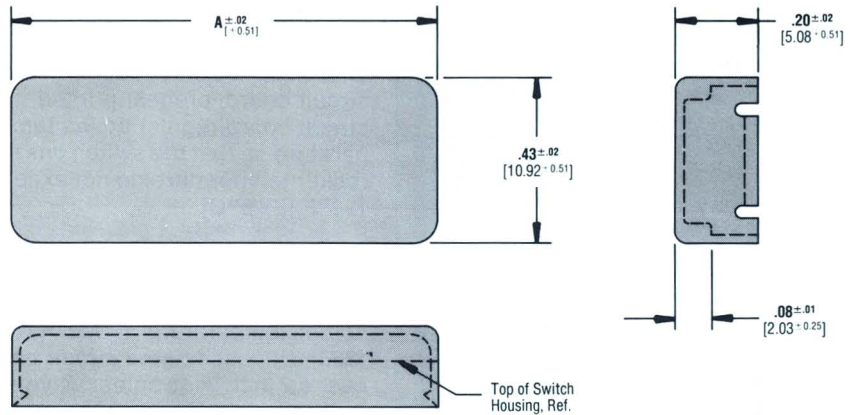
### Lever Type

2 Position (Position 1 is same as pole position "F" on truth table)  
Part Number 53921-1



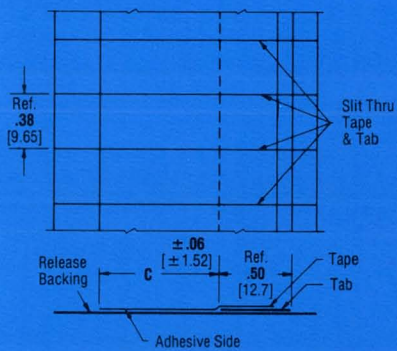
**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

**Protective Cover**



| Protective Cover |       |            |                         | Processing Boot |      |       |  |
|------------------|-------|------------|-------------------------|-----------------|------|-------|--|
| A                |       | Part No.   | No. of Switch Positions | Part No.        | B    |       |  |
| Inch             | mm    |            |                         |                 | Inch | mm    |  |
| .29              | 7.37  | 435238-8   | 2                       | 435587-1        | .26  | 6.6   |  |
| .39              | 9.91  | 435238-9   | 3                       | 435587-2        | .36  | 9.14  |  |
| .49              | 12.45 | 435238-1   | 4                       | 435587-3        | .46  | 11.68 |  |
| .59              | 14.99 | 435238-2   | 5                       | 435587-4        | .56  | 14.22 |  |
| .69              | 17.53 | 435238-3   | 6                       | 435587-5        | .66  | 16.76 |  |
| .79              | 20.07 | 435238-4   | 7                       | 435587-6        | .76  | 19.3  |  |
| .89              | 22.61 | 435238-5   | 8                       | 435587-7        | .86  | 21.84 |  |
| .99              | 25.15 | 435238-6   | 9                       | 435587-8        | .96  | 24.38 |  |
| 1.09             | 27.69 | 435238-7   | 10                      | 435587-9        | 1.06 | 26.92 |  |
| 1.19             | 30.23 | 1-435238-0 | 11                      | 1-435587-0      | 1.16 | 29.46 |  |
| 1.29             | 32.77 | 1-435238-1 | 12                      | 1-435587-1      | 1.26 | 32    |  |

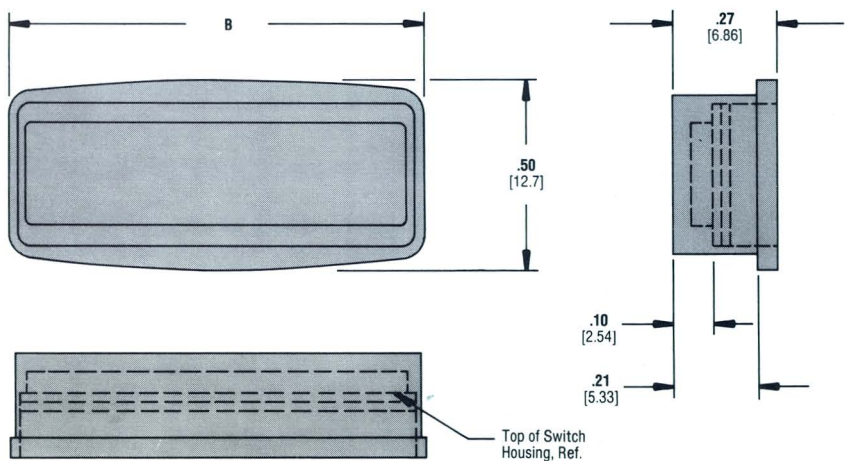
**Sealing Tape**



| Switch Size    | C    |       | Sealing Tape ** Part Number |
|----------------|------|-------|-----------------------------|
|                | Inch | mm    |                             |
| 1-6 Positions  | .82  | 20.83 | 435682-1                    |
| 7-12 Positions | 1.38 | 35.05 | 435682-2                    |

\*\* Material: Transparent Polyester .002 [0.05] thick.

**Sealing Boot**



## Recommended Soldering and Cleaning Processes

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### Wave Soldering

Keep all switch contacts in their "OPEN" position for all operations.

With switches inserted in printed circuit board, preheat printed circuit board regulating the temperature so that the switch case and rocker temperature do not exceed 190°F [87.8°C].

Flux only the bottom of the board. Do not allow flux to pass over the top of printed circuit board. Maintain solder temperature at 500°F [260°C], pass printed circuit board over a 2 inch wide solder wave so that actual end to end exposure of switch to solder wave is a maximum of 5 seconds.

### Hand Soldering

Keep all switch contacts in "OPEN" position. Use a soldering iron of 30 watts or less, heat pad and lead simultaneously for approximately 2 seconds while applying solder.

### Cleaning

It is recommended that the sealing tape or sealing boot be used on the low profile switches and the sealing boot be used on all other switches, except the Rotary PCB, during any cleaning or fluxing process to avoid contamination of switch contacts with flux residues or other foreign materials.

The following cleaning process is recommended:

Use a cleaning solvent that is found to have no deteriorating effect on the plastics or epoxy bonding materials used on the switch.

The cleaning solvent should not be contaminated with dissolved flux.

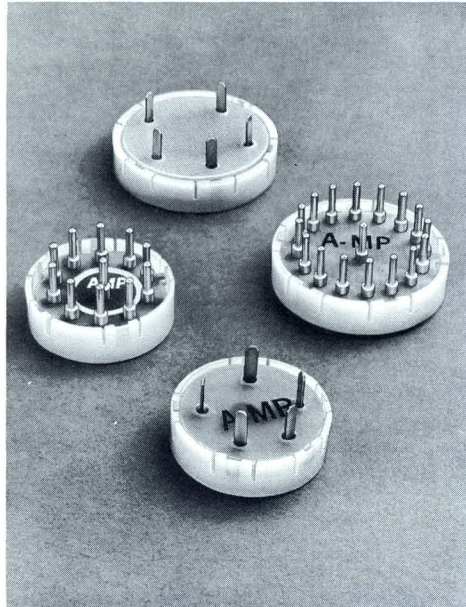
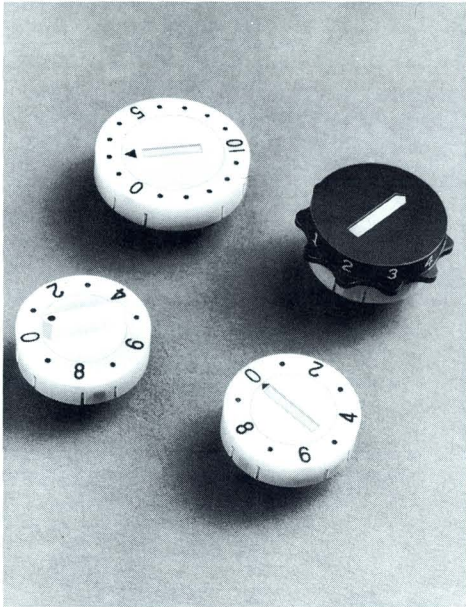
When vapor degreasing systems are used, do not subject the switch to solvents at temperatures above 125°F [51.7°].

Switch contacts should be in "OPEN" position during cleaning.

For detailed process specifications of all switches except Rotary PCB, request AMP Specification 118-7001.

For Rotary PCB Switches request AMP Specification 118-11031.





AMP Pc Board Rotary Switches that establish optimum switching reliability of programming electrical and mechanical circuits in machine tools, test equipment, computers and input data terminals. These manually operated switches are specifically designed to be mounted on a pc board and offer output capabilities which include: 8-position binary coded octal (BCO), 10-position binary coded decimal (BCD), 16-position hexadecimal plus 8-, 10- and 16-position single pole (decimal). In addition, they feature a small diameter and very low profile, making them highly compatible with the miniaturization standards of today's packaging techniques.

Use of the Pc Board Rotary Switches, too, offers distinct economical advantages. They can be mounted on the same board with other circuit components eliminating the need for input/output wiring to perform switching functions. Also, boards can be punched or drilled for switch and component mounting at the same time. Switch tabs or pins then are simply inserted into the mounting holes and either flow or hand soldered

to the etched circuitry as any other component.

In addition to varied output capabilities, these versatile AMP switches also can be supplied in three different styles allowing you to select the operation method best suited to your specific application. One version incorporates a slot which accepts a screwdriver, coin or other similar device. This particular style permits operation of the switch without sacrificing overall height. Its height of .220" above the board is no greater than the usual board mounted discrete component. The other two versions have either a bar-type knob or thumbwheel for their operation. All three styles can be rotated bidirectionally.

Rugged construction, positive detent-action contacts, plus large readable numerals are additional features of the AMP Pc Board Rotary Switches provide a simple, highly reliable means ability. These features, coupled with a fully enclosed design which provides environmental protection for all contact surfaces, assures excellent electrical and mechanical performance.

### Printed Circuit Board Rotary Switches, 6000 Series

#### Features

- **COMPACT DESIGN** — Small diameter, low profile switches are ideal for pc board mounting.
- **WIDE CHOICE OF OUTPUTS** — 8-position binary coded octal, 10-position binary coded decimal, 16-position hexadecimal and 8-, 10- or 16-position single pole.
- **VERSATILE APPLICATION** — Available styles include slotted version for screwdriver or coin actuation, plus bar-type knob and thumbwheel versions for hand rotation.
- **ECONOMICAL** — Board mounting eliminates need for input/output wiring to perform switching functions.
- **POSITIVE SWITCHING** — Contacts have positive detent action; all switch positions easily identified by large readable numerals.
- **OPTIMUM RELIABILITY** — Fully enclosed design protects contact surfaces from dust, dirt and other environmental contaminants.



## Specifications

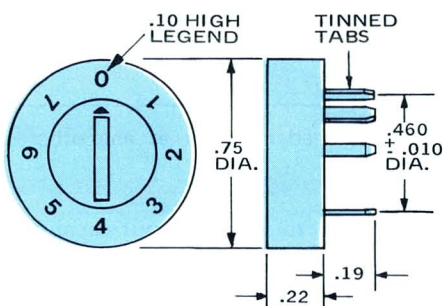
### Electrical Characteristics:

|   |                      |
|---|----------------------|
| Contact Life Expectancy   | 10,000 Cross Points  |
| Contact Current Rating  | 250 Milliampères     |
| Initial Contact Resistance (at 50 Millivolts and 20 Milliampères) | 50 Milliohms         |
| Insulation Resistance   | $1 \times 10^8$ Ohms |
| Dielectric Breakdown Voltage                                      | 500 Volts Dc         |
| Circuit Capacitance (at 135 KHz)                                  | 3.0 Picofarads       |

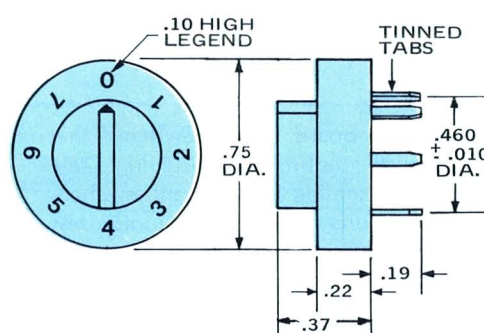
### Materials:

|                       |  |
|-----------------------|--|
| Contacts              | Phosphor Bronze, Gold-over-Nickel Plated       |
| Solder Tabs and Pins  | Coded Switches<br>Beryllium Copper, Tin Plated |
|                       | Single Pole Switches<br>Brass, Tin Plated      |
| Structural Parts      | Polyacetal                                     |
| Printed Circuit Board | Glass Epoxy                                    |

### 8-Position Rotary Switches (with Binary Coded Octal output)



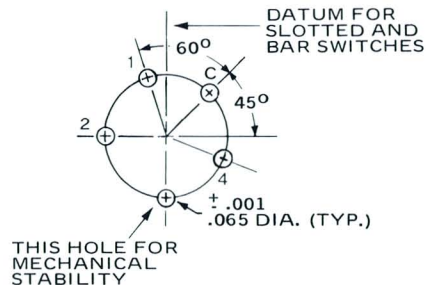
Screwdriver/Coin-Actuated BCO Switch, Part No. 435174-1



Bar-Type Knob BCO Switch, Part No. 1-435174-1

| Circuit |        | Switch Position |   |   |   |   |   |   |   |
|---------|--------|-----------------|---|---|---|---|---|---|---|
| Input   | Output | 0               | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| C       | /1     | -               | X | - | X | - | X | - | X |
|         | /2     | -               | - | X | X | - | - | X | X |
|         | /4     | -               | - | - | - | X | X | X | X |

X = Closed Circuit, -- = Open Circuit

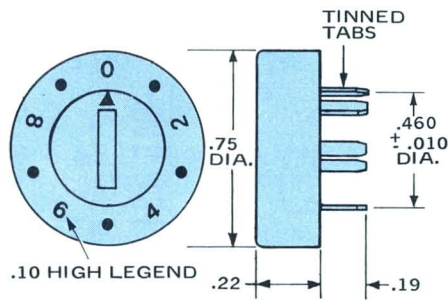


Typical Board Hole Pattern (Switch Side)

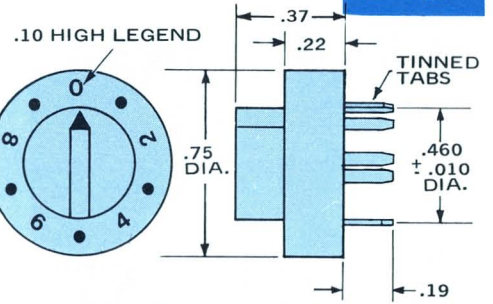


Specifications (Cont.)

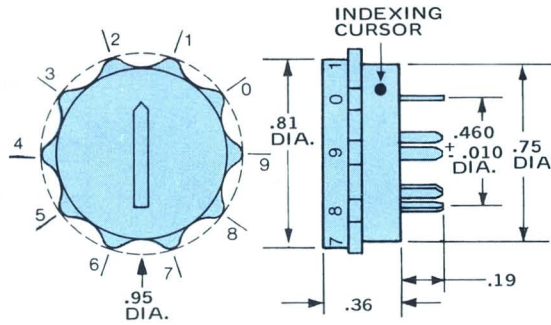
10-Position Rotary Switches  
(with Binary Coded Decimal  
output)



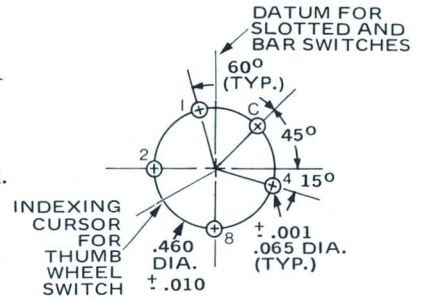
Screwdriver/Coin-Actuated BCD  
Switch, Part No. 435005-1



Bar-Type Knob BCD Switch,  
Part No. 435123-1



Thumbwheel BCD Switch,  
Part No. 435128-1

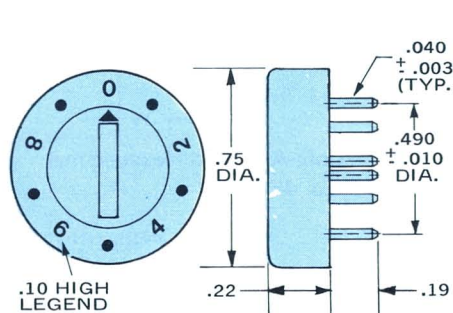


Typical Board Hole Pattern  
(Switch Side)

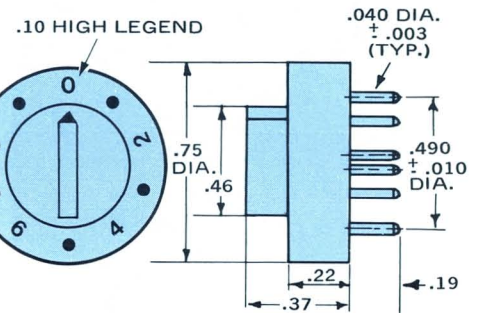
| Circuit |        | Switch Position |   |   |   |   |   |   |   |   |   |
|---------|--------|-----------------|---|---|---|---|---|---|---|---|---|
| Input   | Output | 0               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| C       | 1      | —               | X | — | X | — | X | — | X | — | X |
|         | 2      | —               | — | X | X | — | — | X | X | — | — |
|         | 4      | —               | — | — | — | X | X | X | X | — | — |
|         | 8      | —               | — | — | — | — | — | — | — | X | X |

X = Closed Circuit, — = Open Circuit

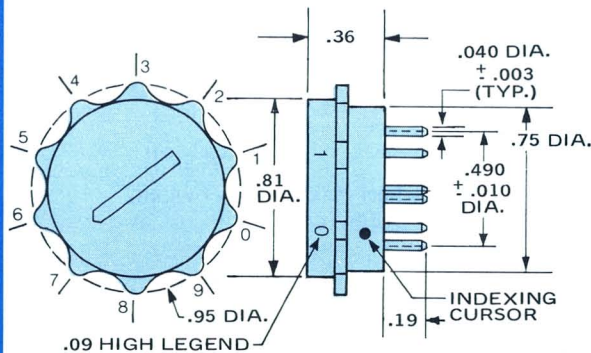
10-Position Rotary Switches  
(Single Pole)



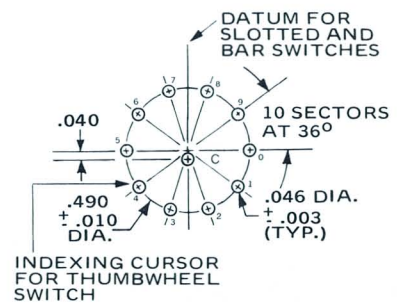
Screwdriver/Coin-Actuated Single Pole  
Switch, Part No. 1-435097-1



Bar-Type Knob Single Pole Switch,  
Part No. 2-435097-1



Thumbwheel Single Pole Switch,  
Part No. 435097-1



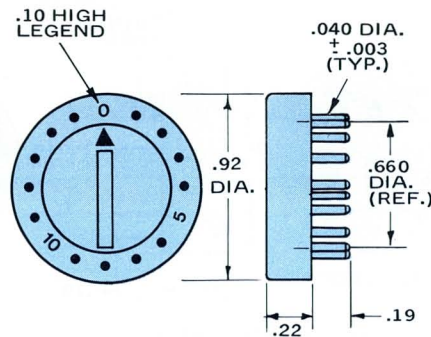
Typical Board Hole Pattern  
(Switch Side)

NOTE: An 8-Position Single Pole Rotary Switch in any of the three styles shown above can be proposed upon request.

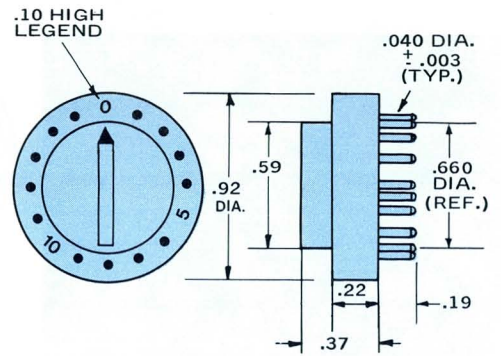


## 16-Position Rotary Switches (Single Pole)

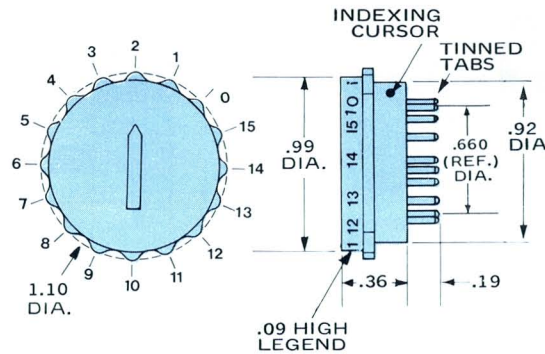
### Specifications (Cont.)



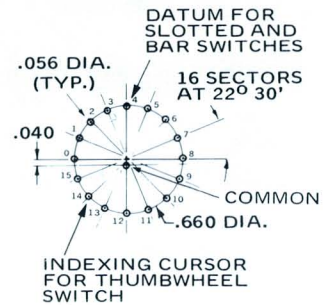
**Screwdriver/Coin-Actuated Single Pole Switch, Part No. 435304-1**



**Bar-Type Knob Single Pole Switch, Part No. 1-435304-1**

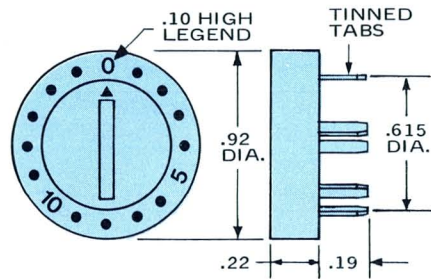


**Thumbwheel Single Pole Switch, Part No. 2-435304-1**

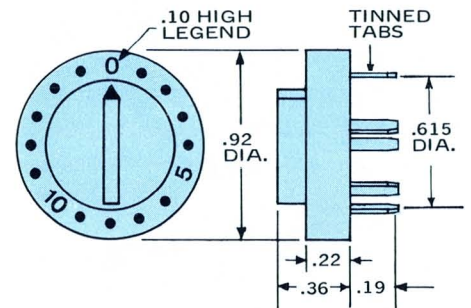


**Typical Board Hole Pattern (Switch Side)**

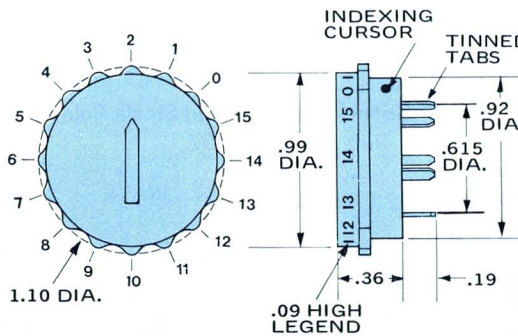
## 16-Position Rotary Switches (with Hexadecimal output)



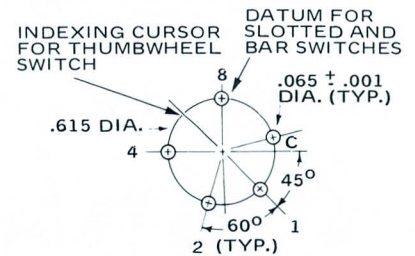
**Screwdriver/Coin-Actuated Hexadecimal Switch, Part No. 435167-1**



**Bar-Type Knob Hexadecimal Switch, Part No. 1-435167-1**



**Thumbwheel Hexadecimal Switch, Part No. 2-435167-1**



**Typical Board Hole Pattern (Switch Side)**

| Circuit |        | Switch Position |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|---------|--------|-----------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| Input   | Output | 0               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| C       | 1      | -               | X | - | X | - | X | - | X | - | X | -  | X  | -  | X  | -  | X  |
|         | 2      | -               | - | X | X | - | - | X | X | - | - | X  | X  | -  | -  | X  | X  |
|         | 4      | -               | - | - | - | X | X | X | X | - | - | -  | -  | X  | X  | X  | X  |
|         | 8      | -               | - | - | - | - | - | - | - | X | X | X  | X  | X  | X  | X  | X  |

X = Closed Circuit, - = Open Circuit







## Introduction

AMP thumbwheel switches provide a simple, highly reliable means of manually programming various types of electrical/electronic equipment. These miniature switches are designed for front and rear panel mounting and can be used singly or "stacked" for either individual or matrix output applications. They are ideally suited for use in machine tool and process control systems as well as test equipment, aircraft, various instruments and input data terminals.

Thumbwheel switches come in four basic types: a .500" [12.7 mm] wide standard module; .500" [12.7 mm] wide sealed and enclosed modules; a .350" [8.89 mm] wide module; and a 1" [25.4 mm] wide message wheel module. The narrow .350" [8.89 mm] wide switch is intended for use where space is at a premium, while the .500" [12.7 mm] sealed and enclosed versions are specially designed for use in harsh atmospheres. The message wheel switch permits words, abbreviations, symbols, etc. to be used for identifying switch positions, instead of conventional numerals. All switches feature rugged construction, positive detent action and use of large, legible readouts; they are highly adaptable for industrial environments.

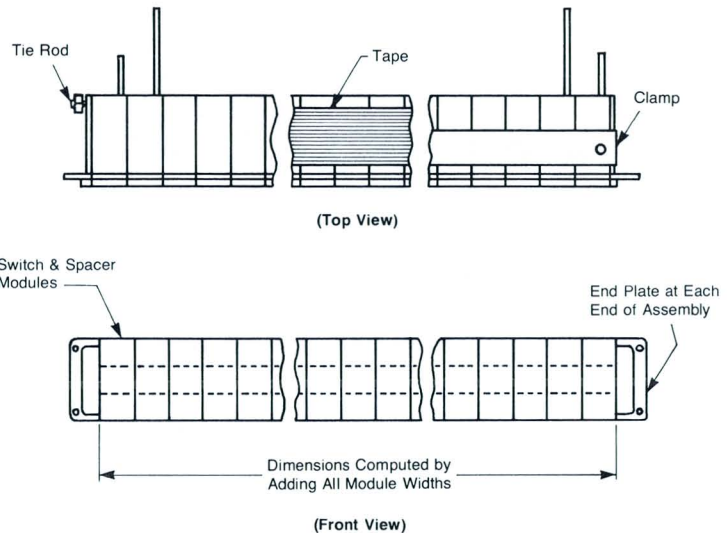
Thumbwheel switches also can be supplied with a variety of output capabilities, special features and options to afford complete application versatility and adaptability. Outputs are decimal, BCD and BCO in numerous switching configurations. Special switch features include molded-in stops for limiting rotation of the switch wheel and a choice of wheel/character color combinations—black on white or white on black. The options available include: methods of interconnection using AMP's Commercial Interconnection System (CIS) "F" posts, AMPMODU receptacles and posts, AMP pc connectors, AMP EDGE terminals and soldered wire terminations; transparent character windows for protection against dust and dirt; extended (long) pc boards for direct component interposition; spacers for custom module stacking; and special markings to accommodate specific readout requirements.

**Specifications subject to change.  
Consult AMP Incorporated for latest  
design specifications.**

## Ordering Information

AMP thumbwheel switches are available as individual modules—with the assembly hardware ordered separately—and in pre-assembled units to facilitate mounting. The

information provided below and on page 20-32 will enable you to select and order all of the modules and components needed for your particular switching application.



### Switch Module and Component Identification

The first essential in ordering switches is to determine the type(s) of modules required. The available types are:

1. .500 [12.8] standard switch
2. .500 [12.8] sealed or enclosed switch
3. .350 [8.89] switch
4. Message wheel switch (supply message information)
5. Spacer; .250" [6.35 mm] wide, .500" [12.7 mm] wide, .350" [8.89 mm] wide

Next, specify the desired output of each switch module—decimal, BCD, BCO, repeating + and -. See the Selection Guide, page 20-32, for page references of all available outputs for each switch type. If a code other than those listed or a special code is desired, supply output code information.

Then, provide the following information (as applicable) for each module:

1. Housing and end plate finish;
  - a. Black glossy
  - b. Black matte
  - c. Special (supply details)
2. Type of housing and end plate;
  - a. With mounting flange
  - b. Without mounting flange
3. Type of assembly hardware;
  - a. Tie rods

- b. Clamps
- c. Fiberglass tape
4. Protective character window. Specify, yes or no.
5. Switch wheel marking;
  - a. 0 thru 9 (10 position)
  - b. 0 thru 7 (8 position)
  - c. + and -, repeating (10 position)
  - d. Special (supply details)
6. Wheel rotation stops, if desired, supply a "number dash number" indicating stop requirements. For example, 2-6 indicates wheel rotation to be limited between positions 2 and 6, totaling 5 switch positions.
7. Module (switch and/or spacer) marking—decimal point, abbreviations, symbols, etc. (supply marking information)
8. Pc board length;
  - a. Short
  - b. Long
  - c. Special (supply details)
9. Contacts mounted on pc board;
  - a. CIS "F" posts (applied by AMP)
  - b. Others, including AMPMODU receptacles and AMP EDGE terminals (specify)
  - c. None (for pc connector or soldered wire applications)
  - d. Special (supply details)

#### Notes:

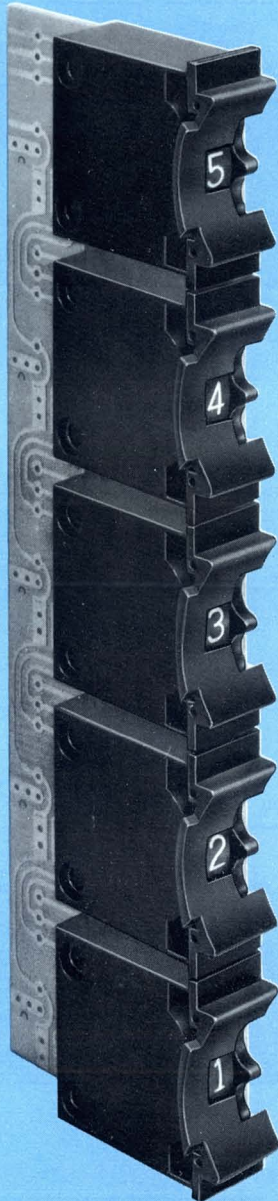
1. Where provided, part nos. should be used for ordering all switch modules and components.
2. For delivery information, contact AMP Incorporated.



## Description

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

## Types of Switches

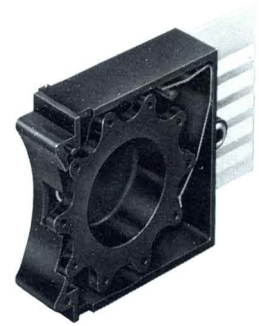
**Vertical Switch Assembly**

.500 [12.7] standard thumbwheel switches are also available vertically stacked onto a single-unit pc board. Part No. **435472-1** (for 5-module assembly shown)

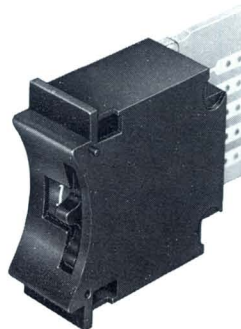
**Note:** Different numbers of module assemblies can be supplied. Consult AMP incorporated, Harrisburg, Pa.

**.500 [12.7] Standard Thumbwheel Switch**

AMP .500 [12.7] standard thumbwheel switches are available as 8 or 10 position switches with outputs in decimal, BCD or BCO. They can be supplied with short or long boards and for mother/daughter board, pc connector, solderless wire or soldered wire connection. Standard housings with a glossy or fine matte finish incorporate a mounting flange to facilitate front or rear panel mounting. For details on the selection and ordering of these switches and on all available options, see pages 20-30, 20-32.

**.350 [8.89] Thumbwheel Switch**

AMP .350 [8.89] thumbwheel switches are furnished with most of the same capabilities as the .500 [12.7] standard switch, but are intended for use where horizontal mounting space is limited or where a wider switch is unnecessary. Available outputs and options also include the same broad range as the wider switch. See pages 20-30, 20-32 for details on the selection and ordering of these switches.

**.500 [12.7] Sealed and Enclosed Thumbwheel Switches**

AMP .500 [12.7] sealed and enclosed thumbwheel switches provide varying degrees of environmental protection, as required. The enclosed version employs a housing design which serves as a barrier against such contaminants as dirt and dust. The sealed version, using the same housing, also has an epoxy seal which provides protection against fumes, vapors and moisture. Both versions are currently supplied as a 10 position switch with a BCD output, but can be made available with a variety of outputs, special features and options. For details on the selection and ordering of these switches, see pages 20-30, 20-32.

**Message Wheel Thumbwheel Switch**

AMP message wheel thumbwheel switches are specifically designed for the use of words, abbreviations or symbols to identify switch positions. Their 1" [25.4 mm] wide housings make them ideal for handling virtually any special readout requirement. The switch is presently furnished as a 10 position module with a BCD output, but can be readily adapted to accommodate any of the other decimal, BCD and BCO outputs as well as all available options. For details on the selection and ordering of these switches, see pages 20-30, 20-32.



# Thumbwheel Switch Selection Guide

**Dimensioning:**  
 All dimensions in inches and millimetres.  
 Values in brackets are metric equivalents.

This selection guide is a quick-reference chart designed to help you select the switching modules and components for your particular application. The referenced catalog page numbers indicate the location of product part numbers and engineering information.

- Available**
- Can be made available**

**Note:** The modules and components listed as "available" and "can be made available" do not represent all of the switching capabilities offered by AMP. If your needs dictate switching requirements other than those cataloged, contact your local AMP Sales Engineer or AMP Incorporated, Harrisburg, Pennsylvania.

## .500 [12.7] Standard Thumbwheel Switches

| Module Type                             | Finish<br>(pp. 20-37, 20-38) |       | Module Mounting Flange<br>(pp. 20-37, 20-38) |         |
|---|------------------------------|-------|--|---------|
|   | Glossy                       | Matte | With   | Without |
| Switch: 10 Pos Decimal<br>(p. 20-39)    |                              |       |  |         |
| 8 Pos. Decimal<br>(p. 20-39)            |                              |       |  |         |
| 10 Pos. BCD Codes<br>(pp. 20-40, 20-41) |                              |       |  |         |
| 8 Pos. BCO Codes<br>(p. 20-42)          |                              |       |  |         |
| 10 Pos. + &<br>(p. 20-42)               |                              |       |  |         |
| Spacer: 250 [6.35] Wide<br>(p. 20-36)   |                              |       |  |         |
| 500 [12.7] Wide<br>(p. 20-36)           |                              |       |  |         |

## .500 [12.7] Sealed & Enclosed Thumbwheel Switches

| Module Type                            | Finish<br>(pp. 20-49, 20-50) |       | Module Mounting Flange<br>(pp. 20-49, 20-50) |         |
|--|------------------------------|-------|--|---------|
|  | Glossy                       | Matte | With   | Without |
| Switch: 10 Pos BCD Codes<br>(p. 20-44) |                              |       |  |         |
| Spacer: 250 [6.35] Wide<br>(p. 20-36)  |                              |       |  |         |
| 500 [12.7] Wide<br>(p. 20-36)          |                              |       |  |         |

## .350 [8.89] Thumbwheel Switches

| Module Type                             | Finish<br>(pp. 20-45, 20-46) |       | Module Mounting Flange<br>(pp. 20-45, 20-46) |         |
|---|------------------------------|-------|--|---------|
|   | Glossy                       | Matte | With   | Without |
| Switch: 10 Pos Decimal<br>(p. 20-47)    |                              |       |  |         |
| 10 Pos. BCD Codes<br>(pp. 20-47, 20-48) |                              |       |  |         |
| 10 Pos. + &<br>(p. 20-48)               |                              |       |  |         |
| Spacer: 350 [8.89] Wide<br>(p. 20-36)   |                              |       |  |         |

## Message Wheel Thumbwheel Switches

| Module Type                            | Finish<br>(pp. 20-43, 20-44) |       | Module Mounting Flange<br>(pp. 20-43, 20-44) |         |
|--|------------------------------|-------|--|---------|
|  | Glossy                       | Matte | With   | Without |
| Switch: 10 Pos BCD Codes<br>(p. 20-50) |                              |       |  |         |
| Spacer: 250 [6.35] Wide<br>(p. 20-36)  |                              |       |  |         |
| 500 [12.7] Wide<br>(p. 20-36)          |                              |       |  |         |

<sup>1</sup>Special codes as well as coded outputs other than those listed are also available.

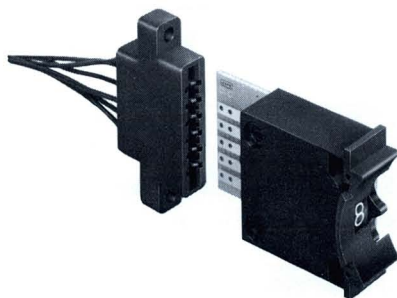
<sup>2</sup>Standard color is black.



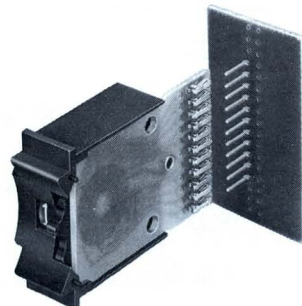


Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

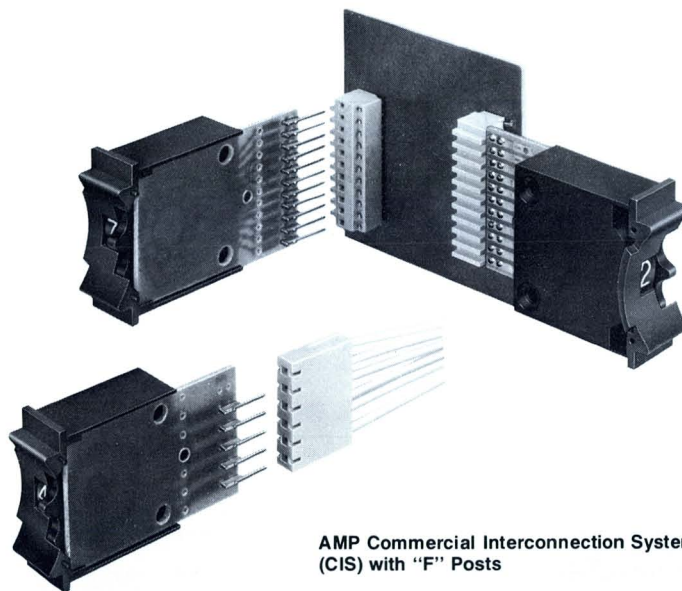
Interconnection Methods



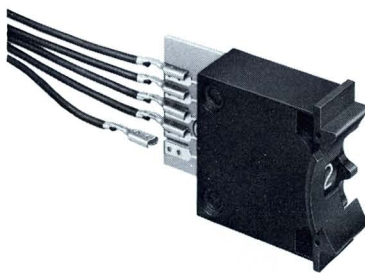
AMP Pc Board Connectors



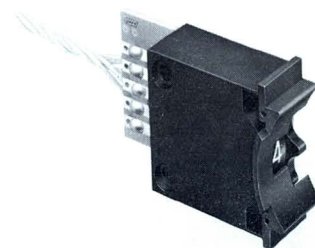
AMPMODU Receptacles and Posts



AMP Commercial Interconnection System (CIS) with "F" Posts



AMP EDGE Terminals



Soldered Wire Terminations

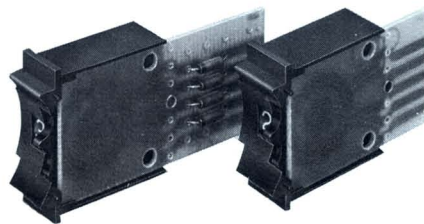


**Board lengths**

**Protective Character Windows**

| Interconnection Method*   | Part Number (.100 [2.54]) $\phi$ Spacing | Part Number (.156 [3.96]) $\phi$ Spacing |
|---|--|--|
| <b>Modified Fork Pc Connectors</b>  |  |  |
| For Mother/Daughter Board Applications:<br>Connector preloaded with solder dip contacts | 530008                                   | 583351                                   |
| For Board-to-Wire Applications:<br>Connector preloaded with solder eyelet contacts      | 583743-1                                 | 583415                                   |
| Connector housing   | 583259-4                                 | 583297-1                                 |
| for crimp snap-in contacts (24-20 AWG [0.2-0.6 mm <sup>2</sup> ])                       |  | 583259-4                                 |
| <b>AMP-LEAF Pc Edge Connectors</b>  |  |  |
| For Board-to-Wire Applications:<br>Connector housing                                    |  | 583722-1                                 |
| for crimp snap-in contacts (26-22 AWG [0.12-0.4 mm <sup>2</sup> ])                      |  | 42702 & 60029                            |
| <b>Twin Leaf Pc Edge Connectors</b>   |  |  |
| For Board-to-Wire Applications:<br>Connector housing                                    |  | 1-583859-3                               |
| for crimp snap-in contacts (24-20 AWG [0.2-0.6 mm <sup>2</sup> ])                       |  | 583853                                   |
| for solder eyelet contacts  |  | 583885                                   |
| <b>AMPMODU Receptacles .025 [0.64] Sq.</b>  | 85863-2                                  | 85863-2                                  |
| <b>Commercial Interconnection System (CIS)</b>  | "F" Posts Applied by AMP                 | "F" Posts Applied by AMP                 |
| <b>AMP EDGE Terminals (22-20 AWG [0.3-0.6 mm<sup>2</sup>])</b>                          |  | 42263-6                                  |
| <b>Soldered Wires</b>   | Boards Predrilled                        | Boards Predrilled                        |

\*All pc connectors and AMP EDGE terminals are for .500" [12.7 mm] wide switches only. These switches have .062" [1.57 mm] thick pc boards.



Input/output boards on all AMP switches may be supplied in two lengths. A long board is used where components such as diodes and resistors are required in the switching function and

are to be mounted directly onto the board. The short board is used where no such components are needed. All interconnection methods may be used with either board length.

Transparent plastic windows are available on .500 [12.7] and .350 [8.89] switches. They provide protection for the wheel characters against dirt, dust and other contaminants. They are ideally suited for use in industrial environments.

**Dimensioning:**

1. All dimensions in inches and millimetres. Values in brackets are metric equivalents.
2. Chart contains dimensions in inches over millimetres.

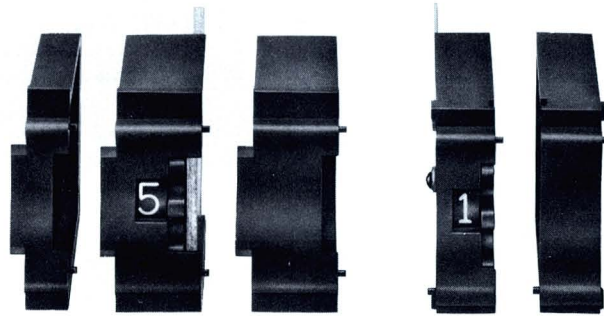
### Special Marking



Special marking such as punctuation, abbreviations and symbols can be supplied on switch modules and spacers. These markings are in

addition to the special markings which may be obtained on the switch wheels.

### Spacers

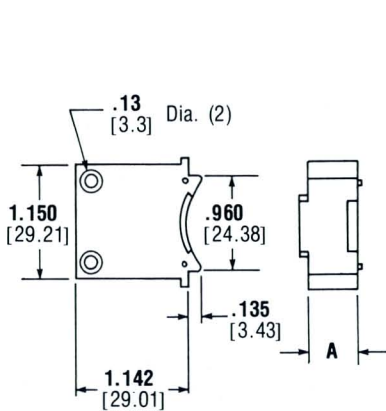


Spacers are available for custom stacking or assembling switch modules. They are supplied with glossy or fine matte finishes. Material construction

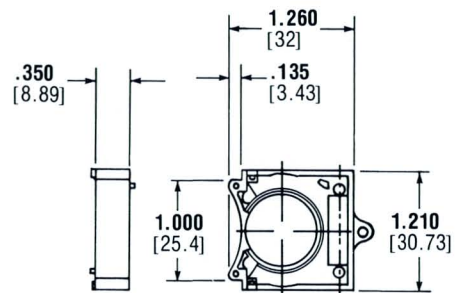
of the spacers is black polycarbonate (glossy finish) or black thermoplastic (matte finish).

| Figure Number | Dim. A | Finish | Part Number |
|---------------|--------|--------|-------------|
| 1             | .500   | Glossy | 2-435069-1  |
|               | 12.7   | Matte  | 2-435069-2  |
|               | .250   | Glossy | 2-435069-3  |
|               | 6.35   | Matte  | 2-435069-4  |
| 2             | —      | Glossy | 435608-1    |
|               | —      | Matte  | 435608-2    |

**Note:** With regards to mounting flanges, the configurations shown are considered "standard". However, spacers with or without mounting flanges, whichever is opposite of standard, can be made available upon request.



**Figure 1. Spacers for .500 [12.7] Standard & Message Wheel Switches**



**Figure 2. Spacer for .350 [8.89] Switches**

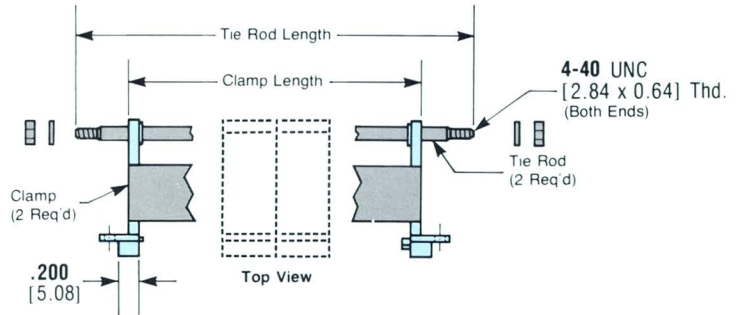


# .500 [12.7] Standard Thumbwheel Switch Specifications

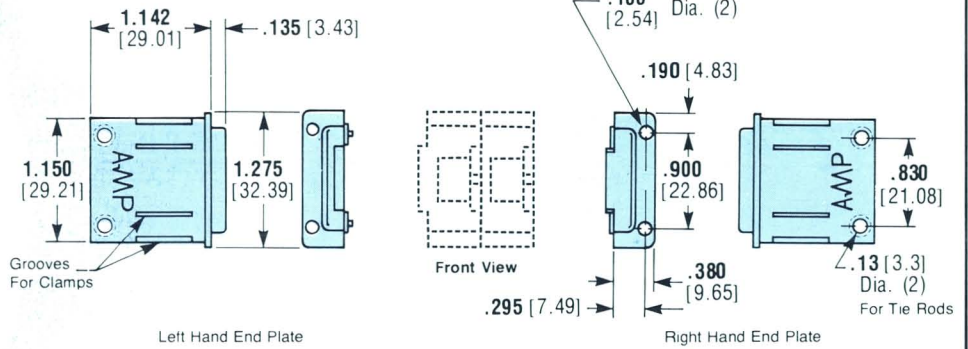
**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.



## Assembly hardware



When switches are purchased as individual modules, assembly hardware must be ordered separately. Part numbers of the assembly hardware — end plates, tie rods, clamps — are listed below. Part numbers of switch modules with various decimal, BCD and BCO outputs are provided on pages 20-39 thru 20-42. For complete details on selecting and ordering switches, refer to pages 20-30, 20-32.



**Note:** Corresponding dimensions are the same for both left- and right-hand end plates.

- Material:**  
End Plates — Black polycarbonate (glossy finish)  
Black polyester (matte finish)  
Tie Rods — Passivated stainless steel  
Clamps — .016 [0.41] thk. passivated stainless steel

| End Plate  | Finish | Part Number* |
|------------|--------|--------------|
| Left Hand  | Glossy | 2-435016-1   |
|            | Matte  | 2-435016-2   |
| Right Hand | Glossy | 4-435016-1   |
|            | Matte  | 4-435016-2   |

\*Part nos. are for end plates with mounting flange. End plates without mounting flange are available upon request.

| No. of .500 [12.7] Increments | Tie Rod** |             |        | Clamp       |  |  |
|-------------------------------|-----------|-------------|--------|-------------|--|--|
|                               | Length    | Part Number | Length | Part Number |  |  |
| 1                             | .90       | 435017-1    | .745   | 435337-1    |  |  |
| 2                             | 1.40      | 435017-2    | 1.245  | 435337-2    |  |  |
| 3                             | 1.90      | 435017-3    | 1.745  | 435337-3    |  |  |
| 4                             | 2.40      | 435017-4    | 2.245  | 435337-4    |  |  |
| 5                             | 2.90      | 435017-5    | 2.745  | 435337-5    |  |  |
| 5.5                           | 3.15      | 5-435017-7  | —      | —           |  |  |
| 6                             | 3.40      | 435017-6    | 3.245  | 435337-6    |  |  |
| 7                             | 3.90      | 435017-7    | 3.745  | 435337-7    |  |  |
| 8                             | 4.40      | 435017-8    | 4.245  | 435337-8    |  |  |
| 9                             | 4.90      | 435017-9    | 4.745  | 435337-9    |  |  |
| 10                            | 5.40      | 1-435017-0  | 5.245  | 1-435337-0  |  |  |
| 11                            | 5.90      | 1-435017-1  | 5.745  | 1-435337-1  |  |  |
| 12                            | 6.40      | 1-435017-2  | 6.245  | 1-435337-2  |  |  |
| 13                            | 6.90      | 1-435017-3  | 6.745  | 1-435337-3  |  |  |
| 13.5                          | 7.15      | 1-435017-7  | —      | —           |  |  |
| 14                            | 7.40      | 1-435017-4  | 7.245  | 1-435337-4  |  |  |
| 14.5                          | 7.65      | 1-435017-6  | —      | —           |  |  |
| 15                            | 7.90      | 1-435017-5  | 7.745  | 1-435337-5  |  |  |
| 16                            | 8.40      | 1-435017-8  | —      | —           |  |  |
| 17                            | 8.90      | 1-435017-9  | —      | —           |  |  |
| 19.5                          | —         | —           | 9.995  | 1-435337-8  |  |  |

\*\*Part nos. are for one tie rod only; two are required per assembly. Also, two #4 lock washers (22964-2) and #4-40 [2.84 x 0.64] nuts (21124-6) must be ordered separately for each tie rod.

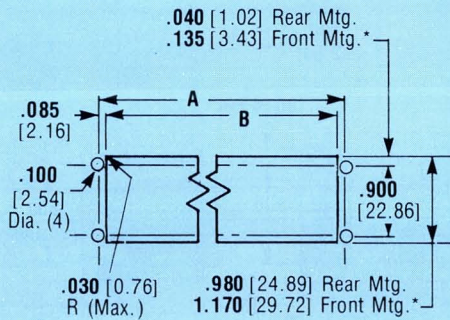
**Note:** Fiberglass tape also available for assembled switch modules.



## .500 [12.7] Standard Thumbwheel Switch Specifications (Cont'd)

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### Dimensions



A Dim. = .590 [14.99] + Total Width of All Modules  
B Dim. = .420 [10.67] + Total Width of All Modules

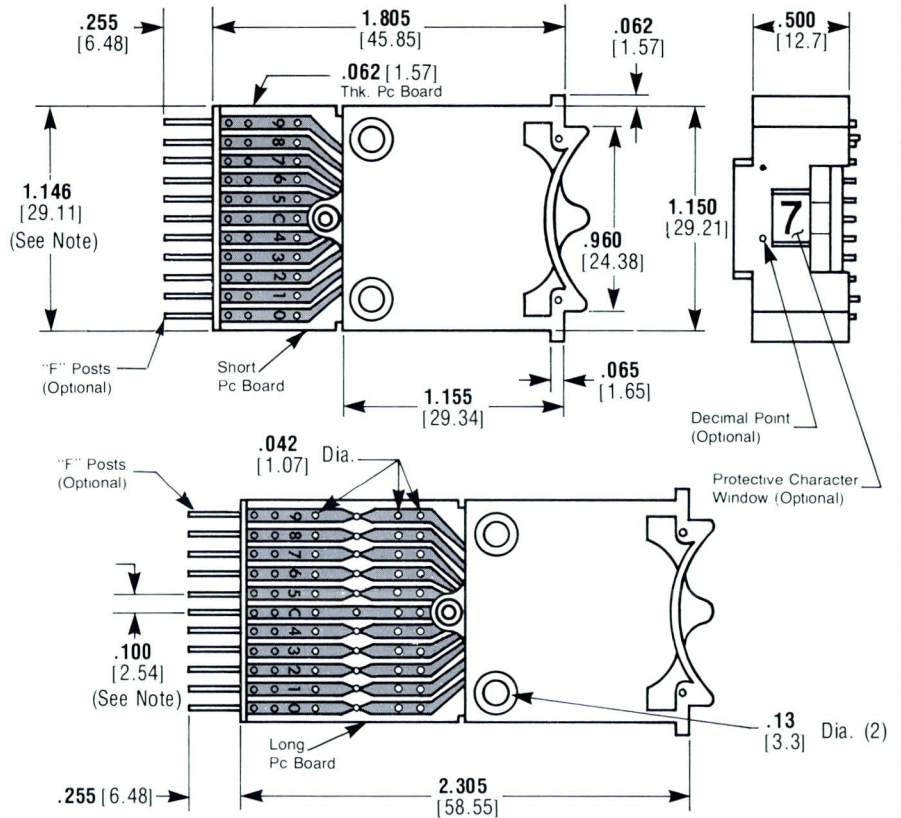
\*Housings & End Plates Must Have Mounting Flanges.

### Suggested Panel Cutout

### Electrical

### Mechanical

### Environmental (MIL-STD-202)



**Note:** 10 position decimal switch shown for illustration purposes only. Dimensions are also typical for other decimal, BCD and BCO switches, except as follows:

|               |            |
|---------------|------------|
| 1.146 [29.11] | 100 [2.54] |
| Board Width   | ⌀          |

|               |             |
|---------------|-------------|
| 1.080 [27.43] | .156 [3.96] |
| Board Width   | ⌀           |

- 8 Pos. Decimal
- 10 Pos. BCD w/Complement
- 10 Pos. BCD w/Separate Common to Complement (Part No. 1-435286-0)
- 10 Pos. BCD 9's Complement w/Complement
- 8 Pos. BCO w/Complement

- 10 Pos. BCD
- 10 Pos. BCD Complement
- 10 Pos. BCD w/Separate Common to Complement (all except Part No. 1-435286-0)
- 10 Pos. BCD 9's Complement
- 8 Pos. BCO
- 8 Pos. BCO Complement
- 8 Pos. BCO w/Separate Common to Complement
- 10 Pos. + and - Repeating

**Outputs:** Decimal, BCD and BCO. Other codes also available.

**Contact Resistance (pad-to-pad):** .1 ohm (max.)

**Current Rating:** 3 amperes (continuous); .125 ampere (switching)

**Insulation Resistance (74°F [23.3°C], sea level):** 1 x 10<sup>9</sup> ohms (min.)

**Dielectric Withstanding Voltage:** 500 VDC (min.)

**Capacitance (between any two conductors):** 5 pf (max.)

**Wheel/Dial Positions:** 8 and 10, standard. Other variations available.

**Wheel/Dial Characters:** White, gothic style, .18" [4.57 mm] high (max.)

**Operating Force:** .4 to 1.25 lb. [1.78 to 5.56 N]

**Structural Plastic:** Black, polycarbonate (glossy finish) or polyester (matte finish)

**Protective Character Window:** Clear polycarbonate

**Printed Circuit Boards:** Flame retardant, glass epoxy laminate

**Contacts:** Gold-over-nickel plated phosphor bronze

**Detent Spring:** Phosphor bronze

**Life:** 1,000,000 detent operations (min.)

**Temperature:** -40°F to +190°F [-40°C to +87.7°C]

**Shock:** 25 G in all planes

**Vibration:** 10-2000 Hz (Method 204B, Condition B)



**.500 [12.7] Standard Thumbwheel Switch Specifications (Cont'd)**

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

The switch configurations tabulated in the following charts are intended to be representative, and should not be considered the only ones available from AMP. A wide range of options regarding output codes, finishes, wheel markings, module markings, pc board lengths and contacts mounted on the switch pc

boards for interconnection can be made available upon request. Refer to page 20-30, 20-32 for full details on how to order the switch of your choice.

Truth tables for the output codes of the .500 [12.7] standard thumbwheel switches are presented on page 20-51, tables 1 thru 13.

**10 Position Decimal (Truth Table 1)**

| Contacts Mounted on Pc Board | Board Length | Housing Finish                                | Part Number | Special Features                              |
|------------------------------|--------------|---|-------------|---|
| "F" Posts <sup>1</sup>       | Short        | Glossy  | 435054-5    | None  |
|                              |              | Matte   | 435054-9    | None  |
|                              |              | Glossy  | _____3      | Wht. Wheel, Blk. Characters                   |
|                              | Long         | Matte   | _____3      | Wht. Wheel, Blk. Characters                   |
|                              |              | Matte   | 2-435054-4  | Rotation Stops 1-9                            |
|                              |              | Glossy  | 2-435054-5  | Protective Window                             |
| None <sup>2</sup>            | Short        | Glossy  | 435054-1    | None  |
|                              |              | Matte   | 435054-2    | None  |
|                              |              | Glossy  | _____3      | Wht. Wheel, Blk. Characters                   |
|                              |              | Matte   | _____3      | Wht. Wheel, Blk. Characters                   |
|                              |              | Matte   | 1-435054-2  | Rotation Stops 0-3                            |
|                              |              | Matte   | 2-435054-7  | Rotation Stops 0-5                            |
|                              | Long         | Glossy  | 2-435054-6  | Rotation Stops 0-1, Protective Window         |
|                              |              | Glossy  | 2-435054-0  | Protective Window                             |
|                              |              | Matte   | 2-435054-1  | Protective Window                             |
|                              |              | Matte   | 2-435054-2  | Wheel Marking 0, 1, 2, 3, 4, 5, 6, 7, 8, C    |
|                              |              | Glossy  | 1-435054-0  | None  |
|                              |              | Matte   | 1-435054-1  | None  |
|                              |              | Matte   | 1-435054-7  | Rotation Stops 0-4                            |
|                              |              | Matte   | 1-435054-8  | Blk. Wheel, No Characters, Rotation Stops 0-1 |
| Matte                        | 2-435054-3   | Blk. Wheel, No Characters, Rotation Stops 0-3 |             |   |

**8 Position Decimal (Truth Table 2)**

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features |
|------------------------------|--------------|----------------|-------------|------------------|
| None <sup>2</sup>            | Short        | Glossy         | 435293-1    | None             |
|                              |              | Matte          | 435293-2    | None             |
|                              | Long         | Glossy         | 435293-3    | None             |
|                              |              | Matte          | 435293-4    | None             |

<sup>1</sup>CIS "F" posts are applied by AMP.  
<sup>2</sup>Switches with no I/O contacts will mate with AMP pc connectors having contacts on .100 [2.54] centers. Refer to page 20-35 for details.  
<sup>3</sup>Consult AMP Incorporated, Harrisburg, Pa.

# .500 [12.7] Standard Thumbwheel Switch Specifications (Cont'd)

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

## 10 Position BCD (Truth Table 3)

| Contacts Mounted on Pc Board | Board Length       | Housing Finish    | Part Number        | Special Features                                     |                    |                             |
|------------------------------|--------------------|-------------------|--------------------|--|--------------------|-----------------------------|
| "F" Posts <sup>1</sup>       | Short              | Glossy            | 435053-5           | None   |                    |                             |
|                              |                    | Matte             | 435053-6           | None   |                    |                             |
|                              |                    | Glossy            | _____ <sup>5</sup> | Wht. Wheel, Blk. Characters                          |                    |                             |
|                              |                    | Matte             | _____ <sup>5</sup> | Wht. Wheel, Blk. Characters                          |                    |                             |
|                              | Long               | Matte             | 2-435053-2         | Overall Length = 2.030 [51.56] <sup>6</sup>          |                    |                             |
|                              |                    | Glossy            | 2-435053-6         | Protective Window                                    |                    |                             |
|                              |                    | Glossy            | 2-435053-7         | Protective Window, Decimal Point                     |                    |                             |
|                              |                    | None <sup>2</sup> | Short              | Glossy   | 435053-1           | None                        |
|                              |                    |                   |                    | Matte  | 435053-2           | None                        |
|                              |                    |                   |                    | Glossy   | _____ <sup>5</sup> | Wht. Wheel, Blk. Characters |
| Matte                        | _____ <sup>5</sup> |                   |                    | Wht. Wheel, Blk. Characters                          |                    |                             |
| Glossy                       | 2-435053-0         |                   |                    | Protective Window                                    |                    |                             |
| Matte                        | 1-435053-8         |                   |                    | Protective Window                                    |                    |                             |
| Matte                        | 1-435053-9         |                   |                    | Protective Window, Rotation Stops 0-3                |                    |                             |
| Matte                        | 1-435053-3         |                   |                    | Rotation Stops 0-5                                   |                    |                             |
| Matte                        | 1-435053-4         |                   |                    | Rotation Stops 0-4                                   |                    |                             |
| Matte                        | 1-435053-5         |                   |                    | Rotation Stops 5-7                                   |                    |                             |
| Long                         | Long               | Matte             | 1-435053-7         | Decimal Point  |                    |                             |
|                              |                    | Matte             | 2-435053-1         | Overall Length = 1.705 [43.31]                       |                    |                             |
|                              |                    | Matte             | 2-435053-3         | Overall Length = 1.705 [43.31],<br>4 Diodes (1N4148) |                    |                             |
|                              |                    | Matte             | 2-435053-4         | Slotted Pc Board <sup>3</sup>                        |                    |                             |
|                              |                    | Matte             | 2-435053-5         | Slotted Pc Board <sup>3</sup> , Rotation Stops 0-1   |                    |                             |
|                              |                    | Glossy            | 435053-9           | None   |                    |                             |
|                              |                    | Matte             | 1-435053-0         | None   |                    |                             |
|                              |                    | Glossy            | _____ <sup>5</sup> | Wht. Wheel, Blk. Characters                          |                    |                             |
|                              |                    | Matte             | _____ <sup>5</sup> | Wht. Wheel, Blk. Characters                          |                    |                             |

## 10 Position BCD Complement (Truth Table 4)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features |
|------------------------------|--------------|----------------|-------------|------------------|
| None <sup>2</sup>            | Short        | Glossy         | 435287-1    | None             |
|                              |              | Matte          | 435287-2    | None             |
|                              |              | Matte          | 435287-5    | Decimal Point    |
|                              | Long         | Glossy         | 435287-3    | None             |
|                              |              | Matte          | 435287-4    | None             |

## 10 Position BCD with Complement (Truth Table 5)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features   |
|------------------------------|--------------|----------------|-------------|--------------------|
| None <sup>4</sup>            | Short        | Glossy         | 435288-1    | None               |
|                              |              | Matte          | 435288-2    | None               |
|                              |              | Matte          | 435288-7    | Rotation Stops 0-3 |
|                              |              | Matte          | 435288-5    | Rotation Stops 0-4 |
|                              | Long         | Matte          | 435288-6    | Protective Window  |
|                              |              | Glossy         | 435288-3    | None               |
|                              |              | Matte          | 435288-4    | None               |

<sup>1</sup>CIS "F" posts are applied by AMP.

<sup>2</sup>Switches with no I/O contacts, except switches **2-435053-1** & **2-435053-3**, will mate with AMP pc connectors having contacts on .156 [3.96] centers. Refer to page 4 for details.

<sup>3</sup>Switches **2-435053-4** & **2-435053-5** with slotted pc boards accept AMP EDGE terminals. Refer to page 4 for details.

<sup>4</sup>Switches with no I/O contacts will mate with AMP pc connectors having contacts on .100 [2.54] centers.

Refer to page 20-35 for details.

<sup>5</sup>Consult AMP Incorporated, Harrisburg, Pa.

<sup>6</sup>Switch **2-435053-2** has lands exiting pc board at 90°.



# .500 [12.7] Standard Thumbwheel Switch Specifications (Cont'd)

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

## 10 Position BCD with Separate Common to Complement (Truth Table 6)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features              |
|------------------------------|--------------|----------------|-------------|-------------------------------|
| None <sup>2</sup>            | Short        | Glossy         | 435286-1    | None                          |
|                              |              | Matte          | 435286-2    | None                          |
|                              |              | Matte          | 435286-5    | Slotted Pc Board <sup>3</sup> |
|                              |              | Matte          | 435286-6    | Decimal Point                 |
|                              |              | Glossy         | 435286-8    | Protective Window             |
|                              |              | Matte          | 435286-7    | Rotation Stops 0-1            |
|                              |              | Matte          | 435286-9    | Rotation Stops 0-2            |
|                              |              | Matte          | 1-435286-0  | None                          |
|                              | Long         | Glossy         | 435286-3    | None                          |
|                              |              | Matte          | 435286-4    | None                          |

## 10 Position BCD 9's Complement (Truth Table 7)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number        | Special Features            |
|------------------------------|--------------|----------------|--------------------|-----------------------------|
| "F" Posts <sup>1</sup>       | Short        | Matte          | 1-435169-0         | None                        |
|                              | Long         | Glossy         | 1-435169-1         | Protective Window           |
| None <sup>2</sup>            |              | Short          | Glossy             | 1-435169-2                  |
|                              | Glossy       |                | 435169-1           | None                        |
|                              | Matte        |                | 435169-2           | None                        |
|                              | Glossy       |                | _____ <sup>5</sup> | Wht. Wheel, Blk. Characters |
|                              | Matte        |                | _____ <sup>5</sup> | Wht. Wheel, Blk. Characters |
|                              | Matte        |                | 435169-5           | Special Wire Holes          |
|                              | Glossy       |                | 435169-6           | Decimal Point               |
|                              | Glossy       |                | 435169-9           | Protective Window           |
|                              | Long         | Glossy         | 435169-7           | None                        |
|                              |              | Matte          | 435169-8           | None                        |

## 10 Position BCD 9's Complement with Complement (Truth Table 8)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features |
|------------------------------|--------------|----------------|-------------|------------------|
| "F" Posts <sup>1</sup>       | Short        | Glossy         | 435264-5    | Decimal Point    |
|                              |              | Glossy         | 435264-6    | None             |
| None <sup>4</sup>            | Short        | Glossy         | 435264-1    | None             |
|                              |              | Matte          | 435264-2    | None             |
|                              | Long         | Glossy         | 435264-3    | None             |
|                              |              | Matte          | 435264-4    | None             |

<sup>1</sup>CIS "F" posts are applied by AMP.

<sup>2</sup>Switches with no I/O contacts, except switch **1-435286-0**, will mate with AMP pc connectors having contacts on .156 [3.96] centers. Switch **1-435286-0** mates with AMP pc connectors having contacts on .100 [2.54] centers. Refer to page 20-35 for details.

<sup>3</sup>Switch **435286-5** has a slot in pc board between commons.

<sup>4</sup>Switches with no I/O contacts will mate with AMP pc connectors having contacts on .100 [2.54] centers. Refer to page 20-35 for details.

<sup>5</sup>Consult AMP Incorporated, Harrisburg, Pa.

## .500 [12.7] Standard Thumbwheel Switch Specifications (Cont'd)

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

### 8 Position BCO (Truth Table 9)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features  |
|------------------------------|--------------|----------------|-------------|-------------------|
| None <sup>1</sup>            | Short        | Glossy         | 435289-1    | None              |
|                              |              | Matte          | 435289-2    | None              |
|                              | Long         | Glossy         | 435289-3    | None              |
|                              |              | Matte          | 435289-4    | None              |
|                              |              | Glossy         | 435289-5    | Protective Window |

### 8 Position BCO Complement (Truth Table 10)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features |
|------------------------------|--------------|----------------|-------------|------------------|
| None <sup>1</sup>            | Short        | Glossy         | 435290-1    | None             |
|                              |              | Matte          | 435290-2    | None             |
|                              | Long         | Glossy         | 435290-3    | None             |
|                              |              | Matte          | 435290-4    | None             |

### 8 Position BCO with Complement (Truth Table 11)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features |
|------------------------------|--------------|----------------|-------------|------------------|
| None <sup>2</sup>            | Short        | Glossy         | 435291-1    | None             |
|                              |              | Matte          | 435291-2    | None             |
|                              | Long         | Glossy         | 435291-3    | None             |
|                              |              | Matte          | 435291-4    | None             |

### 8 Position BCO with Separate Common to Complement (Truth Table 12)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features |
|------------------------------|--------------|----------------|-------------|------------------|
| None <sup>1</sup>            | Short        | Glossy         | 435292-1    | None             |
|                              |              | Matte          | 435292-2    | None             |
|                              | Long         | Glossy         | 435292-3    | None             |
|                              |              | Matte          | 435292-4    | None             |

### 10 Position + and -, Repeating (Truth Table 13)

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features                                  |
|------------------------------|--------------|----------------|-------------|---|
| None <sup>1</sup>            | Short        | Glossy         | 435283-1    | Protective Window                                 |
|                              |              | Matte          | 435283-2    | Protective Window                                 |
|                              |              | Glossy         | 435283-3    | Protective Window, Wheel Marking 1, 0, 1, 0, etc. |

<sup>1</sup>Switches with no I/O contacts will mate with AMP pc connectors having contacts on .156 [3.96] centers. Refer to page 20-35 for details.

<sup>2</sup>Switches with no I/O contacts will mate with AMP pc connectors having contacts on .100 [2.54] centers. Refer to page 20-35 for details.

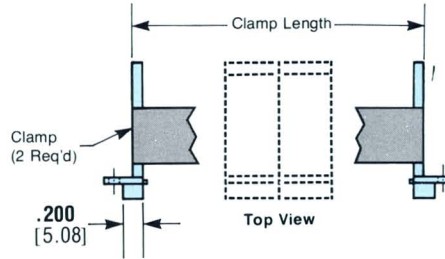


# .500 [12.7] Sealed & Enclosed Thumbwheel Switch Specifications

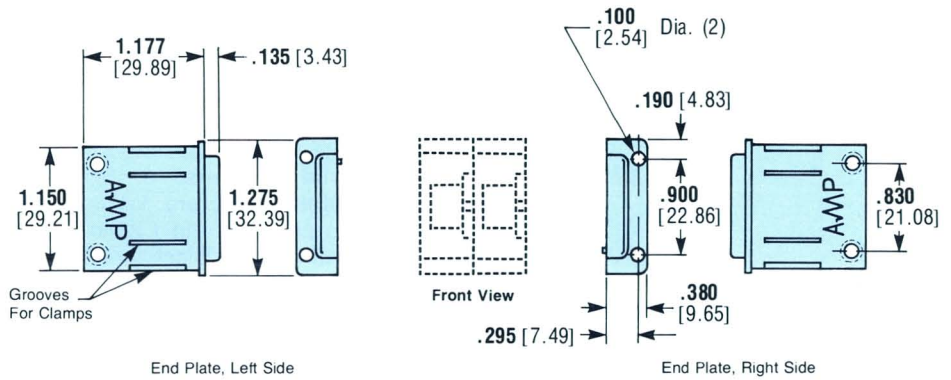
**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.



### Assembly Hardware



When switches are purchased as individual modules, assembly hardware must be ordered separately. Part numbers of the assembly hardware—end plates, clamps—are listed below. Part numbers of switch modules with various BCD outputs are provided on page 20-44. For complete details on selecting and ordering switches, refer to pages 20-30, 20-32.



**Material:**  
End Plates—Black polyester (matte finish)  
Clamps—.016 [0.41] thk. passivated stainless steel

**Note:** End plates used for the left- and right-hand sides of a switch assembly are identical.

| End Plate         | Finish | Part Number* |
|-------------------|--------|--------------|
| Left & Right Hand | Matte  | 435453-1     |

\*Part nos. are for end plates with mounting flange. End plates without mounting flange are available upon request.

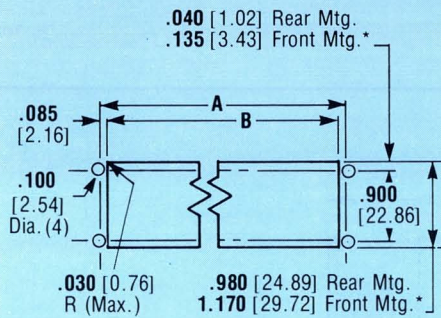
| No. of .500 [12.7] increments | Clamp |        | Part Number |
|-------------------------------|-------|--------|-------------|
|                               | Inch  | mm     |             |
| 1                             | .745  | 18.92  | 435337-1    |
| 2                             | 1.245 | 31.62  | 435337-2    |
| 3                             | 1.745 | 44.32  | 435337-3    |
| 4                             | 2.245 | 57.02  | 435337-4    |
| 5                             | 2.745 | 69.72  | 435337-5    |
| 6                             | 3.245 | 82.42  | 435337-6    |
| 7                             | 3.745 | 95.12  | 435337-7    |
| 8                             | 4.245 | 107.82 | 435337-8    |
| 9                             | 4.745 | 120.52 | 435337-9    |
| 10                            | 5.245 | 133.22 | 1-435337-0  |
| 11                            | 5.745 | 145.92 | 1-435337-1  |
| 12                            | 6.245 | 158.62 | 1-435337-2  |
| 13                            | 6.745 | 171.32 | 1-435337-3  |
| 14                            | 7.245 | 184.02 | 1-435337-4  |
| 15                            | 7.745 | 196.72 | 1-435337-5  |

**Note:** Fiberglass tape also available for assembled switch modules.

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

## .500 [12.7] Sealed & Enclosed Thumbwheel Switch Specifications (Cont'd)

### Dimensions



A Dim. = .590 [14.99] + Total Width of All Modules  
B Dim. = .420 [10.67] + Total Width of All Modules

\*Housings & End Plates Must Have Mounting Flanges.

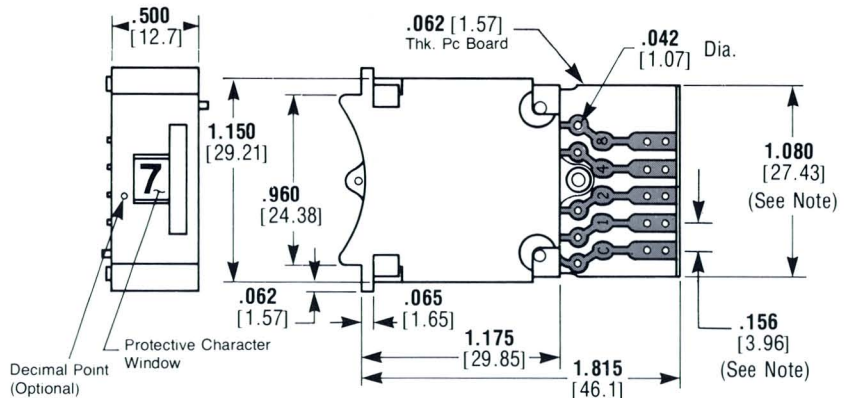
### Suggested Panel Cutout

### Electrical

### Mechanical

### Environmental (MIL-STD-202)

### Part Numbers



**Note:** 10 position BCD switch shown for illustration purposes only. Dimensions are also typical for switch with BCD 9's complement with complement output, except that board width is 1.146 [29.11] and board pad centerline is .100 [2.54].

**Outputs:** BCD. Other codes also available.

**Contact Resistance (pad-to-pad):** .1 ohm (max.)

**Current Rating:** 3 amperes (continuous); .125 ampere (switching)

**Insulation Resistance (74°F [23.3°C], sea level):**  $1 \times 10^9$  ohms (min.)

**Dielectric Withstanding Voltage:** 500 VDC (min.)

**Capacitance (between any two conductors):** 5 pf (max.)

**Wheel/Dial Positions:** 10, standard. Other variations available.

**Wheel/Dial Characters:** White, gothic style, .18" [4.57 mm] high (max.)

**Operating Force:** .4 to 1.25 lb. [1.78 to 5.56 N]

**Structural Plastic:** Black, polyester (matte finish)

**Protective Character Window:** Clear polycarbonate

**Printed Circuit Boards:** Flame retardant glass epoxy laminate

**Contacts:** Gold-over-nickel plated phosphor bronze

**Detent Spring:** Phosphor bronze

**Life:** 500,000 detent operations (MIL-STD-202, Method 106)

**Temperature:** -55°C to +85°C (Method 107, Condition A)

**Shock:** 10 microsecond contact opening (max.) (Method 213, 100 G sawtooth pulse)

**Vibration:** 10 microsecond contact opening (max.) (Method 204, 10 to 500 Hz, .06 double amplitude)

**Altitude:** 70,000 ft. [21 336 m] (Method 105, Condition C)

(Sealed Switch Only)

**Seal:** MIL-S-22710, Paragraph 4.8.14.1

**Moisture Resistance:** 25 megohms (min.) (Method 106)

**Sand and Dust:** Method 110, Condition B

**Explosion:** Method 109

**Salt Spray:** Method 101, Condition B

**435452-2**—Output code is 10 position BCD (Truth Table 3). Switch (with no I/O contacts) will mate with AMP pc connectors having contacts on .156 [3.96] centers. Refer to page 20-35 for details.

**435526-1**—Output code is 10 position BCD 9's Complement with Complement (Truth Table 8). Switch (with no I/O contacts) will mate with AMP pc connectors having contacts on .100 [2.54] centers. Refer to page 20-35 for details.

The switch configurations specified above are intended to be representative, and should not be considered the only ones available from AMP. A wide range of options regarding output codes, finishes, wheel markings, module markings, pc board lengths and contacts mounted on the switch pc boards for interconnection can

be made available upon request. Refer to page 20-30 for full details on how to order the switch of your choice.

Truth tables for the output codes of the .500 [12.7] sealed and enclosed thumbwheel switches are presented on page 20-51, tables 3 and 8.

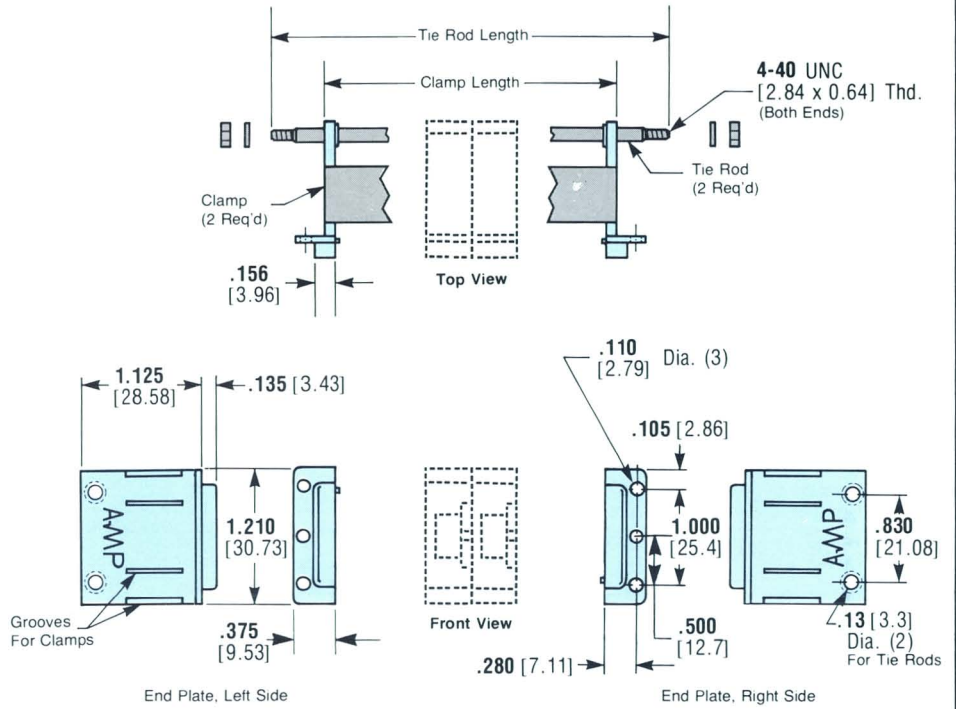


# .350 [8.89] Thumbwheel Switch Specifications

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.



### Assembly Hardware



When switches are purchased as individual modules, assembly hardware must be ordered separately. Part numbers of the assembly hardware — end plates, tie rods, clamps — are listed below. Part numbers of switch modules with various decimal and BCD outputs are provided on pages 20-47 and 20-48. For complete details on selecting and ordering switches, refer to pages 20-30, 20-31 and 20-32.

**Material:**  
End Plates — Black polycarbonate (glossy finish)  
Black NORYL† (matte finish)  
Tie Rods — Passivated stainless steel  
Clamps — .016 [0.41] thk. passivated stainless steel

**Note:** End plates used for the left- and right-hand sides of a switch assembly are identical.

| End Plate    | Finish | Part Number* |
|--------------|--------|--------------|
| Left & Right | Glossy | 435245-1     |
| Hand         | Matte  | 435245-2     |

\*Part nos. are for end plates without mounting flange.

| No. of<br>.350 [8.89]<br>increments | Tie Rod** |        | Clamp  |        | Part Number |
|-------------------------------------|-----------|--------|--------|--------|-------------|
|                                     | Length    |        | Length |        |             |
|                                     | Inch      | mm     | Inch   | mm     |             |
| 1                                   | .70       | 17.78  | .545   | 13.84  | 5-435337-1  |
| 2                                   | 1.05      | 26.67  | .895   | 22.73  | 5-435337-2  |
| 3                                   | 1.40      | 35.56  | 1.245  | 31.62  | 435337-2    |
| 4                                   | 1.75      | 44.45  | 1.595  | 40.51  | 5-435337-3  |
| 5                                   | 2.10      | 53.34  | 1.945  | 49.4   | 5-435337-4  |
| 6                                   | 2.45      | 62.23  | 2.295  | 58.29  | 5-435337-5  |
| 7                                   | 2.80      | 71.12  | 2.645  | 67.18  | 5-435337-6  |
| 8                                   | 3.15      | 80.01  | 2.995  | 76.09  | 5-435337-7  |
| 9                                   | 3.50      | 88.9   | 3.345  | 84.96  | 5-435337-8  |
| 10                                  | 3.85      | 97.79  | 3.695  | 93.85  | 5-435337-9  |
| 11                                  | 4.20      | 106.68 | 4.045  | 102.74 | 6-435337-0  |
| 12                                  | 4.55      | 115.57 | 4.395  | 111.63 | 6-435337-1  |
| 13                                  | 4.90      | 124.46 | 4.745  | 120.52 | 435337-9    |
| 14                                  | 5.25      | 133.35 | 5.095  | 129.41 | 6-435337-2  |
| 15                                  | 5.60      | 142.24 | 5.445  | 138.31 | 6-435337-3  |
| 16                                  | 5.95      | 151.13 | —      | —      | —           |
| 17                                  | 6.30      | 160.02 | —      | —      | —           |
| 23                                  | 8.40      | 213.36 | —      | —      | —           |

\*\*Part nos. are for one tie rod only; two are required per assembly. Also, two #4 lock washers (22964-2) and # 4-40 [2.84 x 0.64] nuts (21124-6) must be ordered separately for each tie rod.

**Note:** Fiberglass tape also available for assembled switch modules.

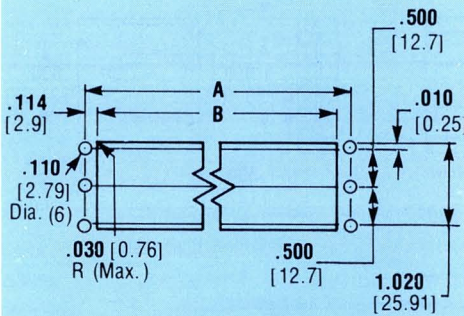
**Dimensioning:**

All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

## .350 [8.89]

### Thumbwheel Switch Specifications (Cont'd)

#### Dimensions



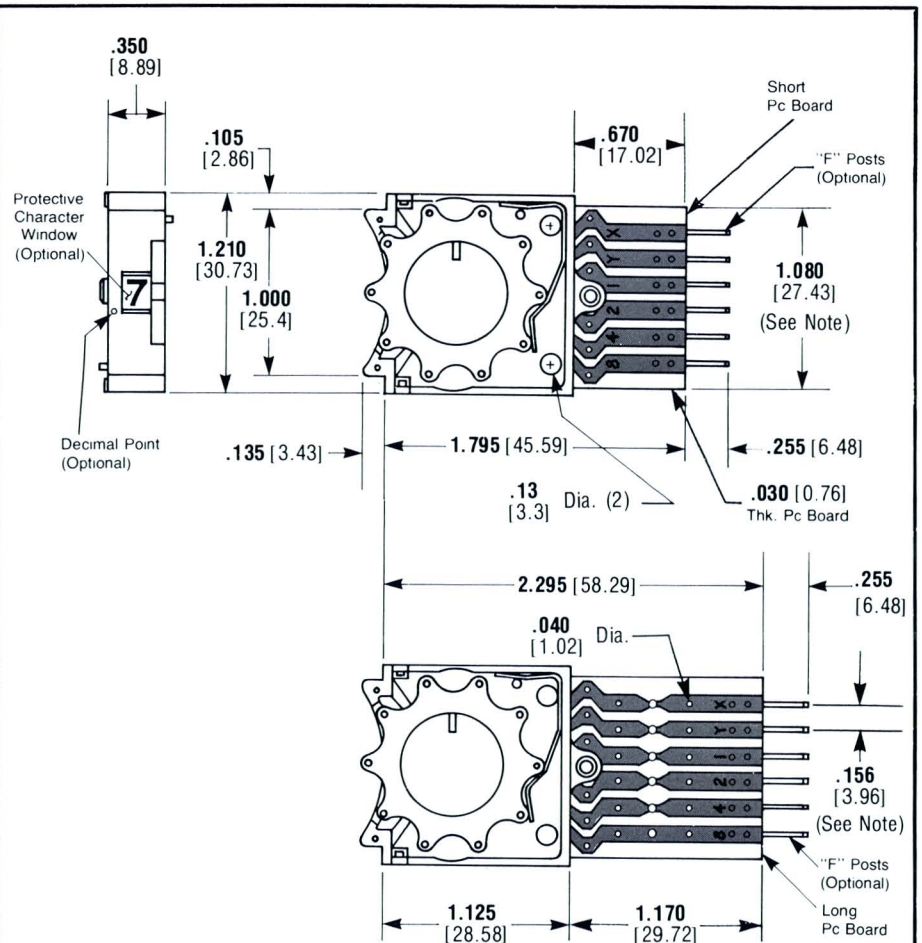
A Dim. = .560 [14.22] + Total Width of All Modules  
B Dim. = .332 [8.43] + Total Width of All Modules

#### Suggested Panel Cutout

#### Electrical

#### Mechanical

#### Environmental (MIL-STD-202)



**Note:** 10 position BCD switch with separate common to complement shown for illustration purposes only. Dimensions are also typical for decimal and other BCD switches, except as follows:

|   |             |                            |             |
|---|-------------|----------------------------|-------------|
| 1.146 [29.11]                           | .100 [2.54] | 1.080 [27.43]              | .156 [3.96] |
| Board Width                             | ¢           | Board Width                | ¢           |
| 10 Pos. Decimal                         |             | 10 Pos. BCD                |             |
| 10 Pos. BCD w/Complement                |             | 10 Pos. + and -, Repeating |             |
| 10 Pos. BCD 9's Complement w/Complement |             |                            |             |

**Outputs:** Decimal and BCD. Other codes also available.

**Contact Resistance (pad-to-pad):** .1 ohm (max.)

**Current Rating:** 3 amperes (continuous); .125 ampere (switching)

**Insulation Resistance (74°F [23.3°C], sea level):** 1 x 10<sup>9</sup> ohms (min.)

**Dielectric Withstanding Voltage:** 500 VCD (min.)

**Capacitance (between any two conductors):** 5 pf (max.)

**Wheel/Dial Positions:** 10, standard. Other variations available.

**Wheel/Dial Characters:** White, gothic style, .18" [4.57 mm] high (max.)

**Operating Force:** .4 to 1.25 [1.78 to 5.56 N]

**Structural Plastic:** Black, polycarbonate (glossy finish) or NORYL† (matte finish)

**Protective Character Window:** Clear polycarbonate

**Printed Circuit Boards:** Flame retardant, glass epoxy laminate

**Contacts:** Gold-over-nickel plated phosphor bronze

**Detent Spring:** Phosphor bronze

**Life:** 1,000,000 detent operations (min.)

**Temperature:** -40°F to +190°F [-40°C to +87.7°C]

**Shock:** 25 G in all planes

**Vibration:** 10-2000 Hz (Method 204B, Condition B)



**.350 [8.89]  
Thumbwheel Switch  
Specifications (Cont'd)**

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

The switch configurations tabulated in the following charts are intended to be representative, and should not be considered the only ones available from AMP. A wide range of options regarding output codes, finishes, wheel markings, module markings, pc board lengths and contacts mounted on the

switch pc boards for interconnection can be made available upon request. Refer to page 20-30 for full details on how to order the switch of your choice.

Truth tables for the output codes of the .350 [8.89] thumbwheel switches are presented on page 20-51, tables 1 thru 13.

**10 Position Decimal  
(Truth Table 1)**

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features               |
|------------------------------|--------------|----------------|-------------|--------------------------------|
| "F" Posts <sup>1</sup>       | Short        | Glossy         | 435307-5    | None                           |
|                              |              | Matte          | 435307-6    | None                           |
|                              | Long         | Glossy         | 435307-7    | None                           |
|                              |              | Matte          | 435307-8    | None                           |
| None                         | Short        | Glossy         | 435307-1    | None                           |
|                              |              | Matte          | 435307-2    | None                           |
|                              |              | Matte          | 435307-9    | Overall Length = 1.645 [41.78] |
|                              | Long         | Glossy         | 435307-3    | None                           |
|                              |              | Matte          | 435307-4    | None                           |

**10 Position BCD  
(Truth Table 3)**

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features |
|------------------------------|--------------|----------------|-------------|------------------|
| "F" Posts <sup>1</sup>       | Short        | Glossy         | 435308-5    | None             |
|                              |              | Matte          | 435308-6    | None             |
|                              | Long         | Glossy         | 435308-7    | None             |
|                              |              | Matte          | 435308-8    | None             |
| None                         | Short        | Glossy         | 435308-1    | None             |
|                              |              | Matte          | 435308-2    | None             |
|                              | Long         | Glossy         | 435308-3    | None             |
|                              |              | Matte          | 435308-4    | None             |

<sup>1</sup>CIS "F" posts are applied by AMP.

**.350 [8.89]  
Thumbwheel Switch  
Specifications (Cont'd)**

Dimensioning:  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

**10 Position BCD with Complement  
(Truth Table 5)**

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features   |
|------------------------------|--------------|----------------|-------------|--------------------|
| 'F' Posts <sup>1</sup>       | Long         | Matte          | 435414-3    | None               |
|                              |              | Glossy         | 435414-1    | None               |
| None                         | Short        | Glossy         | 435414-2    | Rotation Stops 0-1 |
|                              |              | Matte          |             |                    |

**10 Position BCD with Separate  
Common to Complement  
(Truth Table 6)**

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features   |
|------------------------------|--------------|----------------|-------------|--------------------|
| 'F' Posts <sup>1</sup>       | Short        | Glossy         | 435517-5    | None               |
|                              |              | Matte          | 435517-6    | None               |
|                              | Long         | Glossy         | 435517-7    | None               |
|                              |              | Matte          | 435517-8    | None               |
| None                         | Short        | Glossy         | 435517-1    | None               |
|                              |              | Matte          | 435517-2    | None               |
|                              | Long         | Matte          | 435517-9    | Rotation Stops 0-7 |
|                              |              | Glossy         | 435517-3    | None               |
|                              |              | Matte          | 435517-4    | None               |
|                              |              |                |             |                    |

**10 Position BCD 9's Complement  
with Complement  
(Truth Table 8)**

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features |
|------------------------------|--------------|----------------|-------------|------------------|
| None                         | Short        | Glossy         | 435490-1    | None             |
|                              |              | Matte          | 435490-2    | None             |

**10 Position + and -, Repeating  
(Truth Table 13)**

| Contacts Mounted on Pc Board | Board Length | Housing Finish | Part Number | Special Features |
|------------------------------|--------------|----------------|-------------|------------------|
| None                         | Short        | Glossy         | 435523-1    | None             |
|                              |              | Matte          | 435523-2    | None             |

<sup>1</sup>CIS "F" posts are applied by AMP.

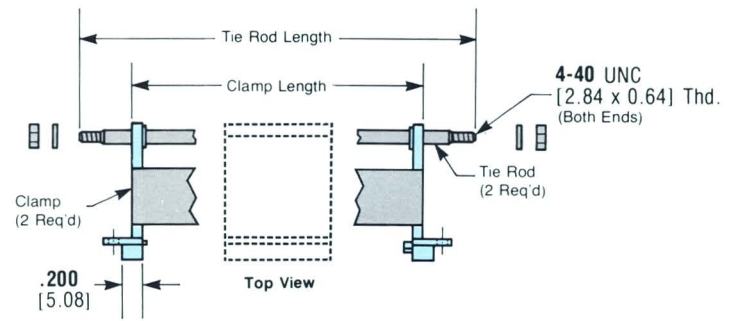


# Message Thumbwheel Switch Specifications

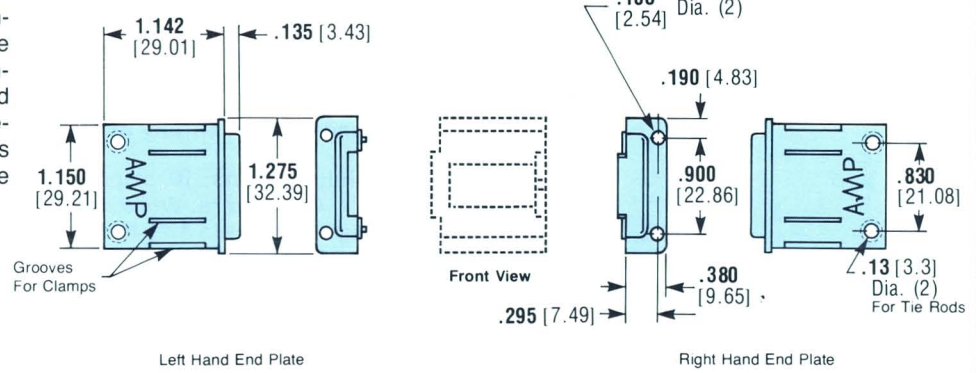
**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.



### Assembly Hardware



When switches are purchased as individual modules, assembly hardware must be ordered separately. Part numbers of the assembly hardware—end plates, tie rods, clamps—are listed below. Part numbers of switch modules with BCD output are provided on page 20-50. For complete details on selecting and ordering switches, refer to pages 20-30, 20-32 and 20-33.



**Material:**  
End Plates—Black polycarbonate (glossy finish)  
Black polyester (matte finish)  
Tie Rods—Passivated stainless steel  
Clamps—.016 [0.41] thk. passivated stainless steel

**Note:** Corresponding dimensions are the same for both left- and right-hand end plates.

| End Plate  | Finish | Part Number* |
|------------|--------|--------------|
| Left Hand  | Glossy | 2-435016-1   |
|            | Matte  | 2-435016-2   |
| Right Hand | Glossy | 4-435016-1   |
|            | Matte  | 4-435016-2   |

\*Part nos. are for end plates with mounting flange. End plates without mounting flange are available upon request.

| No. of<br>.500 [12.7]<br>increments | Tie Rod** |        |             | Clamp  |        |             |
|-------------------------------------|-----------|--------|-------------|--------|--------|-------------|
|                                     | Length    |        | Part Number | Length |        | Part Number |
| Inch                                | mm        | Inch   |             | mm     |        |             |
| 2                                   | 1.40      | 35.56  | 435017-2    | 1.245  | 31.62  | 435337-2    |
| 3                                   | 1.90      | 48.26  | 435017-3    | 1.745  | 44.32  | 435337-3    |
| 4                                   | 2.40      | 60.96  | 435017-4    | 2.245  | 57.02  | 435337-4    |
| 5                                   | 2.90      | 73.66  | 435017-5    | 2.745  | 69.72  | 435337-5    |
| 5.5                                 | 3.15      | 80.01  | 5-435017-7  | —      | —      | —           |
| 6                                   | 3.40      | 86.36  | 435017-6    | 3.245  | 82.42  | 435337-6    |
| 7                                   | 3.90      | 99.06  | 435017-7    | 3.745  | 95.12  | 435337-7    |
| 8                                   | 4.40      | 111.76 | 435017-8    | 4.245  | 107.82 | 435337-8    |
| 9                                   | 4.90      | 124.46 | 435017-9    | 4.745  | 120.52 | 435337-9    |
| 10                                  | 5.40      | 137.16 | 1-435017-0  | 5.245  | 133.22 | 1-435337-0  |
| 11                                  | 5.90      | 149.86 | 1-435017-1  | 5.745  | 145.92 | 1-435337-1  |
| 12                                  | 6.40      | 162.56 | 1-435017-2  | 6.245  | 158.62 | 1-435337-2  |
| 13                                  | 6.90      | 175.26 | 1-435017-3  | 6.745  | 171.32 | 1-435337-3  |
| 13.5                                | 7.15      | 181.61 | 1-435017-7  | —      | —      | —           |
| 14                                  | 7.40      | 187.96 | 1-435017-4  | 7.245  | 184.02 | 1-435337-4  |
| 14.5                                | 7.65      | 194.31 | 1-435017-6  | —      | —      | —           |
| 15                                  | 7.90      | 200.66 | 1-435017-5  | 7.745  | 196.72 | 1-435337-5  |
| 16                                  | 8.40      | 213.36 | 1-435017-8  | —      | —      | —           |
| 17                                  | 8.90      | 226.06 | 1-435017-9  | —      | —      | —           |
| 19.5                                | —         | —      | —           | 9.995  | 253.87 | 1-435337-8  |

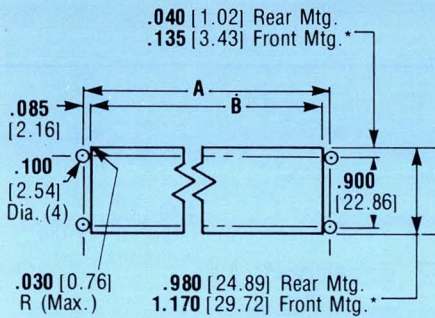
\*\*Part nos. are for one tie rod only; two are required per assembly. Also, two #4 lock washers (22964-2) and #4-40 [2.84 x 0.64] nuts (21124-6) must be ordered separately for each tie rod.

**Note:** Fiberglass tape also available for assembled switch modules.

**Dimensioning:**  
All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

## Message Thumbwheel Switch Specifications (Cont'd)

### Dimensions



A Dim. - .590 [14.99] + Total Width of All Modules  
B Dim. - .420 [10.67] + Total Width of All Modules

\*Housings & End Plates Must Have Mounting Flanges.

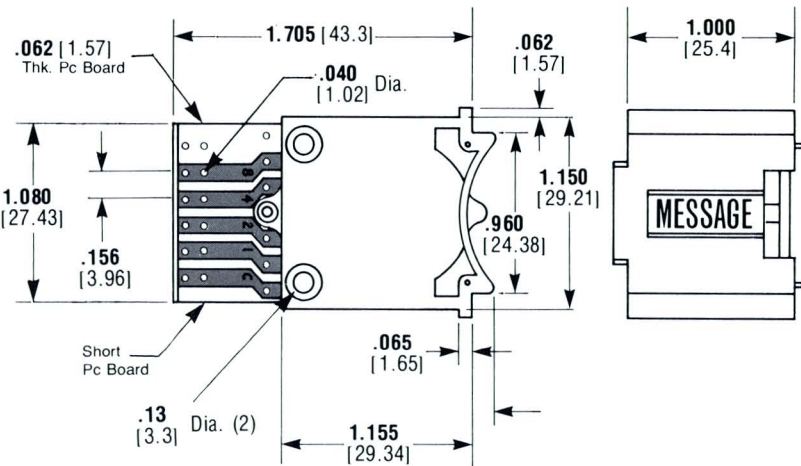
### Suggested Panel Cutout

### Electrical

### Mechanical

### Environmental (MIL-STD-202)

### Part Numbers



Note: 10 position BCD switch shown for illustration purposes only.

- Outputs:** BCD. Other codes also available.
- Contact Resistance (pad-to-pad):** .1 ohm (max.)
- Current Rating:** 3 amperes (continuous); .125 ampere (switching)
- Insulation Resistance (74°F [23.3°C], sea level):** 1 x 10<sup>9</sup> ohms (min.)
- Dielectric Withstanding Voltage:** 500 VDC (min.)
- Capacitance (between any two conductors):** 5 pf (max.)

- Wheel/Dial Positions:** 10, standard. Other variations available.
- Wheel/Dial Characters:** White, gothic style, .19" [4.83 mm] high (max.)
- Operating Force:** .4 to 1.25 lb. [1.78 to 5.56 N]
- Structural Plastic:** Black, polyester (matte finish)
- Protective Character Window:** Clear polycarbonate
- Printed Circuit Boards:** Flame retardant glass epoxy laminate
- Contacts:** Gold-over-nickel phosphor bronze
- Detent Spring:** Phosphor bronze
- Life:** 1,000,000 detent operations

- Temperature:** -40°F to +190°F [-40°C to +87.8°C]
- Shock:** 25 G in all planes
- Vibration:** 10-2000 Hz (Method 204B, Condition B)

**435415-1**—Output code is 10 position BCD (Truth Table 3). Switch has a special pc board and will not mate with AMP pc connectors. Dial messages for this particular switch are:

| Dial Position | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9 |
|---------------|------|------|------|------|------|------|------|------|------|---|
| Dial Message  | NORM | NORM | NORM | NORM | AUTO | AUTO | AUTO | AUTO | LAMP |   |
|               | +MTR | -MTR | +FT  | -FT  | +MTR | -MTR | +FT  | -FT  | TEST |   |

**435415-2**—Output code is 10 position BCD (Truth Table 3). Switch has a special pc board and will not mate with AMP pc connectors. Special feature also includes four 1N4148 diodes mounted on switch pc board. Dial messages for this particular switch are:

| Dial Position | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9 |
|---------------|------|------|------|------|------|------|------|------|------|---|
| Dial Message  | NORM | NORM | NORM | NORM | AUTO | AUTO | AUTO | AUTO | LAMP |   |
|               | +MTR | -MTR | +FT  | -FT  | +MTR | -MTR | +FT  | -FT  | TEST |   |

The switch configurations specified above are intended to be representative, and should not be considered the only ones available from AMP. A wide range of options regarding output codes, finishes, wheel markings, module markings, pc board lengths and contacts mounted on the switch pc boards for interconnection can be made available

upon request. Refer to page 20-30 for full details on how to order the switch of your choice.

The truth table for the output code (10 position BCD) of the message thumbwheel switch is presented on page 20-51, table 3.



# Thumbwheel Switch Truth Tables

**Table 1.**  
10 Pos. Decimal

| Dial Position | Common to: |   |   |   |   |   |   |   |   |   |
|---------------|------------|---|---|---|---|---|---|---|---|---|
|               | 0          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0             | ●          |   |   |   |   |   |   |   |   |   |
| 1             |            | ● |   |   |   |   |   |   |   |   |
| 2             |            |   | ● |   |   |   |   |   |   |   |
| 3             |            |   |   | ● |   |   |   |   |   |   |
| 4             |            |   |   |   | ● |   |   |   |   |   |
| 5             |            |   |   |   |   | ● |   |   |   |   |
| 6             |            |   |   |   |   |   | ● |   |   |   |
| 7             |            |   |   |   |   |   |   | ● |   |   |
| 8             |            |   |   |   |   |   |   |   | ● |   |
| 9             |            |   |   |   |   |   |   |   |   | ● |

**Table 2.**  
8 Pos. Decimal

| Dial Position | Common to: |   |   |   |   |   |   |   |
|---------------|------------|---|---|---|---|---|---|---|
|               | 0          | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 0             | ●          |   |   |   |   |   |   |   |
| 1             |            | ● |   |   |   |   |   |   |
| 2             |            |   | ● |   |   |   |   |   |
| 3             |            |   |   | ● |   |   |   |   |
| 4             |            |   |   |   | ● |   |   |   |
| 5             |            |   |   |   |   | ● |   |   |
| 6             |            |   |   |   |   |   | ● |   |
| 7             |            |   |   |   |   |   |   | ● |

**Table 3.**  
10 Pos. BCD

| Dial Position | Common to: |   |   |   |
|---------------|------------|---|---|---|
|               | 1          | 2 | 4 | 8 |
| 0             |            |   |   |   |
| 1             | ●          |   |   |   |
| 2             |            | ● |   |   |
| 3             | ●          | ● |   |   |
| 4             |            |   | ● |   |
| 5             | ●          | ● | ● |   |
| 6             | ●          | ● | ● | ● |
| 7             | ●          | ● | ● | ● |
| 8             |            |   |   | ● |
| 9             | ●          | ● |   | ● |

**Table 4.**  
10 Pos. BCD Complement

| Dial Position | Common to: |           |           |           |
|---------------|------------|-----------|-----------|-----------|
|               | $\bar{1}$  | $\bar{2}$ | $\bar{4}$ | $\bar{8}$ |
| 0             | ●          | ●         | ●         | ●         |
| 1             |            | ●         | ●         | ●         |
| 2             | ●          |           | ●         | ●         |
| 3             |            | ●         |           | ●         |
| 4             | ●          | ●         |           | ●         |
| 5             |            | ●         | ●         | ●         |
| 6             | ●          |           | ●         | ●         |
| 7             |            | ●         |           | ●         |
| 8             | ●          | ●         | ●         |           |
| 9             |            | ●         | ●         |           |

**Table 5.**  
10 Pos. BCD w/Complement

| Dial Position | Common to: |   |   |   |           |           |           |           |  |  |
|---------------|------------|---|---|---|-----------|-----------|-----------|-----------|--|--|
|               | 1          | 2 | 4 | 8 | $\bar{1}$ | $\bar{2}$ | $\bar{4}$ | $\bar{8}$ |  |  |
| 0             |            |   |   |   | ●         | ●         | ●         | ●         |  |  |
| 1             | ●          |   |   |   |           | ●         | ●         | ●         |  |  |
| 2             |            | ● |   |   |           |           | ●         | ●         |  |  |
| 3             | ●          | ● |   |   |           |           |           | ●         |  |  |
| 4             |            |   | ● |   |           |           |           | ●         |  |  |
| 5             | ●          | ● | ● |   |           |           |           | ●         |  |  |
| 6             |            | ● | ● | ● |           |           |           | ●         |  |  |
| 7             | ●          | ● | ● | ● |           |           |           | ●         |  |  |
| 8             |            |   | ● | ● | ●         | ●         |           | ●         |  |  |
| 9             | ●          |   | ● | ● | ●         | ●         |           | ●         |  |  |

**Table 6.**  
10 Pos. BCD w/Separate Common to Complement

Common X to ●  
Common Y to ○

| Dial Position | Common to: |   |   |   |
|---------------|------------|---|---|---|
|               | 1          | 2 | 4 | 8 |
| 0             | ○          | ○ | ○ | ○ |
| 1             | ●          | ○ | ○ | ○ |
| 2             | ○          | ● | ○ | ○ |
| 3             | ●          | ● | ○ | ○ |
| 4             | ○          | ○ | ● | ○ |
| 5             | ●          | ○ | ● | ○ |
| 6             | ○          | ● | ● | ○ |
| 7             | ●          | ● | ● | ○ |
| 8             | ○          | ○ | ○ | ○ |
| 9             | ●          | ○ | ○ | ○ |

**Table 7.**  
10 Pos. BCD 9's Complement

| Dial Position | Common to: |   |   |   |
|---------------|------------|---|---|---|
|               | 1          | 2 | 4 | 8 |
| 0             | ●          |   |   |   |
| 1             |            |   |   | ● |
| 2             | ●          | ● | ● |   |
| 3             |            | ● | ● |   |
| 4             | ●          |   | ● |   |
| 5             |            |   |   | ● |
| 6             | ●          | ● |   |   |
| 7             |            |   |   | ● |
| 8             | ●          |   |   |   |
| 9             |            |   |   |   |

**Table 8.**  
10 Pos. BCD 9's Complement w/Complement

| Dial Position | Common to: |   |   |   |           |           |           |           |  |  |
|---------------|------------|---|---|---|-----------|-----------|-----------|-----------|--|--|
|               | 1          | 2 | 4 | 8 | $\bar{1}$ | $\bar{2}$ | $\bar{4}$ | $\bar{8}$ |  |  |
| 0             | ●          |   |   |   | ●         | ●         | ●         | ●         |  |  |
| 1             |            |   |   |   | ●         | ●         | ●         | ●         |  |  |
| 2             | ●          | ● | ● |   |           |           |           | ●         |  |  |
| 3             |            | ● | ● |   | ●         | ●         | ●         | ●         |  |  |
| 4             | ●          |   | ● |   | ●         | ●         | ●         | ●         |  |  |
| 5             |            |   |   |   | ●         | ●         | ●         | ●         |  |  |
| 6             | ●          | ● |   |   |           |           |           | ●         |  |  |
| 7             |            |   |   |   | ●         | ●         | ●         | ●         |  |  |
| 8             | ●          |   |   |   |           |           |           | ●         |  |  |
| 9             |            |   |   |   | ●         | ●         | ●         | ●         |  |  |

**Table 9.**  
8 Pos. BCO

| Dial Position | Common to: |   |   |
|---------------|------------|---|---|
|               | 1          | 2 | 4 |
| 0             |            |   |   |
| 1             | ●          |   |   |
| 2             |            | ● |   |
| 3             | ●          | ● |   |
| 4             |            |   | ● |
| 5             | ●          | ● |   |
| 6             |            | ● | ● |
| 7             | ●          | ● | ● |

**Table 10.**  
8 Pos. BCO Complement

| Dial Position | Common to: |           |           |  |
|---------------|------------|-----------|-----------|--|
|               | $\bar{1}$  | $\bar{2}$ | $\bar{4}$ |  |
| 0             | ●          | ●         | ●         |  |
| 1             |            | ●         | ●         |  |
| 2             | ●          |           | ●         |  |
| 3             |            | ●         |           |  |
| 4             | ●          | ●         |           |  |
| 5             |            |           | ●         |  |
| 6             | ●          |           |           |  |
| 7             |            |           |           |  |

**Table 11.**  
8 Pos. BCO w/Complement

| Dial Position | Common to: |   |   |           |           |           |  |  |
|---------------|------------|---|---|-----------|-----------|-----------|--|--|
|               | 1          | 2 | 4 | $\bar{1}$ | $\bar{2}$ | $\bar{4}$ |  |  |
| 0             |            |   |   | ●         | ●         | ●         |  |  |
| 1             | ●          |   |   | ●         | ●         | ●         |  |  |
| 2             |            | ● |   | ●         | ●         | ●         |  |  |
| 3             | ●          | ● |   |           |           | ●         |  |  |
| 4             |            |   | ● | ●         | ●         | ●         |  |  |
| 5             | ●          | ● | ● |           |           | ●         |  |  |
| 6             |            | ● | ● |           |           | ●         |  |  |
| 7             | ●          | ● | ● |           |           | ●         |  |  |

**Table 12.**  
8 Pos. BCO w/Separate Common to Complement

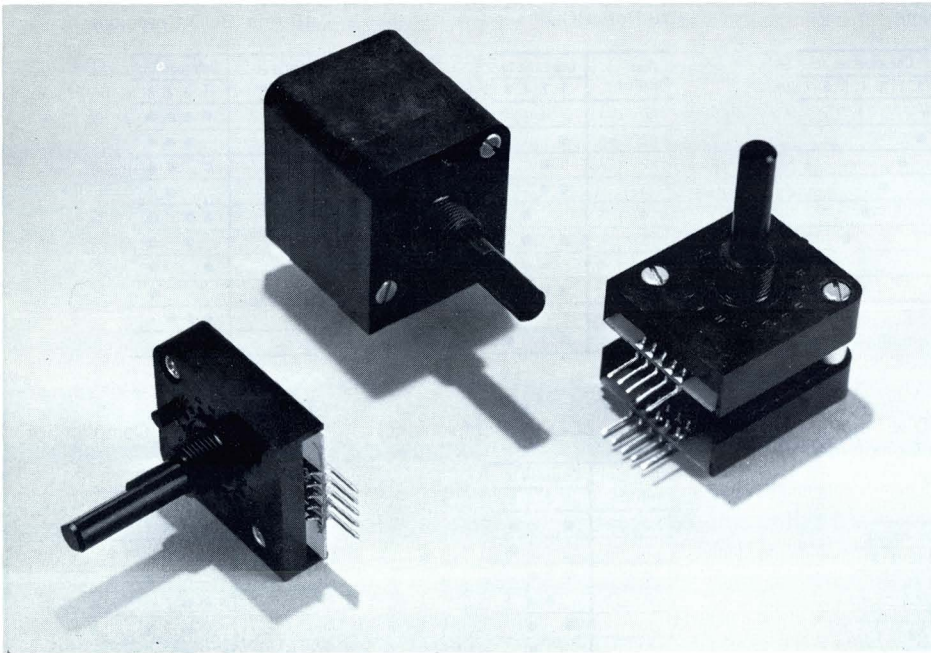
Common X to ●  
Common Y to ○

| Dial Position | Common to: |   |   |
|---------------|------------|---|---|
|               | 1          | 2 | 4 |
| 0             | ○          | ○ | ○ |
| 1             | ●          | ○ | ○ |
| 2             | ○          | ● | ○ |
| 3             | ●          | ● | ○ |
| 4             | ○          | ○ | ○ |
| 5             | ○          | ○ | ○ |
| 6             | ○          | ○ | ○ |
| 7             | ●          | ● | ● |

**Table 13.**  
10 Pos. + and -, Repeating (DPDT)

Common X to ●  
Common Y to ○

| Dial Position | Common to: |   |   |
|---------------|------------|---|---|
|               | +          | - | - |
| +             | ○          | ● |   |
| -             | ○          | ○ | ● |
| +             | ○          | ● |   |
| -             | ○          | ○ | ● |
| +             | ○          | ● |   |
| -             | ○          | ○ | ● |
| +             | ○          | ● |   |
| -             | ○          | ○ | ● |
| +             | ○          | ● |   |
| -             | ○          | ○ | ● |



### Multi-Layer Rotary Switch 3000 Series

#### Features

- **Code Flexibility** — Switch output capabilities include hexadecimal, hexadecimal complement and BCD, plus various other codes requiring a maximum of 17 contacts per switch layer.
- **Modular Stacking** — Switch layers can be stacked for multi-layer operation by a single actuator — without increasing mounting surface dimensions.
- **Optimum Reliability** — Ruggedly constructed switches consist of molded thermoplastic layers, durable acetal spring wheel and detents, brass or corrosion resistant steel hardware, and phosphor bronze contacts with gold-over-nickel plating.
- **Positive Switching** — Positive detent action of spring wheel and detents assure error-free operation.
- **Compact Design** — Switches require a minimum of front- or behind-panel mounting space.
- **Enclosed Contacts** — Contact surfaces are fully protected against dirt, dust and other environmental hazards.

**Note:** All dimensions in inches unless indicated otherwise.

**Specifications subject to change. Consult AMP Incorporated for latest design specifications.**

The AMP Multi-Layer Rotary Switch provides a highly reliable, low cost means of manually programming various types of electronic equipment. It is specifically designed for logic level circuitry but is capable of controlling electrical circuits that operate at current ratings of 2 amperes, 115 volts ac (nonswitching) and up to 125 milliamperes, 115 volts ac (switching). In addition, it also offers industry many distinct advantages, including: simplicity of design for inherent switching reliability, an extremely compact design that requires a minimum of front-panel or behind-panel mounting space, plus a progressive build-up capability which allows the addition of poles without increasing mounting surface dimensions.

This unique switching device is ruggedly constructed of molded thermoplastic layers that can be stacked for multi-pole switching by a common shaft and detent. Positive detent action with quick make/break operation is provided by the durable acetal spring wheel and detents which form

an integral part of the housing. All contact surfaces are fully enclosed within the housing, thus greatly reducing operational failures due to dirty contacts. The phosphor bronze contacts are gold-over-nickel plated.

Termination is normally through .022 x .025 "F" posts on .100 centers with spacing between layers of .300. Other termination methods can be made available similar to the AMP 5000 Series Thumbwheel Switch using AMP Modified Fork Pc connectors with crimp, snap-in contacts, posts that will accept wrap-type connections, AMPMODU receptacles and posts or various other AMP interconnection techniques. When required spacing between layers may be varied by adding spacers.

The typical Multi-Layer Rotary Switch is shown above. This is a hexadecimal complement coded switch with a 22-1/2° throw. Switches can be supplied with stops to limit rotation to less than 360° and with various other coded outputs requiring a maximum of seventeen contacts per layer.



Specifications

Electrical

**Circuit Current Rating:**  
 Nonswitching . . . . . 2A @ 115 VAC  
 Switching (Resistive Load) . . . . . 125 MA @ 115 VAC (Max.)  
**Initial Contact Resistance** (Measured from input terminal, thru contact to output terminal) . . . . . 100 Milliohms (Max.)  
**Insulation Resistance** (@ 250 VDC) . . . . .  $1 \times 10^8$  Ohms (Min.)  
**Dielectric Breakdown Voltage** . . . . . 300 VDC (Min.)

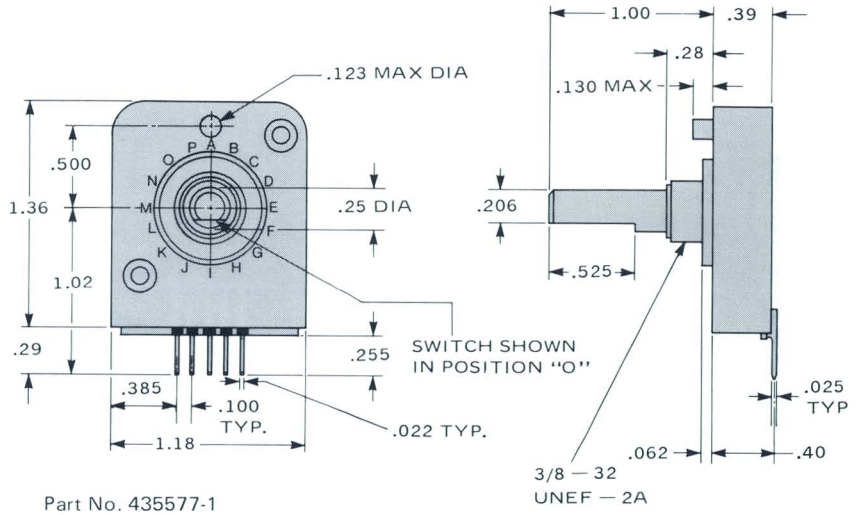
Physical and Environmental

**Contact Life Expectancy** . . . . . 25,000 Rotations @ Rated Load  
**Initial Operating Force** . . . . . 1 to 2 Inch/Lbs.  
**Operating Temperature** . . . . . -40°F to +190°F

Material

**Structural Parts** (Switch Layers) . . . . . Non-flammable ultramid  
**Operating Shaft and Detent** . . . . . Acetal  
**Printed Circuit Boards** . . . . . Glass epoxy, copper clad  
**Contacts** . . . . . Phosphor bronze, gold-over-nickel plated  
**Hardware** . . . . . Brass or corrosion resistant steel

Dimensional



NOTES:

- Knobs for operating switches are to be supplied by the customer.
- Stops for limiting switch rotation to less than 360° can be provided upon request.

| Circuit |        | Switch Position |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|---------|--------|-----------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| Input   | Output | 0               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| C       | 1      | X               | - | X | - | X | - | X | - | X | - | X  | -  | X  | -  | X  | -  |
|         | 2      | X               | X | - | - | X | X | - | - | X | X | -  | -  | X  | X  | -  | -  |
|         | 4      | X               | X | X | X | - | - | - | - | X | X | X  | X  | -  | -  | -  | -  |
|         | 8      | X               | X | X | X | X | X | X | X | - | - | -  | -  | -  | -  | -  | -  |

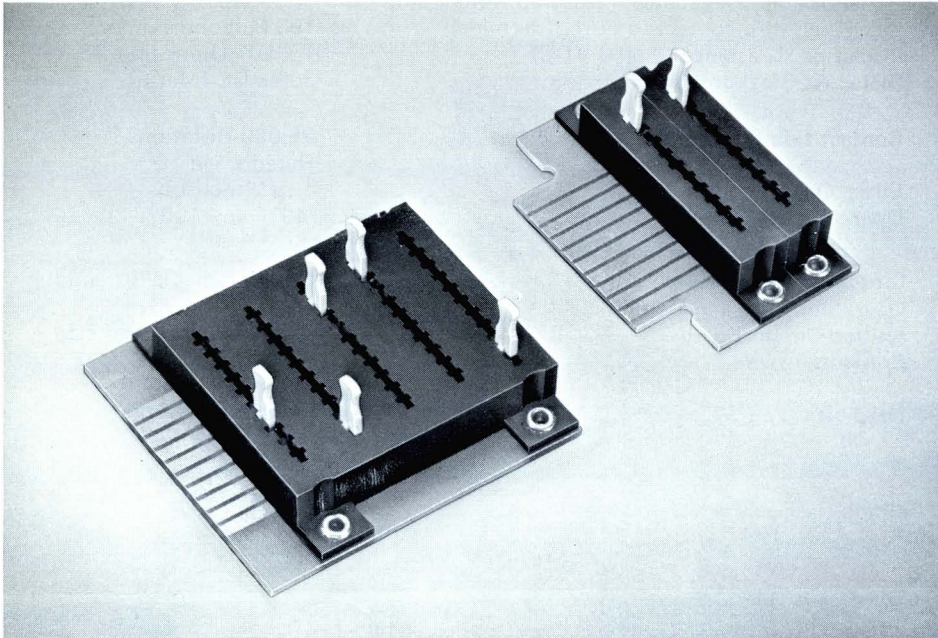
X = Closed Circuit, - = Open Circuit

The above truth table is for a 16-position hexadecimal complement coded switch. However, switches with other various codes can be made available. In addition to 22½° throw, throws of 20°, 30°, 36° or other spacing can be provided. For complete details, consult your local AMP Sales Engineer or write AMP Incorporated, Harrisburg, Pa. 17105.



# 20 AMP

## Switches



### Pull-to-Set Switch

#### Features

- Economical low cost switching
- Modular design for maximum flexibility
- Choice of board mount assemblies or individual switches to mount on your board
- Sturdy construction
- Long life — 100,000 cross-point switching
- High pressure, positive contact
- Single pole, ten throw functions
- Available in 1 x 10, 5 x 10, and 2 x 40 position modules

**Note:** All dimensions in inches unless indicated otherwise.

**Specifications subject to change. Consult AMP Incorporated for latest design specifications.**

The AMP Pull-to-Set switch is an economical means of providing matrix slide switching. This uniquely modular designed switch can be mounted directly to your printed circuit board or can be supplied by AMP as a complete assembly already board mounted to your specifications.

To program the switch the actuator knob is lifted and moved to the desired position indicated by the pointers on each side of the knob. The spring in the actuator knob provides reliable contact force. The switch contact in the module rides on a brass buss strip which has a printed circuit pin for connection to the matrix.



Specifications

**Electrical Characteristics**

Contact Circuit Resistance measured at 6 VDC open circuit and 250 ma closed circuit current, the initial circuit resistance in a 1 x 10 switch is typically .5 ohms. Test conducted using standard unplated contacts. Lower resistance values can be obtained by using plated contact surfaces.

Contact Current Rating at 70°F is 4 amperes continuous non-switching. Switching limits the current to .5 amperes at 125 VAC. Temperature rise at 4 amperes is typically 30° above ambient.

Circuit Capacitance (typical 10 x 10 matrix) between adjacent switches 8 pf; between adjacent P.C. board lands

9 pf and between adjacent closed circuits 11 pf (all typical).

Insulation resistance between the printed circuit pin and the matrix circuitry is  $1 \times 10^9$  ohms minimum measured at 500 VDC. Dielectric breakdown voltage between two adjacent conductors is 1,000 VAC.

**Mechanical Characteristics**

Life cycle is rated for 100,000 cross-point switchings at maximum specified load. Materials used consist of phosphor bronze for the contact springs, brass for the buss strip and 94V-0 rated thermoplastic for the case and slide.

Legend can be hot stamped on the switch case, maximum size of character is .100" x .075".

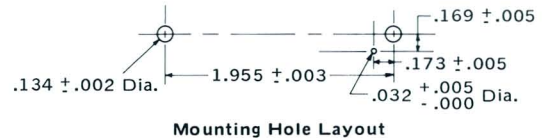
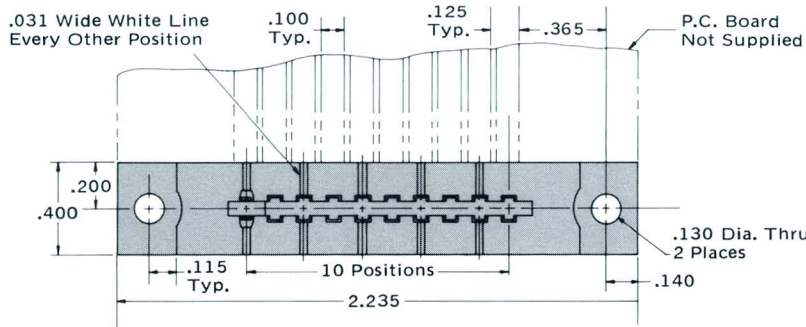
**1 x 10 Position Module**

**Materials:**

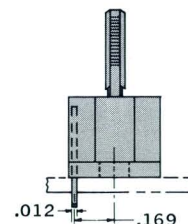
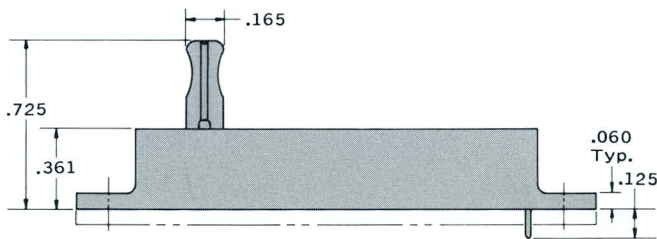
- Contact Spring — Phosphor bronze
- Buss Strip — Brass
- Case — Glass-filled Thermoplastic, black
- Slide — Polyester, white

**Part Numbers:**

- Without white lines — 435624-1
- With white lines — 435624-2



Mounting Hole Layout



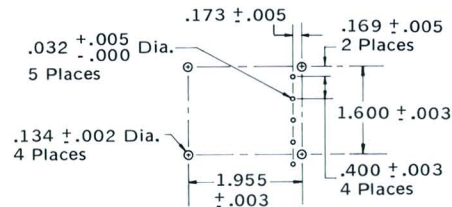
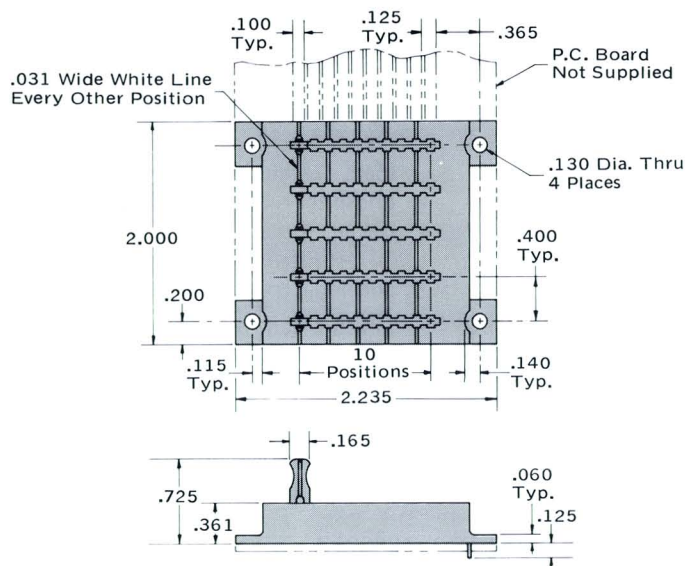
### 5 x 10 Position Module

**Materials:**

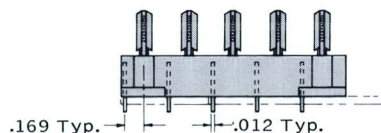
- Contact Spring – Phosphor bronze
- Buss Strip – Brass
- Case – Glass-filled Thermoplastic, black
- Slide – Polyester, white

**Part Numbers:**

- Without white lines – 435625-1
- With white lines – 435625-2



**Mounting Hole Layout**



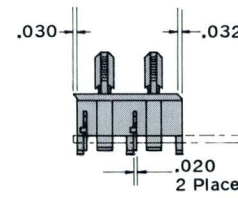
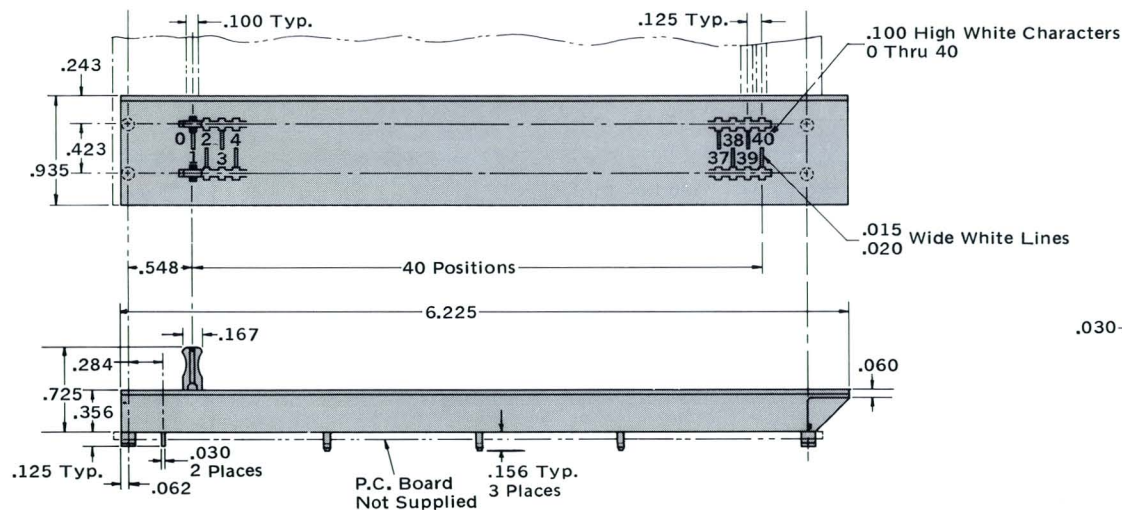
### 2 x 40 Position Module

**Materials:**

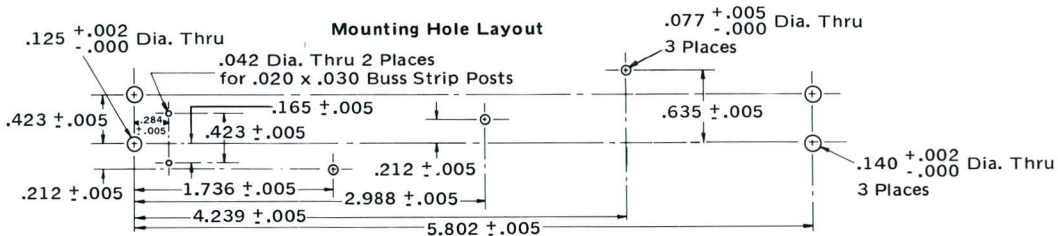
- Contact Spring – Phosphor bronze
- Buss Strip – Brass
- Case – Glass-filled Thermoplastic, black
- Slide – Polyester, white

**Part Number:**

- With white lines and numbers – 435644-3



**Mounting Hole Layout**





## Switches and Relays



The AMP Coded and Decimal Slide Switches provide reliable, low cost switching for applications requiring manual coding. The switch is basically a slide contact system containing a positive detent at each position. Contact is made with a printed conductor pattern that can be arranged to provide codes using one common and four output connections or decimal type connections. These versatile switches are presently available in 11 and 13 position configurations.

Electrical and mechanical integrity of these switches is assured through the use of top quality construction materials, including thermoplastic polyester or TFE filled polycarbonate housings and gold over nickel plated, phosphor bronze contacts. Depending on your application all switches are available with one or two mounting flanges.

**Electrical Characteristics:**

Contact/Voltage Rating  
 Switching 50 VDC @ 125 Ma  
 Non-Switching 50 VDC @ 250 Ma  
 Contact Circuit Resistance at 50 Milliamps — 2 Milliohms Max.  
 Insulation Resistance at 100 VDC —  $1 \times 10^8$  Ohms Min.  
 Dielectric Breakdown Voltage — 500 VDC Min.  
 Capacitance — Between adjacent circuits at 135Khz — 10.0 pf max.

Switching reliability, resulting in error-free operation, is achieved through the detented slide positions which establish positive, accurate slide location.

Output for all slide switches can be designed to mate with a variety of AMP terminating devices — from individual lead connections to one-piece edge connectors for printed conductor patterns.

Illustrated on the following pages are a number of typical coded and decimal arrangements presently available. However, any arrangement of codes or decimals you may require for your specific application can be provided using one common and four outputs at any individual position — contact your local AMP Sales Engineer or AMP Incorporated, Harrisburg, Pennsylvania.

**Switching Mode**

Decimal — Break before make  
 Code — Make before break

**Mechanical Characteristics**

Life Cycles — 50,000  
 Detent Force — 16 oz. Max.

**Materials**

Housing — Thermoplastic Polyester or TFE Filled Polycarbonate  
 Contact — Gold over Nickel Plated Phosphor Bronze

**Coded and Decimal Slide Switches****Features**

- Available in 11 and 13 positions
- One common and four output
- Choice of code and decimal arrangement
- Modular design
- Choice of thermoplastic polyester or TFE filled polycarbonate housings
- Gold over nickel plated phosphor bronze contacts
- Long life — 50,000 cycles
- Choice of connections — individual circuit or PC board connections

**Environmental**

Operating Temperature — 0°F to +150°F  
 Storage Temperature — -40°F to +190°F  
 Humidity — per MIL-STD-202, Method 103, Test Condition B, Non-operating  
 Shock — Three shocks at 20G's (11 Milliseconds) in all three planes — Non-operating  
 Vibration — MIL-STD-202, Method 201A, Non-operating.

All dimensions in inches.

Specifications subject to change. Consult AMP Incorporated for latest design specifications.

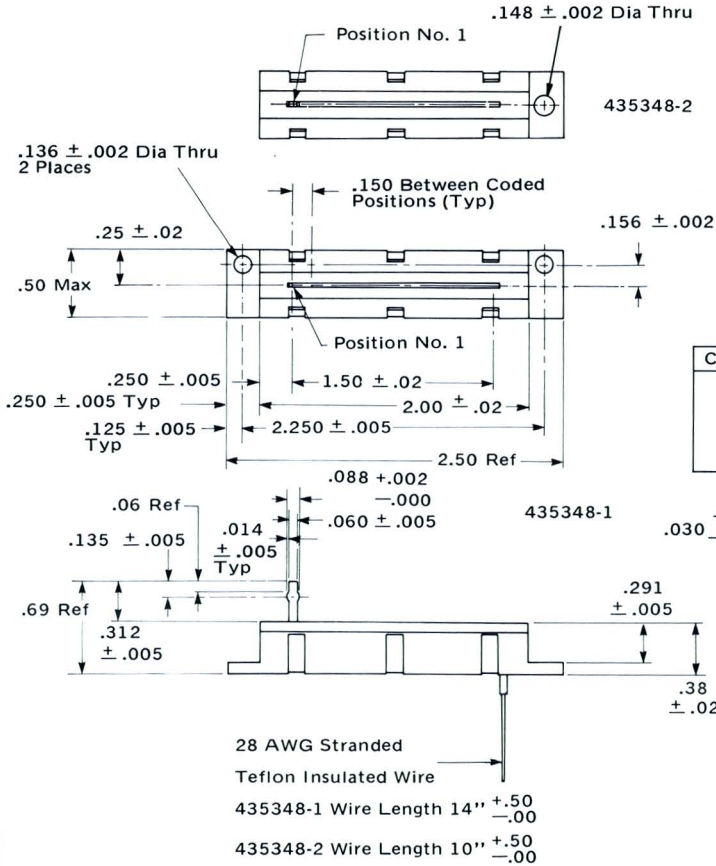


## Coded Slide Switches

### 11 Position Switch

| Switch Position | Common Connected To: |   |   |   |
|-----------------|----------------------|---|---|---|
|                 | 1                    | 2 | 3 | 4 |
| 1               | -                    | X | X | X |
| 2               | X                    | X | X | X |
| 3               | -                    | - | - | - |
| 4               | X                    | - | - | - |
| 5               | -                    | X | - | - |
| 6               | X                    | X | - | - |
| 7               | -                    | - | X | - |
| 8               | X                    | - | X | - |
| 9               | -                    | X | X | - |
| 10              | X                    | X | X | - |
| 11              | -                    | - | - | X |

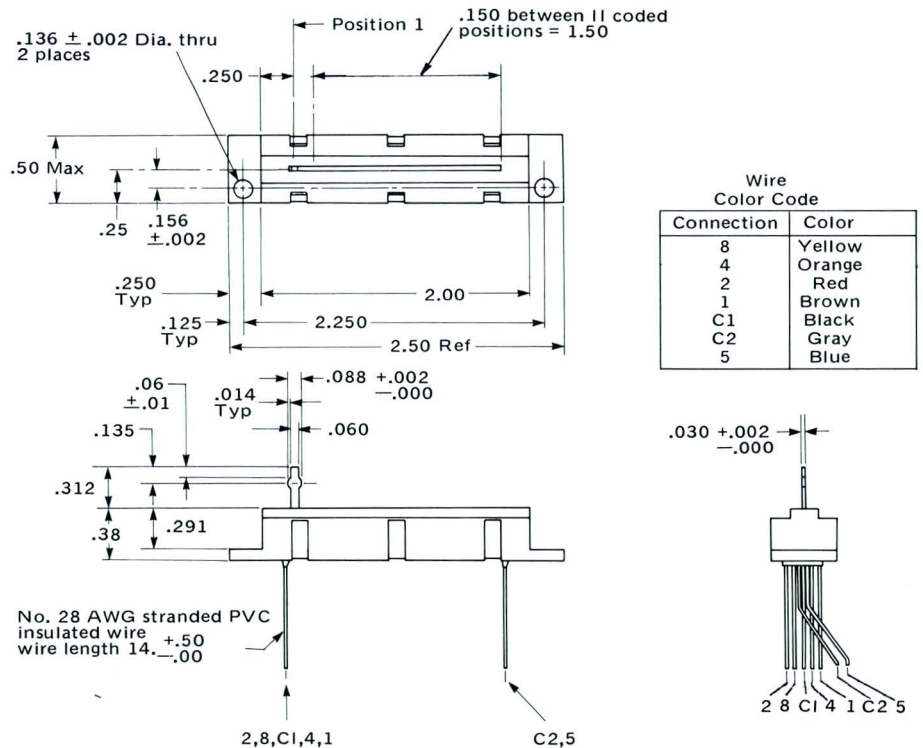
Part Numbers:  
 435348-1  
 (Two mounting holes)  
 435348-2  
 (One mounting hole)



### 11 Position Switch

| Switch Position | Common "C1" Connected To: |   |   |   |   |
|-----------------|---------------------------|---|---|---|---|
|                 | 1                         | 2 | 4 | 8 | 5 |
| 1               | X                         | - | - | - | - |
| 2               | -                         | X | - | - | - |
| 3               | X                         | X | - | - | - |
| 4               | -                         | - | X | - | - |
| 5               | X                         | - | X | - | - |
| 6               | -                         | X | X | - | - |
| 7               | X                         | X | X | - | - |
| 8               | -                         | - | - | X | - |
| 9               | X                         | - | - | X | - |
| 10              | -                         | - | - | - | - |
|                 | Common "C2" Connected To: |   |   |   |   |
|                 | 1                         | 2 | 4 | 8 | 5 |
| 11              | -                         | - | - | - | X |

Part Number:  
 435348-4



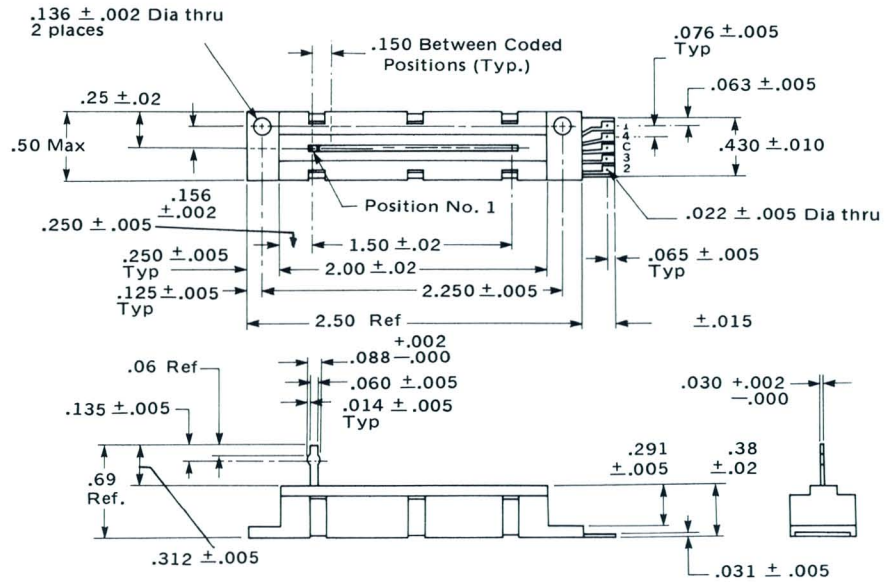


Coded Slide Switch (Continued)

11 Position Switch

| Switch Position | Common Connected To: |   |   |   |
|-----------------|----------------------|---|---|---|
|                 | 1                    | 2 | 3 | 4 |
| 1               | X                    | X | - | X |
| 2               | X                    | - | - | X |
| 3               | X                    | - | - | - |
| 4               | -                    | X | - | - |
| 5               | X                    | X | - | - |
| 6               | -                    | - | X | - |
| 7               | X                    | - | X | - |
| 8               | -                    | X | X | - |
| 9               | X                    | X | X | - |
| 10              | -                    | - | - | - |
| 11              | -                    | - | - | - |

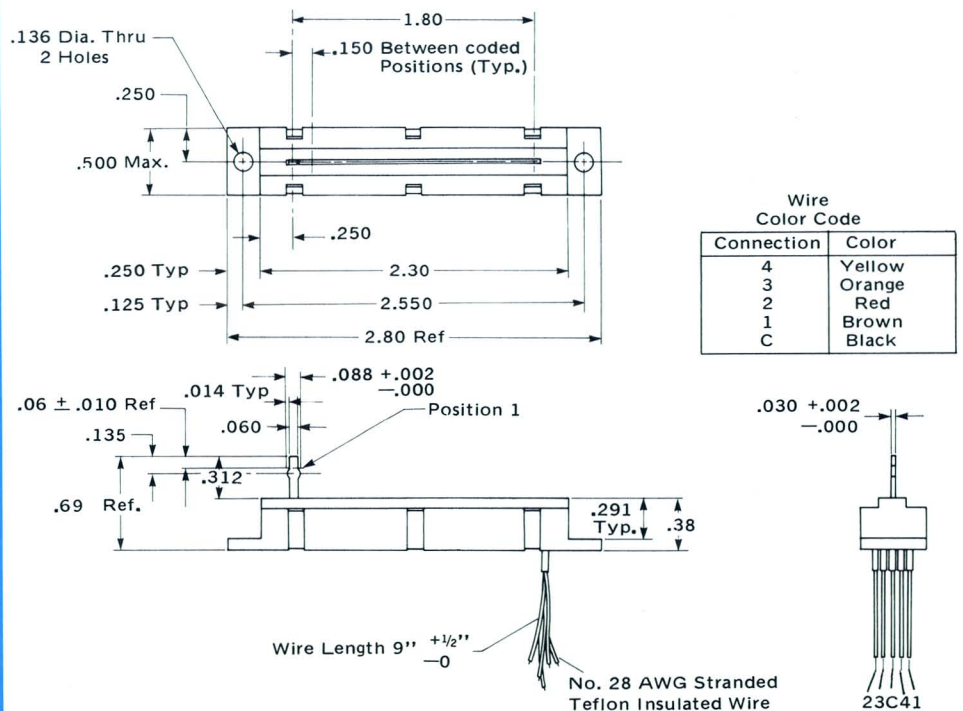
Part Number:  
435348-6



13 Position Switch

| Switch Position | Common Connected To: |   |   |   |
|-----------------|----------------------|---|---|---|
|                 | 1                    | 2 | 3 | 4 |
| 1               | -                    | X | X | X |
| 2               | X                    | X | X | X |
| 3               | -                    | - | - | - |
| 4               | X                    | - | - | - |
| 5               | -                    | X | - | - |
| 6               | X                    | X | - | - |
| 7               | -                    | - | X | - |
| 8               | X                    | - | X | - |
| 9               | -                    | X | X | - |
| 10              | X                    | X | X | - |
| 11              | -                    | - | - | X |
| 12              | X                    | - | - | X |
| 13              | -                    | X | - | X |

Part Number:  
435341-1

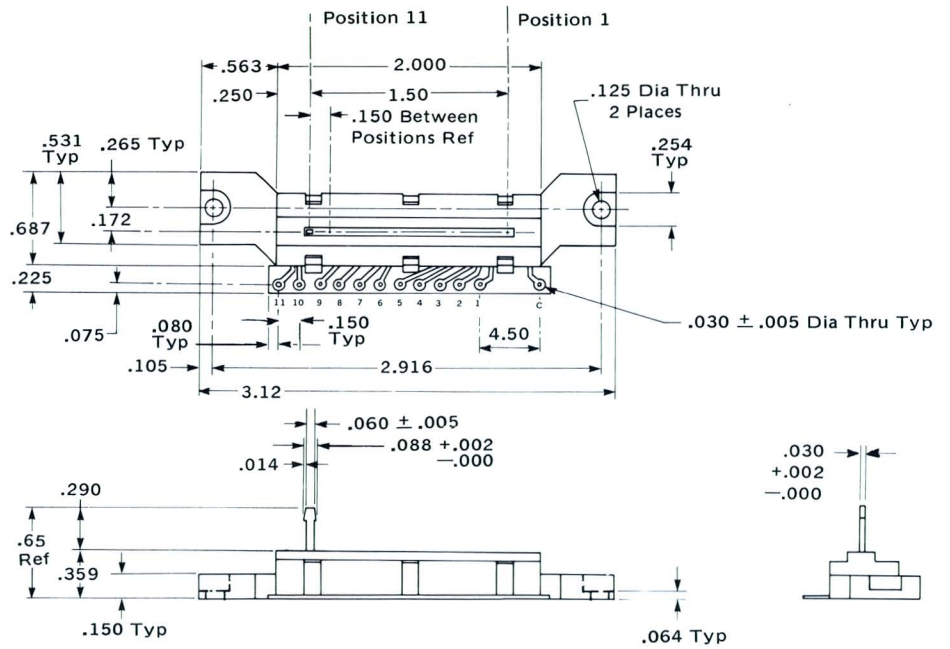


## Decimal Slide Switches

### 11 Position Switch

| Switch Position | Common Connected To: |   |   |   |   |   |   |   |   |    |    |
|-----------------|----------------------|---|---|---|---|---|---|---|---|----|----|
|                 | 1                    | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1               | X                    | - | - | - | - | - | - | - | - | -  | -  |
| 2               | -                    | X | - | - | - | - | - | - | - | -  | -  |
| 3               | -                    | - | X | - | - | - | - | - | - | -  | -  |
| 4               | -                    | - | - | X | - | - | - | - | - | -  | -  |
| 5               | -                    | - | - | - | X | - | - | - | - | -  | -  |
| 6               | -                    | - | - | - | - | X | - | - | - | -  | -  |
| 7               | -                    | - | - | - | - | - | X | - | - | -  | -  |
| 8               | -                    | - | - | - | - | - | - | X | - | -  | -  |
| 9               | -                    | - | - | - | - | - | - | - | X | -  | -  |
| 10              | -                    | - | - | - | - | - | - | - | - | X  | -  |
| 11              | -                    | - | - | - | - | - | - | - | - | -  | X  |

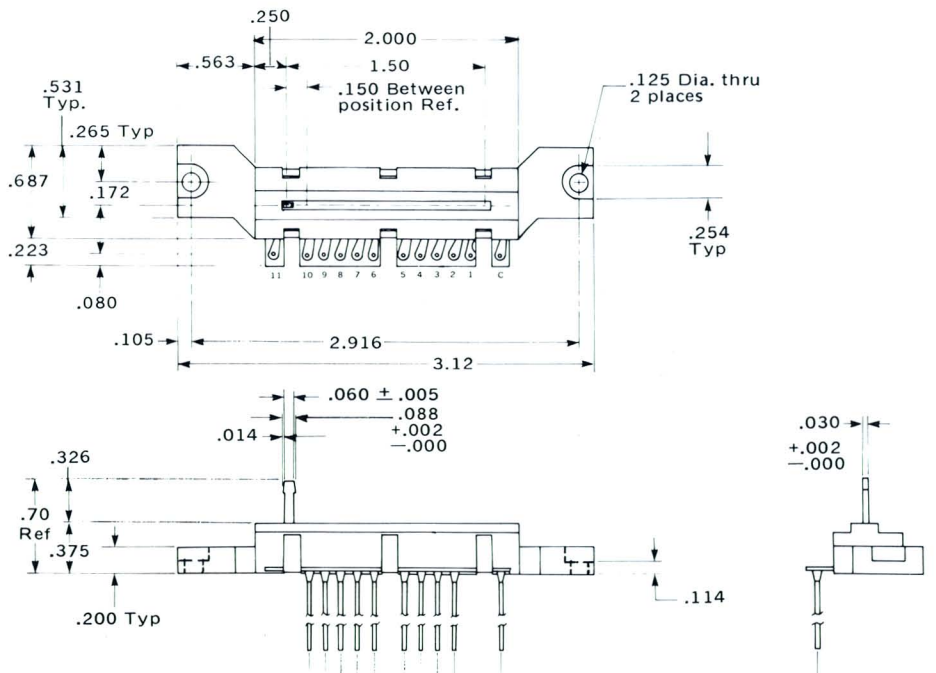
Part Number:  
435348-5



### 11 Position Switch

| Switch Position | Common Connected To: |   |   |   |   |   |   |   |   |    |    |
|-----------------|----------------------|---|---|---|---|---|---|---|---|----|----|
|                 | 1                    | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1               | X                    | - | - | - | - | - | - | - | - | -  | -  |
| 2               | -                    | X | - | - | - | - | - | - | - | -  | -  |
| 3               | -                    | - | X | - | - | - | - | - | - | -  | -  |
| 4               | -                    | - | - | X | - | - | - | - | - | -  | -  |
| 5               | -                    | - | - | - | X | - | - | - | - | -  | -  |
| 6               | -                    | - | - | - | - | X | - | - | - | -  | -  |
| 7               | -                    | - | - | - | - | - | X | - | - | -  | -  |
| 8               | -                    | - | - | - | - | - | - | X | - | -  | -  |
| 9               | -                    | - | - | - | - | - | - | - | X | -  | -  |
| 10              | -                    | - | - | - | - | - | - | - | - | X  | -  |
| 11              | -                    | - | - | - | - | - | - | - | - | -  | X  |

Part Number:  
435348-3



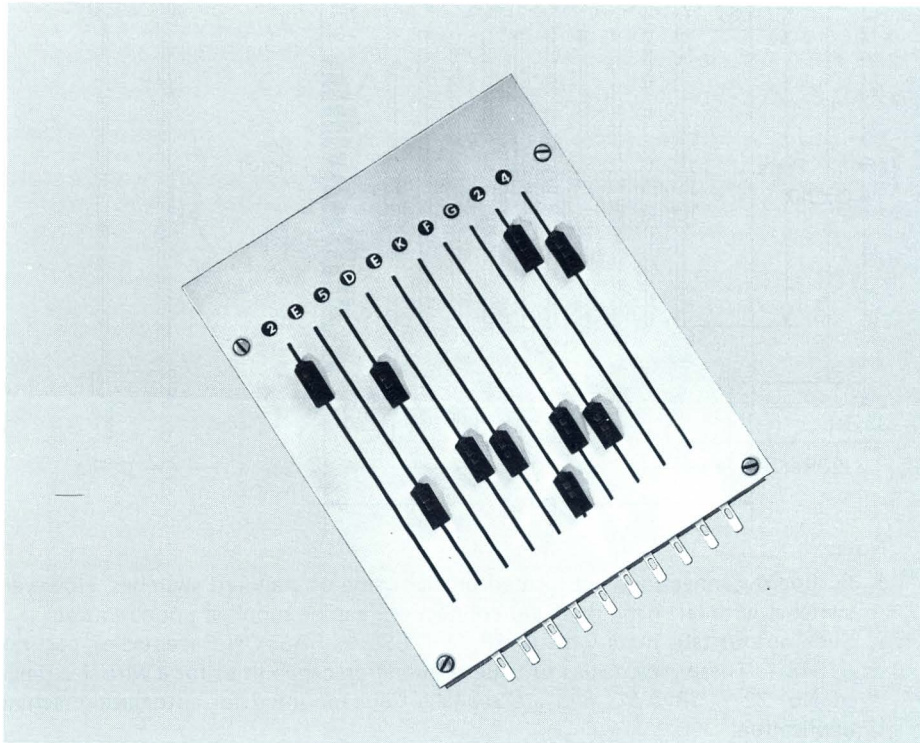
No. 24 AWG Stranded Teflon insulated wire  
12" ± .50 wire length

Wire Color Code

| Connection | Color  |
|------------|--------|
| 11         | Violet |
| 10         | Green  |
| 9          | Brown  |
| 8          | Yellow |
| 7          | White  |
| 6          | Red    |
| 5          | Orange |
| 4          | Gray   |
| 3          | Blue   |
| 2          | Black  |
| 1          | Black  |
| C          | Black  |



## Switches



A-MP★ Matrix Slide Switches provide reliable, low cost matrix switching for applications requiring manual data entry operations. These versatile switches are available in a wide range of standard sizes and offer data entering capabilities that may include up to 10 outputs per switch. Each output is controlled by a separate slide and, in turn, can provide as many as 16 variations (slide positions).

Switching reliability, resulting in a minimum of operator errors, is achieved through such design characteristics as detented slide positions which establish positive, accurate slide location plus "in-line" visual readouts which facilitate the verification of data prior to actual data entry. Other features assuring the electrical and mechanical integrity of the switches include the use of only top quality construction materials, switch contacts plated gold or nickel for excellent continuity, and slide output tabs which mate with A-MP "110" Series

FASTON★ Receptacles for highly reliable, quick connect/disconnect wire terminations. The same high termination quality for wired connections to the switch pc board is also provided by any one of several A-MP Pc Connectors, including the DUO-TYNE★ Flag One-Piece Pc Edge Connector or various AMP-UNYT★ Pc Connectors with crimp snap-in contacts.

All Matrix Slide Switches are exceptionally compact in size and especially designed for panel mounting. They can be flush mounted to a front panel, requiring two simple "Z" brackets and a rectangular cutout in the panel, or they can be mounted on a panel or chassis using the two "Z" brackets or threaded standoffs.

The combined features of the A-MP Matrix Slide Switches make them ideal for applications where data is to be entered at remote terminals such as test equipment programming, machine tool control, programming of process control variables as well as numerous other applications.

### Matrix Slide Switches

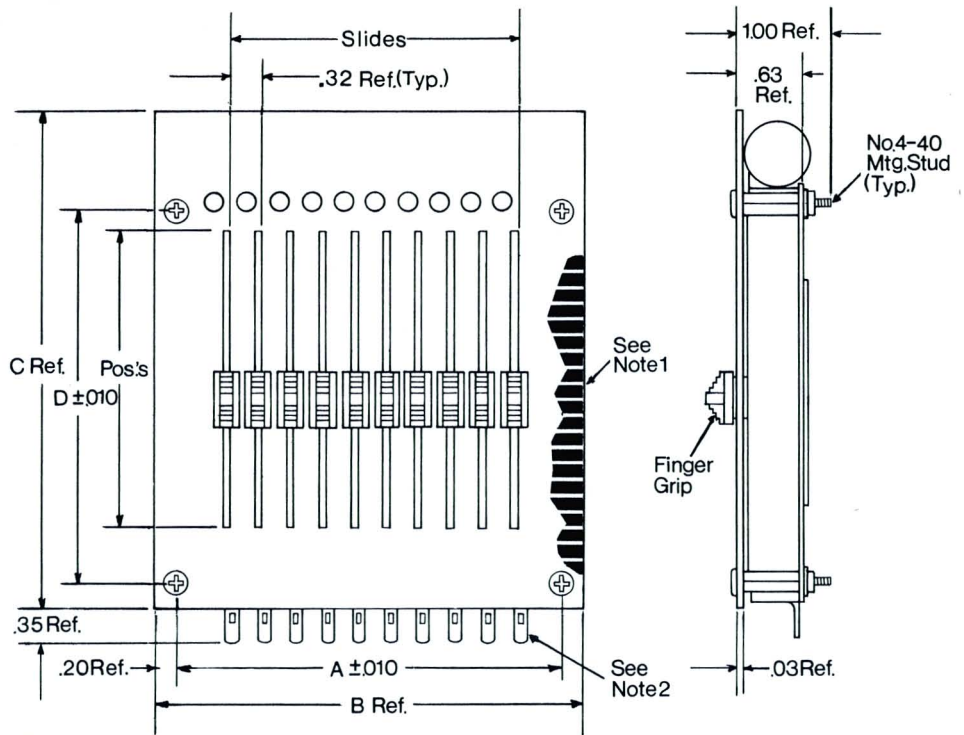
#### FEATURES

- Contact lifting principle employing detent channel and ball assures longer life by eliminating abrasion and preventing metal smear between pc board conductors.
- Standard switch sizes include 5 x 10, 10 x 10, 5 x 16 and 10 x 16 slide/position configurations.
- Flexible modular design permits various combinations of non-standard switch configurations.
- Standard sizes available with or without visual display. Standard visual readouts are legible .125" high white characters on black background.
- Standard readout characters are "0 thru 9" followed by letters "A thru F" on switches having more than 10 slide positions.
- Visual readout characters other than standard characters are available.
- Small physical switch size is due to unique roll-up design of visual display indicators.
- Interchangeable contact finger grips — standard color is black; other colors also available.
- Brushed stainless steel face plate is designed for easy, attractive flush mounting to front panel.
- Gold or nickel plated contacts.
- Slide output tabs mate with A-MP "110" Series FASTON Receptacles; pc board connections accept DUO-TYNE Flag One-Piece Pc Edge Connector or various AMP-UNYT Pc Connectors with crimp snap-in contacts.
- High speed machine-applied terminations assure top quality, low cost connections.



Matrix Slide Switches with Visual Display

Dimensional Specifications



Notes:

1. Pc board connections are located on right side of standard switches. However, switches with left hand pc board connections can be supplied upon request.
2. Slide output tabs mate with A-MP "110" Series FASTON Receptacles, part no. 61048-1. These receptacles provide termination capabilities for a wire size range of No. 22 – 18 AWG and are available tape-mounted for automatic machine application.

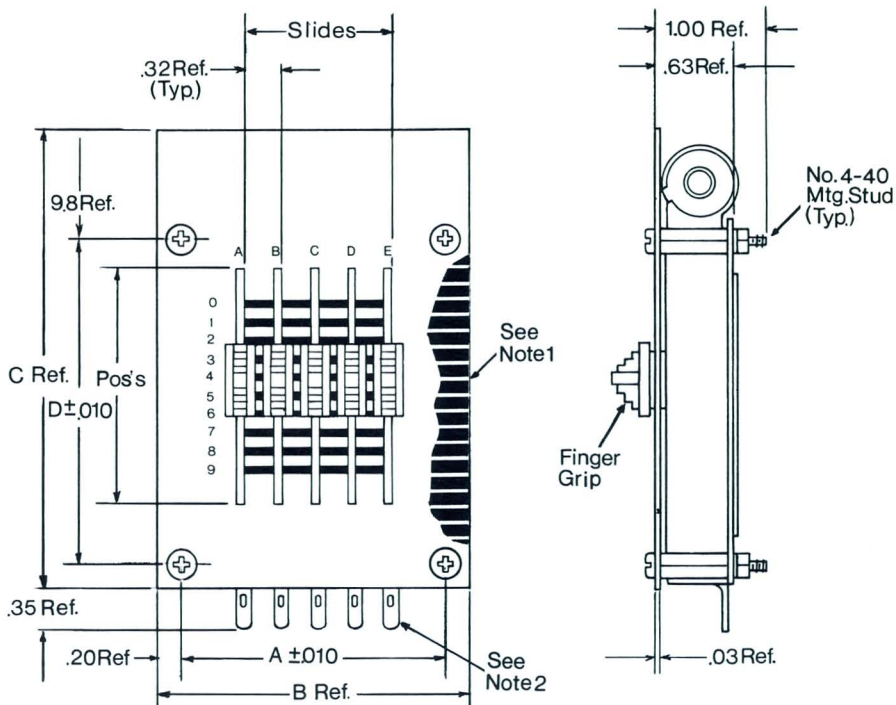
| Switch Configuration<br>(Slide x Position) | DUO-TYNE<br>Edge Connector<br>Part Number* | Dimensions |       |       |       | Contact<br>Plating | Switch<br>Part Number |
|--|--|------------|-------|-------|-------|--------------------|-----------------------|
|  |  | A          | B     | C     | D     |                    |                       |
| 5 x 10                                     | 582376                                     | 2.180      | 2.580 | 3.900 | 2.731 | Gold               | 435124-5              |
|  |  |            |       |       |       | Nickel             | 435124-6              |
| 5 x 16                                     | 582378                                     | 2.180      | 2.580 | 4.830 | 3.667 | Gold               | 435124-7              |
|  |  |            |       |       |       | Nickel             | 435124-8              |
| 10 x 10                                    | 582376                                     | 3.780      | 4.180 | 3.900 | 2.731 | Gold               | 435124-9              |
|  |  |            |       |       |       | Nickel             | 435124-4              |
| 10 x 16                                    | 582378                                     | 3.780      | 4.180 | 4.830 | 3.667 | Gold               | 1-435124-0            |
|  |  |            |       |       |       | Nickel             | 435124-1              |

\*These part nos. are for 12- and 18-position DUO-TYNE Flag Connectors without mounting holes. These switch connections will accept a variety of pc board type connectors available from AMP. Consult the AMP District Sales Engineer nearest you or write AMP Incorporated, Harrisburg, Pa. for details.



Dimensional Specifications

Matrix Slide Switches without Visual Display



Notes:

1. Pc board connections are located on right side of standard switches. However, switches with left hand pc board connections can be supplied upon request.
2. Slide output tabs mate with A-MP "110" Series FASTON Receptacles, part no. 61048-1. These receptacles provide termination capabilities for a wire size range of No. 22 – 18 AWG and are available tape-mounted for automatic machine application.

| Switch Configuration<br>(Slide x Position) | DUO-TYNE<br>Edge Connector<br>Part Number* | Dimensions |       |       |       | Contact<br>Plating | Switch<br>Part Number |
|--|--|------------|-------|-------|-------|--------------------|-----------------------|
|  |  | A          | B     | C     | D     |                    |                       |
| 5 x 10                                     | 582376                                     | 2.180      | 2.580 | 3.900 | 2.731 | Gold               | 5-435124-2            |
|  |  |            |       |       |       | Nickel             | 5-435124-0            |
| 5 x 16                                     | 582378                                     | 2.180      | 2.580 | 4.830 | 3.667 | Gold               | 5-435124-3            |
|  |  |            |       |       |       | Nickel             | 5-435124-4            |
| 10 x 10                                    | 582376                                     | 3.780      | 4.180 | 3.900 | 2.731 | Gold               | 5-435124-5            |
|  |  |            |       |       |       | Nickel             | 5-435124-6            |
| 10 x 16                                    | 582378                                     | 3.780      | 4.180 | 4.830 | 3.667 | Gold               | 5-435124-7            |
|  |  |            |       |       |       | Nickel             | 5-435124-8            |

\*These part nos. are for 12- and 18-position DUO-TYNE Flag Connectors without mounting holes. These switch connections will accept a variety of pc board type connectors available from AMP. Consult the AMP District Sales Engineer nearest you or write AMP Incorporated, Harrisburg, Pa. for details.

Electrical Characteristics

General Specifications

|  |  |
|--|--|
| Contact Life Expectancy (Nonswitching) . . . . .         | In excess of 500,000   |
| Initial Contact Resistance @ 500 Ma, 6VDC. . . . .       | Crosspoint Operations<br>15 Milliohms (Gold Plating)         |
| End-of-Life Contact Resistance @ 500 Ma, 6 VDC . . . . . | 35 Milliohms (Nickel Plating)<br>50 Milliohms (Gold Plating) |
| Capacitance (Between Adjacent Circuits)*. . . . .        | 1.0 Ohms (Nickel Plating)<br>50 Picofarads (max.)            |
| Contact Current Rating: Switching . . . . .              | 0.5 A, Dc (max.)   |
| Nonswitching . . . . .                                   | 2.0 A per Contact; 3.0 A per<br>Vertical or Horizontal Bus   |
| Insulation Resistance @ 500 VDC. . . . .                 | 1 x 10 <sup>11</sup> Ohms                                    |
| Dielectric Strength: Ac . . . . .                        | 1.0 Kv (rms)   |
| Dc . . . . .   | 1.5 Kv   |

\*Capacitance varies with size of switch due to conductor length. Value stated is typical for a standard 10 x 16 switch.

Environmental Characteristics

|                                |  |
|--------------------------------|--|
| Temperature: Storage . . . . . | -67°F to +185°F  |
| Operating. . . . .             | 0°F to +135°F  |
| Humidity. . . . .              | MIL-STD-202, Method 103, Test<br>Condition B (non-operating) |
| Shock. . . . .                 | Three shocks of 20 G's for<br>11 MS in all three planes      |
| Vibration . . . . .            | MIL-STD-202, Method 201A<br>(non-operating)                  |

Materials

Pc Board and Conductor Strips: Type FR-4 Glass Epoxy, 2 Oz. Copper Clad; Plated with either .00010 (min.) Electroless Nickel or with .00005 (min.) Gold over .00020 (min.) Nickel

Contact Spring: No. 6 Hard Phosphor Bronze; Unplated or plated with .00005 (min.) Gold over Nickel Flash on contact surfaces

Face Plate: 300 Series Stainless Steel; Brush Finished

Display Tape: Polyester

Display Tape Housing: Acetal

Contact Housing: Acetal

Finger Grip: Nylon; Color, Black (Standard)

Slide Extension: Glass-Filled Nylon

Detent Spring: No. 6 Hard Phosphor Bronze

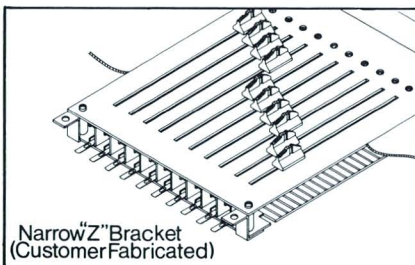
Detent Ball: Chrome Alloy Steel

Detent Rail: Cartridge Brass coated with Insulation Grade Epoxy Enamel

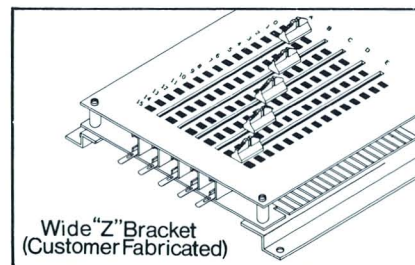
Spacers: Aluminum

Hardware: Stainless Steel or Cadmium Plated Steel

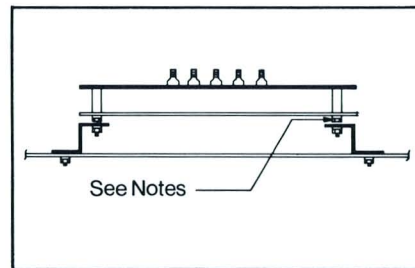
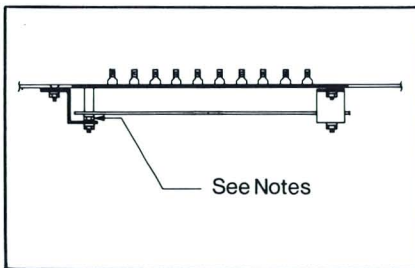
Suggested "Z" Bracket Mounting Techniques



Flush Mounting



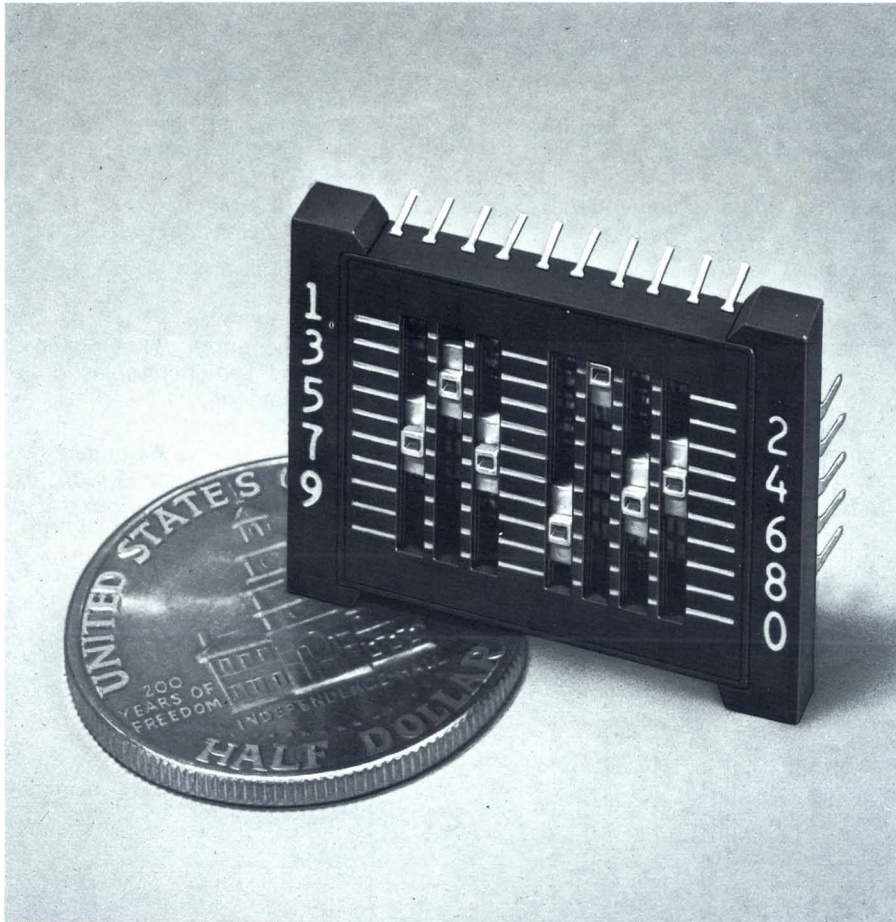
Stand-Off Mounting



- Notes: 1. Both narrow and wide "Z" brackets can be used for either flush or stand-off mounting.  
2. Factory installed nuts must not be loosened; otherwise, misalignment of switch contacts may result.



## Switches and Relays



The AMP Mini-Matrix Slide switch provides a highly reliable, low cost means of manually programming various types of electrical/electronic equipment. This unique device is basically a multiplicity of manually operated slides which select cross-points in a matrix. It features an extremely compact design and a very low profile, making the switch highly compatible with the miniaturization standards of today's packaging techniques. The switch is ideally suited for use in logic level matrix switching applications.

AMP's Mini-Matrix Slide switch is currently available in a 10 x 10 (maximum) switch configuration. It is designed to be flow soldered into a customer's pc board and has I/O legs on .100" [2.54 mm] centers. Five row

axis circuits are contained on each side of the switch with the I/O legs of each side offset by .062" [1.57 mm], and 10 column axis circuits are contained on each end. Only one end of the column axis circuits requires electrical connection. Customers may purchase this solderable switch in any configuration from 4 x 10 to 10 x 10 to meet their particular switching requirements.

The AMP Mini-Matrix Slide switch also is ruggedly constructed, assuring long-life performance as well as its electrical and mechanical integrity. Plastic parts are made of 94V-O rated glass-filled thermoplastic polyester. The slide springs are stainless steel, and the column and row buses are copper alloy. Contact surfaces are electro-plated gold.

### AMP Mini-Matrix Slide Switch

#### Features

- Provides for up to 10 decimal digits in a minimum of space
- 10 x 10 switch occupies only 1" x 1.38" [25.4 mm x 35.05 mm] of area on a pc board
- Very low profile—extends only .165" [4.19 mm] above pc board
- Can be flow soldered to a pc board with other components
- Flush top surface can be protected with sealing tape for cleaning subsequent to soldering
- Plastic parts made of UL recognized, 94V-O rated thermoplastic polyester
- Customer selects the exact configuration—from 4 x 10 to 10 x 10—to meet his particular switching requirements

#### Dimensioning:

All dimensions in inches and millimetres. Values in brackets are metric equivalents.

**Specifications subject to change.**  
Consult AMP Incorporated for latest design specifications.



**Dimensioning:**

All dimensions in inches and millimetres.  
Values in brackets are metric equivalents.

**Electrical**

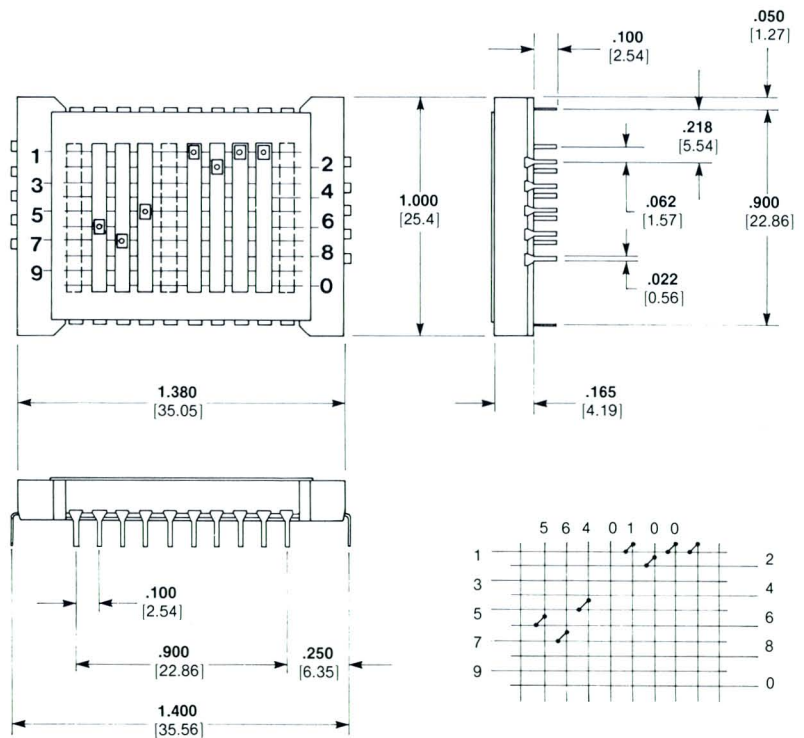
Contact Voltage/Current Rating:  
 Switching . . . . . 12 VDC at 100 MA  
 Nonswitching . . . . . 50 VAC at 100 MA  
 Contact Resistance (Dry Circuit) . . . . . Less than 1 Ohm  
 Insulation Resistance . . . . . 1 x 10<sup>10</sup> Ohms (Min.)  
 at 100 VDC  
 Dielectric Withstanding Voltage . . . . . 200 VDC (Min.)  
 Electrical Life End-Point\* . . . . . 2000 Cycles (Min.)

\* Electrical life end-point is defined as a contact resistance greater than 1 ohm.

**Material**

Structural Plastic . . . . . UL Recognized, 94V-O Rated, Glass-Filled Thermoplastic Polyester  
 Slides . . . . . Stainless Steel  
 Column and Row Axes Buses . . . . . Copper Alloy with Contact Areas Electroplated Gold  
 Printed Circuit Board . . . . . Copper Clad Glass-Epoxy Laminate  
 Contact Surfaces . . . . . Electroplated Gold

**Dimensional**



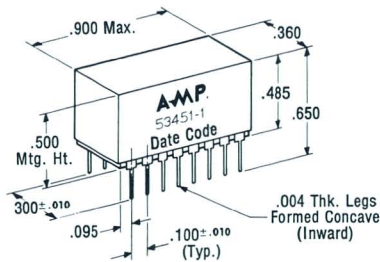
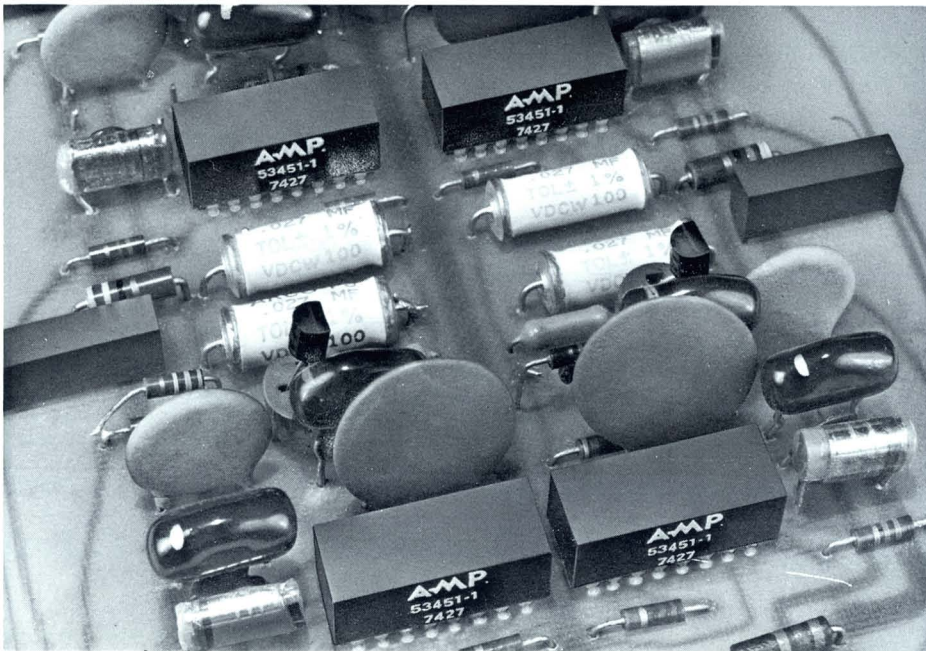
**Mini-Matrix Slide Switch  
10 x 10 Maximum\*  
(for pc board mounting)**

**Schematic (for 7 x 10 switch)  
Part Number: 435723-1**

\* A 7 x 10 switch configuration is shown for illustration purposes only. Customers may select any slide location or combination of slide locations from 4 to 10. Slide locations not selected are simply closed.



## Relays and Switches



An AMP innovation in advanced switching/packaging concepts is the electromechanical relay. Designed for printed circuit board mounting, this switching device provides optimum reliability, and by virtue of its pluggability, offers a highly economical means of switching in almost any type of multi-functioning electrical/electronic equipment. In both design and construction, it also offers the benefits of the highly specialized engineering and manufacturing skills that AMP has developed over the years as a leading innovator in electrical/electronic products — quality metal formed contacts, precision gold plating, durable plastic molded housings, etc.

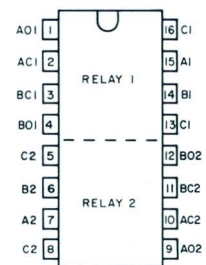
Physically, the electromechanical relay is a 16-pin DIP type device which contains two completely

independent relays; each functioning as a double pole, double throw switch. This 4.5 volt relay is designed to be IC controlled. As a switching interface, the relay can be driven directly from a typical dc power supply, 5 VDC (logic Vcc). Its low resistance contacts and medium power capability also make it ideal for multiplexing applications.

The formed input/output pins of the relay are spaced on .100" x .300" centers. This allows them to be mounted to a board by the normal methods used for IC's. For board mounting, AMP has available a variety of packaging devices — receptacles, sockets, DIP headers, etc. — which provides a choice of interconnections using solder, TERMI-POINT clip or wrap-type terminations.

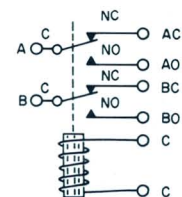
### Electromechanical Relay, Two DPDT (2 Form C) Part No. 53451-1

Pin Configuration



Pin 1 identified by molded-in notch

Relay Schematic  
(2 Relays per DIP Unit)



### Features

- Two independent relays per unit.
- 16-pin, DIP-type device compatible with present packaging techniques for IC's.
- DPDT (2 Form C) switch configuration (per relay).
- 4.5 volt relay designed to be IC controlled.
- Low resistance gold contacts.
- Electromechanical relay with true circuit isolation.
- Correct installation assured by symmetrical package design.
- High sensitivity.
- Fast, reliable, economical switching.

### Notes:

1. More details regarding performance and test qualification of this electromechanical relay are available. Direct all inquiries to the General Products Division of AMP Incorporated.
2. All dimensions in inches.

Specifications subject to change. Consult AMP Incorporated for latest design specifications.



## Electrical and Environmental

### PERFORMANCE

#### Electrical:

Average life of the relay exceeds 50 million cycles when switching incandescent lamp loads.

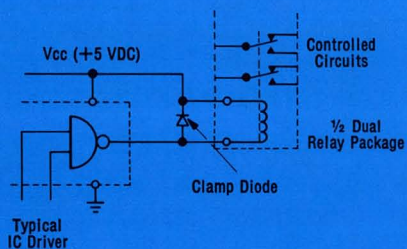
#### Mechanical:

Average life of the relay exceeds 75 million cycles.

(For additional relay performance not specified in this publication, refer to AMP Customer Drawing No. 53451-1.)

**NOTE:** AMP specifies the reliability of relays on a "first miss" basis. Failure is defined as the first time any individual normally-open or -closed contact of a relay does not successfully operate within prescribed contact failure criteria, when operated at rated drive and within prescribed transfer time. It is recognized, however, that a relay may perform satisfactorily in applications beyond these criteria.

### Typical Application (IC-to-Relay)



## Specifications

### Absolute Maximum Ratings

|                             |                        |
|-----------------------------|------------------------|
| Coil Voltage                | 7.5 VDC (Continuous)   |
| Contact Switched Voltage    | 120 VAC/VDC*           |
| Contact Switched Current    | 1.0 A, Dc or Ac (rms)* |
| Insulation Resistance       | 100 Megohms (Min.)     |
| Dielectric Strength         | 300 VAC @ 60 Hz        |
| Operating Temperature Range | 0°C to +70°C           |

\*These are maximum voltage and current values and are not to be used in combination. See Contact Failure Criteria below.

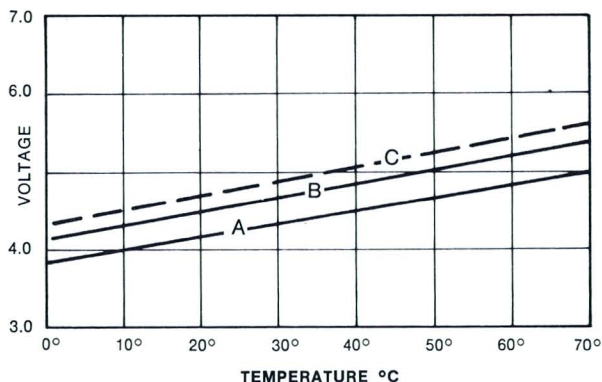
### Typical Ratings

#### Coil Operating Characteristics (at 20°C)

|                   |        | 4.5 V (Nom.) |      |
|-------------------|--------|--------------|------|
|                   |        | Min.         | Max. |
| Pick Voltage      | (VDC)  | —            | 4.5  |
| Drop-Out Voltage  | (VDC)  | .5 Typ.      |      |
| Pick Current      | (ma)   | —            | 32   |
| Drop-Out Current  | (ma)   | 3 Typ.       |      |
| Resistance        | (Ohms) | 133          | 147  |
| Resistance Change | (%/C°) | .38          | .41  |
| Inductance        | (mh)   | 40           | 300* |
| Capacitance       | (pf)   | .2           | 1.6  |
| Dissipation       | (mw)   | —            | 135  |

\*Includes dynamic L (inductance) property of open-closed armature.

#### REQUIRED COIL VOLTAGE VS TEMPERATURE



LINE A — 30 ma OPERATION — THE RELAYS ARE 100% INSPECTED TO THIS VALUE.  
 LINE B — 32 ma OPERATION — SPECIFIED MAXIMUM PULL-IN CURRENT.  
 LINE C — MINIMUM VOLTAGE RECOMMENDED DUE TO COIL HEATING. (A HIGHER VOLTAGE IS REQUIRED WHEN THE RELAY IS DE-ENERGIZED LESS THAN ONE MINUTE AFTER AN EXTENDED "ON" PERIOD.)

#### Contact Switching Characteristics (per Relay) at Nominal Operation

|                         |             | Min. | Max. |
|-------------------------|-------------|------|------|
| Lead-to-Lead Resistance | (Milliohms) | —    | 100  |
| Operating Time*         | (ms)        | 2.0  | 5.0  |
| Release Time*           | (ms)        | 2.0  | 4.0  |

\*Including bounce

| Suggested IC Drivers |  | No. of Relays per Driver DIP |
|----------------------|--|------------------------------|
| 74XX                 | Type   |                              |
| 7406/7416            | Hex Inverter Buffer/Drivers (w/open-collector)   | 6                            |
| 7407/7417            | Hex Buffer/Drivers (w/open-collector)            | 6                            |
| 7437/7438            | Quadruple 2-Input Positive N and Gate            | 4                            |
| 7445/74145           | BCD-to-Decimal Decoder/Driver (w/open-collector) | 1 of 10                      |