SERIES 94H
Binary Coded

DIMENSIONS in inches (and millimeters)

Tolerances are ± .010 inches unless specified otherwise.

Surface Mount Gullwing

- 060 (1.52) TYP.
- 0.100 .005 (2.54, 0.13) TYP.
- 0.020 +.004/-.002

Surface Mount J-Lead

- CORNER CLOSEST TO PIN #1
- 0.250 (.635)
- 0.315 (.800)
- 0.385 (9.8)

Standard Thru-Hole

- 0.040 .005 (1.02, 0.13)
- 0.100 .005 TYP. (2.54, 0.13)

TERMINALS ARE
- .020 +.004/-.002
- WIDE BY .012 .002
- .038 DIA. HOLE SIZE RECOMMENDED
- .146 (3.71)
- .225 (5.72)
- 300 (7.62) TYP.

FEATURES
- Sealed Construction; No Tape Seal Required
- Surface Mount or Thru-Hole Style
- Tube or Tape and Reel Packaging
- Octal, BCD, and Hexadecimal Code
- In Standard or Complement
- Standard and Right Angle Mount
- Flush or Extended Actuators
- Gold-Plated Contacts
- RoHS Compliant

ACTUATOR STYLES

- Octal–8 position
- BCD–10 position
- Hex–16 position

Extended Actuator Types

- .140 DIA. (.356)
- .270 (.686) OR .200 (.508)

SEE ORDERING INFORMATION

EXTENDED ORDERING INFORMATION

- .140 DIA. (.356)
- .270 (.686) OR .282 (.716)

Figure 1

Figure 2

Figure 3

Specifications are subject to change. Please refer to the current datasheet on www.grayhill.com for the most current published specifications for this product.
**Rotary DIP Switches**

**DIMENSIONS** in inches (and millimeters)

Right Angle Thru-Hole

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>0.210</td>
<td>(5.33)</td>
</tr>
<tr>
<td>0.430</td>
<td>(10.92)</td>
</tr>
<tr>
<td>0.145</td>
<td>(3.68)</td>
</tr>
<tr>
<td>0.158</td>
<td>(3.98)</td>
</tr>
<tr>
<td>0.100 ± 0.005 TYP.</td>
<td>(2.54 ± 0.13)</td>
</tr>
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TERMINALS ARE

<table>
<thead>
<tr>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.020 ± 0.002</td>
<td>(0.51 ± 0.05)</td>
</tr>
<tr>
<td>0.012 ± 0.002</td>
<td>(0.31 ± 0.05)</td>
</tr>
</tbody>
</table>

THICK

**ORDERING INFORMATION: Series 94H**

Series Actuator Style:
- A = Flush, Figure 1
- B = .270, Figure 2
- C = .170, Figure 3 (see page B-21)
- E = .090, Figure 3 (see page B-21)
- F = Flush, Figure 1

Code:
- B = Standard (Natural),
- C = Complementary (Contrasting Color)

RoHS Compliant Packaging:
- R = Tape and Reel, (Surface Mount Only)
- Blank = Tube*

Terminal Style:
- RA = Right Angle, Thru-Hole
- J = J-Lead
- W = Surface Mount
- Blank = Thru-Hole

Number of Positions:
- 08 = Octal, 8 Position
- 10 = BCD, 10 Position
- 16 = Hex, 16 Position

Each reel contains the following number of switches with a 15.35 inch (390 mm) minimum leader and a 6.30 inch (160 mm) minimum trailer.

- 94HA style 750 sw/reel
- 94HB style 150 sw/reel
- 94HC style 200 sw/reel
- 94HE style 300 sw/reel
- 94HF style 750 sw/reel

*S 27 Pieces per tube for surface mount and thru-hole, 24 pieces per tube for right angle switches.

**SERIES 94 High Temperature Knobs: For Shaft Extensions**

Slotted knobs show switch markings. Contact Grayhill for other knob material/marketing color combinations and geometrics.

*Used only with Actuator Type B or C

**ORDERING INFORMATION: Series 94 High Temperature Knobs* **

<table>
<thead>
<tr>
<th>Knob Style and Height</th>
<th>Knob Color</th>
<th>Arrow Color</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>Gray</td>
<td>N/A</td>
<td>947706-001</td>
</tr>
<tr>
<td>5A</td>
<td>Gray</td>
<td>Black</td>
<td>947706-005</td>
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<tr>
<td>1B</td>
<td>Black</td>
<td>N/A</td>
<td>947705-001</td>
</tr>
<tr>
<td>1B</td>
<td>Gray</td>
<td>N/A</td>
<td>947705-012</td>
</tr>
<tr>
<td>2B</td>
<td>Gray</td>
<td>White</td>
<td>947705-004</td>
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<tr>
<td>3B</td>
<td>Gray</td>
<td>Black</td>
<td>947705-017</td>
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<tr>
<td>4B</td>
<td>Gray</td>
<td>Black</td>
<td>947705-018</td>
</tr>
<tr>
<td>1B</td>
<td>Natural</td>
<td>N/A</td>
<td>947705-009</td>
</tr>
<tr>
<td>4B</td>
<td>Black</td>
<td>White</td>
<td>947705-010</td>
</tr>
<tr>
<td>5B</td>
<td>Gray</td>
<td>Black</td>
<td>947705-019</td>
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</table>

*Ordered as a separate item. B = Standard (Natural), C = Complementary (Contrasting Color).
SPECFICATIONS

Electrical Ratings
Make-and-break Current Rating: 30 mA at 30 Vdc for 10,000 cycles of operation.
Carrying Current Rating: 100 mA at 50 Vdc
Contact Resistance: 50 mohms maximum initially (measured at 10 mA, 50 mVdc).
150 mohms maximum after life.
Insulation Resistance: (measured at 100 Vdc across open switch contacts)
Initial: 5000 Mohms minimum. After Life: 1000 Mohms minimum.
Dielectric Strength: (measured across open switch contacts)
Initial: 5000 Vac RMS minimum. After Life: 250 Vac RMS

Mechanical Ratings
Mechanical Life: 10,000 cycles of operation.
One cycle is a rotation through all positions and a complete return through all positions.
Mechanical Shock: 1000g's, 0.5mS, half sine per MIL-STD-202F, Method 213, Test Condition E.
Vibration Resistance: 10-2000 Hz at 15G or 0.060" double amplitude per MIL-STD-202F, Method 204, Test Condition B.
Operational Torque: 2 to 6 inch-ounces initially and 1.2 inch-ounces minimum after life.

Environmental Ratings
Operating Temperature Range: -40° to +85°C.
Storage Temperature Range: -40° to +85°C.

Materials and Finishes
Rotor and Switch Body: Plastic (UL94 V-O)
Contact Material: Copper alloy plated.
30 microinches minimum gold over 50 microinches minimum nickel.
Shorting Member: Copper alloy plated.
30 microinches minimum gold over 50 microinches minimum nickel.
Terminals: Copper alloy, matte tin plated over nickel barrier.
Internal O-ring: Rubber BUNA-N

CODE & TRUTH TABLES

<table>
<thead>
<tr>
<th>Switch Position</th>
<th>Standard Output</th>
<th>Complement Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>1</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>2</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
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<tr>
<td>3</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
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<tr>
<td>4</td>
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<td>● ● ● ● ● ● ● ●</td>
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<tr>
<td>5</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
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<tr>
<td>6</td>
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<td>● ● ● ● ● ● ● ●</td>
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<tr>
<td>7</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>8</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
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<tr>
<td>9</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>A</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>B</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>C</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>D</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
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<tr>
<td>E</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
</tr>
<tr>
<td>F</td>
<td>● ● ● ● ● ● ● ●</td>
<td>● ● ● ● ● ● ● ●</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CODE OUTPUT</th>
<th>CODE OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 4 8</td>
<td>1 2 4 8</td>
</tr>
</tbody>
</table>

All switches are continuous rotation.
Dot indicates terminal to common connection.
Octal and Octal Complement outputs are 0 thru 7 positions.
BCD and BCD Complement outputs are 0 thru 9 positions.
Hexadecimal and Hexadecimal Complement outputs are 0 thru F positions.
Standard codes have natural color rotors.
Complements have rotors in a contrasting color.

Specifications are subject to change. Please refer to the current datasheet on www.grayhill.com for the most current published specifications for this product.

Soldering Information
*For the most current soldering & cleaning processing guidelines, please see page 4
Soldering Temperature: 260° C maximum.
Cleaning: Acceptable solutions include 1-1-1 Trichlorethane, Freon (TF, TE, or TMS), Isopropyl Alcohol and detergent (140°F maximum). Solutions which are not recommended include Acetone, Methylene Chloride, and Freon TMC.
Grayhill DIP Switch Processing Information

The information provided within is intended as processing guidelines for the assembly, soldering, cleaning, and use of Grayhill DIP switches. This information supersedes any other process information that is available in Grayhill Inc. catalogs or data sheets as related to Grayhill Inc. standard DIP switch products. Please contact Grayhill Inc. for any questions related to the information in this document.

Mounting
Unless otherwise noted, Grayhill DIP switches are shipped with slides or rockers in the ON position and rotary DIP switches are shipped with the actuators in the 0 position. It is recommended that they be solder processed in those positions to ensure proper performance without issue.

Soldering
WAVE SOLDER: Switches that can be processed using wave solder equipment (thru hole soldering) are as follows:
- Grayhill Series 76SB, 76PSB, 76RSB, 76SC, 76RSC, 76RSD, 76SD, 76STC, 76STD, 78B, 78RB, 78F, 78G, 78H, 78J, 78K, 90B, 94H (thru hole models), and 94R

Wave soldering guidelines: Solder wave temperature is 260°C max. for 5 seconds max. (0.063” thick PCB). Exposure to flux should be kept to a minimum.

Manual soldering guidelines (for thru hole switches): Soldering temperature is 350°C max. for 3 seconds maximum of dwell time.

REFLOW SOLDER: Switches that can be processed using reflow process equipment are as follows:
- Grayhill Series 76HP, 78HF, 78HJ, 90B, 90HB, 94H, 94R, 97C, and 97R

Reflow soldering guidelines: Soldering temperature is 260°C max. for 5 seconds, with a maximum of two reflow cycles at the maximum conditions. Switches should be allowed to cool for 3 to 5 minutes between reflow cycles. Reflow soldering should not be done to any Grayhill DIP switch products not listed directly above as the exposure to higher surface temperatures could cause permanent deformation of the plastic materials.

Recommended Maximum Soldering Conditions:

PCB Cleaning
In-line DIP switches that are tape sealed can be processed using certain washing processes as described below. Tape sealed switches can typically be identified by a suffix of ST or PT that follows after the series, switch style, and number of position identifiers (i.e., 76SB08ST). Non-tape sealed switches should not be subjected to any washing processes as they can introduce contaminants into the contact area of the switches. Rotary DIP products (94H & 94R) are internally sealed and can be processed the same as tape sealed products.

Tape sealed and rotary DIP switch products are qualified for immersion cleaning processes using alcohol or detergent based cleaning solvents at temperatures up to 140°F. maximum. Tape seal products must have the tape seal undisturbed until after any cleaning process. Cleaning processes that use ultrasonic agitation or that use pressurized sprays can defeat the tape and / or internal seals and allow contamination of the switches. They are not recommended for use on inline or rotary DIP products. Switches should not be washed directly after a soldering process. There should be a delay of at least three minutes to allow adequate time for cooling after soldering.

Tape seal integrity: Inline DIP products that are tape sealed are tested to meet and pass a gross leak test using 125°C Fluorinert for 20 seconds minimum. Reference MIL-202, Method 112.

Tape seal material:
- 76,78: Polyester film, rated to 170°F. maximum temperature
- 90: Polyimide film, rated to 260°C. maximum temperature