

# ABBATRON

**HH Smith**

Through strategic acquisitions at the beginning of the millennium, Abbatron's leadership set the course to enter the electronics industry by bringing innovative production techniques and employing state-of-the-art lean manufacturing systems. Our 40,000 square foot factory provides the products and services featured in this catalog and we look forward to expanding our offering as new RoHS compliant products are successfully introduced.

Our staff, representatives, and contracted distributors look forward to serving you and your associates with the highest level of quality and service at a price you can afford.

"May we have an opportunity to join your lean manufacturing team and enjoy mutual success?"

## ABBATRON

**HH Smith**

ABBATRON HH Smith  
632 Arch Street P.O. Box 726  
Meadville, PA 16335

sales@abbatron.com  
www.abbatron.com

Tel: 1-888-847-6484  
Fax: 1-814-333-1912

Abbatron's 40,000 square foot facility in Pennsylvania is equipped with a wide variety of screw machines, CNC lathes, molders, stamping machines, and more. All to produce for you the part that fits.

For more information on how Abbatron can meet your special requirements, see inside back cover for a complete list of authorized Abbatron distributors or visit our web site at [www.abbatron.com](http://www.abbatron.com) to find a sales representative in your area.

### **HUBZone Certification extended through 2010**

MEADVILLE, PA – The United States Small Business Administration has awarded Abbatron with 7(J) status as a HUBZone Certified Business Concern. This certification significantly benefits Abbatron as it enables aggressive pursuit of additional opportunities with the federal government and other major private sector contractors to the U.S. government. Abbatron has been registered under HUBZone number 19229 and is duly identified on the federal site for Central Contractor Registration (CCR). Approved under the North American Industry Classification System (NAICS) codes 334419 and 332721, Abbatron may pursue contracts under other NAICS codes as qualified to perform. Although no additional business is guaranteed under this certification, greater consideration in future contract awards is likely.

The HUBZone Empowerment Contracting Program stimulates economic development and creates jobs in urban and rural communities by providing federal contracting preferences to small businesses. These preferences go to small businesses that obtain HUBZone (Historically Underutilized Business Zone) certification in part by employing staff who live in a HUBZone. The company must also maintain a "principal office" in one of these specially designated areas. [A principal office can be different from a company headquarters, as explained in our section dedicated to Frequently Asked Questions.] The program resulted from provisions contained in the Small Business Reauthorization Act of 1997. From <http://www.sba.gov/hubzone/>

For more information, please contact the factory at 888-847-6484.

#### **CAGE CODE:**

91967

#### **NAICS CODES:**

332721-334419

#### **STANDARD INDUSTRIAL CLASSIFICATION:**

3678 Electroinc Connectors  
3679 Electronic Components, NEC

#### **FEDERAL SUPPLY CLASSIFICATION:**

5935-5940-6627

Abbatron is a major designer and manufacturer of Milspec Components.

### INTRODUCTION

|                         |   |
|-------------------------|---|
| RoHS Compliance         | 2 |
| Custom Capabilities     | 4 |
| Custom Cable Quote Form | 5 |

### TEST LEADS AND PATCH CORD

|                               |    |
|-------------------------------|----|
| Test Leads                    | 6  |
| Test Lead Kits                | 7  |
| Jumpers                       | 8  |
| Test Prods                    | 9  |
| Alligator Clips               | 9  |
| Dual Instrument Test Adapters | 10 |

### POSTS, PLUGS AND JACKS

|                                 |    |
|---------------------------------|----|
| Binding Posts                   | 12 |
| Insulated Binding Posts         | 13 |
| Miniature Binding Posts         | 14 |
| Metal Binding Posts             | 15 |
| Dual Binding Posts              | 16 |
| Spring Loaded Binding Posts     | 17 |
| Knob Type Binding Posts         | 19 |
| Standard Insulated Banana Plugs | 20 |
| Insulated Banana Plugs          | 21 |
| Uninsulated Banana Plugs        | 22 |
| Giant Banana Plugs              | 23 |
| Insulated Banana Jacks          | 23 |
| Uninsulated Banana Jacks        | 24 |
| Phone Tip Plugs                 | 25 |
| Insulated Tip Jacks             | 26 |
| Printed Circuit Test Jacks      | 27 |
| Uninsulated Tip Jacks           | 27 |

### CONNECTORS

|                            |    |
|----------------------------|----|
| Coaxial Antenna Connectors | 28 |
| Receptacles                | 28 |

### HARDWARE

|                                 |    |
|---------------------------------|----|
| Terminal Strip Boards           | 29 |
| Solder Lugs and Terminals       | 30 |
| Insulated Washers               | 31 |
| Grommets                        | 32 |
| Bumpers and Chassis Feet        | 33 |
| Cable Clamps and Strain Reliefs | 34 |
| Hole Plugs                      | 35 |
| Instrument Handles and Ferrules | 36 |
| Shaft Accessories               | 37 |
| High Voltage Insulators         | 38 |

### SPACERS AND STANDOFFS

|                                            |    |
|--------------------------------------------|----|
| Spacer/Standoff Information                | 40 |
| Brass Round Spacers                        | 41 |
| Brass Round Standoffs                      | 42 |
| Brass Hex Standoffs                        | 43 |
| Brass Male/Female Hex Standoffs            | 44 |
| Brass Male/Female Adapters                 | 44 |
| Brass Swivel Standoffs                     | 45 |
| Aluminum Round Spacers                     | 46 |
| Aluminum Round Standoffs                   | 47 |
| Aluminum Hex Standoffs                     | 48 |
| Aluminum Male/Female Hex Standoffs         | 49 |
| Nylon Round Spacers                        | 50 |
| Nylon Round, Hex and Male/Female Standoffs | 51 |
| Phenolic Spacers                           | 52 |
| Ceramic Standoffs                          | 53 |

|              |    |
|--------------|----|
| <b>INDEX</b> | 54 |
|--------------|----|

|                             |    |
|-----------------------------|----|
| <b>DISTRIBUTOR PARTNERS</b> | 57 |
|-----------------------------|----|

## RoHS Compliance Restriction of Hazardous Substances Directive 2002/95/EC

### Background

As a result of environmental concerns the EU (European Union) has legislated the restriction of certain hazardous materials in all new electrical and electronic equipment sold in member EU countries on or after July 1, 2006. Specifically, with the exception of those items listed as exempted in the annex to Directive 2002/95/EC, the maximum concentration values by weight in homogeneous materials are limited to:

|                                         |       |
|-----------------------------------------|-------|
| Cadmium (Cd)                            | 0.01% |
| Hexavalent Chromium (Cr <sup>6+</sup> ) | 0.10% |
| Lead (Pb)                               | 0.10% |
| Mercury (Hg)                            | 0.10% |
| Polybrominated Biphenyls (PBB)          | 0.10% |
| Polybrominated Diphenyl Ethers (PBDE)   | 0.10% |

The term "homogeneous" with regards to the directive is understood as 'of uniform composition throughout'. Examples of 'homogeneous materials' are individual types of plastics, ceramics, glass, metals, alloys, paper, boards, resins, and coatings. Homogenous material as related to the directive implies individual material that cannot be mechanically disjointed into different materials.

The term 'mechanically disjointed' means that the material can be, in principle, separated by mechanical actions such as for example unscrewing, cutting, crushing, grinding and abrasive processes.

### RoHS Compliance

Abbatron is now in compliance to Directive 2002/95/EC (the RoHS directive) using parallel efforts related to internal manufacturing methods, supply chain, and design.

#### Manufacturing Methods

- As of March 1, 2005 all soldering operations at Abbatron use lead-free soldering materials.
- As of June 30, 2005 each master file record of any raw material, component, or finished product inventoried at Abbatron was updated to reflect one of two classifications:
  - RoHS compliant
  - Not RoHS compliant

Note: with certain limited exceptions the vast majority of Abbatron's existing parts are and have always been RoHS compliant. Products made with certain finishes such as tin/lead and yellow irridite, and certain phenolics which use flame-retardants are not currently RoHS compliant. Parallel to our efforts to clearly identify any nonconforming materials in our inventory master files, we are investigating cost-effective alternatives which will conform to RoHS requirements.

## Part Number Changes

Revision levels (Rev Levels) are used on all Abbatron documents related to customer order confirmations, shipment documentation, inventory control, production work orders, purchase orders issued to our vendors, etc.

Our strategy regarding Revision Level changes to reflect RoHS compliance status is as follows:

- No revision number change is required for any raw materials, components, or finished parts that have always been RoHS compliant.
- Subsequent to June 30, 2005 any design or manufacturing method change to a previously nonconforming part which causes it to come into RoHS compliance will require the issuance of a new revision level (Rev Level) to indicate compliance to the RoHS directive.

## Package Marking

Production operations began July 1, 2005 to mark the packaging containing new production of RoHS compliant parts to indicate RoHS compliance. (Note: It is not possible from a practical standpoint for Abbatron to re-label existing inventories produced prior to July 1, 2005. This will not be an issue, however, because the vast majority of inventories are already RoHS compliant and because each package contains a manufacture date that can be used to determine RoHS compliance status.)

## Supply Chain

Since March 1, 2005 Abbatron has been requiring all raw material, component, plating, and other vendors to complete supplier questionnaires regarding the RoHS compliance of the products they supply to Abbatron.

## Design

As of March 1, 2005 all new designs require RoHS compliant raw materials, components, and plating specifications except for customer-specific parts for which the customer has provided written a deviation specifically permitting deviation from RoHS compliance with regards to that particular item.

## Summary

Abbatron, LLC is committed to, and has actively pursued compliance with the RoHS directive as of its July 1, 2006 effective date. Should you have any questions regarding Abbatron's RoHS related initiatives, please contact Abbatron's customer service staff, representative, or contracted distributor.

# Custom Capabilities

## Machining Capability

Up to 2" diameter barstock. 10 & 12-axis Swiss style turning, with live tooling, to .812" diameter. Tolerances to  $\pm .00020$ ". Hexagon, square, and special shapes are also accommodated.



## Materials

Steel, Stainless Steel, Titanium, Copper, Brass, Aluminum and Plastics. We are experienced with a wide variety of material and special requirements of each.

## Order Quantities

We welcome orders for quantities in the 500 to 1,000,000+ range. Smaller quantities of prototypes may be produced for first time orders.

## Lean Manufacturing

Lean Manufacturing allows us to offer Just-In-Time programs and work seamlessly with your Lean Operations.



## Quality Assurance

Our Quality Assurance Program is utilized throughout every step in the manufacturing process. From the receipt of your purchase order to the shipment leaving our dock, every aspect of quality is controlled. Due to our consistent quality, several ISO 9000 compliant customers have reduced and even eliminated their incoming inspection of our products.



## Engineering Assistance

Design engineering assistance is available. Because we have a unique perspective to the design of your components we have often been asked to assist in this area. Many times consideration is given to functionality without considering how economically the part may be manufactured. We have the capability to assist your engineers with problem solving and design development often resulting in reduced costs and improved quality.

## Secondary Operation

In-House Secondary Operation capabilities includes milling, drilling, threading, stamping, over-molding and assembling. In addition to conventional machinery, several custom built machines are utilized to accurately and efficiently complete a variety of demanding operations.



**Plating and Heat Treating** requirements are easily accommodated. Working with proven vendors, we are able to provide these additional services to our customers.



## Abbatron

632 Arch Street  
Meadville, PA 16335  
Tel: 814-724-6440  
Fax: 814-333-1912  
email - sales@abbatron.com



Premier Supplier of Electronic Hardware

## CUSTOM CABLE QUOTE FORM

Please fax RFQ to (814) 333-1912

Name: \_\_\_\_\_

Company: \_\_\_\_\_

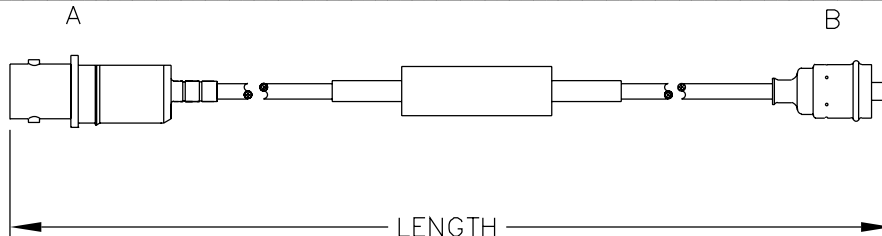
Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_

URL: \_\_\_\_\_



### Connector A

Type: ☐ Open End, ☐ RCA  
☐ Banana, ☐ Test Tip  
☐ Alligator Clip  
☐ RF: Specify \_\_\_\_\_  
☐ Other \_\_\_\_\_

Style: ☐ Bulkhead Jack, ☐ Jack  
☐ Plug, ☐ Right Angle Jack  
☐ Right Angle Plug

Series: ☐ Strain Relief, ☐ Heat Shrink  
☐ Over Molded, ☐ Crimped  
☐ Other \_\_\_\_\_

### Connector B

Type: ☐ Open End, ☐ RCA  
☐ Banana, ☐ Test Tip  
☐ Alligator Clip  
☐ RF: Specify \_\_\_\_\_  
☐ Other \_\_\_\_\_

Style: ☐ Bulkhead Jack, ☐ Jack  
☐ Plug, ☐ Right Angle Jack  
☐ Right Angle Plug

Series: ☐ Strain Relief, ☐ Heat Shrink  
☐ Over Molded, ☐ Crimped  
☐ Other \_\_\_\_\_

Cable Length: \_\_\_\_\_ Cable Type: \_\_\_\_\_

Quantity Requested: \_\_\_\_\_ Date Required: \_\_\_\_\_

Target Price: \_\_\_\_\_ Spec Sheet Attached? \_\_\_\_\_

Any Additional Information:

Quote Form

# Test Leads

Abbatron test leads are precision-made interconnect wire devices for temporary attachment of wire leads between equipment and circuitry. Each style of lead is meant for a specific application and will provide the greatest degree of safety and convenience when used properly.

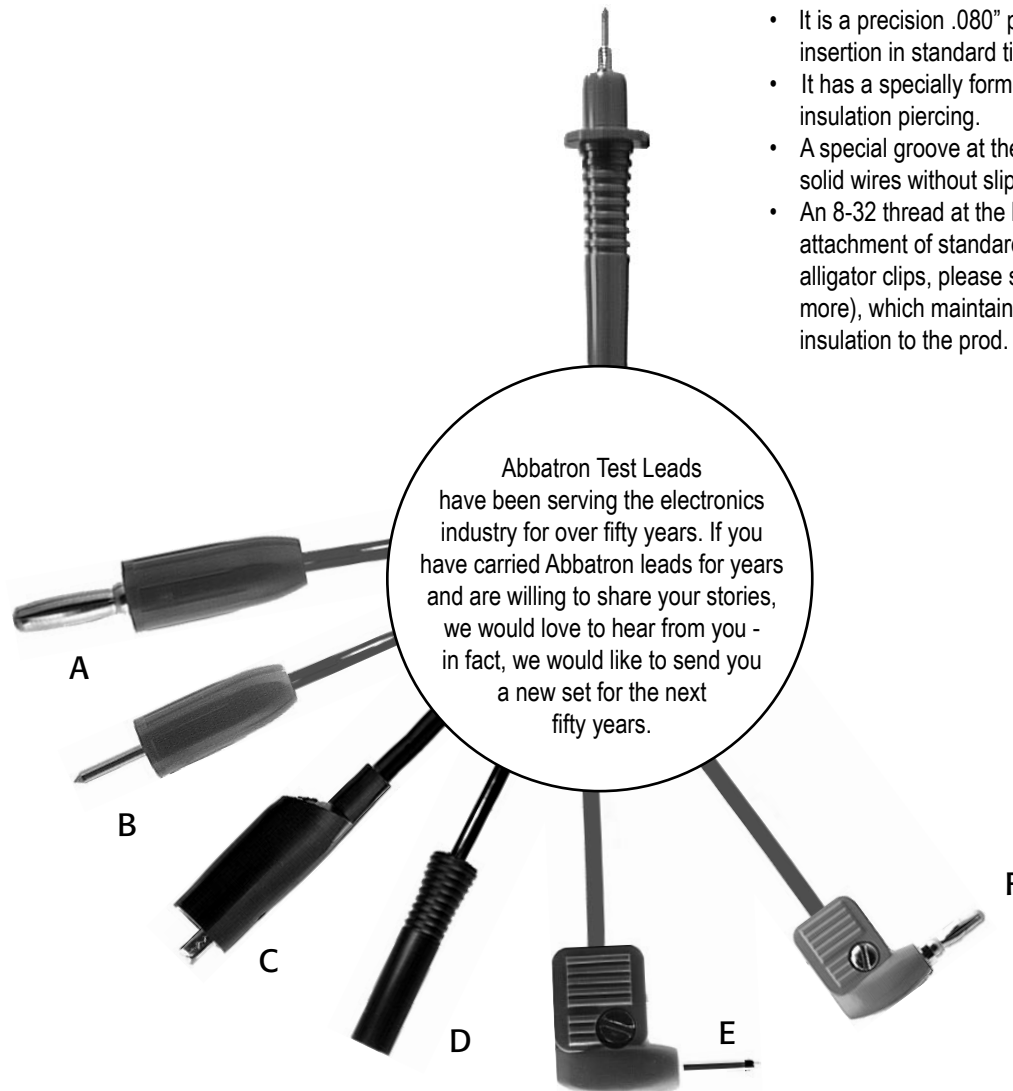
All Abbatron test leads are supplied as a pair, one red and one black and in standard, four-foot lead lengths.

| FIG | Part # | Meter End                         |
|-----|--------|-----------------------------------|
| A   | 623P   | Standard Banana Plug              |
| B   | 603P   | Standard Phone Tip Plug           |
| C   | 615P   | Standard Alligator Clip with Boot |
| D   | 9325P  | Shrouded Safety Banana Plug       |
| E   | 625P   | Right-Angle Phone Tip             |
| F   | 685P   | Right-Angle Standard Banana Plug  |

All of the safety designed plugs have fully shrouded insulation covering metal parts and are made to fit all popular safety input schemes. At the probe end, all Abbatron Test Leads feature a safety prod, which combines many safety features in an original Abbatron design:

- Prods are made of tough, flame-retardant ABS which resists deformation and cracking under the most severe service.
- Finger-grip grooves and a generous guard washer prevent accidental contact with live conductors.
- Prod tip is removable.
- The probe tip is unique in that it serves several purposes:

- It is a precision .080" phone tip for insertion in standard tip jacks (page 26 and 27.)
- It has a specially formed sharp tip for insulation piercing.
- A special groove at the front lays over solid wires without slipping.
- An 8-32 thread at the base allows attachment of standard adapters (such as alligator clips, please see page 9 for more), which maintain the integrity of insulation to the prod.





610P

## Universal Test Lead Kit

- Banana plug test lead kit, with additional parts for universal attachment to various instrument input connectors. Adapters plug onto banana plug end.
- One pair of leads (one red and one black) and accessories are supplied in a handy folding vinyl pouch.
- Lead wire is #18 PVC insulated. It is extra-flexible and kink resistant. Nominal length is 48".

| PART NO. | DESC.        | QTY. | ACCESSORIES        |
|----------|--------------|------|--------------------|
| 610P     | Complete Kit | 2    | Alligator Clips    |
|          |              | 2    | Spade Lugs         |
|          |              | 2    | Phone Tips         |
| 623P     | Repl. Leads  | 2    | One red, one black |

## Test Lead Wire Specifications

| AWG  |                 |        |        | RATINGS |         |
|------|-----------------|--------|--------|---------|---------|
| WIRE | INSULATION      | O.D.   | STRAND | VOLTAGE | CURRENT |
| #18  | PVC             | 0.140" | 65/35  | 10KV    | 10 AMP  |
| #18  | Rubber (Buna N) | 0.140" | 65/36  | 10KV    | 10 AMP  |
| #20  | Rubber          | 0.120" | 26/34  | 5KV     | 8 AMP   |
| #24  | PVC             | 0.090" | 19/36  | 5KV     | 5 AMP   |

Need something a little different? Abbatron can manufacture custom test leads designed to your specifications. Call your nearest Abbatron distributor or representative for details.

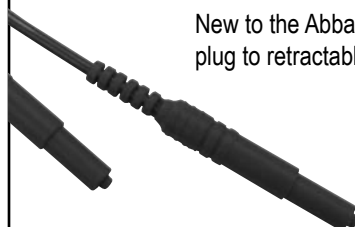


699

## Interchangeable Tip Test Lead Kit

- An indispensable kit for every technician, laboratory, production control station and repair/service facility. A pair of ribbed safety-grip test prods are permanently fixed on one end. Meter ends and prods have modular connectors into which fit a complete assortment of instrument input accessories.
- One pair of leads (one red and one black) and accessories are supplied in a handy folding vinyl pouch.
- Lead wire is #18 PVC insulated. Nominal length is 48".

| PART NO. | DESC.        | QTY. | ACCESSORIES     |
|----------|--------------|------|-----------------|
| 699      | Complete Kit | 2    | Banana Plugs    |
|          |              | 2    | Alligator Clips |
|          |              | 2    | Spade Lugs      |
|          |              | 4    | Phone Tips      |
|          |              | 2    | Needle Tips     |



New to the Abbatron selection is this retractable shrouded banana plug. It is offered as a 48" retractable banana plug to retractable banana plug jumper.

## 1339-48

A standard gold plated banana plug is housed in a spring loaded Nylon 6/6 housing. This plug, developed for maximum safety, is available in red (-102) or black (-103). Please add color as suffix to part number.

Jumpers are common universal connection devices for measurement or testing. These connectors will offer solid, semi-permanent connections between instruments with a maximum of safety and reliability. They are, however, electrically noisy and may be unsafe at power voltage levels and should only be used for temporary connections. The preferred technique is to use a jumper with a connector matching the post jack or other terminal to which it is desired to connect.

\*Please note that figures C, D, E and F are offered with an insulated handle (see G). All Jumpers shown here are supplied as either a pair, (one red, one black) or individually in red (-102) or black (-103). Please add color as suffix to part number.

| PART NO. | FIG. | LENGTH INCHES | WIRE    | INSULATION | UNIT |
|----------|------|---------------|---------|------------|------|
| 1596-12- | A    | 12            | #18 AWG | PVC        | One  |
| 1596-24- | A    | 24            | #18 AWG | PVC        | One  |
| 1596-36- | A    | 36            | #18 AWG | PVC        | One  |
| 1596-48- | A    | 48            | #18 AWG | PVC        | One  |
| 1596-60- | A    | 60            | #18 AWG | PVC        | One  |
| 629      | A    | 12            | #20 AWG | Rubber     | Pair |
| 657      | A    | 24            | #20 AWG | Rubber     | Pair |
| 658      | A    | 36            | #20 AWG | Rubber     | Pair |
| 659      | A    | 48            | #20 AWG | Rubber     | Pair |
| 1510-08- | B    | 8             | #18 AWG | PVC        | One  |
| 1510-12- | B    | 12            | #18 AWG | PVC        | One  |
| 1510-24- | B    | 24            | #18 AWG | PVC        | One  |
| 1510-36- | B    | 36            | #18 AWG | PVC        | One  |
| 627      | C    | 48            | #20 AWG | Rubber     | Pair |
| 628      | D    | 48            | #20 AWG | Rubber     | Pair |
| 647      | E    | 48            | #20 AWG | Rubber     | Pair |
| 604      | F    | 12            | #20 AWG | Rubber     | Pair |
| 605      | F    | 24            | #20 AWG | Rubber     | Pair |
| 606      | F    | 36            | #20 AWG | Rubber     | Pair |
| 607      | F    | 48            | #20 AWG | Rubber     | Pair |

## PATCH CORD RATINGS

| AWG WIRE | INSULATIONS     | O.D.   | STRAND | RATINGS |         |
|----------|-----------------|--------|--------|---------|---------|
|          |                 |        |        | VOLTAGE | CURRENT |
| #18      | PVC             | 0.140" | 65/36  | 10KV    | 10 AMP  |
| #18      | Rubber (Buna N) | 0.140" | 65/36  | 10KV    | 10 AMP  |
| #20      | Rubber          | 0.120" | 26/34  | 5KV     | 8 AMP   |
| #24      | PVC             | 0.090" | 19/36  | 5KV     | 5 AMP   |



## G

Insulated handle supplied with Figures C, D, E and F



## A

Standard Booted Alligator Clip at each end



## B

Standard Stacking Banana Plug at each end



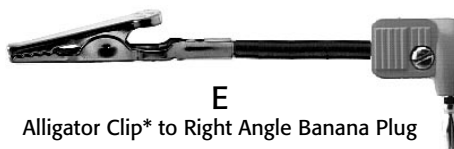
## C

Alligator Clip to Stacking Tip Plug



## D

\*Alligator Clip\* to Right Angle Tip Plug



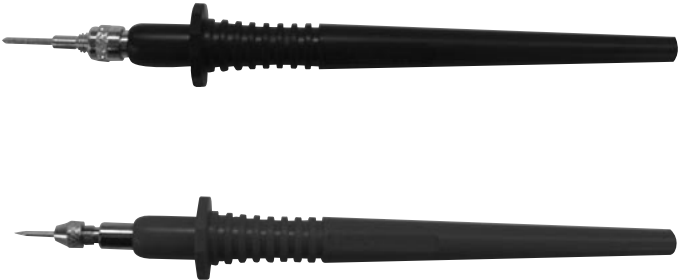
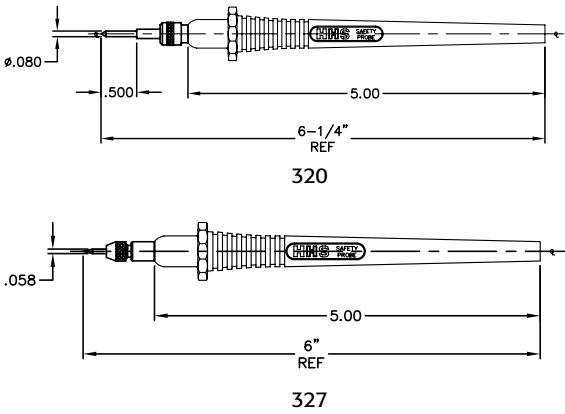
## E

Alligator Clip\* to Right Angle Banana Plug



## F

Alligator Clip\* to Alligator Clip\*



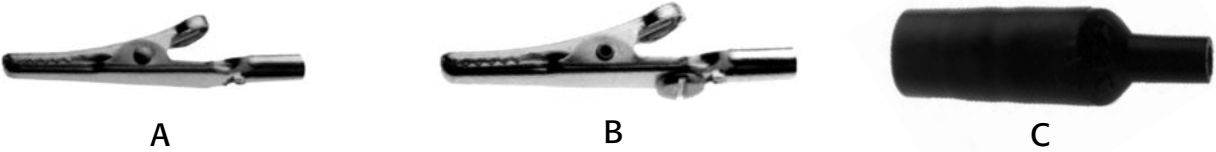
Test prod handles are offered in red (-102) or black (-103). Please add color as suffix to part number.

- Precision machined tips are nickel plated brass.
- Prods are made of tough, flame-retardant ABS which resists deformation and cracking under the most severe service.
- Finger-grip grooves and a generous guard washer prevent accidental contact with live conductors.
- Probe tip is removable for replacement purposes.

| PART NO. | MATERIAL | TIP         | WIRE CONNECTION |
|----------|----------|-------------|-----------------|
| 320      | ABS      | Threaded    | Solderless      |
| 327      |          | Replaceable | Solder          |

Test Prods  
Alligator Clips

Alligator Clips



| PART NO. | STYLE          | FIG. | MATERIAL | PLATING    | LENGTH  | BARREL O.D. | CONNECTION                   |
|----------|----------------|------|----------|------------|---------|-------------|------------------------------|
| 300      | Standard       | A    | Steel    | Bright Tin | 1-31/32 | 5/32        | Solder or Banana Plug        |
| 350      | Standard       | B    | Steel    | Bright Tin | 2       | 3/16        | Screw. Solder or Banana Plug |
| 331      | Standard Boot  | C    | Rubber   | -          | 2       | 9/32        | Covers Standard Clips        |
| 389      | Miniature Boot |      |          |            | 1-3/8   | 7/32        | Covers Medium Clips          |

Red and black color availability for part numbers 331 and 389.

# Dual Instrument Test Adapters



1516



1676



210



1675

## 1516

- Shorting type adapter with dual banana jacks to dual banana plugs. Internal busbar shorted across line.
- ABS body contains banana jack holes for side stacking. Banana plug springs are Beryllium Copper. Standard 3/4" centers.

## 1676

- Dual banana plugs to dual banana jacks. Cable mount design.
- Turret terminal connections for permanent solder, wires or components.
- ABS body, banana springs are beryllium copper. 3/4" standard centers.

## 210

- Dual banana plugs to dual banana jacks. Cable mounted design.
- ABS body features ground polarity indicator. Internal set screws hold wire secure.

## 1675

- Dual banana plugs to dual banana jacks. 7/32" diameter cable mount design.
- Set screws secure leads to conductors.
- Standard 3/4" centers. ABS body, nickel plated beryllium copper springs.

## Ratings

- Rated at 15 amps AC, for 10°C temperature rise, continuous duty, except where limited by coaxial connectors.
- 5KV, 60 cycle AC continuous working voltage, except where limited by coaxial connectors.
- Capacitance: 1.0 pf between conductors.
- Resistance: 1 Milliohm or less per conductor.

\* All adapters shown are available in red (-102) or black (-103).

# Dual Instrument Test Adapters



1682

## 1682

- Insulated dual binding posts to standard dual banana plugs.
- ABS body contains banana jack holes for side stacking. Banana plug springs are beryllium copper.
- Available in black body; one red, one black binding post head. Standard 3/4" centers.



1686



1687

## 1686

- BNC coaxial jack to dual banana plugs.
- ABS body contains banana jack holes for side stacking. Banana plug springs are beryllium copper.
- Available in black body; one red, one black binding post head. Standard 3/4" centers.

## 1687

- BNC coaxial plug to standard dual banana plugs.
- ABS body contains banana jack holes for side stacking. Standard 3/4" centers.



1688



1689

## 1688

- Insulated dual binding posts to male BNC coaxial connector. MIL UG-144/U style.
- ABS body contains banana jack holes for side stacking. Standard 3/4" centers.

## 1689

- Insulated dual binding posts to BNC coaxial jack.
- ABS body contains banana jack holes for side stacking. Available in black body; one red, one black binding post head. Standard 3/4" centers.

### Ratings:

- Rated at 15 Amps AC, for 10°C temperature rise, continuous duty, except where limited by coaxial connectors.
- 5KV, 60 cycle AC continuous working voltage, except where limited by coaxial connectors.
- Capacitance: 1.0 pf between conductors.
- Resistance: 1 Milliohm or less per conductor.

# Binding Post Information

A binding post is a versatile connector that allows a temporary or semi-permanent connection between electronic devices or circuits.

## Construction Features:

The contact surface clamp washer, against which the wire or lug is clamped by the head, is an integral part of the stud and not a force-fitted separate washer. This avoids possible electrolytic corrosion across the mating faces due to current through the interface and subsequent increase in noise, galvanic EMF and resistance. The cross-hole is drilled at right angles to a key-flat on the clamp washer in the screw machine, assuring absolute angular alignment of the finished post to the keyed flat in the instrument panel. Press-on base washers can have as much as five or ten degrees of angular misalignment.

The behind-panel backup insulating washer is made of solid plastic, which reduces cost and increases insulation from flashover voltage of the post.

A flat metal washer is provided as a bearing surface for the nut against the backup washer. This washer can be used without the insulating backup washer, if it is desired, to ground the post to the panel.

All posts are shipped individually and unassembled in a sealed bag. This maintains the integrity of the part set, and also does away with the need to disassemble the post before assembling it on the panel.

**TABLE A**  
**BINDING POST RATINGS**

All current ratings are 60 Hz RMS and are for 10°C temperature rise over ambient, long term. Voltage ratings are 60 Hz at sea level. Capacitance is to a 1/8" aluminum panel, component mounted as recommended. All ratings are working and do not represent maximum values.

| STUD SIZE | CURRENT | VOLTAGE | CAPACITANCE |
|-----------|---------|---------|-------------|
| #4        | 5 AMPS  | 1 KV    | 2.5 pF      |
| #6        | 15 AMPS | 1 KV    | 3 pF        |
| #8        | 15 AMPS | 1 KV    | 4.5 pF      |
| #10       | 30 AMPS | 2 KV    | 5 pF        |

## Connection Options:

1. Top insertion of banana plug.
2. Alligator clip inserted through top jack hole.
3. Spade lug positioned over stud and fastened by tightening the head.
4. Wire inserted through cross hole and held by head.
5. Standard .080" phone tip can be inserted in cross hole and held by head.
6. Wire wrapped around stud and fastened by tightening head.

## Finishes:

MIL-Spec and certain other posts are supplied in gold plate in accordance with the requirements of the specifications. In all instances where gold is plated on brass, a barrier of Nickel is provided to prevent migration.

Excellent appearance and solderability are also provided by pure tin plating on alternative versions of these posts, with lower cost. This is a bright, acid tin, 99% pure, and NOT a solder plating.

Where solderability of the post is not a requirement, bright nickel plating is provided for maximum corrosion protection.

Plastic parts are provided with a low-luster, semi-matte finish for a modern appearance on contemporary instruments.

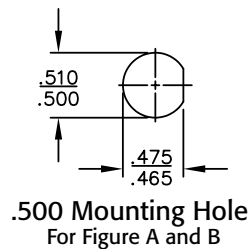
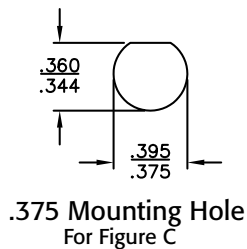
## Material Specifications:

All binding posts are machined from solid brass. Mounting nuts and washers are also brass.

- **Brass:** Free-matching leaded brass, per QQ-B-626, Comp. 360, 1/2 hard.
- **Gold:** Gold plated, per MIL-G-45201, 5 micro-inch over 50 micro-inch hard nickel strike.
- **Nickel:** Nickel plate, per QQ-N-290, 200 micro-inch.
- **Tin:** Tin plate, per MIL-T-10727, 200 micro-inch Bright Acid Tin.

# Insulated Binding Posts

- Post head is molded Lexan polycarbonate, hex or fluted. Captivated to prevent loss.
- Body is brass with gold or tin plating as indicated.
- Insulated washers are molded polycarbonate and completely insulate post from panel. Keyed to panel and body to prevent rotation.
- Body mounts in 3/8" or 1/2" round or "D" hole for anti-rotation (see diagrams).
- Connects with .080" phone tip plug, 1/4" spade lug, standard banana plug, alligator clip or wire (to #14).
- To connect circuit, wrap wire around solder turret or attach to solder lug between nuts (lug not supplied).
- All posts shown here are available in standard red (-102) and black (-103). Other colors are available from factory. Please add color to part number as suffix.

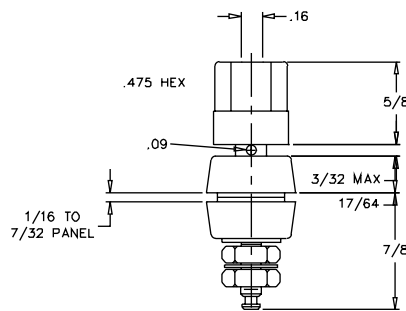
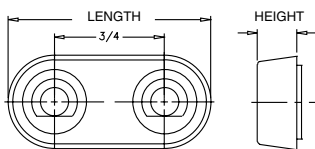


| PART NO. | FIG. | HEAD SHAPE | POST THREAD | PLATING |
|----------|------|------------|-------------|---------|
| 257      | A    | Hex        | 10-32       | Gold    |
| 899      |      |            |             | Tin     |
| 459      | B    | Fluted     | 10-32       | Gold    |
| 799      |      |            |             | Tin     |
| 1275     | C    | Fluted     | 6-32        | Tin     |
| 1275N    |      |            | 8-32        |         |
| 1517     |      |            | 6-32        | Gold    |
| 1514     |      |            | 8-32        |         |

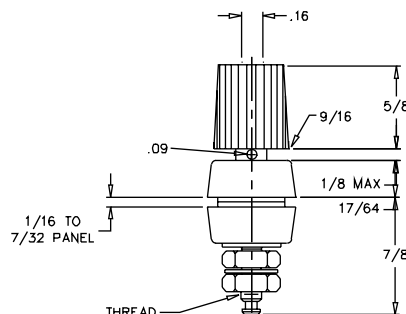
## Base Insulators:

Use these molded polycarbonate insulators to convert single posts to dual as indicated in table. Available in black.

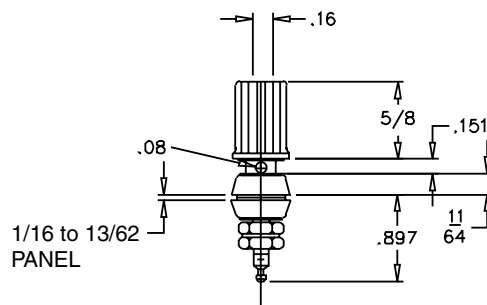
| PART NO. | MNTG HOLE DIA. | LENGTH | HEIGHT | CONVERTS |
|----------|----------------|--------|--------|----------|
| 1814-5   | 3/8            | 1-7/32 | 5/32   | 1517     |
| 207-03   | 1/2            | 1-3/8  | 17/64  | 257      |



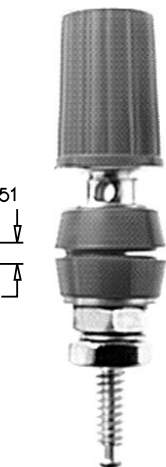
**A**



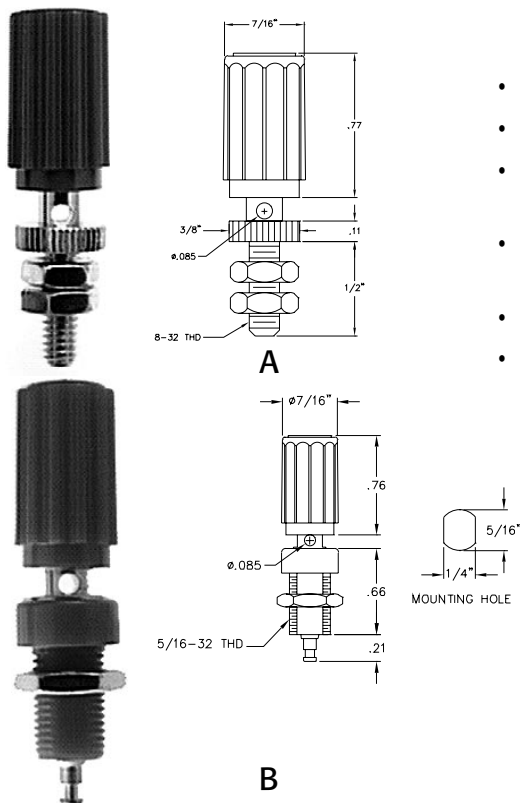
**B**



**C**



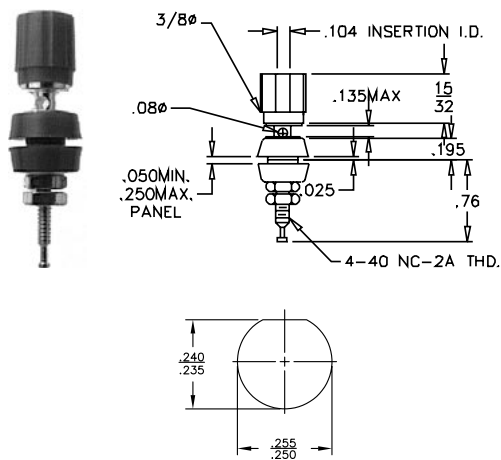
## Insulated Binding Posts



- Body is brass with nickel or tin plating as indicated.
- Body mounts as indicated in table.
- Connects with .080" phone tip plug, spade lug, standard banana plug, alligator clip or wire (to #14).
- To connect circuit, wrap wire around solder turret or attach to solder lug between nuts (lug not supplied).
- Please refer to Table A (page 12) for post rating information.
- All posts shown here are available in standard red (-102) and black (-103). Other colors are available from factory. Please add color to part number as suffix.

| PART NO. | FIGURE | MNTG. HOLE | POST THREAD | WASHER     | PLATING |
|----------|--------|------------|-------------|------------|---------|
| 1482     | A      | 11/16      | 8-32        | None       | Nickel  |
| 1464     | B      | 5/16 "D"   | 5/16 - 32   | Insulating | Tin     |

## Miniature Binding Posts

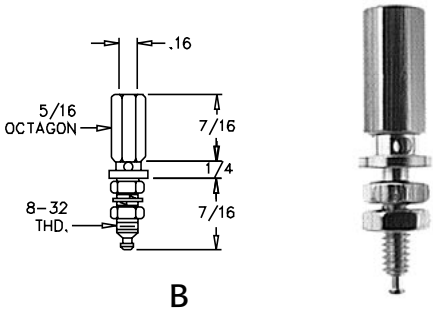
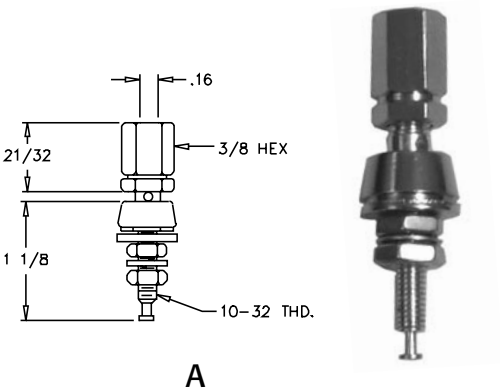


- Fluted post head is molded Lexan Polycarbonate with a gold plated brass insert.
- Body is brass with gold plating.
- Washers are molded nylon with a gold plated brass insert.
- Mounts in panel hole as indicated in table.
- Connects with .080" phone tip plug, spade lug, miniature banana plug, alligator clip or wire (to #18).
- To connect circuit, wrap wire around solder turret or attach to solder lug between nuts (lug not supplied).
- Please refer to Table A (page 12) for post rating information.
- Post is available in standard red (-102) and black (-103). Other colors are available from factory. Please add color to part number as suffix.

| PART NO. | MNTG. HOLE | POST THREAD |
|----------|------------|-------------|
| 3015     | 1/2        | 4-40        |

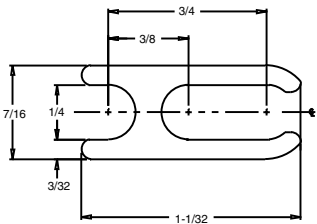
- Post heads are nickel plated brass.
- Bodies are machined brass with tin plating.
- Connects with .080" phone tip plug, 1/4" spade lug, standard banana plug, alligator clip or wire (to #14).
- To connect circuit, wrap wire around solder turret or attach to solder lug between nuts (lug not supplied).
- Please refer to Table A (page 12) for post rating information.

| PART NO. | FIG. | MNTG. HOLE | POST THREAD | HEAD SHAPE |
|----------|------|------------|-------------|------------|
| 1835     | A    | 1/2 "D"    | 10-32       | Hex        |
| 137      | B    | #8         | 8-32        |            |



Abbatron Binding Posts Safety Features:

- Insulating material is high-temperature, flame-retardant polycarbonate, with a UL continuous-usage temperature of 220°F (110°C), and UL Flammability Rating of 94 V-O.
- Restricted head-opening prevents contact with live metal parts, even with the head screwed back down. Positive internal captivation does not allow the head to be removed, even with excessive torque.
- Recessed and insulated banana jack opening will not allow contact with the metal stud, even with the head screwed down. Abbatron recommends using the 289 style shrouded banana plug for the highest possible safety level.
- Positive, double-keyed insulating washers prevent rotation of the stud or body when tightened into a keyed panel hole.

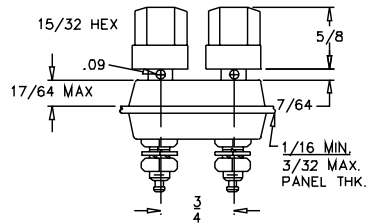


1828

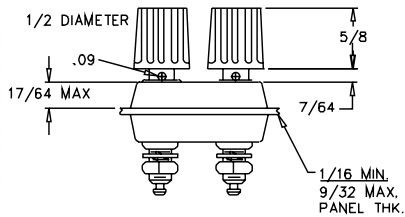
Shorting Link:

- Constructed of spring brass with nickel plating.
- Rated at 20 Amps.
- Fits 269 style posts (page 16).

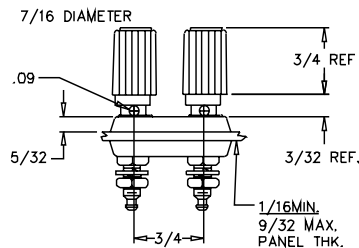
# Dual Binding Posts



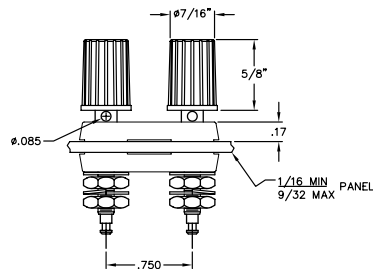
A



B



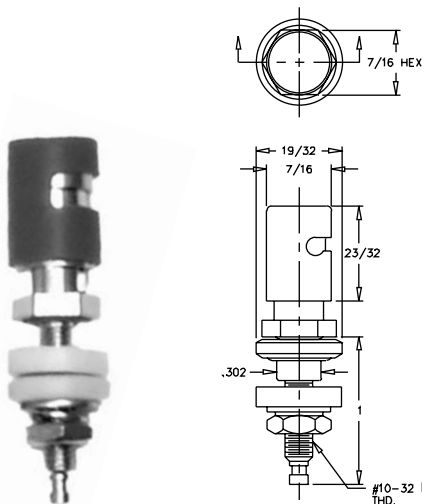
C



D

- Fluted or hex insulated post heads are molded Lexan polycarbonate. Captivated to prevent loss.
- Body is brass with tin plating.
- Insulated washers are molded polycarbonate and completely insulate post from panel. Keyed to panel and body to prevent rotation.
- Body mounts into dual holes with 3/4" centers.
- Connects with .080" phone tip plug, 1/4" spade lug, standard banana plug, alligator clip, wire (to #14) and shorting links.
- To connect circuit, wrap wire around solder turret or attach to solder lug between nuts (lug not supplied).
- Please refer to Table A (page 12) for ratings.
- All posts shown are available as black, red or red and black in the table.

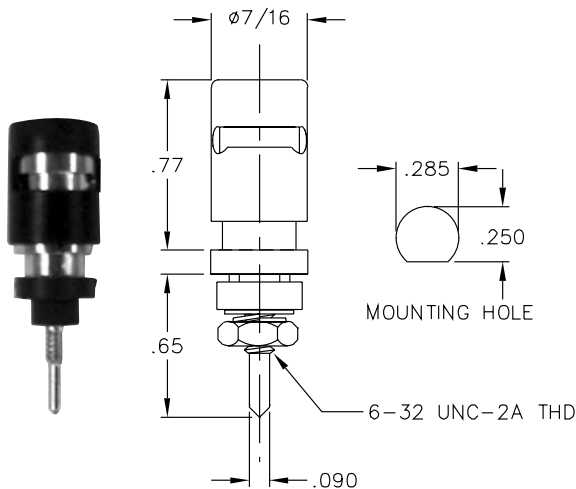
| PART NO. | FIG. | MNTG. HOLE | POST THREAD | HEAD SHAPE | HEAD COLORS   |
|----------|------|------------|-------------|------------|---------------|
| 269BB    | A    | 1/2        | 10-32       | Hex        | Black - Black |
| 269RB    |      |            |             |            | Red - Black   |
| 269RR    |      |            |             |            | Red - Red     |
| 1813BB   | B    | 1/2        | 10-32       | Hex        | Black - Black |
| 1813RB   |      |            |             |            | Red - Black   |
| 1813RR   |      |            |             |            | Red - Red     |
| 1477BB   | C    | 3/8        | 6-32        | Fluted     | Black - Black |
| 1477RB   |      |            |             |            | Red - Black   |
| 1477RR   |      |            |             |            | Red - Red     |
| 1814BB   | D    | 3/8        | 6-32        | Fluted     | Black - Black |
| 1814RB   |      |            |             |            | Red - Black   |
| 1814RR   |      |            |             |            | Red - Red     |
| 1809BB   | D    | 3/8        | 8-32        | Fluted     | Black - Black |
| 1809RB   |      |            |             |            | Red - Black   |
| 1809RR   |      |            |             |            | Red - Red     |



1837

- ML-P-55149/8 commercial version, this heavy duty, water-proof post is meant for rugged applications.
- Body is nickel plated brass.
- Insulated washers are molded nylon. Cap is silicon rubber, as are "O" ring waterproof seals for panel.
- Body mounts into 5/16" hole in panel from 1/16" to 1/8" thick.
- Spring loaded push cap tightly grips wire in side slot.
- To connect circuit, wrap wire around solder turret or attach to solder lug between nuts (lug not supplied).
- Please refer to Table A (page 12) for post rating information.
- Available in red (-102, MIL Spec Type PB 08NA02) or black (-103, MIL Spec Type PB 08NA01).

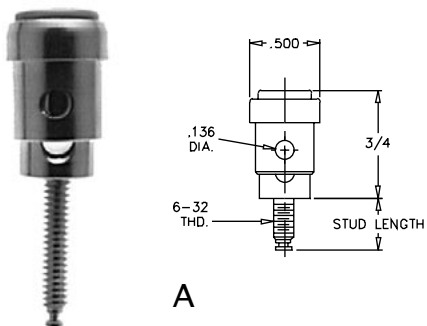
| PART NO. | FIG. | MNTG HOLE | POST THREAD | STUD LENGTH | PLATING |
|----------|------|-----------|-------------|-------------|---------|
| 1837-    | A    | 5/16      | 10-32       | 1           | Nickel  |
| 1839-    | B    | 9/32      | 6-32        | 5/8         |         |



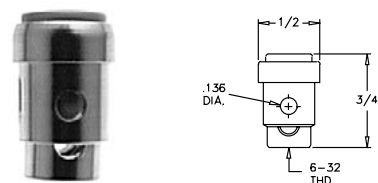
1839

- High retention spring loaded binding post.
- 70 lb/in spring compression rate.
- Based on MIL-P-55149/10.
- Waterproof to 1m.
- Top insulating washer is over-molded on the post.
- Anti-rotational design.
- Nickel finish.
- Spring loaded push cap tightly grips wire in slot.
- Available in red (-102) or black (-103).

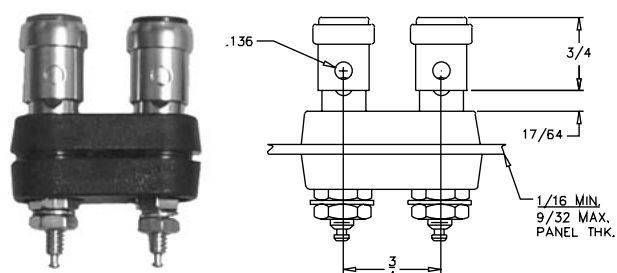
# Spring Loaded Binding Posts



A



B



C

| PART NO. | FIG. | MNTG. HOLE | POST THREAD | STUD LENGTH | PLATING |
|----------|------|------------|-------------|-------------|---------|
| 2802     | A    | #6         | 6-32        | 3/8         | Nickel  |
| 2803     |      |            |             | 1/2         |         |
| 2804     |      |            |             | 3/4         |         |
| 2809     | B    |            |             | 6-32 THD    |         |
| 2713BB   | C    | 1/2        | 8-32        | 1/16 MIN    |         |
| 2713RB   |      |            |             | 9/32 MAX    |         |
| 2713RR   |      |            |             | PANEL THKNS |         |

- Quick and secure wire connection is assured with these spring loaded binding posts.
- Heads and bodies are brass with plated finish as indicated above. Insulated caps on heads are available in red (-102) or black (-103) or for the Dual posts, a combination (RR, RB, BB). Please add color as suffix to part number.
- Posts mount into #6 holes. Dual posts require standard 3/4" centers.
- Use with phone tip plug up to 1/8" diameter or connect to wire up to #12 AWG.
- To connect circuit, wrap wire around solder turret or attach to solder lug between nuts (lug not supplied).
- Please refer to Table A (page 12) for post rating information.

# Knob Type Binding Posts

- Where only a simple, grounded, single-wire connection is to be made to a panel or chassis, these metal compression type posts are recommended.
- Parts in diagram B and C connect with .080" phone tip plug, standard banana plug and wire (to #14).

| PART NO. | FIGURE | MOUNTING HOLE | MOUNTING THREAD |
|----------|--------|---------------|-----------------|
| 110      | A      | #8            | 8-32 Screw      |
| 159      | B      | #6            | 6-32 Thread     |
| 136      | C      | #6            | 6-32 Thread     |

## Design & Application Features:

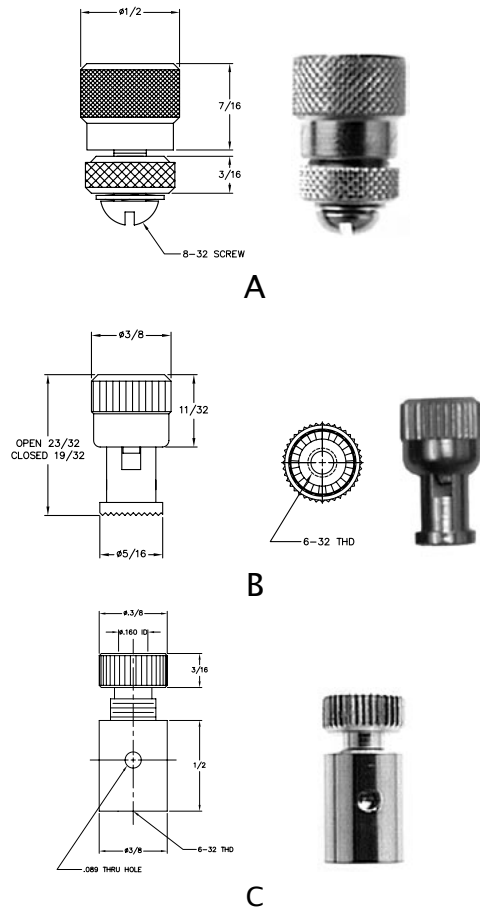
Where only a simple, grounded, single wire connection is to be made to a panel or chassis, the metal compression type posts are recommended (part numbers 159,136).

Where a grounded connection is required, but a variety of plugs, tips or wires may be used, the metal-head, multiple-use binding posts are ideal. The hex styles offer a variety of sizes and current ranges (part numbers 1835 and 137).

For lowest cost in insulated binding posts, fluted head posts are the choice (part number 1464). The thread is molded as an integral part of the head, thus reducing cost but maintaining quality. Versions are offered to ground the post directly to the panel or to fully insulate the post.

Our premium quality insulated binding posts feature brass threaded inserts in the head, separable washer construction and a variety of head styles, stud sizes, mounting space requirements and metal finishes.

High current posts are available in both hex and fluted heads, whereas the thinner styles offer narrow fluted heads for space efficiency (part numbers 257, 1517 and 459). Both of these types are made in military specifications style in the gold plated versions. Tin plated posts have all the features of the MIL-Spec posts with the bright solderable pure tin plating for greater economy.

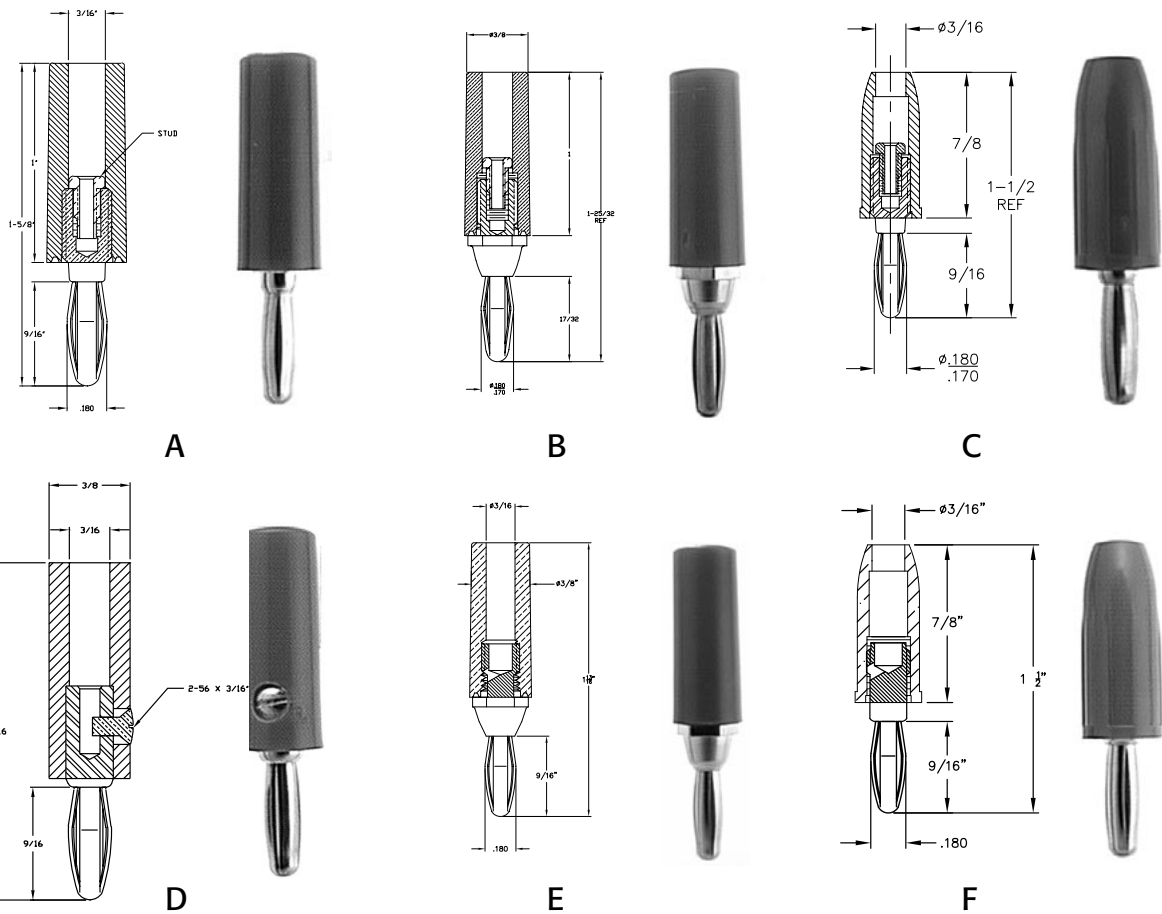


A subminiature post is offered to fit miniature banana plugs and miniature alligator clips and spade lugs (part number 3015).

The line of dual binding posts offer all features and economies of the single posts but with the added convenience of pre-mounting on exact 3/4" or 1/2" centers on a common panel insulator (part numbers 269, 1477, 1813 and 1814).

| Type           | SPECS      | CONTINUOUS TEMPERATURE | FLAMMABILITY RATING - UL |
|----------------|------------|------------------------|--------------------------|
| Nylon Type 6/6 | ASTM-D4066 | 185 F                  | 94 V-2                   |
| Polycarbonate  | UL-94      | 220 F                  | 94 V-0                   |
| A.B.S.         | L-P-1183   | 160 F                  | 94HB                     |
| Phenolic       | -          | 220 F                  | 94HB                     |

# Standard Insulated Banana Plugs



Banana Plugs

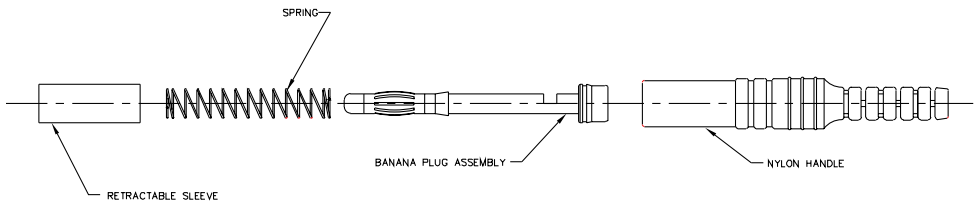
- Banana plug bodies are nickel plated brass with beryllium copper springs.
- Handles are molded plastic as indicated in table.
- Available in red (-102) and black (-103) as standard colors. Other colors are available upon request.

| PART NO. | ILLUS. | TYPE     | HANDLE        | WIRING       | RATING        |
|----------|--------|----------|---------------|--------------|---------------|
| 211      | A      | Standard | Nylon         | Stud or Well | 15 Amps - 1KV |
| 212      | B      |          | Polycarbonate |              |               |
| 476      | C      |          | Nylon         | Side Screw   |               |
| 204      | D      |          |               | Solderless   |               |
| 295      | E      |          | Polycarbonate |              |               |
| 455      | F      |          |               |              |               |

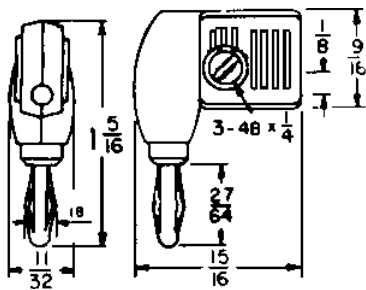
289

Shrouded Safety Banana Plug

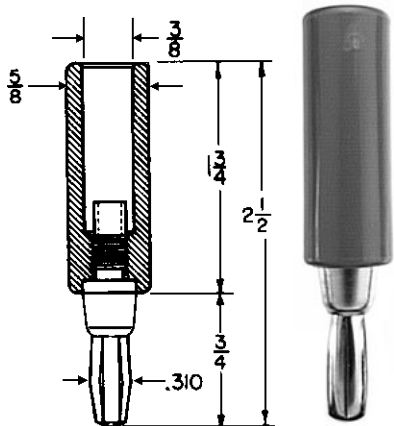
- Brass body has beryllium copper caged spring and is gold plated.
- Housing is molded nylon type 6/6.
- Plug is supplied unassembled for immediate application. Available in red (-102) or black (-103).



- Each plug shown below has a special feature and each is machined from brass and is nickel plated. Insulating material is indicated in table.
- Available in red (-102) or black (-103). Please add color as suffix to part number.



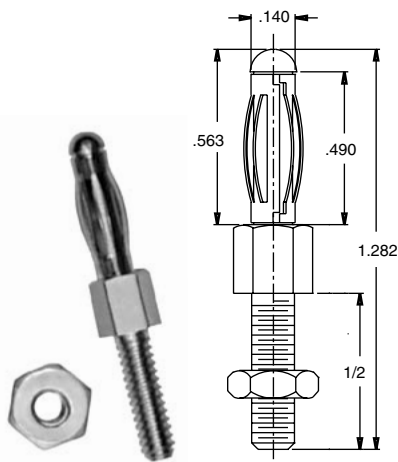
A



B

| PART NO. | ILLUS. | TYPE        | HANDLE | WIRING      | RATING        |
|----------|--------|-------------|--------|-------------|---------------|
| 255      | A      | Right Angle | ABS    | Solder Well | 10 Amps - 1KV |
| 285      | B      | Giant       | Nylon  | Solder Well | 25 Amps - 2KV |

# Uninsulated Banana Plugs



425

Uninsulated banana plugs have nickel plated brass bodies with nickel plated beryllium copper springs. All plugs shown here feature a male threaded stud as indicated in table.

Hardware is included (except with part 192).

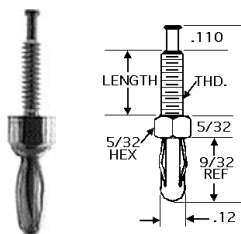
## 425

### Caged Spring Banana Plug

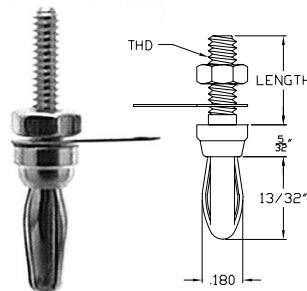
- Body is precision machined from brass and nickel plated. Hardware included.
- Caged springs are made from beryllium copper and are nickel plated.
- Also available with gold plating (# 425AA).

This caged spring banana plug features nine 'leaves' for greater contact during use. It is designed with a 6-32 threaded post for ease of assembly.

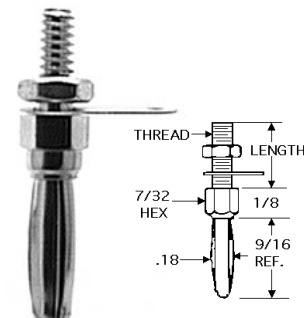
| PART NO. | FIG. | TYPE     | STUD   |        | AMPS |
|----------|------|----------|--------|--------|------|
|          |      |          | THREAD | LENGTH | AC   |
| 192      | A    | Mini.    | 2-56   | 17/64  | 5    |
| 460      | B    | Short    | 4-40   | 3/8    | 10   |
| 462      |      |          |        |        |      |
| 401      | C    | Standard | 6-32   | 1/2    | 15   |
| 103      |      |          |        | 3/8    |      |
| 102      | 1/2  |          |        |        |      |
| 432      |      |          |        |        |      |
| 145      | D    |          | 1/4-32 | 11/32  |      |
| 100      | E    |          | 6-32   | 29/32  |      |



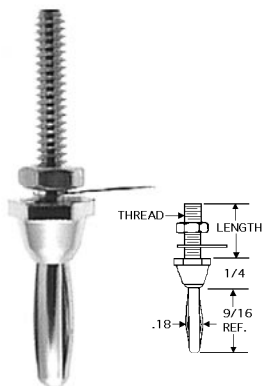
A



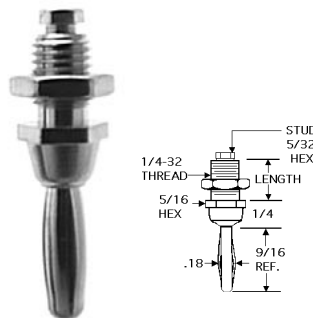
B



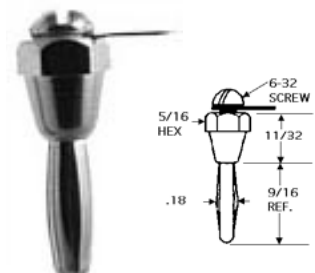
C



D



E

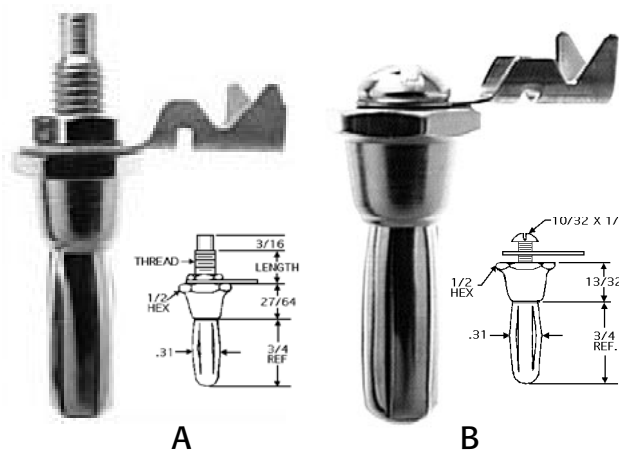


F

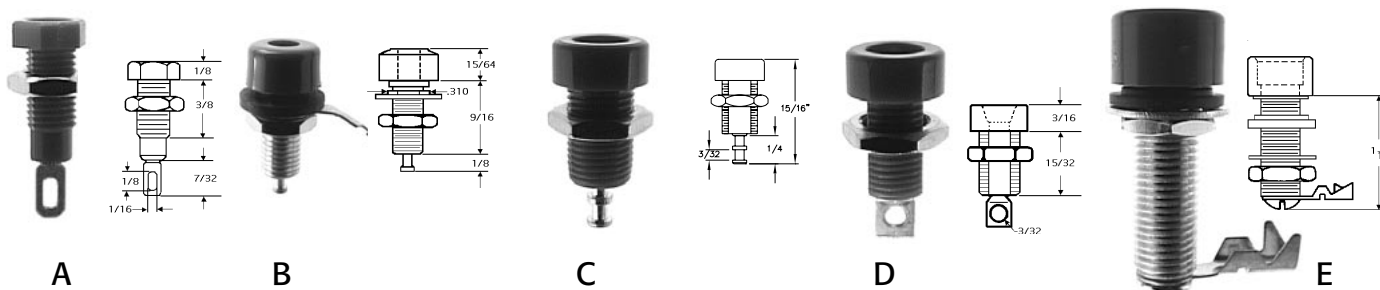
## Giant Banana Plugs

| PART NO. | FIG. | STUD   |        | AMPS |
|----------|------|--------|--------|------|
|          |      | THREAD | LENGTH |      |
| 185      | A    | 1/4-28 | 13/32  | 25   |
| 186      | B    | 10-32  | Hole   | 25   |

- Giant uninsulated banana plugs and machined brass bodies with nickel plating and beryllium copper springs that are also nickel plated.
- Supplied with lug and screw as shown. Solder wire to lug between nut and panel.
- Fits 286 style giant insulated banana jack or style 157 giant uninsulated banana jack (page 24).
- Rated at 25 Amps AC



## Insulated Banana Jacks



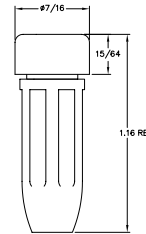
- Metal body jacks are nickel plated brass.
- Jacks mount and are insulated from panel in 5/16" holes. Metal body jacks can be conductive-to-panel mounted in 1/4" holes. All are held with nut supplied.
- Available in red (-102) or black (-103) as standard, call for other colors.
- Wire wraps and solders around turret or through hole in interior contact. Wire can be soldered to lug supplied on metal body jacks.
- Rated at 15 Amps AC for 10°C temperature rise, continuous duty. Voltage 1 KVAC.

| PART NO. | FIG. | TYPE                           | HEAD DIA. | HEAD HEIGHT | BODY LENGTH | THREAD  | I.D. | INSULATING MATERIAL |
|----------|------|--------------------------------|-----------|-------------|-------------|---------|------|---------------------|
| 1458     | A    | Miniature, All Insul.          | 5/16      | 1/8         | 5/8         | 1/4-32  | .104 | Polycarbonate       |
| 205      | B    | Standard, Metal Body           | 7/16      | 15/64       | 9/16        |         | .161 | Nylon               |
| 1499     | C    | Standard, All Insul., "D" Body |           | 3/16        | 15/32       | 5/16-32 |      | Polycarbonate       |
| 1509     | D    |                                |           |             |             |         |      |                     |
| 286      | E    | Giant                          | 5/8       | 3/8         | 13/16       | 3/8-24  | 9/32 | Nylon               |

# Insulated Banana Jacks

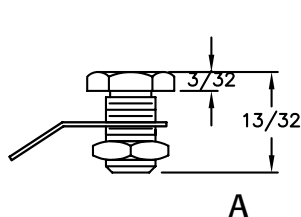
## In-line Banana Jack

- This fully insulated banana jack is designed for secure cable mount via solder or crimp assembly.
- The machined brass body is tin plated for maximum ease of lead-free solderability. This banana jack is fully insulated with nylon 6/6 cap and handle; available in red and black.
- This design is suitable for test lead or patch cord extension where long leads are required. Accepts standard banana plugs.
- Rating: 15 AMPS AC for 10 (degrees symbol) C continuous temperature rise, continuous duty. Voltage 1KVAC.

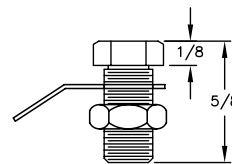


| PART NO. | TYPE    | HEAD DIA. | HEAD HEIGHT | BODY LENGTH | THREAD | I.D. | INSULATING MATERIAL |
|----------|---------|-----------|-------------|-------------|--------|------|---------------------|
| 251      | In-Line | 7/16      | 15/64       | 29/32       | 1/4-32 | .161 | Nylon               |

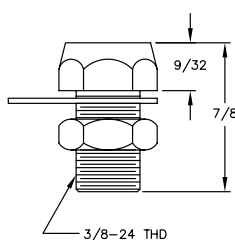
# Uninsulated Banana Jacks



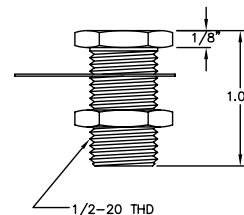
A



B



C

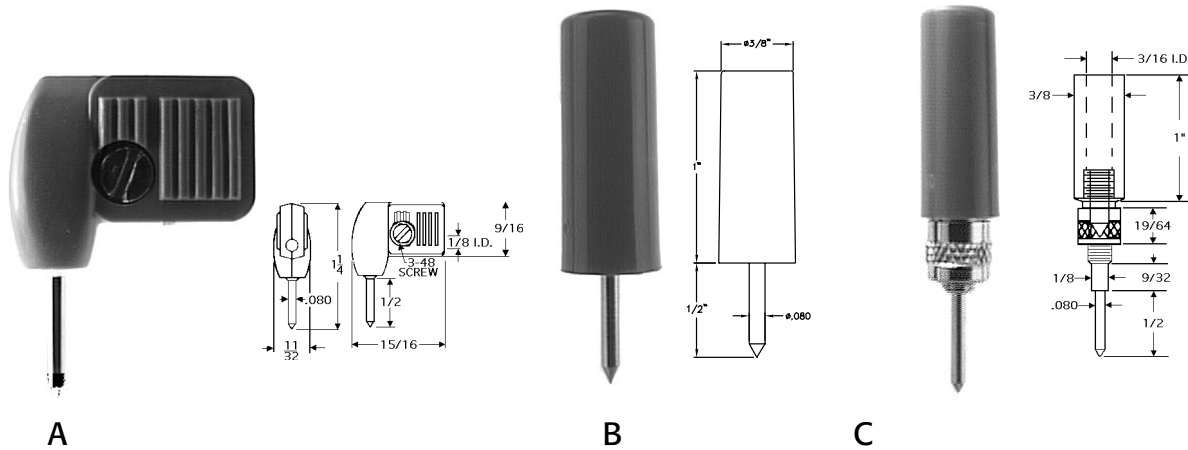


D



- Threaded bodies are machined from brass and nickel plated.
- Body is held to panel with nut. Wire solders to lug between nut and panel. Hardware included.

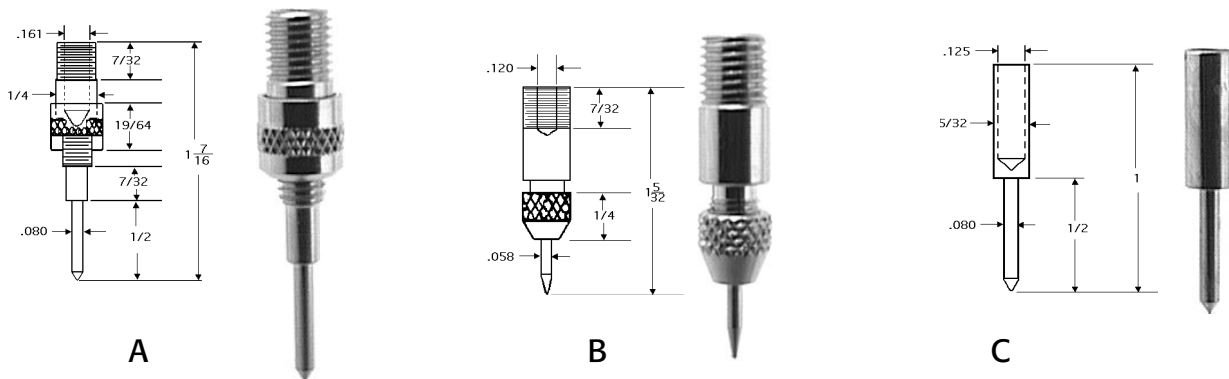
| PART NO. | ILLUS. | TYPE     | HEAD DIA. | HEAD HEIGHT | BODY LENGTH | THD.   | I.D. |
|----------|--------|----------|-----------|-------------|-------------|--------|------|
| 101      | A      | Standard | 3/8       | 3/32        | 13/32       | 1/4-32 | .161 |
| 109      | B      | Standard | 5/16      | 1/8         | 1/2         | 1/4-32 | .161 |
| 187      | C      | Giant    | 1/2       | 9/32        | 19/32       | 3/8-24 | .275 |
| 157      | D      | Giant    | 5/8       | 1/5         | 7/8         | 1/2-20 | .275 |



## Insulated Phone Tip Plugs

- Body is brass with nickel plating. Handle is molded plastic as indicated in table.
- Colors: All of the above plugs are offered in standard -102 red or -103 black. Add color as suffix to part number. Other colors such as white, yellow, green and blue are available by special order.
- Please see pages 6 and 8 for jumpers or test leads using these plugs and page 9 for test prods. Need something similar but different? We have or can make what you need to get the job done.

| PART NO. | FIG. | TYPE       | HANDLE MATERIAL | AMPS | VOLTS |
|----------|------|------------|-----------------|------|-------|
| 235      | A    | RA Solder  | ABS             | 12   | 1 KV  |
| 203      | B    | Solder     | Nylon           | 12   | 1 KV  |
| 200      | C    | Solderless | Nylon           | 12   | 1 KV  |

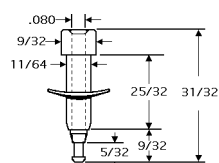


## Uninsulated Phone Tip Plugs

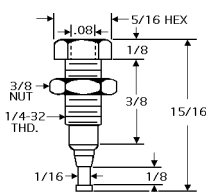
- Brass body with nickel plating.
- Needle tips are nickel plated steel.
- Wire leads solder into well in back of plug. On solderless types, wire fits through hole in body, wraps around screw portion and is held with knurled collar.
- Rated at 12 Amps AC for 10°C temperature rise, continuous duty.

| PART NO. | FIG. | TYPE       | MOUNTING  | STYLE                  |
|----------|------|------------|-----------|------------------------|
| 124      | A    | Solderless | Threaded  | Long tip               |
| 128      | B    | Solder     | Threaded  | Replaceable needle tip |
| 108      | C    | Solder     | Wire Mnt. | Earphone tip, machined |

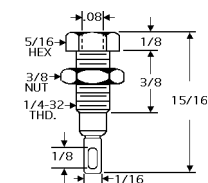
# Insulated Tip Jacks



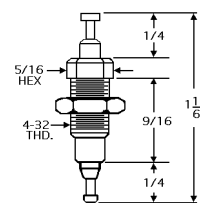
A



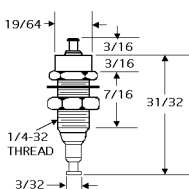
B



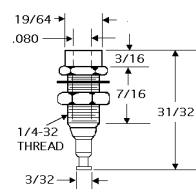
C



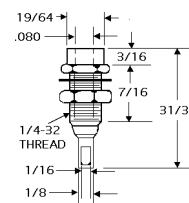
D



E



F



G

- Mounts in panel hole as indicated, with hardware supplied for fully insulated mounting.
- Wire lead solders to contact lug or wraps and solders to turret.

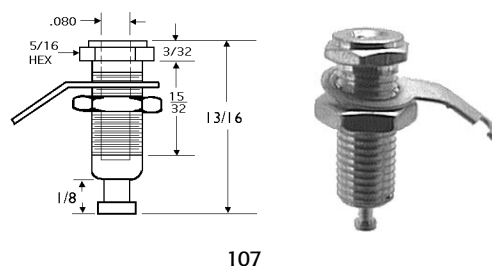
Rated at 10 Amps AC for 10°C temperature rise, continuous duty. Voltage, capacitance ratings per table.

Available in red (-102) or black (-103) as standard colors. Call for other colors.

| PART NO. | ILLUS. | TYPE                                                                           | MOUNTING HOLE | RATINGS |          |
|----------|--------|--------------------------------------------------------------------------------|---------------|---------|----------|
|          |        |                                                                                |               | VOLTAGE | CAPACITY |
| 1598     | A      | All insulated, Quick Mounting                                                  | 3/16          | 1 KV    | 4.0 pf   |
| 1505     | B      | All insulated, Turret Terminal                                                 | 1/4           | 2 KV    | 3.0 pf   |
| 1506     | C      | All insulated, Eyelet Terminal                                                 |               |         |          |
| 1507     | D      | All insulated, Feed-Thru Brass Turret                                          |               |         | 10.0 pf  |
| 1503     | E      | Insulated Body, Metal Shell, Feed-Thru                                         |               |         |          |
| 3501     | F      | Insulated Body, Metal Shell, Turret Terminal<br>MIL Version Per MIL-C-39024/10 |               |         |          |
| 3502     |        | Insulated Body, Metal Shell, Eyelet Terminal<br>MIL Version Per MIL-C-39024/10 |               |         |          |

## Uninsulated Tip Jacks

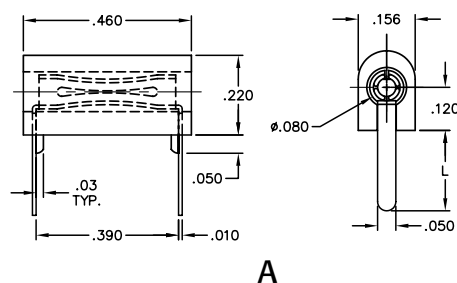
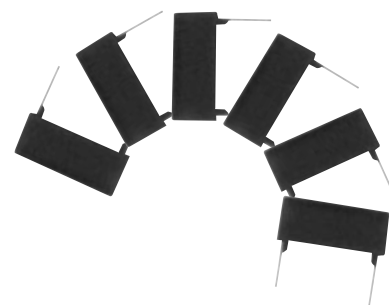
- Brass body with nickel plating.
- Phosphorus bronze contact.
- Mounts in a .250" hole in panels up to 0.375" thick, with nut supplied.
- Wire lead solders to lug on jack.
- Rated at 15 Amps AC for 10°C temperature rise, continuous duty.



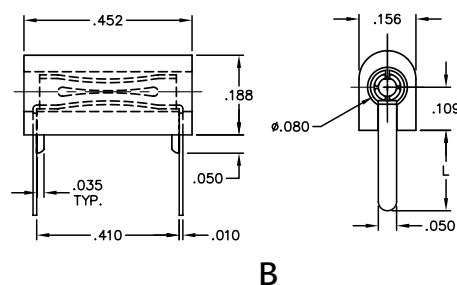
107

## Printed Circuit Test Jacks

- Description: Double entry design, probe inserts at either end of jack. Accepts probes no larger than .084", contacts down to .074". Closed bottom construction keeps jack from fouling with solder or flux. Locking ears hold jack firmly to board until soldered. Precise dimensions allow automated assembly to boards.
- Body is molded nylon per MIL-P-20693.
- Beryllium copper spring.
- Mounts into .052" holes.
- Data: Insertion force: 30 oz. max.  
Withdraw force: 8 oz. min with .080" probe.
- Ratings: Operating voltage is 1500 volts, 60 CPS RMS sea level. 350 volts, 60CPS RMS at 50,000 feet. 5 Amp AC max. current rating.
- Contact resistance: 20 Millivolt drop maximum at specified current at 25°C.
- Color: add color number as suffix to part number:  
-101 White    -102 Red  
-103 Black    -104 Green  
-105 Blue    -107 Yellow
- This part is similar to MIL-C-39024/11A. Other contact finishes are available as special order in quantity from the factory.



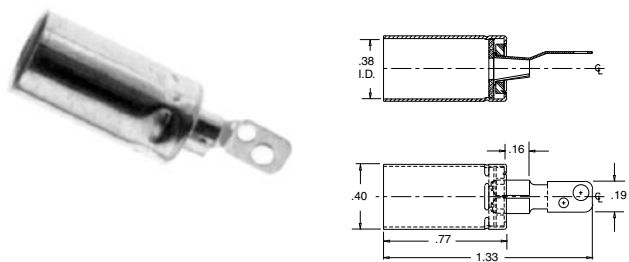
A



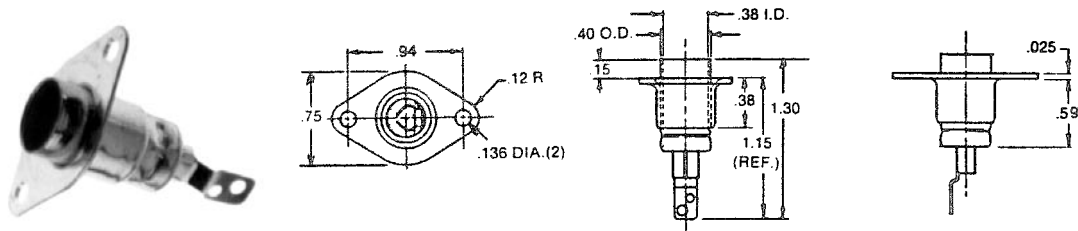
B

| PART NO. | ILLUS. | LENGTH | FINISH | BOARD THKNS. |
|----------|--------|--------|--------|--------------|
| 325      | A      | 0.130  | Gold   | 1/16         |
| 321      |        | 0.219  | Gold   | 1/8          |
| 430      | B      | 0.203  | Gold   | 3/19         |

# Coaxial Antenna Connectors



1235  
Coaxial Antenna Jack



1207  
Coaxial Antenna Jack

## Receptacles



- Power outlet is for use on a variety of small appliances and electronic equipment. Are black, general purpose phenolic.
- Black and white 6" wire leads are stripped 1/2" for convenience and have green ground wire.
- UL and CSA approved.
- Rated at 15 Amps, 125 Volts AC.

| PART NO. | PANEL CUTOUT | TERMINAL TYPE | POLARIZED        |
|----------|--------------|---------------|------------------|
| 1280-103 | AA           | 6" Wire Leads | Yes, with ground |

All lugs are electro-tin plated steel.

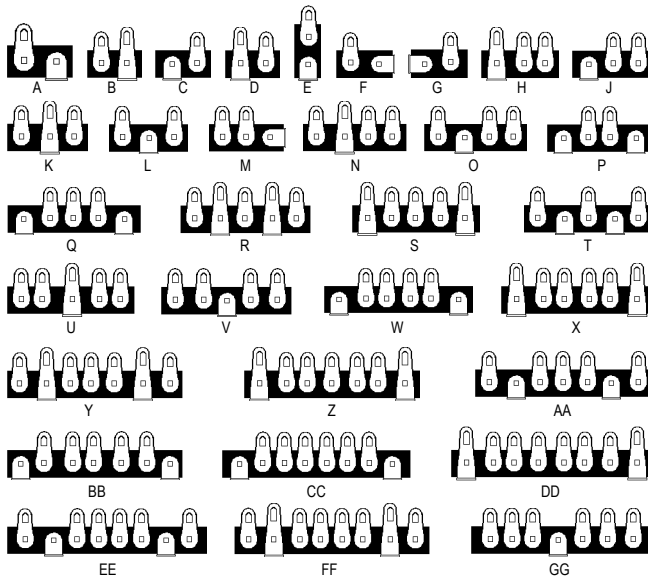
Strip material: flame retardant phenolic, .062" thk.

Lug spacing: 3/8" standard, 1/4" miniature.

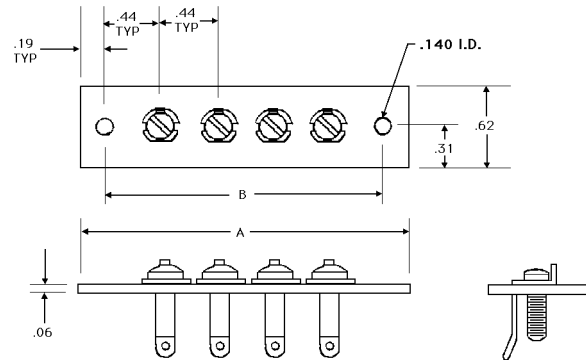
Strip width: 3/8" standard, 5/16" miniature.

Mounting hole: .140" ID Standard, .096" ID mini. mounting

Screw: #6 standard, #3 or 3/32" rivet Mini.



| STANDARD<br>PART NO. | MINIATURE<br>PART NO. | FIG. | No. of Terminals |          |
|----------------------|-----------------------|------|------------------|----------|
|                      |                       |      | Insulated        | Grounded |
| 861                  |                       | A    | 1                | -        |
| 862                  | 1062                  | B    | 1                | 1        |
| 813                  |                       | C    | 1                | -        |
| 820                  | 1004                  | D    | 1                | 1        |
| 849                  |                       | E    | 1                | -        |
| 828                  |                       | F    | 1                | -        |
| 821                  |                       | G    | 1                | -        |
| 830                  | 1055                  | H    | 2                | 1        |
| 829                  |                       | J    | 2                | -        |
| 864                  | 1064                  | K    | 2                | -        |
| 863                  |                       | L    | 2                | 1        |
| 846                  |                       | M    | 2                | -        |
| 850                  | 1074                  | N    | 3                | -        |
| 857                  |                       | O    | 3                | 1        |
| 867                  |                       | P    | 2                | -        |
| 853                  |                       | Q    | 3                | -        |
| 868                  | 1068                  | R    | 3                | 1        |
| 847                  | 1071                  | S    | 3                | -        |
| 865                  |                       | T    | 3                | -        |
| 866                  | 1066                  | U    | 4                | 1        |
| 855                  |                       | V    | 4                | -        |
| 869                  |                       | W    | 4                | -        |
| 854                  | 1076                  | X    | 4                | 1        |
| 879                  | 1158                  | Y    | 7                | -        |
| 859                  | 1156                  | Z    | 5                | -        |
| 871                  |                       | AA   | 5                | 1        |
| 860                  | 1060                  | BB   | 5                | -        |
| 848                  |                       | CC   | 6                | -        |
| 900                  | 1075                  | DD   | 6                | 1        |
| 858                  |                       | EE   | 6                | -        |
| 870                  | 1070                  | FF   | 6                | -        |
| 901                  | -                     | GG   | 6                | 1        |



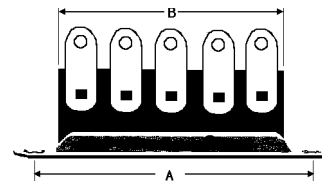
Boards are 1/16" thick laminated phenolic.

Terminals are 1/32" brass or steel, bright tin plated.

Screws are steel, zinc or bright tin plated.

Hardware, alternative dimensions, materials or finishes are available upon request.

| PART NO. | QTY. LUGS | DIM A | DIM. B |
|----------|-----------|-------|--------|
| 914      | 1         | 1.25  | .87    |
| 872      | 2         | 1.69  | 1.31   |
| 873      | 3         | 2.12  | 1.75   |
| 874      | 4         | 2.56  | 2.19   |
| 875      | 5         | 3.00  | 2.62   |
| 876      | 6         | 3.44  | 3.06   |
| 877      | 7         | 3.87  | 3.5    |
| 928      | 8         | 4.31  | 3.94   |
| 929      | 9         | 4.75  | 4.37   |
| 930      | 10        | 5.19  | 4.82   |



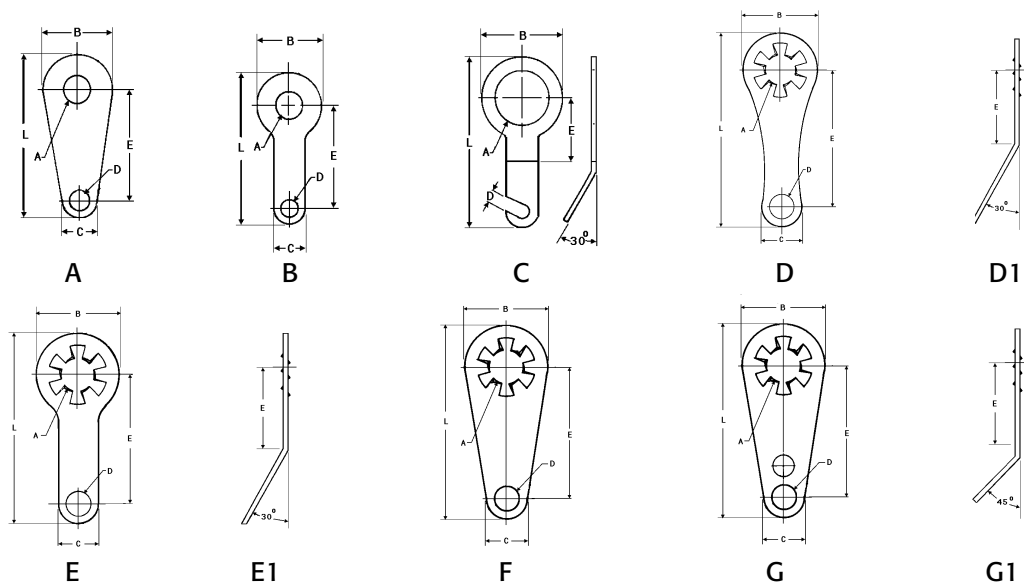
Strip material: flame retardant phenolic.

Lugs: steel, electro-tin plated, 5/16" centers.

Mounting holes for #6 screws, electro-tin plated base.

| PART NO. | NO. TERMINALS | MNTG. CTRS. | LENGTH |
|----------|---------------|-------------|--------|
|          |               | A           | B      |
| 3002     | 2             | 1           | .67    |
| 3003     | 3             | 1-5/16      | .99    |
| 3004     | 4             | 1-5/8       | 1.30   |
| 3005     | 5             | 1-15/16     | 1.61   |
| 3006     | 6             | 2-1/4       | 1.92   |
| 3007     | 7             | 2-9/16      | 2.24   |
| 3008     | 8             | 2-7/8       | 2.55   |
| 3009     | 9             | 3-3/16      | 2.86   |
| 3010     | 10            | 3-1/2       | 3.17   |
| 3011     | 11            | 3-13/16     | 3.49   |
| 3012     | 12            | 4-1/8       | 3.80   |
| 3013     | 13            | 4-7/16      | 4.11   |

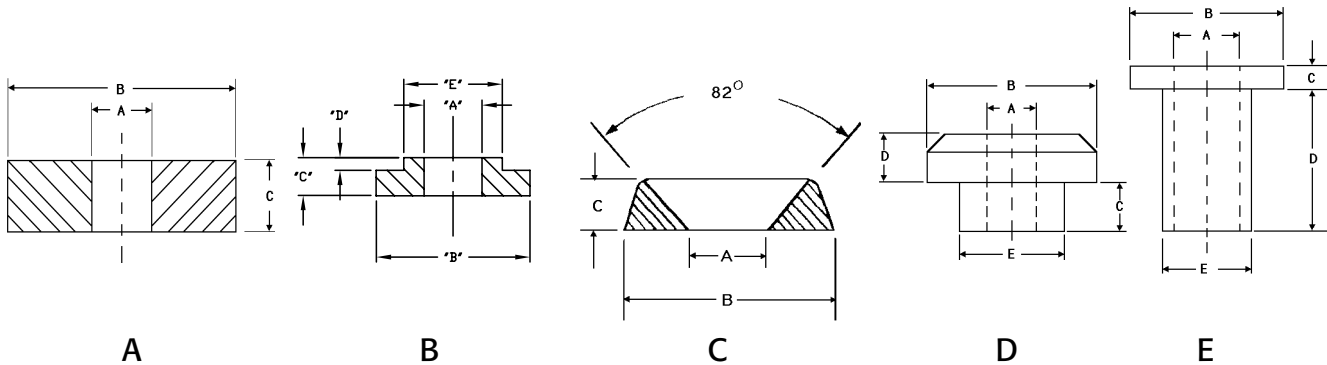
# Solder Lugs



- Made of brass material.
- Tin finish
- Bent lugs have the same configuration as the flat lug shown in the adjacent drawing, with the bend details as shown.

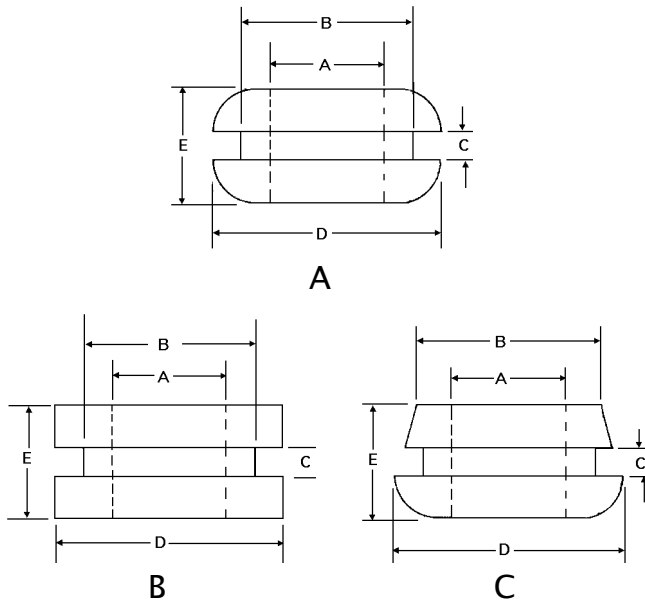
| PART NO. | ILLUS | STUD SIZE | LENGTH | THKNS. | O.D.  | WIDTH | HOLE | CNTR  |       |      |      |      |      |      |     |
|----------|-------|-----------|--------|--------|-------|-------|------|-------|-------|------|------|------|------|------|-----|
|          |       | A         | L      |        | B     | C     | D    | E     |       |      |      |      |      |      |     |
| 1485-6   | A     | #6        | 9/16   | .010   | 9/16  | 3/16  | 1/16 | 5/16  |       |      |      |      |      |      |     |
| 1485-8   |       | #8        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1485-10  |       | #10       |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1497     |       |           | 3/8    | 25/64  | .016  | 7/8   | 7/32 | 5/64  | 1/2   |      |      |      |      |      |     |
| 1488-4   | B     | #4        | 9/16   | .010   | 1/4   | 5/32  | 1/16 | 23/64 |       |      |      |      |      |      |     |
| 1488-6   |       | #6        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1488-8   |       | #8        |        | .020   | 5/16  | 3/16  | 3/32 | 5/16  |       |      |      |      |      |      |     |
| 1496     | C     | 1/4       | 25/32  |        | 3/8   | 5/32  | 1/16 | 19/64 |       |      |      |      |      |      |     |
| 1410-4   | D     | #4        | 7/8    | .018   | 5/16  | 11/64 | 3/32 | 5/8   |       |      |      |      |      |      |     |
| 1410-6   |       | #6        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1410-8   |       | #8        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1410-10  |       | #10       | 57/64  |        | 11/32 | 3/16  |      | 1/2   |       |      |      |      |      |      |     |
| 1410-14  |       | 1/4       | 13/16  |        | 7/16  |       |      |       |       |      |      |      |      |      |     |
| 1414-4   | D1    | #4        |        |        | 5/16  | 11/64 |      | 17/64 |       |      |      |      |      |      |     |
| 1414-6   |       | #6        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1414-8   |       | #8        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1414-10  |       | #10       | 53/64  |        | 11/32 |       |      |       |       |      |      |      |      |      |     |
| 1411-4   | E     | #4        | 47/64  |        | 5/16  | 5/32  | 3/16 | 3/32  | 17/32 |      |      |      |      |      |     |
| 1411-6   |       | #6        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1411-8   |       | #8        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1415-4   | E1    | #4        | 23/32  |        |       |       |      |       | 5/16  | 3/16 | 3/32 | 7/32 |      |      |     |
| 1415-6   |       | #6        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1415-8   |       | #8        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1412-4   | F     | #4        | 5/8    |        |       |       |      |       |       |      |      | 5/16 | 3/16 | 3/32 | 3/8 |
| 1412-6   |       | #6        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1412-8   |       | #8        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1413-4   | G     | #4        | 23/32  |        | 5/16  | 3/16  | 3/32 | 15/32 |       |      |      |      |      |      |     |
| 1413-6   |       | #6        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1413-8   |       | #8        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1416-4   | G1    | #4        | 41/64  |        |       |       |      | 5/16  | 3/16  | 3/32 | 1/4  |      |      |      |     |
| 1416-6   |       | #6        |        |        |       |       |      |       |       |      |      |      |      |      |     |
| 1416-8   |       | #8        |        |        |       |       |      |       |       |      |      |      |      |      |     |

- Nominal dimensions are indicated. Inner diameter is clearance for screw size shown. Others are  $\pm 1/64"$ .
- Alternative sizes, materials or finishes may be obtained in quantity as special order.
- Nylon 6/6 washers are offered in natural milky white color.



| PART NO. | FIG. | SCREW CLEAR | MAT.  | ID A  | OD B  | THKNS C | HT. D | DIA. E | PART NO. | FIG. | SCREW CLEAR | MAT.  | ID A  | OD B  | THKNS C | HT. D | DIA. E |       |
|----------|------|-------------|-------|-------|-------|---------|-------|--------|----------|------|-------------|-------|-------|-------|---------|-------|--------|-------|
| 2652     | A    | #2          | Nylon | 3/32  | 1/4   | 1/32    | 1/32  | 5/32   | 2666     | B    | #10         | Nylon | 13/64 | 3/8   | 3/32    | 1/32  | 5/16   |       |
| 2671     |      | #4          |       | 1/8   | 9/32  | 3/54    | 3/54  |        | 2664     |      | 1/4         |       | 1/4   | 3/8   |         |       |        |       |
| 2514     |      |             |       |       |       |         |       |        | #6       |      | 1/4         |       | 1/16  | 1/16  |         |       | 2669   | 17/64 |
| 2670     |      | 9/64        |       | 5/16  | 3/64  | 3/64    | 2668  |        |          |      |             |       |       |       |         |       | 3/8    | 3/8   |
| 2515     |      |             |       |       |       |         | #8    |        | 11/64    |      | 3/8         |       | 1/16  | 1/16  |         |       | 2667   | #6    |
| 2672     |      | #10         |       | 13/64 | 5/8   | 3/32    |       |        |          | 3/32 |             |       |       |       |         | 2687  | #8     |       |
| 2673     |      |             |       |       |       |         | 1/4   |        | 1/2      |      | 3/32        |       | 3/32  | 2688  | #10     | 9/64  |        | 7/16  |
| 2674     |      | 5/16        |       | 5/16  | 1/16  | 1/16    |       |        |          | 2689 |             |       |       | 17/64 |         | 11/64 | 33/64  | 7/64  |
| 2518     |      |             |       |       |       |         | #10   |        | 13/64    | 7/16 | 3/32        |       | 3/32  |       | 2690    | 3/8   | 13/64  | 37/64 |
| 2675     |      | 5/16        |       | 5/16  | 1/16  | 1/16    |       |        |          |      |             |       |       | 1/16  | 2691    |       | #8     | 15/64 |
| 2676     |      |             |       |       |       |         | #10   |        | 13/64    | 7/16 | 3/32        |       | 3/32  |       | 2681    | 17/64 |        | 1/4   |
| 2677     |      | 3/8         |       | 5/8   | 1/16  | 1/16    |       |        |          |      |             |       |       | 1/16  | 2682    |       | 3/8    | 1/8   |
| 2679     |      |             |       |       |       |         | #10   |        | 13/64    | 7/16 | 3/32        |       | 3/32  |       | 2683    | #10   |        | 9/64  |
| 2678     |      | 5/16        |       | 5/16  | 1/16  | 1/16    |       |        |          |      |             |       |       | 1/16  | 2684    |       | 17/64  | 11/64 |
| 2517     |      |             |       |       |       |         | #10   |        | 13/64    | 7/16 | 3/32        |       | 3/32  |       | 2685    | 3/8   |        | 13/64 |
| 2651     | B    | #2          | Nylon | 3/32  | 1/4   | .055    |       | .025   |          |      |             |       |       | 5/32  | 2686    |       | E      | 3/8   |
| 2661     |      | #4          |       | 1/8   | 17/54 | 1/16    | 1/32  | 3/16   | 2534     | #4   | 7/64        |       | 15/64 | 1/4   | 1/4     | 9/64  |        |       |
| 2662     |      | #6          |       | 9/64  | 5/16  | 3/32    |       |        | 1/32     |      | 1/4         |       | 2535  |       |         | #6    |        | 9/64  |
| 2663     |      |             |       |       |       |         | #8    | 11/64  |          | 3/8  |             |       | 3/32  | 1/32  | 1/4     |       |        | 2536  |
| 2660     |      | #10         |       | 13/64 | 7/16  | 3/32    |       |        | 3/32     |      | 1/4         |       |       |       |         | 2537  |        | 17/64 |
| 2665     |      |             |       |       |       |         | #10   | 13/64  |          | 7/16 |             |       | 3/32  | 3/32  | 1/4     | 2538  |        |       |

## Grommets



Alternative sizes and shapes are available in quantity from factory. Call for details.

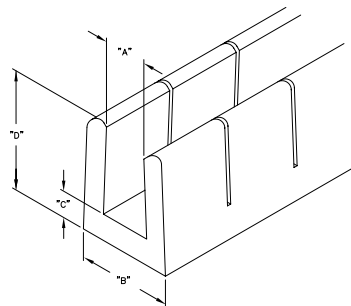
| PART  | ILLUS. | INSIDE DIA. | MNTG. HOLE | CHASSIS THKNS. | O.D.  | THKNS. |
|-------|--------|-------------|------------|----------------|-------|--------|
|       |        | A           | B          | C              | D     | E      |
| 2185  | A      | 1/8         | 3/16       | 1/16           | 5/16  | 3/16   |
| 91114 |        | 5/32        | 1/4        |                | 11/32 |        |
| 2058  |        |             |            |                | 3/8   |        |
| 2172  |        | 3/16        | 5/16       | 7/16           | 7/32  |        |
| 91103 |        |             | 7/16       | 1/8            | 9/16  | 3/8    |
| 2170  | 1/4    | 3/8         | 1/16       | 5/8            | 1/4   |        |
| 91116 | B      | 5/16        | 1/2        | 1/8            | 3/4   | 3/8    |
| 91106 | C      |             | 7/16       | 3/16           | 5/8   | 1/2    |
| 2174  | A      |             |            | 1/16           | 19/32 | 15/64  |
| 91117 |        |             |            | 1/8            | 9/16  | 3/8    |
| 91107 |        |             | 3/8        | 3/32           | 5/8   | 5/16   |
| 2175  |        | 1/2         |            | 1/16           | 41/64 | 1/4    |
| 2177  | 7/16   | 9/16        | 3/4        |                | 1/4   |        |
| 2186  | 1/2    | 3/4         | 1/16       |                | 5/16  |        |
| 2188  | 9/16   | 13/16       |            |                |       |        |
| 2187  | 5/8    | 7/8         | 1/32       | 1-1/8          |       |        |
| 2189  | 3/4    |             |            | 1"             | 5/32  |        |

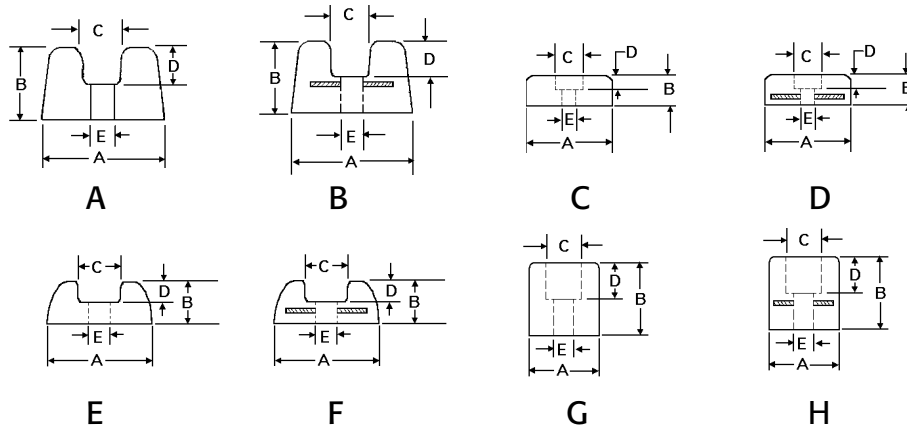
- Grommets are made from Black Buna-S Synthetic Rubber (SBR), approximately 60 durometer.
- Prevents wire chafing through holes in panels from 1/16" to 7/8" as indicated in table.

## Caterpillar Grommets

- Insulates and prevents chafing wires.
- Made of black nylon, type 6/6.

| PART NO. | CHASSIS THICKNESS RANGE | DIMENSIONS |         |        |          | LENGTH |
|----------|-------------------------|------------|---------|--------|----------|--------|
|          |                         | PANEL A    | WIDTH B | THCK C | HEIGHT D |        |
| 2692     | .042-.052               | .047       | .139    | .047   | .190     | 25'    |
| 2693     | .075-.085               | .080       | .182    | .052   | .200     | 25'    |
| 2694     | .115-.125               | .120       | .232    | .057   | .220     | 25'    |





- Recessed bumpers with a clearance hole for attachment offers convenient protection for electrical equipment.
- Rubber material is a Black Buna-S Synthetic Rubber (SBR), approximately 60 durometer.
- Some styles of bumpers offer molded-in steel washers for support as indicated in table.
- Alternative sizes and shapes are available in quantity from the factory.

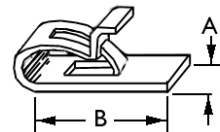
| PART NO. | ILLUS. | MATERIALS & ACCESSORIES | SCREW CLR. ID | O.D.  | HEIGHT | RECESS DIA | RECESS DEPTH |      |       |      |     |
|----------|--------|-------------------------|---------------|-------|--------|------------|--------------|------|-------|------|-----|
|          |        |                         | E             | A     | B      | C          | D            |      |       |      |     |
| 2192     | A      | Rubber                  | 1/8           | 1/2   | 1/4    | 1/4        | 1/8          |      |       |      |     |
| 2190     | B      | Rubber - Washer         |               | 17/32 |        |            | 5/8          | 1/4  | 5/32  |      |     |
| 2455     | A      | Rubber                  |               |       | 5/32   | 9/32       |              |      | 9/32  | 1/8  |     |
| 2184     | A      | Rubber                  | 1/8           | 5/8   | 15/32  | 1/4        | 3/16         |      |       |      |     |
| 2193     | C      | Rubber                  | 3/16          |       |        |            |              | 5/8  | 5/16  | 5/16 |     |
| 2136     | D      | Rubber - Washer         | 11/64         |       | 11/32  | 13/23      | 1/4          | 7/32 |       |      |     |
| 2456     | G      | Rubber                  | 5/32          |       |        |            |              |      | 17/32 | 7/32 | 1/4 |
| 2139     | H      | Rubber - Washer         | 1/8           | 3/4   | 9/32   | 1/4        | 1/8          |      |       |      |     |
| 2457     | A      | Rubber                  | 3/16          | 15/16 | 3/8    | 9/32       | 3/16         |      |       |      |     |
| 2463     | B      | Rubber - Washer         |               |       | 9/16   | 3/8        | 5/16         |      |       |      |     |
| 2458     | A      | Rubber                  |               |       | 1/8    | 1"         | 1"           | 1/4  | 5/8   |      |     |
| 2459     | C      | Rubber                  | 1"            | 1"    |        |            |              |      |       | 1/4  | 5/8 |
| 2464     | D      | Rubber - Washer         | 1"            | 1"    |        |            |              |      |       | 1/4  | 5/8 |
| 2194     | C      | Rubber - Washer         | 1/8           | 1"    | 1"     | 1/4        | 5/8          |      |       |      |     |
| 2465     | H      | Rubber - Washer         |               |       |        |            |              | 1"   | 1"    | 1/4  | 5/8 |
| 2138     | E      | Rubber                  |               |       |        |            |              | 1"   | 1"    | 1/4  | 5/8 |
| 2135     | F      | Rubber - Washer         | 1/8           | 1"    | 1"     | 1/4        | 5/8          |      |       |      |     |
| 2461     | G      | Rubber                  |               |       |        |            |              | 1"   | 1"    | 1/4  | 5/8 |
| 2137     | H      | Rubber - Washer         |               |       |        |            |              | 1"   | 1"    | 1/4  | 5/8 |

## Wire & Cable Clamps

### Fahnestock Clips

- Fahnestock clips are made of nickel plated spring brass and designed for screw-on application as indicated in table.
- Type 539 Fahnestock clip has an additional hole for wire soldering.

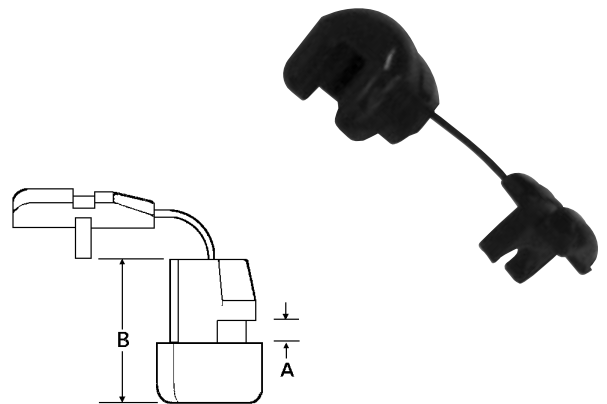
| PART NO. | A      | B   | MOUNTING |
|----------|--------|-----|----------|
| 539      | 9/16   | .41 | #4 Hole  |
| 533      | 1-1/16 | .88 | #6 Hole  |



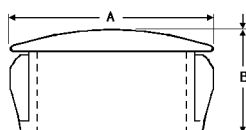
- See our website @ [www.abbatron.com](http://www.abbatron.com) for a full list of cable clamps.

## Wire Strain Reliefs

- Wire strain relief clamps are made of black nylon, type 6/6, and are offered in right angle or straight-through styles.
- One piece, these easy to install reliefs absorb pull and twist stress on power cords. They fully insulate and permanently anchor the power cord.
- U.L. and CSA recognized components.

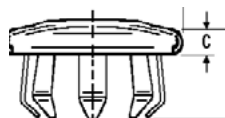


| PART NO. | UL & CSA STYLES | USE WITH WIRE TYPES | APPROX. CABLE SIZES | DIMENSIONS   |              |         |        |
|----------|-----------------|---------------------|---------------------|--------------|--------------|---------|--------|
|          |                 |                     |                     | CHASSIS HOLE | ACROSS FLATS | CHASSIS | LENGTH |
|          |                 |                     |                     |              |              | A       | B      |
| 938      | SR-3P-4         | SPT-1               | .12X.22             | 7/16         | 25/64        | 1/16    | 13/32  |
| 939      | SR-5N-4         | SV,SVT,HPD          | 1/4X19/64 Dia.      | 1/2          | 29/64        | 1/16    | 7/16   |
| 823      | SR-6N-4         | SJ,SJT,SJO          | .330-.360 Dia.      | 5/8          | 35/64        | 1/16    | 37/64  |



- Hole plugs are black, type 6/6 nylon.
- Part number 3083 is vented.

| PART NO. | HOLE DIA. | DIA. A  | HEIGHT B | MAX CHASSIS |
|----------|-----------|---------|----------|-------------|
| 3089     | 1/4       | 5/16    | 5/16     | 1/16        |
| 3090     | 5/16      | 3/8     |          |             |
| 3091     | 3/8       | 15/32   | 13/32    | 1/8         |
| 3092     | 1/2       | 67/64   |          |             |
| 3093     | 5/8       | 23/32   |          |             |
| 3094     | 3/4       | 27/32   |          |             |
| 3095     | 1         | 1-1/8   | 29/64    |             |
| 3083     |           | 1-13/64 |          |             |
| 3096     | 1-1/8     | 1-7/32  |          |             |
| 3097     | 1-1/4     | 1-3/8   |          |             |
| 3098     | 1-3/8     | 1-1/2   |          |             |
| 3099     | 1-1/2     | 1-43/64 |          |             |



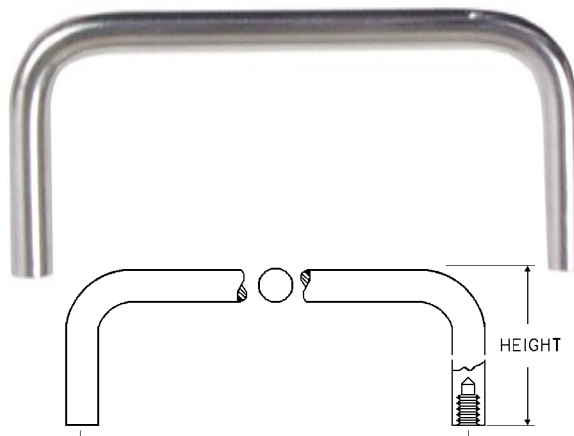
- Hole plugs are nickel plated steel.
- Prongs are adjustable to ensure a snug fit.
- Part number 656 is vented.

| PART NO. | HOLE DIA. | NO.OF PRONGS | DIA.    | LENGTH | HEIGHT |
|----------|-----------|--------------|---------|--------|--------|
| 650      | 1/4       | 6            | 13/32   | 15/64  | 1/16   |
| 651      | 5/16      |              | 7/16    | 1/4    |        |
| 652      | 3/8       |              | 1/2     | 15/64  |        |
| 653      | 1/2       | 8            | 21/32   | 9/32   | 5/64   |
| 654      | 5/8       |              | 13/16   | 19/64  |        |
| 655      | 3/4       | 12           | 59/64   |        |        |
| 608      | 7/8       |              | 1-1/16  |        |        |
| 612      | 1         |              | 1-9/64  | 21/64  | 3/32   |
| 656      | 1         | 6            | 1-5/32  | 19/64  | 5/64   |
| 3084     | 1-1/8     | 12           | 1-5/16  | 11/32  |        |
| 3085     | 1-1/4     |              | 1-7/16  |        | 3/32   |
| 3086     | 1-3/8     |              | 1-9/16  | 13/32  | 5/64   |
| 3087     | 1-1/2     |              | 1-41/64 |        | 3/32   |

# Instrument Handles

## INTERNAL THREADED HANDLE

| PART NO.      | MAT.     | FINISH       | HT.   | RADIUS | MOUNTING CENTERS | THREAD & DEPTH |   |
|---------------|----------|--------------|-------|--------|------------------|----------------|---|
| 5/32 Diameter |          |              |       |        |                  |                |   |
| 1633          | Brass    | Zinc         | 1     | 3/16   | 1 - 1/4          | 4 - 40 x 3/8   |   |
| 1632          |          | Chrome       |       |        |                  |                |   |
| 1634          | Aluminum | Satin        |       |        |                  |                | 2 |
| 1635          |          | Blk Anodized |       |        |                  |                |   |
| 1637          | Brass    | Zinc         |       |        | 3                |                |   |
| 1636          |          | Chrome       |       |        |                  |                |   |
| 1638          | Aluminum | Satin        |       |        |                  |                | 3 |
| 1639          |          | Blk Anodized |       |        |                  |                |   |
| 1641          | Brass    | Zinc         |       |        | 3                |                |   |
| 1640          |          | Chrome       |       |        |                  |                |   |
| 1642          | Aluminum | Satin        |       |        |                  |                | 3 |
| 1643          |          | Blk Anodized |       |        |                  |                |   |
| 1/4 Diameter  |          |              |       |        |                  |                |   |
| 1617          | Brass    | Zinc         | 1-1/2 | 1/4    | 2                | 8 - 32 x 9/16  |   |
| 1616          |          | Chrome       |       |        | 3                |                |   |
| 1621          |          | Zinc         |       |        |                  |                |   |
| 1620          |          | Chrome       |       |        |                  |                |   |
| 5/16 Diameter |          |              |       |        |                  |                |   |
| 2057          | Brass    | Chrome       | 1-1/2 | 5/16   | 3                | 10 - 32 x 9/16 |   |
| 1604          |          | Zinc         |       |        | 4 - 1/4          |                |   |
| 2056          |          | Chrome       |       |        |                  |                |   |

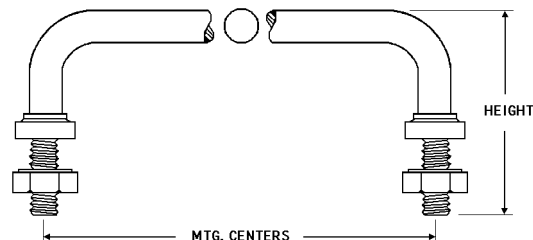


INTERNAL THREADED HANDLES



## EXTERNAL THREADED HANDLE

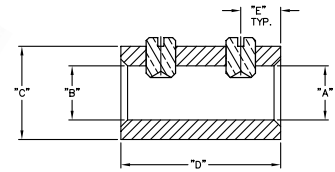
| PART NO. | MAT.  | FINISH     | HT.     | RADIUS | MOUNTING CENTERS | THREAD & DEPTH         |
|----------|-------|------------|---------|--------|------------------|------------------------|
| 1610     | Brass | Black Zinc | 2 - 1/8 | 5/16   | 3                | 5/16 - 18<br>x<br>5/16 |



EXTERNAL THREADED HANDLES

## SHAFT COUPLERS

| PART NO.                             | ID    | ID    | OD    | LG    | # SCREWS | E    |
|--------------------------------------|-------|-------|-------|-------|----------|------|
|                                      | A     | B     | C     | D     |          |      |
| BRASS COUPLER -- NICKEL PLATED       |       |       |       |       |          |      |
| 120                                  | 0.25  | 0.25  | 0.438 | 0.75  | 2        | 3/16 |
| 131                                  |       | 0.375 | 0.5   |       |          |      |
| MINI. COUPLER -- BRASS-NICKEL PLATED |       |       |       |       |          |      |
| 180                                  | 0.125 | 0.125 | 0.281 | 0.375 | 4        | 5/64 |



Shaft Couplers

## SHAFT LOCKS

| PART NO.      | FIG. | FOR SHAFT SIZE | DIMENSIONS |      |       |      | THREAD SIZE |
|---------------|------|----------------|------------|------|-------|------|-------------|
|               |      |                | A          | B    | C     | D    |             |
| Bushing Mount |      |                |            |      |       |      |             |
| 181           | A    | 1/4            | .253       | 1/2  | 1/2   | 7/16 | 3/8-32      |
| 182           | B    |                | 1/2        | 1    |       |      |             |
| 183           | C    | 1/8            | .128       | 9/16 | 11/32 | 5/16 |             |
| Panel Mount   |      |                |            |      |       |      |             |
| 114           | C    | 1/4            | .253       | 1/2  | 7/16  | 7/16 | 3/8-32      |

All shaft accessories shown on this page are machined from brass and nickel plated.



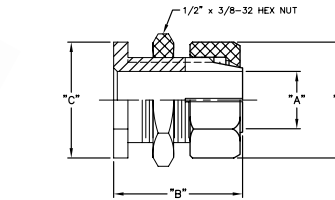
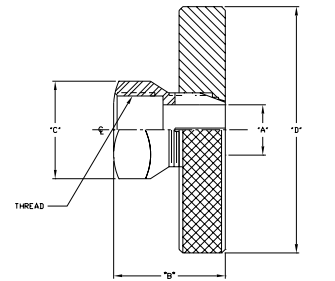
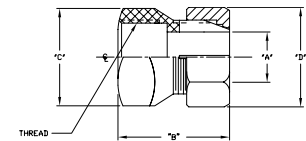
A



B



C



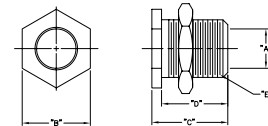
Shaft Locks

## PANEL BEARINGS

| PART NO. | FOR SHAFT SIZE | DIMENSIONS |       |         |        |        |
|----------|----------------|------------|-------|---------|--------|--------|
|          |                | A I.D.     | B HEX | C LGTH. | D BODY | E THD. |
| 184      | 1/8" Mini.     | .128       | 11/32 | 7/16    | 3/8    | 1/4-32 |
| 119      | 1/4"           | .253       | 7/16  | 1/2     | 7/16   | 3/8-32 |



Panel Bearings

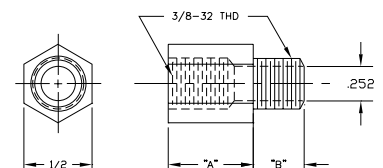


## BUSHING EXTENDERS

| PART NO. | BODY LENGTH (A) | THREAD LENGTH (B) |
|----------|-----------------|-------------------|
| 2350     | 5/8             | 3/16              |
| 2351     | 5/8             | 1/4               |
| 2352     | 5/8             | 3/8               |
| 2353     | 11/16           | 3/8               |
| 2354     | 11/16           | 1/2               |
| 2355     | 3/4             | 1/4               |



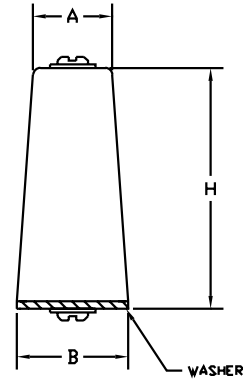
Bushing Extenders



# High Voltage Insulators

## High Voltage Insulators

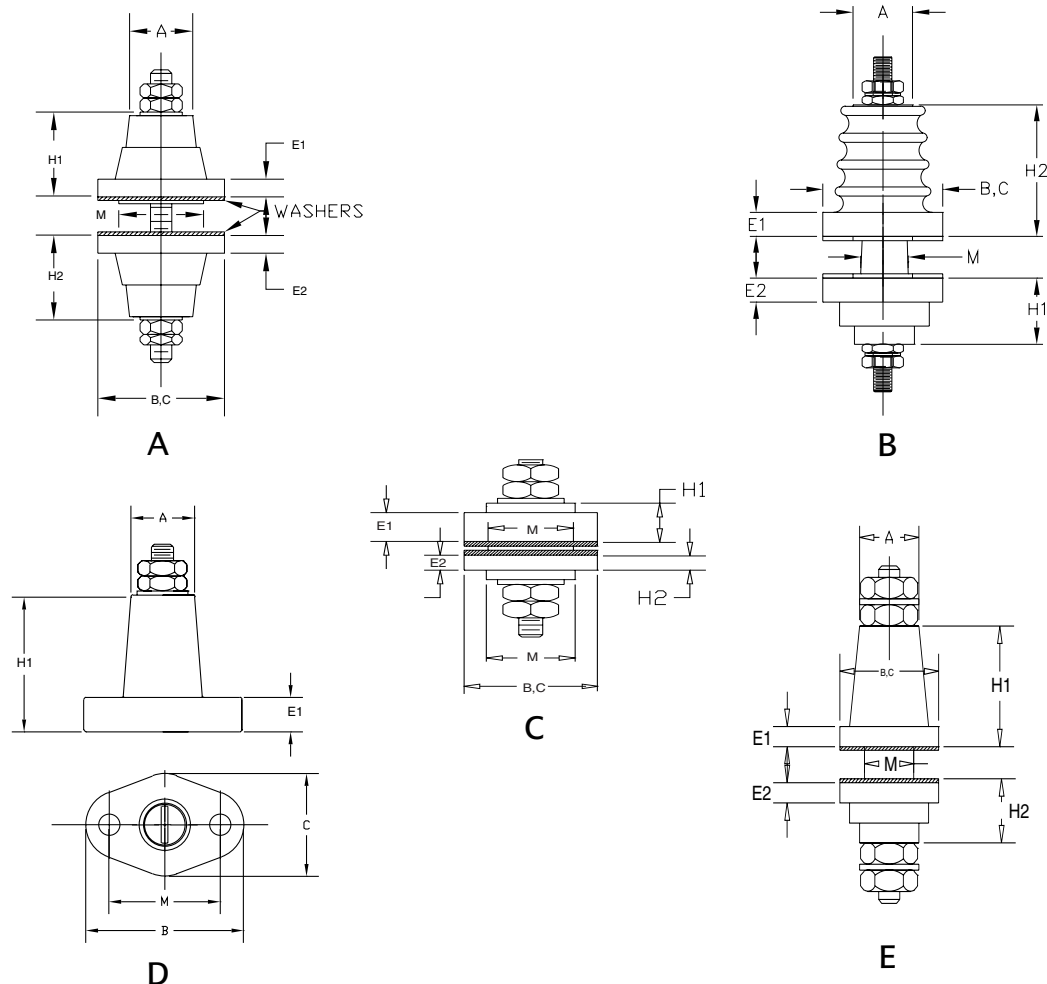
- Abbatron High Voltage Insulators are ideal for high-voltage, high-temperature standoff and/or feed-thru applications. They are not intended for high-vacuum or hermetically sealed use, nor with heavy shear loads.
- Temperature ratings recommend Steatite safe operation to 1800°F (980°C). Cushion washers may further limit operating temperature.
- Voltage ratings (recommended in table) are specified under clean, dry conditions only. Moisture and/or dirt will de-rate up to 50%.
- Nominal operating current, limited by hardware size, shown for AC, 60Hz, 10°C rise.
- These insulators are made from Grade L-5 Steatite per MIL-I-10E. Hardware is nickel plated brass except for solder lugs, which are tin plated. Cushion washers are "Champak", compressed paper or cork.



| PART NO. | VOLT RATING | MIN. DIA. A | MIN. DIA. B | HEIGHT H | SCREW SIZE |
|----------|-------------|-------------|-------------|----------|------------|
| 9500     | 3 KV        | 7/16        | 5/8         | 21/32    | 6-32       |
| 9501     | 4 KV        | 1/2         | 3/4         | 1-1/32   | 8-32       |
| 9502     | 5 KV        | 1/2         | 1           | 1-9/16   | 8-32       |
| 9503     | 10 KV       | 5/8         | 1-1/8       | 2-1/16   | 10-32      |

### Steatite Material Specifications:

- Water absorption 0.05% maximum
- 2600°C softening temperature
- Coefficient of Expansion 7.5 (In/In. per °C x 10<sup>-6</sup>)
- Dielectric strength 250 Volts per mil.
- .003 power factor at 1MHz
- Clear glaze finish over creamy white colored Steatite material.



All insulators are supplied with hardware shown.

| PART NO. | FIG. | VOLT RATING | HEIGHT |      | HEIGHT |      | MIN. DIA. | FLANGE WIDTH |     |       | MOUNTING | SCREW THD SIZE | STUD LENGTH |
|----------|------|-------------|--------|------|--------|------|-----------|--------------|-----|-------|----------|----------------|-------------|
|          |      |             | H1     | H2   | E1     | E2   |           | A            | B   | C     | M        |                |             |
| 9524     | D    | 1KV         | 5/8    |      | 3/32   |      | 13/64     |              | 1   | 7/32  | 11/16    | 6-32           | 13/64       |
| 9555AD   | C    |             | 1/4    | 5/32 | 3/16   | 3/32 | 1/2       |              |     |       |          |                | 1-1/4       |
| 9550AA   | A    |             | 1/2    | 1/2  | 1/8    | 1/8  | 3/8       |              | 3/4 | 3/4   | 1/2      |                | 2           |
| 9522     | D    | 3KV         | 1      |      | 7/64   | 7/64 | 15/32     | 1-5/32       |     | 19/64 | 13/16    | 8/32           | 1/4         |
| 9542AA   | E    |             | 7/8    | 3/8  | 1/8    | 1/8  | 1/2       | 3/4          |     | 3/4   | 3/8      | 10/32          | 2-3/8       |
| 9551AB   | A    |             | 27/32  |      |        |      | 5/8       | 1-1/4        |     | 3/16  | 7/8      |                | 2-7/8       |
| 9540AB   | E    | 5KV         | 1-1/4  |      | 1/2    |      | 19/32     | 15/16        |     |       | 7/16     |                | W2-7/8      |
| 9545     | B    |             | 1-3/8  |      | 11/16  |      | 5/8       | 1-1/4        |     |       | 1/2      | 1/4-20         | 3-1/2       |
| 9552AA   | A    |             | 1-1/8  |      |        |      | 7/8       | 1-3/4        |     | 1/4   | 1-1/4    |                | 4-3/8       |

# Spacer and Standoff Information

Spacers are mechanical devices used to physically or electrically separate board, chassis, components and other devices from each other. They may also be used to locate, hinge and guide parts in electrical and mechanical assemblies. They are not intended to be used as precision bearings or shafts or as highly precise jacking or adjusting devices.

## Materials:

**Brass:** Is the most common material for high quality spacers. It provides strength, corrosion resistance and electrical conductivity. It is non-magnetic and will stand up well to most environmental conditions, including heat and humidity. The weight of larger brass spacers can be a disadvantage in certain situations.

**Aluminum:** Spacers provide a compromise between weight and strength. Although they cannot be provided in solderable finishes, they can be plated with special colored finishes besides the standard clear chromate. Anodized finishes have insulating characteristics when undamaged, and can be provided in a black matte, non-reflective surface. Aluminum is non-magnetic and can withstand severe conditions when properly finished.

**Nylon:** Is a general-purpose insulating material for spacers. Molded threads are precise and will withstand torquing without stripping. It is an excellent insulator and its surface lubricity allows wires to be routed against the spacer without fear of chafing the insulation. Disadvantages of nylon are relatively low operating temperature, cold-flow under high-compressive loading and a tendency to absorb up to 2% moisture in high humid ambients.

**Phenolic:** Are made from paper-base, resin impregnated, heat-cured materials. High torque should not be applied to these spacers. They are the insulating spacer of choice when higher temperatures are encountered than can be withstood by nylon, or where greater strength without cold-flow is required.

**Ceramic:** Spacers are a Grade L-5 Steatite material, glazed and fired at high temperature. They exhibit exceptional strength in compression and tension, but are quite weak in shear and torsion, as are all glass-type materials. Ceramic spacers will withstand very high operating temperatures and very high voltages without flash-over. Due to the nature of the manufacturing processes, high tolerances cannot be met in dimensions or threading, so these spacers should not be considered as precise devices. Tightening torques on fasteners should be held to a minimum and no shear or torsional load should be applied to spacers in use.

Alternate materials such as **Stainless Steel** are available in quantity from the factory. Call for details.

**Shape:** Standard spacers are offered in round or hex external form. Other forms can be supplied in quantity as specials from the factory.

**Round** spacers are generally used for minimum clearance requirements and as a general use shape. **Hex** spacers are used primarily in threaded spacers where wrench use and tightening are required. For this reason, hex spacers are only offered in threaded styles, while round spacers are offered in clearance and threaded types.

**Diameters:** Outside diameters are graduated with regard to internal thread sizes for strength, minimum clearance requirements and footprint area. In general, a minimum of two thread sizes are provided for each OD. For specifications not illustrated in the following pages, contact the factory or your sales representative for more information.

**Length:** Standard spacers are generally offered in lengths of 1/8" to 1". Extended length spacers are available up to six inches in graduated half and full inch increments in aluminum and ceramic only. For metallic spacers, this is an issue of weight versus function. Brass and steel spacers tend to be unacceptably heavy in the longer lengths and serve no purpose which cannot be met by aluminum. Ceramic spacers are offered in longer lengths, proportionally sized in OD for high-voltage and high-compressive requirements.

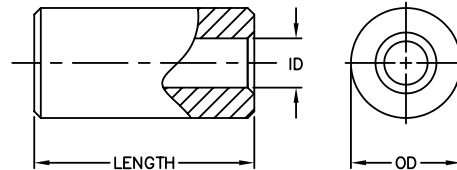
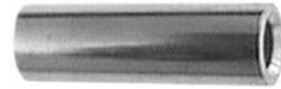
**Finishes:** Various finishes have been selected as standard for each of the materials supplied. They represent the most practical and cost-effective finish for the majority of applications. Alternative finishes are available on special order in quantity from the factory, including most MIL-spec requirements.

**Threading:** There are three possible ways to thread the inside of a spacer: (1) Straight through with continuous thread throughout. (2) Halfway from each end, meeting near the middle with no continuity of the thread throughout. (3) Part way in from each end, with no hole through the rest of the spacer. The method used on any style of spacer depends on the length and its ratio to the diameter of the tap. Excessively deep threading is costly and usually not necessary. Threads are only made continuous where practical. Please refer to the **Thread Depth Table** throughout the next section for standard parameters. Special depths can be ordered in quantity from the factory.

**Mounting Footprint:** End finish techniques of outside chamfering and countersinking reduce the total surface area in contact with the mounting surface of the spacers, increasing pressure at this surface. If the area is too small, fastening pressure will cause the spacer to dig in to the surface, deforming and possibly cracking it. For that reason, most thread sizes are offered in two different OD spacers to allow a choice of pressure versus clearance requirements.

# Brass Round Spacers

| LENGTH |       | O.D. | I.D. |      |      |      |       |
|--------|-------|------|------|------|------|------|-------|
|        |       |      | #2   | #4   | #6   | #8   | #10   |
| .125   | 1/8   | 3/16 | 9000 | 9015 |      |      |       |
|        |       | 1/4  |      | 8700 | 8701 | 8702 |       |
|        |       | 3/8  |      |      |      | 8732 | 9375A |
| .187   | 3/16  | 3/16 | 9001 | 9016 |      |      |       |
|        |       | 1/4  |      | 8703 | 8704 | 8705 |       |
|        |       | 3/8  |      |      |      | 8735 | 9375B |
| .250   | 1/4   | 3/16 | 9002 | 9017 |      |      |       |
|        |       | 1/4  |      | 2340 | 2100 | 2105 |       |
|        |       | 3/8  |      |      |      | 2115 | 9375C |
| .312   | 5/16  | 3/16 | 9003 | 9018 |      |      |       |
|        |       | 1/4  |      | 8706 | 8707 | 8708 |       |
|        |       | 3/8  |      |      |      | 8738 | 9375D |
| .375   | 3/8   | 3/16 | 9004 | 9019 |      |      |       |
|        |       | 1/4  |      | 2341 | 2101 | 2106 |       |
|        |       | 3/8  |      |      |      | 2116 | 9375E |
| .437   | 7/16  | 3/16 | 9005 | 9020 |      |      |       |
|        |       | 1/4  |      | 8709 | 8710 | 8711 |       |
|        |       | 3/8  |      |      |      | 8741 | 9375F |
| .500   | 1/2   | 3/16 | 9006 | 9021 |      |      |       |
|        |       | 1/4  |      | 2342 | 2102 | 2107 |       |
|        |       | 3/8  |      |      |      | 2117 | 9375G |
| .562   | 9/16  | 3/16 | 9007 | 9022 |      |      |       |
|        |       | 1/4  |      | 8712 | 8713 | 8714 |       |
|        |       | 3/8  |      |      |      | 8744 | 9375H |
| .625   | 5/8   | 3/16 | 9008 | 9023 |      |      |       |
|        |       | 1/4  |      | 8715 | 8716 | 8717 |       |
|        |       | 3/8  |      |      |      | 8747 | 9375J |
| .687   | 11/16 | 3/16 | 9009 | 9024 |      |      |       |
|        |       | 1/4  |      | 8718 | 8719 | 8720 |       |
|        |       | 3/8  |      |      |      | 8750 | 9375K |
| .750   | 3/4   | 3/16 | 9010 | 9025 |      |      |       |
|        |       | 1/4  |      | 2343 | 2103 | 2108 |       |
|        |       | 3/8  |      |      |      | 2118 | 9375L |
| .812   | 13/16 | 3/16 | 9011 | 9026 |      |      |       |
|        |       | 1/4  |      | 8721 | 8722 | 8723 |       |
|        |       | 3/8  |      |      |      | 8753 | 9375M |
| .875   | 7/8   | 3/16 | 9012 | 9027 |      |      |       |
|        |       | 1/4  |      | 8724 | 8725 | 8726 |       |
|        |       | 3/8  |      |      |      | 8756 | 9375N |
| .937   | 15/16 | 3/16 | 9013 | 9028 |      |      |       |
|        |       | 1/4  |      | 8727 | 8728 | 8729 |       |
|        |       | 3/8  |      |      |      | 8759 | 9375P |
| 1      | 1     | 3/16 | 9014 | 9029 |      |      |       |
|        |       | 1/4  |      | 2344 | 2104 | 2109 |       |
|        |       | 3/8  |      |      |      | 2119 | 9375Q |



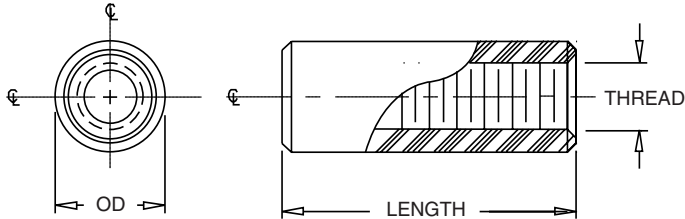
- Standard **nickel plating** provides a hard, bright, non-oxidizing surface which will stand up to difficult ambient conditions.

## Special order options include:

- Alternative plating finishes such as zinc, silver or gold.
- Odd sizes, taps or threads, plus swage or other shapes.
- Abbatron offers engineering services for special application parts or materials.

| SCREW NO. | MAJOR DIA. | HOLE SIZE |
|-----------|------------|-----------|
| #2        | 0.086      | 0.093     |
| #3        | 0.099      | 0.100     |
| #4        | 0.112      | 0.120     |
| #5        | 0.125      | 0.130     |
| #6        | 0.138      | 0.144     |
| #8        | 0.164      | 0.169     |
| #10       | 0.190      | 0.196     |
| #12       | 0.216      | 0.220     |

# Brass Round Standoffs



Standard **nickel plating** provides a hard, bright, non-oxidizing surface which will stand up to difficult ambient conditions.

**Options** include:

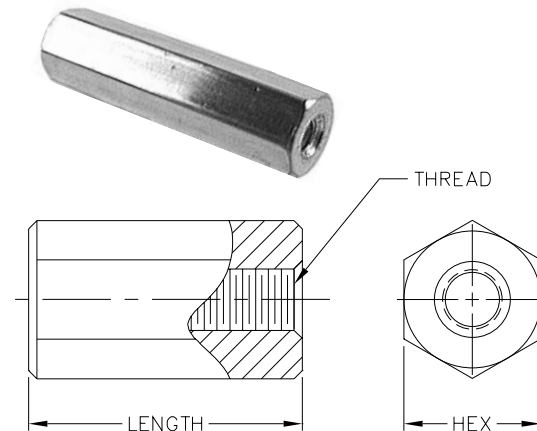
- Alternative plating finishes such as zinc, silver or gold.
- Odd sizes, taps or threads, plus swage or other shapes.
- Abbatron offers engineering services for special application parts or materials.

| LENGTH |      | O.D. | THREAD |       |       |       |        | LENGTH | O.D.  | THREAD |       |       |             |
|--------|------|------|--------|-------|-------|-------|--------|--------|-------|--------|-------|-------|-------------|
|        |      |      | #2-56  | #4-40 | #6-32 | #8-32 | #10-32 |        |       | #2-56  | #4-40 | #6-32 | #8-32       |
| 0.125  | 1/8  | 3/16 | 9030   | 9045  |       |       |        | .625   | 5/8   | 3/16   | 9038  | 9053  |             |
|        |      | 1/4  |        | 8760  | 8761  | 8762  |        |        |       | 1/4    |       | 8775  | 8776 8777   |
|        |      | 3/8  |        |       |       | 7902  | 9380A  |        |       | 3/16   | 9039  | 9054  |             |
| 0.187  | 3/16 | 3/16 | 9031   | 9046  |       |       |        | .687   | 11/16 | 1/4    |       | 8778  | 8779 8780   |
|        |      | 1/4  |        | 8763  | 8764  | 8765  |        |        |       | 3/16   | 9040  | 9055  |             |
|        |      | 3/8  |        |       |       | 7905  | 9380B  |        |       | 1/4    |       | 2373  | 2123 2128   |
| 0.25   | 1/4  | 3/16 | 9032   | 9047  |       |       |        | .812   | 13/16 | 3/16   | 9041  | 9056  |             |
|        |      | 1/4  |        | 2370  | 2120  | 2125  |        |        |       | 1/4    |       | 8781  | 8782 8783   |
|        |      | 3/8  |        |       |       | 7908  | 9380C  |        |       | 3/16   | 9042  | 9057  |             |
| 0.312  | 5/16 | 3/16 | 9033   | 9048  |       |       |        | .875   | 7/8   | 1/4    |       | 8784  | 8785 8786   |
|        |      | 1/4  |        | 8766  | 8767  | 8768  |        |        |       | 3/16   | 9043  | 9058  |             |
|        |      | 3/8  |        |       |       | 7911  | 9380D  |        |       | 1/4    |       | 8787  | 8788 8789   |
| 0.375  | 3/8  | 3/16 | 9034   | 9049  |       |       |        | 1      | 1     | 3/16   | 9044  | 9059  |             |
|        |      | 1/4  |        | 2371  | 2121  | 2126  |        |        |       | 1/4    |       | 2374  | 2124 2129   |
|        |      | 3/8  |        |       |       | 7914  | 9380E  |        |       |        |       | 8760R | 8761R 8762R |
| 0.437  | 7/16 | 3/16 | 9035   | 9050  |       |       |        | 1.125  | 1-1/8 |        |       | 8760S | 8761S 8762S |
|        |      | 1/4  |        | 8769  | 8770  | 8771  |        |        |       |        |       | 8760T | 8761T 8762T |
|        |      | 3/8  |        |       |       | 7917  | 9380F  |        |       |        |       | 8760U | 8761U 8762U |
| 0.5    | 1/2  | 3/16 | 9036   | 9051  |       |       |        |        |       |        |       | 8760V | 8761V 8762V |
|        |      | 1/4  |        | 2372  | 2122  | 2127  |        |        |       |        |       | 8760W | 8761W 8762W |
|        |      | 3/8  |        |       |       | 7920  | 9380G  |        |       |        |       | 8760X | 8761X 8762X |
| .562   | 9/16 | 3/16 | 9037   | 9052  |       |       |        |        |       |        |       | 8760Y | 8761Y 8762Y |
|        |      | 1/4  |        | 8772  | 8773  | 8774  |        |        |       |        |       |       |             |

| Maximum Thread Depth       |      |       |       |       |
|----------------------------|------|-------|-------|-------|
| Thread Size                | 4-40 | 6-32  | 8-32  | 10-32 |
| Thread Length Tapped Thru  | 1"   | 1"    | 1"    | 1"    |
| Thread Length Tap each end | 1/4" | 7/16" | 7/16" | 1/2"  |

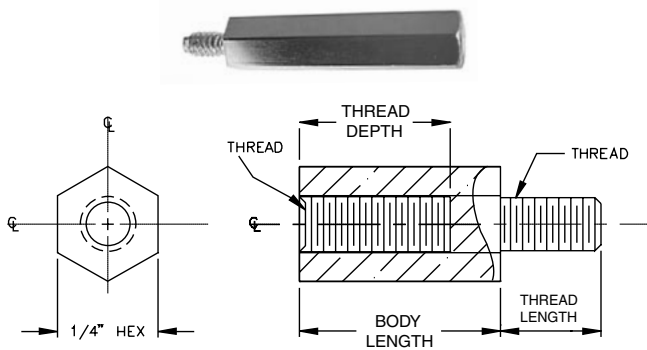
| Maximum Thread Depth       |      |       |       |       |
|----------------------------|------|-------|-------|-------|
| Thread Size                | 4-40 | 6-32  | 8-32  | 10-32 |
| Thread Length Tapped Thru  | 1"   | 1"    | 1"    | 1"    |
| Thread Length Tap each end | 1/4" | 7/16" | 7/16" | 1/2"  |

- Standard **nickel plating** provides a hard, bright, non-oxidizing surface which will stand up to difficult ambient conditions.
- Alternative plating finishes, odd sizes, taps or threads.



| LENGTH |      | O.D. | THREAD |       |       |       | LENGTH |       | O.D. | THREAD |       |       |       |
|--------|------|------|--------|-------|-------|-------|--------|-------|------|--------|-------|-------|-------|
|        |      |      | #2-56  | #4-40 | #6-32 | #8-32 |        |       |      | #2-56  | #4-40 | #6-32 | #8-32 |
| 0.125  | 1/8  | 3/16 | 9130   | 9145  |       |       | .687   | 11/16 | 3/16 | 9139   | 9154  |       |       |
|        |      | 1/4  |        | 8820  | 8821  | 8822  |        |       | 1/4  |        | 8838  | 8839  | 8840  |
| 0.187  | 3/16 | 3/16 | 9131   | 9146  |       |       | .750   | 3/4   | 3/16 | 9140   | 9155  |       |       |
|        |      | 1/4  |        | 8823  | 8824  | 8825  |        |       | 1/4  |        | 2333  | 2323  | 2328  |
| 0.25   | 1/4  | 3/16 | 9132   | 9147  |       |       | .812   | 13/16 | 3/16 | 9141   | 9156  |       |       |
|        |      | 1/4  |        | 2330  | 2320  | 2325  |        |       | 1/4  |        | 8841  | 8842  | 8843  |
| 0.312  | 5/16 | 3/16 | 9133   | 9148  |       |       | .875   | 7/8   | 3/16 | 9142   | 9157  |       |       |
|        |      | 1/4  |        | 8826  | 8827  | 8828  |        |       | 1/4  |        | 8844  | 8845  | 8846  |
| 0.375  | 3/8  | 3/16 | 9134   | 9149  |       |       | .937   | 15/16 | 3/16 | 9143   | 9158  |       |       |
|        |      | 1/4  |        | 2331  | 2321  | 2326  |        |       | 1/4  |        | 8847  | 8848  | 8849  |
| 0.437  | 7/16 | 3/16 | 9135   | 9150  |       |       | 1      | 1     | 3/16 | 9144   | 9159  |       |       |
|        |      | 1/4  |        | 8829  | 8830  | 8831  |        |       | 1/4  |        | 2334  | 2324  | 2329  |
| 0.5    | 1/2  | 3/16 | 9136   | 9151  |       |       | 1.125  | 1-1/8 | 1/4  |        | 8820R | 8821R | 8822R |
|        |      | 1/4  |        | 2332  | 2322  | 2327  | 1.250  | 1-1/4 |      |        | 8820S | 8821S | 8822S |
| 0.562  | 9/16 | 3/16 | 9137   | 9152  |       |       | 1.375  | 1-3/8 |      |        | 8820T | 8821T | 8822T |
|        |      | 1/4  |        | 8832  | 8833  | 8834  | 1.500  | 1-1/2 |      |        | 8820U | 8821U | 8822U |
| .625   | 5/8  | 3/16 | 9138   | 9153  |       |       | 1.625  | 1-5/8 |      |        | 8820V | 8821V | 8822V |
|        |      | 1/4  |        | 8835  | 8836  | 8837  | 1.75   | 1-3/4 |      |        | 8820W | 8821W | 8822W |
|        |      |      |        |       |       |       | 1.875  | 1-7/8 |      |        | 8820X | 8821X | 8822X |
|        |      |      |        |       |       |       | 2      | 2     |      |        | 8820Y | 8821Y | 8822Y |

## Brass Male/Female Hex Standoffs

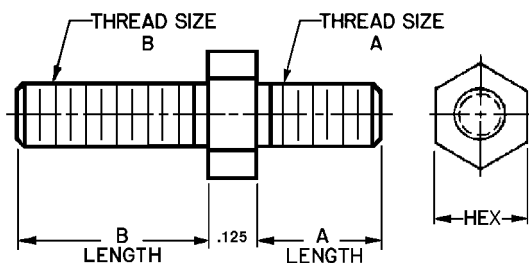


- Hex shaped standoffs are ideal wherever wrench tightening may be required.
- Standard **nickel plating** provides a hard, bright, non-oxidizing surface which will stand up to difficult ambient conditions.
- Alternative finish, size or thread can be custom manufactured upon request.

| BODY LENGTH |       | 4-40 | 6-32 | 8-32 |
|-------------|-------|------|------|------|
| .250        | 1/4   | 8216 | 8248 | 8280 |
| .375        | 3/8   | 8217 | 8249 | 8281 |
| .500        | 1/2   | 8218 | 8250 | 8282 |
| .625        | 5/8   | 8219 | 8251 | 8283 |
| .750        | 3/4   | 8220 | 8252 | 8284 |
| .875        | 7/8   | 8221 | 8253 | 8285 |
| 1           | 1     | 8222 | 8254 | 8286 |
| 1.125       | 1-1/8 | 8223 | 8255 | 8287 |
| 1.250       | 1-1/4 | 8224 | 8256 | 8288 |
| 1.375       | 1-3/8 | 8225 | 8257 | 8289 |
| 1.500       | 1-1/2 | 8226 | 8258 | 8290 |
| 1.625       | 1-5/8 | 8227 | 8259 | 8291 |
| 1.750       | 1-3/4 | 8228 | 8260 | 8292 |
| 2           | 2     | 8229 | 8261 | 8293 |
| 2.500       | 2-1/2 | 8230 | 8262 | 8294 |
| 3           | 3     | 8231 | 8263 | 8295 |

| Thread Specs for Male/Female Standoffs (min) |             |              |               |
|----------------------------------------------|-------------|--------------|---------------|
| Thread Size                                  | Body Length | Thread Depth | Thread Length |
| 4-40                                         | 1/4"        | 1/8"         | 3/16"         |
|                                              | 3/8" to 3"  | 1/4"         |               |
| 6-32 & 8-32                                  | 1/4"        | 1/8"         | 1/4"          |
|                                              | 3/8"        | 1/4"         |               |
|                                              | 1/2"        | 11/32"       | 3/8"          |
|                                              | 5/8" to 3"  | 3/8"         |               |

## Brass Male/Male Adapters



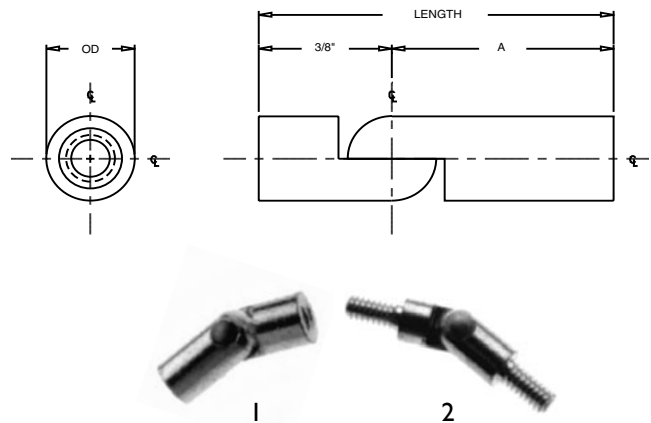
- Brass Male/Male Adapters serve as a quick and easy way to "make it fit". Other thread sizes or lengths can be manufactured in quantity at the factory.
- Standard finish is **nickel plating**. Alternative plating finishes such as zinc are also available upon request.
- Features of all brass spacers include strength, corrosion resistance and electrical conductivity. All brass parts are non-magnetic.
- Abbatron offers engineering services for special application parts or materials.

| PART NO. | HEX  | THREAD "A" |            | THREAD "B" |            |  |  |  |  |  |
|----------|------|------------|------------|------------|------------|--|--|--|--|--|
|          |      | SIZE       | LENGTH 'A' | SIZE       | LENGTH 'B' |  |  |  |  |  |
| 8300     | 1/4  | 4-40       | 3/16       | 4-40       | 3/16       |  |  |  |  |  |
| 8301     |      |            |            | 6-32       | 1/4        |  |  |  |  |  |
| 8302     |      | 6-32       | 1/4        | 8-32       | 3/8        |  |  |  |  |  |
| 8303     |      |            |            |            |            |  |  |  |  |  |
| 8304     |      | 8-32       | 3/8        | 10-32      |            |  |  |  |  |  |
| 8305     | 5/16 |            |            |            |            |  |  |  |  |  |
| 8306     |      |            |            |            |            |  |  |  |  |  |
| 8307     |      | 10-32      |            |            |            |  |  |  |  |  |

## FEMALE/FEMALE ROUND SWIVEL STANDOFFS (FIGURE 1)

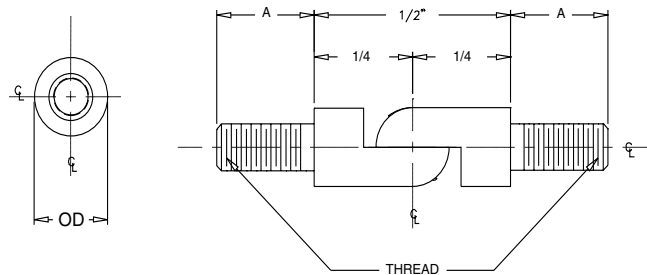
| PART # | LENGTH | O.D. | THREAD | A    |
|--------|--------|------|--------|------|
| 3021   | 3/4    | 3/16 | 4-40   | 3/8" |
| 3022   | 1      |      |        | 5/8" |
| 3023   | 3/4    | 1/4  | 6-32   | 3/8" |
| 3024   | 1      |      |        | 5/8" |
| 3025   | 3/4    |      | 8-32   | 3/8" |
| 3026   | 1      |      |        | 5/8" |

- Abbatron offers durable swivel standoffs can be used as hinges or as certain right angle fasteners.
- Nickel plated finish. Alternative finishes available.
- All part numbers shown here are standard factory supported parts. Other sizes are available in quantity.

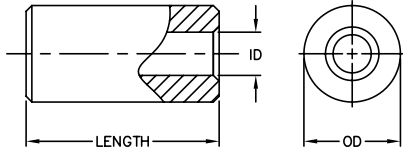


## MALE/MALE ROUND SWIVEL STANDOFFS (FIGURE 2)

| PART # | O.D. | THREAD | A     |
|--------|------|--------|-------|
| 3027   | 3/16 | 4-40   | 1/4"  |
| 3028   | 1/4  | 6-32   | 5/16" |
| 3029   |      | 8-32   |       |



# Aluminum Round Spacers



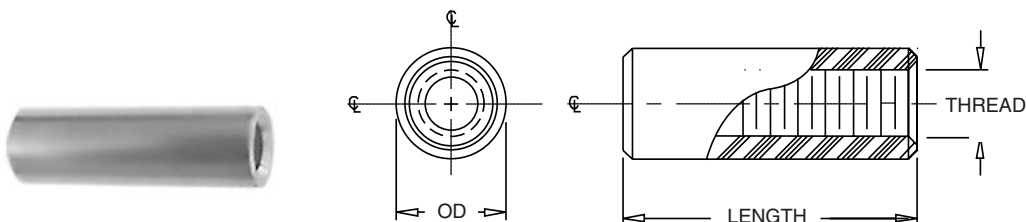
- Standard clear chromate finish. Alternative finishes are also available in quantity.
- Aluminum spacers offer a light-weight alternative to standard brass counterparts.

| SCREW NO. | MAJOR DIA. | HOLE SIZE |
|-----------|------------|-----------|
| #2        | 0.086      | 0.093     |
| #3        | 0.099      | 0.100     |
| #4        | 0.112      | 0.120     |
| #5        | 0.125      | 0.130     |
| #6        | 0.138      | 0.144     |
| #8        | 0.164      | 0.169     |
| #10       | 0.190      | 0.196     |
| #12       | 0.216      | 0.220     |

| LENGTH |       | O.D. | I.D. |       |       |       | LENGTH |       | O.D. |       |       |       |       |
|--------|-------|------|------|-------|-------|-------|--------|-------|------|-------|-------|-------|-------|
|        |       |      | #4   | #6    | #8    | #10   |        |       |      | #4    | #6    | #8    | #10   |
| 0.125  | 1/8   | 1/4  | 8480 | 8500  | 8520  |       | 0.750  | 3/4   | 1/4  | 8485  | 8505  | 8525  |       |
|        |       | 5/16 |      | 9389A | 9390A | 8540  |        |       | 5/16 |       | 9389L | 9390L | 8545  |
|        |       | 3/8  |      |       | 9391A | 9392A |        |       | 3/8  |       |       | 9391L | 9392L |
| 0.187  | 3/16  | 1/4  | 9200 | 9207  | 9214  |       | 0.812  | 13/16 | 1/4  | 9205  | 9212  | 9219  |       |
|        |       | 5/16 |      | 9389B | 9390B | 9221  |        |       | 5/16 |       | 9389M | 9390M | 9226  |
|        |       | 3/8  |      |       | 9391B | 9392B |        |       | 3/8  |       |       | 9391M | 9392M |
| 0.250  | 1/4   | 1/4  | 8481 | 8501  | 8521  |       | 0.875  | 7/8   | 1/4  | 8486  | 8506  | 8526  |       |
|        |       | 5/16 |      | 9389C | 9390C | 8541  |        |       | 5/16 |       | 9389N | 9390N | 8546  |
|        |       | 3/8  |      |       | 9391C | 9392C |        |       | 3/8  |       |       | 9391N | 9392N |
| 0.312  | 15/16 | 1/4  | 9201 | 9208  | 9215  |       | 0.937  | 15/16 | 1/4  | 9206  | 9213  | 9220  |       |
|        |       | 5/16 |      | 9389D | 9390D | 9222  |        |       | 5/16 |       | 9389P | 9390P | 9227  |
|        |       | 3/8  |      |       | 9391D | 9392D |        |       | 3/8  |       |       | 9391P | 9392P |
| 0.375  | 3/8   | 1/4  | 8482 | 8502  | 8522  |       | 1      | 1     | 1/4  | 8487  | 8507  | 8527  |       |
|        |       | 5/16 |      | 9389E | 9390E | 8542  |        |       | 5/16 |       | 9389Q | 9390Q | 8547  |
|        |       | 3/8  |      |       | 9391E | 9392E |        |       | 3/8  |       |       | 9391Q | 9392Q |
| 0.437  | 7/16  | 1/4  | 9202 | 9209  | 9216  |       | 1.125  | 1 1/8 | 1/4  | 8480R | 8500R | 8520R |       |
|        |       | 5/16 |      | 9389F | 9390F | 9223  |        |       | 5/16 |       | 9389R | 9390R | 8540R |
|        |       | 3/8  |      |       | 9391F | 9392F |        |       | 1/4  | 8488  | 8508  | 8528  |       |
| 0.500  | 1/2   | 1/4  | 8483 | 8503  | 8523  |       | 1.250  | 1 1/4 | 5/16 |       | 9389S | 9390S | 8548  |
|        |       | 5/16 |      | 9389G | 9390G | 8543  |        |       | 1/4  | 8480T | 8500T | 8520T |       |
|        |       | 3/8  |      |       | 9391G | 9392G |        |       | 5/16 |       | 9389T | 9390T | 8540T |
| 0.562  | 9/16  | 1/4  | 9203 | 9210  | 9217  |       | 1.375  | 1 3/8 | 1/4  | 8480  | 8509  | 8529  |       |
|        |       | 5/16 |      | 9389H | 9390H | 9224  |        |       | 5/16 |       | 9389U | 9390U | 8549  |
|        |       | 3/8  |      |       | 9391H | 9392H |        |       | 1/4  | 8480V | 8500V | 8520V |       |
| 0.625  | 5/8   | 1/4  | 8484 | 8504  | 8524  |       | 1.500  | 1 1/2 | 5/16 |       | 9389V | 9390V | 8540V |
|        |       | 5/16 |      | 9389J | 9390J | 8544  |        |       | 1/4  | 8490  | 8510  | 8530  |       |
|        |       | 3/8  |      |       | 9391J | 9392J |        |       | 5/16 |       | 9389W | 9390W | 8550  |
| 0.687  | 11/16 | 1/4  | 9204 | 9211  | 9218  |       | 1.625  | 1 5/8 | 1/4  | 8480X | 8500X | 8520X |       |
|        |       | 5/16 |      | 9389K | 9390K | 9225  |        |       | 5/16 |       | 9389X | 9390X | 8540X |
|        |       | 3/8  |      |       | 9391K | 9392K |        |       | 1/4  | 8491  | 8511  | 8531  |       |
|        |       |      |      |       |       |       | 1.750  | 1 3/4 |      |       |       |       |       |
|        |       |      |      |       |       |       |        |       |      |       |       |       |       |
|        |       |      |      |       |       |       | 1.875  | 1 7/8 |      |       |       |       |       |
|        |       |      |      |       |       |       |        |       |      |       |       |       |       |
|        |       |      |      |       |       |       | 2.000  | 2     |      |       |       |       |       |
|        |       |      |      |       |       |       |        |       |      |       |       |       |       |

Aluminum  
Spacers

# Aluminum Round Standoffs



| LENGTH |       | O.D. | #4-40 | #6-32 | #8-32 | #10-32 |
|--------|-------|------|-------|-------|-------|--------|
| 0.125  | 1/8   | 1/4  | 8320  | 8340  | 8360  |        |
|        |       | 5/16 |       | 9396A | 9397A | 8380   |
|        |       | 3/8  |       |       | 9398A | 9399A  |
| 0.187  | 3/16  | 1/4  | 9228  | 9235  | 9242  |        |
|        |       | 5/16 |       | 9396B | 9397B | 9249   |
|        |       | 3/8  |       |       | 9398B | 9399B  |
| 0.250  | 1/4   | 1/4  | 8321  | 8341  | 8361  |        |
|        |       | 5/16 |       | 9396C | 9397C | 8381   |
|        |       | 3/8  |       |       | 9398C | 9399C  |
| 0.312  | 5/16  | 1/4  | 9229  | 9236  | 9243  |        |
|        |       | 5/16 |       | 9396D | 9397D | 9250   |
|        |       | 3/8  |       |       | 9398D | 9399D  |
| 0.375  | 3/8   | 1/4  | 8322  | 8342  | 8362  |        |
|        |       | 5/16 |       | 9396E | 9397E | 8382   |
|        |       | 3/8  |       |       | 9398E | 9399E  |
| 0.437  | 7/16  | 1/4  | 9230  | 9237  | 9244  |        |
|        |       | 5/16 |       | 9396F | 9397F | 9251   |
|        |       | 3/8  |       |       | 9398F | 9399F  |
| 0.500  | 1/2   | 1/4  | 8323  | 8343  | 8363  |        |
|        |       | 5/16 |       | 9396G | 9397G | 8383   |
|        |       | 3/8  |       |       | 9398G | 9399G  |
| 0.562  | 9/16  | 1/4  | 9231  | 9238  | 9245  |        |
|        |       | 5/16 |       | 9396H | 9397H | 9252   |
|        |       | 3/8  |       |       | 9398H | 9399H  |
| 0.625  | 5/8   | 1/4  | 8324  | 8344  | 8364  |        |
|        |       | 5/16 |       | 9396J | 9397J | 8384   |
|        |       | 3/8  |       |       | 9398J | 9399J  |
| 0.687  | 11/16 | 1/4  | 9232  | 9239  | 9246  |        |
|        |       | 5/16 |       | 9396K | 9397K | 9253   |
|        |       | 3/8  |       |       | 9398K | 9399K  |
| 0.450  | 3/4   | 1/4  | 8325  | 8345  | 8365  |        |
|        |       | 5/16 |       | 9396L | 9397L | 8385   |
|        |       | 3/8  |       |       | 9398L | 9399L  |
| 0.812  | 13/16 | 1/4  | 9233  | 9240  | 9247  |        |
|        |       | 5/16 |       | 9396M | 9397M | 9254   |
|        |       | 3/8  |       |       | 9398M | 9399M  |
| 0.875  | 7/8   | 1/4  | 8326  | 8346  | 8366  |        |
|        |       | 5/16 |       | 9396N | 9397N | 8386   |
|        |       | 3/8  |       |       | 9398N | 9399N  |

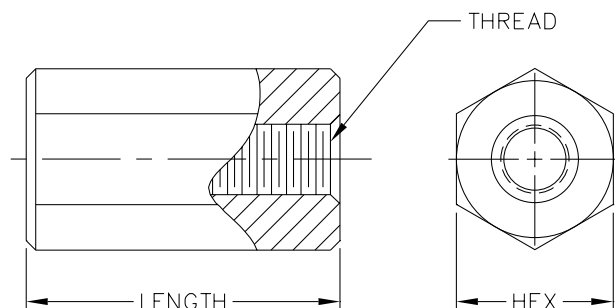
  

| LENGTH |       | O.D. | #4-40  | #6-32  | #8-32  | #10-32 |
|--------|-------|------|--------|--------|--------|--------|
| 0.937  | 15/16 | 1/4  | 9234   | 9241   | 9248   |        |
|        |       | 5/16 |        | 9396P  | 9397P  | 9255   |
|        |       | 3/8  |        |        | 9398P  | 9399P  |
| 1      | 1     | 1/4  | 8327   | 8347   | 8367   |        |
|        |       | 5/16 |        | 9396Q  | 9397Q  | 8387   |
|        |       | 3/8  |        |        | 9398Q  | 9399Q  |
| 1.125  | 1-1/8 | 1/4  | 8320R  | 8340R  | 8360R  |        |
|        |       | 5/16 |        | 9396R  | 9397R  | 8380R  |
|        |       | 1/4  | 8328   | 8348   | 8368   |        |
| 1.250  | 1-1/4 | 5/16 |        | 9396S  | 9397S  | 8388   |
|        |       | 1/4  | 8320T  | 8340T  | 8360T  |        |
|        |       | 5/16 |        | 9396T  | 9397T  | 8380T  |
| 1.375  | 1-3/8 | 1/4  | 8329   | 8349   | 8369   |        |
|        |       | 5/16 |        | 9396U  | 9397U  | 8389   |
|        |       | 1/4  | 8320V  | 8340V  | 8360V  |        |
| 1.500  | 1-1/2 | 5/16 |        | 9396V  | 9397V  | 8380V  |
|        |       | 1/4  | 8330   | 8350   | 8370   |        |
|        |       | 5/16 |        | 9396W  | 9397W  | 8390   |
| 1.625  | 1-5/8 | 1/4  | 8320X  | 8340X  | 8360X  |        |
|        |       | 5/16 |        | 9396X  | 9397X  | 8380X  |
|        |       | 1/4  | 8331   | 8351   | 8371   |        |
| 1.750  | 1-3/4 | 5/16 |        | 9396Y  | 9397Y  | 8391   |
|        |       | 1/4  | 8320Z  | 8340Z  | 8360Z  |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
| 1.875  | 1-7/8 | 1/4  | 8331   | 8351   | 8371   |        |
|        |       | 5/16 |        | 9396Y  | 9397Y  | 8391   |
|        |       | 1/4  | 8331   | 8351   | 8371   |        |
| 2      | 2     | 5/16 |        | 9396Y  | 9397Y  | 8391   |
|        |       | 1/4  | 8320ZA | 8340ZA | 8360ZA |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
| 2.250  | 2-1/4 | 1/4  | 8332   | 8352   | 8372   |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZC | 8340ZC | 8360ZC |        |
| 2.500  | 2-1/2 | 1/4  | 8333   | 8353   | 8373   |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZE | 8340ZE | 8360ZE |        |
| 2.750  | 2-3/4 | 1/4  | 8334   | 8354   | 8374   |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZG | 8340ZG | 8360ZG |        |
| 3      | 3     | 1/4  | 8335   | 8355   | 8375   |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZJ | 8340ZJ | 8360ZJ |        |
| 3.250  | 3-1/4 | 1/4  | 8320ZK | 8340ZK | 8360ZK |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZL | 8340ZL | 8360ZL |        |
| 3.500  | 3-1/2 | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
| 3.750  | 3-3/4 | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
| 4      | 4     | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
| 4.500  | 4-1/2 | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
| 5      | 5     | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
| 5.500  | 5-1/2 | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
| 6      | 6     | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |
|        |       | 5/16 |        | 9396Z  | 9397Z  | 8380Z  |
|        |       | 1/4  | 8320ZM | 8340ZM | 8360ZM |        |

- Aluminum standoffs offer a light-weight alternative to standard brass counterparts.
- Standard clear chromate finish.
- Please reference the Thread Depth Chart at bottom of page. For more information, see page 40.

| Maximum Thread Depth       |      |       |       |       |
|----------------------------|------|-------|-------|-------|
| Thread Size                | 4-40 | 6-32  | 8-32  | 10-32 |
| Thread Length Tapped Thru  | 1"   | 1"    | 1"    | 1"    |
| Thread Length Tap each end | 1/4" | 7/16" | 7/16" | 1/2"  |

# Aluminum Hex Standoffs



- Aluminum with clear chromate finish.
- Hex shape for wrench tightening.

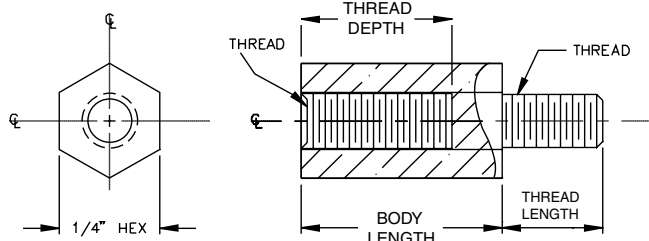
\*Please see page 40 for more information on aluminum standoffs and finishes.

| Maximum Thread Depth       |      |       |       |       |
|----------------------------|------|-------|-------|-------|
| Thread Size                | 4-40 | 6-32  | 8-32  | 10-32 |
| Thread Length Tapped Thru  | 1"   | 1"    | 1"    | 1"    |
| Thread Length Tap each end | 1/4" | 7/16" | 7/16" | 1/2"  |

| LENGTH |       | O.D. | THREAD |       |       |        |
|--------|-------|------|--------|-------|-------|--------|
|        |       |      | #4-40  | #6-32 | #8-32 | #10-32 |
| .125   | 1/8   | 1/4  | 8400   | 8420  | 8440  |        |
|        |       | 5/16 |        | 9403A | 9404A | 8460   |
|        |       | 3/8  |        |       | 9405A | 9406A  |
| .187   | 3/16  | 1/4  | 9284   | 9291  | 9298  |        |
|        |       | 5/16 |        | 9403B | 9404B | 9035   |
|        |       | 3/8  |        |       | 9405B | 9406B  |
| .250   | 1/4   | 1/4  | 8401   | 8421  | 8441  |        |
|        |       | 5/16 |        | 9403C | 9404C | 8461   |
|        |       | 3/8  |        |       | 9405C | 9406C  |
| .312   | 5/16  | 1/4  | 9285   | 9292  | 9299  |        |
|        |       | 5/16 |        | 9403D | 9404D | 9306   |
|        |       | 3/8  |        |       | 9405D | 9406D  |
| .375   | 3/8   | 1/4  | 8402   | 8422  | 8442  |        |
|        |       | 5/16 |        | 9403E | 9404E | 8462   |
|        |       | 3/8  |        |       | 9405E | 9406E  |
| .437   | 7/16  | 1/4  | 9286   | 9293  | 9300  |        |
|        |       | 5/16 |        | 9403F | 9404F | 9307   |
|        |       | 3/8  |        |       | 9405F | 9406F  |
| .500   | 1/2   | 1/4  | 8403   | 8423  | 8443  |        |
|        |       | 5/16 |        | 9403G | 9404G | 8463   |
|        |       | 3/8  |        |       | 9405G | 9406G  |
| .562   | 9/16  | 1/4  | 9287   | 9294  | 9301  |        |
|        |       | 5/16 |        | 9403H | 9404H | 9308   |
|        |       | 3/8  |        |       | 9405H | 9406H  |
| .625   | 5/8   | 1/4  | 8404   | 8424  | 8444  |        |
|        |       | 5/16 |        | 9403J | 9404J | 8464   |
|        |       | 3/8  |        |       | 9405J | 8406J  |
| .687   | 11/16 | 1/4  | 9288   | 9295  | 9302  |        |
|        |       | 5/16 |        | 9403K | 9404K | 9309   |
|        |       | 3/8  |        |       | 9405K | 9406K  |
| .750   | 3/4   | 1/4  | 8405   | 8425  | 8445  |        |
|        |       | 5/16 |        | 9403L | 9404L | 8465   |
|        |       | 3/8  |        |       | 9405L | 9406L  |

| LENGTH |       | O.D.  | THREAD |        |        |        |
|--------|-------|-------|--------|--------|--------|--------|
|        |       |       | #4-40  | #6-32  | #8-32  | #10-32 |
| .812   | 13/16 | 1/4   | 9289   | 9296   | 9303   |        |
|        |       | 5/16  |        | 9403M  | 9404M  | 9310   |
|        |       | 3/8   |        |        | 9405M  | 9406M  |
| .875   | 7/8   | 1/4   | 8406   | 8426   | 8446   |        |
|        |       | 5/16  |        | 9403N  | 9404N  | 8466   |
|        |       | 3/8   |        |        | 9405N  | 9406N  |
| .937   | 15/16 | 1/4   | 9290   | 9297   | 9304   |        |
|        |       | 5/16  |        | 9403P  | 9404P  | 9311   |
|        |       | 3/8   |        |        | 9405P  | 9506P  |
| 1.000  | 1     | 1/4   | 8407   | 8427   | 8447   |        |
|        |       | 5/16  |        | 9403Q  | 9404Q  | 8467   |
|        |       | 3/8   |        |        | 9405Q  | 9406Q  |
| 1.250  | 1-1/4 | 1/4   | 8408   | 8428   | 8448   |        |
|        |       | 5/16  |        | 9403R  | 9404R  | 8468   |
|        |       | 1/4   | 8400T  | 8420T  | 8440T  |        |
| 1.375  | 1-3/8 | 5/16  |        | 9403T  | 9403T  | 8460T  |
|        |       | 1/4   | 8409   | 8429   | 8449   |        |
|        |       | 5/16  |        | 9403U  | 9404U  | 8469   |
| 1.500  | 1-1/2 | 1/4   | 8400V  | 8420V  | 8440V  |        |
|        |       | 5/16  |        | 9403V  | 9404V  | 8460V  |
|        |       | 1/4   | 8410   | 8430   | 8450   |        |
| 1.750  | 1-3/4 | 5/16  |        | 9403W  | 9404W  | 8470   |
|        |       | 1/4   | 8400X  | 8420X  | 8440X  |        |
|        |       | 5/16  |        | 9403X  | 9404X  | 8460X  |
| 1.875  | 1-7/8 | 1/4   | 8411   | 8431   | 8451   |        |
|        |       | 5/16  |        | 9403Y  | 9404Y  | 8471   |
| 2.000  | 2     | 5/16  |        | 9403Z  | 9404Z  | 8471   |
|        |       | 2.250 | 2-1/4  | 8400ZA | 8420ZA | 8440ZA |
|        |       | 2.500 | 2-1/2  | 8412   | 8432   | 8452   |
| 2.750  | 2-3/4 | 2.750 | 2-3/4  | 8400ZC | 8420ZC | 8440ZC |
|        |       | 3.000 | 3      | 8413   | 8433   | 8453   |
|        |       | 3.250 | 3-3/4  | 8400ZE | 8420ZE | 8440ZE |
| 3.500  | 3-1/2 | 3.500 | 3-1/2  | 8414   | 8434   | 8454   |
|        |       | 3.750 | 3-3/4  | 8400ZG | 8420ZG | 8440ZG |
|        |       | 4.000 | 4      | 8415   | 8435   | 8455   |

# Aluminum Male/Female Hex Standoffs

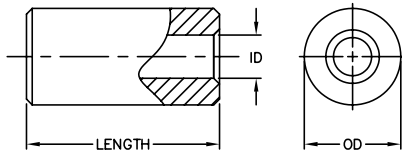


**Aluminum:** Standoffs provide a compromise between weight and strength. Although they cannot be provided in solderable finishes, they can be plated with special colored finishes besides the standard clear chromate. Anodized finishes have insulating characteristics when undamaged, and can be provided in a black matte, non-reflective surface. Aluminum is non-magnetic and can withstand severe conditions when properly finished.

| BODY LENGTH |       | 4-40   | 6-32   | 8-32   |
|-------------|-------|--------|--------|--------|
| .250        | 1/4   | 8000C  | 8001C  | 8002C  |
| .375        | 3/8   | 8000E  | 8001E  | 8002E  |
| .500        | 1/2   | 8000G  | 8001G  | 8002G  |
| .625        | 5/8   | 8000J  | 8001J  | 8002J  |
| .750        | 3/4   | 8000L  | 8001L  | 8002L  |
| .875        | 7/8   | 8000N  | 8001N  | 8002N  |
| 1.000       | 1     | 8000Q  | 8001Q  | 8002Q  |
| 1.125       | 1-1/8 | 8000R  | 8001R  | 8002R  |
| 1.250       | 1-1/4 | 8000S  | 8001S  | 8002S  |
| 1.375       | 1-3/8 | 8000T  | 8001T  | 8002T  |
| 1.500       | 1-1/2 | 8000U  | 8001U  | 8002U  |
| 1.625       | 1-5/8 | 8000V  | 8001V  | 8002V  |
| 1.750       | 1-3/4 | 8000W  | 8001W  | 8002W  |
| 2.000       | 2     | 8000Y  | 8001Y  | 8002Y  |
| 2.500       | 2-1/2 | 8000ZB | 8001ZB | 8002ZB |
| 3.000       | 3     | 8000ZD | 8001ZD | 8002ZD |

| Thread Specs for Male/Female Standoffs (min) |             |              |               |
|----------------------------------------------|-------------|--------------|---------------|
| Thread Size                                  | Body Length | Thread Depth | Thread Length |
| 4-40                                         | 1/4"        | 1/8"         | 3/16"         |
|                                              | 3/8" to 3"  | 1/4"         |               |
| 6-32 & 8-32                                  | 1/4"        | 1/8"         | 1/4"          |
|                                              | 3/8"        | 1/4"         |               |
|                                              | 1/2"        | 11/32"       | 3/8"          |
|                                              | 5/8" to 3"  | 3/8"         |               |

# Nylon Round Spacers



- Molded nylon 6/6.
- An excellent Insulator, the nylon spacer's surface lubricity allows wires to be routed against spacer without fear of chafing the insulation.
- Natural (milky white) finish.
- Relatively low operating temperature.

| SCREW NO. | MAJOR DIA. | HOLE SIZE |
|-----------|------------|-----------|
| #2        | 0.086      | 0.093     |
| #3        | 0.099      | 0.100     |
| #4        | 0.112      | 0.120     |
| #5        | 0.125      | 0.130     |
| #6        | 0.138      | 0.144     |
| #8        | 0.164      | 0.169     |
| #10       | 0.190      | 0.196     |
| #12       | 0.216      | 0.220     |

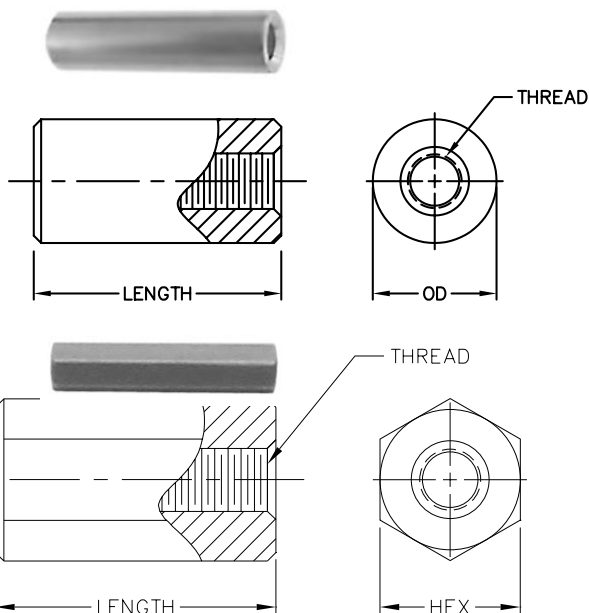
| LENGTH |      | O.D. | HOLE CLEARANCE SIZE |      |       |       |       | LENGTH | O.D.  | HOLE CLEARANCE SIZE |      |       |       |       |
|--------|------|------|---------------------|------|-------|-------|-------|--------|-------|---------------------|------|-------|-------|-------|
|        |      |      | #2                  | #4   | #6    | #8    | #10   |        |       | #2                  | #4   | #6    | #8    | #10   |
| 0.125  | 1/8  | 3/16 | 9160                | 9180 |       |       |       | .562   | 9/16  | 5/16                |      | 4065H | 4067H | 4069H |
|        |      | 1/4  |                     | 4000 | 4001  | 4002  |       |        |       | 3/8                 |      |       | 4068H | 4070H |
|        |      | 5/16 |                     |      | 4065A | 4067A | 4069A |        |       | 3/16                | 9168 | 9188  |       |       |
|        |      | 3/8  |                     |      |       | 4068A | 4070A |        |       | 1/4                 |      | 4024  | 4025  | 4026  |
| 0.187  | 3/16 | 3/16 | 9161                | 9181 |       |       |       | .625   | 5/8   | 5/16                |      | 4065J | 4067J | 4069J |
|        |      | 1/4  |                     | 4003 | 4004  | 4005  |       |        |       | 3/8                 |      |       | 4068J | 4070J |
|        |      | 5/16 |                     |      | 4065B | 4067B | 4069B |        |       | 3/16                | 9169 | 9189  |       |       |
|        |      | 3/8  |                     |      |       | 4068B | 4070B |        |       | 1/4                 |      | 4027  | 4028  | 4029  |
| 0.25   | 1/4  | 3/16 | 9162                | 9182 |       |       |       | .687   | 11/16 | 5/16                |      | 4065K | 4067K | 4069K |
|        |      | 1/4  |                     | 4006 | 4007  | 4008  |       |        |       | 3/8                 |      |       | 4068K | 4070K |
|        |      | 5/16 |                     |      | 4065C | 4067C | 4069C |        |       | 3/16                | 9170 | 9190  |       |       |
|        |      | 3/8  |                     |      |       | 4068C | 4070C |        |       | 1/4                 |      | 4030  | 4031  | 4032  |
| 0.312  | 5/16 | 3/16 | 9163                | 9183 |       |       |       | .750   | 3/4   | 5/16                |      | 4065L | 4067L | 4069L |
|        |      | 1/4  |                     | 4009 | 4010  | 4011  |       |        |       | 3/8                 |      |       | 4068L | 4070L |
|        |      | 5/16 |                     |      | 4065D | 4067D | 4069D |        |       | 3/16                | 9171 | 9191  |       |       |
|        |      | 3/8  |                     |      |       | 4068D | 4070D |        |       | 1/4                 |      | 4033  | 4034  | 4035  |
| 0.375  | 3/8  | 3/16 | 9164                | 9184 |       |       |       | .812   | 13/16 | 5/16                |      | 4065M | 4067M | 4069M |
|        |      | 1/4  |                     | 4012 | 4013  | 4014  |       |        |       | 3/8                 |      |       | 4068M | 4070M |
|        |      | 5/16 |                     |      | 4065E | 4067E | 4069E |        |       | 3/16                | 9172 | 9192  |       |       |
|        |      | 3/8  |                     |      |       | 4068E | 4070E |        |       | 1/4                 |      | 4036  | 4037  | 4038  |
| 0.437  | 7/16 | 3/16 | 9165                | 9185 |       |       |       | .875   | 7/8   | 5/16                |      | 4065N | 4067N | 4069N |
|        |      | 1/4  |                     | 4015 | 4016  | 4017  |       |        |       | 3/8                 |      |       | 4068N | 4070N |
|        |      | 5/16 |                     |      | 4065F | 4067F | 4069F |        |       | 3/16                | 9173 | 9193  |       |       |
|        |      | 3/8  |                     |      |       | 4068F | 4070F |        |       | 1/4                 |      | 4039  | 4040  | 4041  |
| 0.5    | 1/2  | 3/16 | 9166                | 9186 |       |       |       | .937   | 15/16 | 5/16                |      | 4065P | 4067P | 4069P |
|        |      | 1/4  |                     | 4018 | 4019  | 4020  |       |        |       | 3/8                 |      |       | 4068P | 4070P |
|        |      | 5/16 |                     |      | 4065G | 4067G | 4069G |        |       | 3/16                | 9174 | 9194  |       |       |
|        |      | 3/8  |                     |      |       | 4068G | 4070G |        |       | 1/4                 |      | 4042  | 4043  | 4044  |
| 0.562  | 9/16 | 3/16 | 9167                | 9187 |       |       |       | 1      | 1     | 5/16                |      | 4065Q | 4067Q | 4069Q |
|        |      | 1/4  |                     | 4021 | 4022  | 4023  |       |        |       | 3/8                 |      |       | 4068Q | 4070Q |

# Nylon Round, Hex & Male/Female Standoffs

## ROUND THREADED

| LENGTH | O.D. | #4-40 | #6-32 | #8-32 | #10-32 |
|--------|------|-------|-------|-------|--------|
| .250   | 1/4  | 1/4   | 4050  | 4051  | 4052   |
|        |      | 5/16  |       | 4071C |        |
|        |      | 3/8   |       |       | 4072C  |
| .375   | 3/8  | 1/4   | 4053  | 4054  | 4055   |
|        |      | 5/16  |       | 4071E |        |
|        |      | 3/8   |       |       | 4072E  |
| .500   | 1/2  | 1/4   | 4056  | 4057  | 4058   |
|        |      | 5/16  |       | 4071G |        |
|        |      | 3/8   |       |       | 4072G  |
| .625   | 5/8  | 1/4   | 4050J | 4051J |        |
|        |      | 5/16  |       | 4071J |        |
|        |      | 3/8   |       |       | 4072J  |
| .750   | 3/4  | 1/4   | 4059  | 4060  | 4061   |
|        |      | 5/16  |       | 4071L |        |
|        |      | 3/8   |       |       | 4072L  |
| .875   | 7/8  | 1/4   | 4050N | 4051N |        |
|        |      | 5/16  |       | 4071N |        |
|        |      | 3/8   |       |       | 4072N  |
| 1.000  | 1    | 1/4   | 4062  | 4063  | 4064   |
|        |      | 5/16  |       | 4071Q |        |
|        |      | 3/8   |       |       | 4072Q  |

- An excellent insulator, the nylon spacer's surface lubricity allows wires to be routed against spacer without fear of chafing the insulation.
- Natural (milky white) finish.



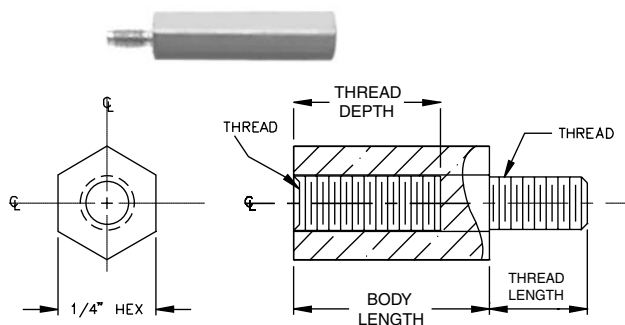
## HEX THREADED

| LENGTH | O.D. | #4-40 | #6-32 | #8-32 |
|--------|------|-------|-------|-------|
| .250   | 1/4  | 4300  | 4301  | 4302  |
| .375   | 3/8  | 4303  | 4304  | 4305  |
| .500   | 1/2  | 4306  | 4307  | 4308  |
| .625   | 5/8  | 4300J | 4301J | 4073J |
| .750   | 3/4  | 4309  | 4310  | 4311  |
| .875   | 7/8  | 4312  | 4313  | 4314  |
| 1.000  | 1    | 4315  | 4316  | 4317  |

| Maximum Thread Depth       |      |       |       |       |
|----------------------------|------|-------|-------|-------|
| Thread Size                | 4-40 | 6-32  | 8-32  | 10-32 |
| Thread Length Tapped Thru  | 1"   | 1"    | 1"    | 1"    |
| Thread Length Tap each end | 1/4" | 7/16" | 7/16" | 1/2"  |

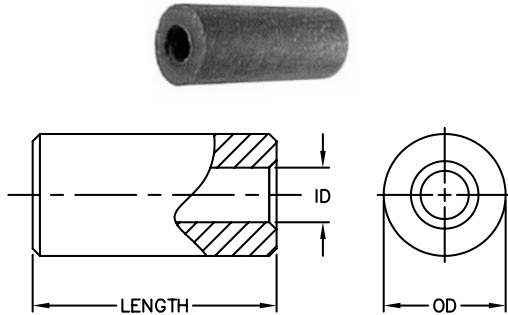
## HEX MALE / FEMALE

| LENGTH | O.D.  | #4-40 | #6-32 | #8-32 |
|--------|-------|-------|-------|-------|
| .250   | 1/4   | 4375  | 4376  | 4377  |
| .375   | 3/8   | 4378  | 4379  | 4380  |
| .500   | 1/2   | 4381  | 4382  | 4383  |
| .625   | 5/8   | 4384  | 4385  | 4386  |
| .750   | 3/4   | 4387  | 4388  | 4389  |
| .875   | 7/8   | 4390  | 4391  | 4392  |
| 1.000  | 1     | 4393  | 4394  | 4395  |
| 1.125  | 1-1/8 | 4396  | 4397  | 4398  |
| 1.250  | 1-1/4 | 4399  | 4400  | 4401  |
| 1.375  | 1-3/8 | 4402  | 4403  | 4404  |
| 1.500  | 1-1/2 | 4405  | 4406  | 4407  |
| 1.625  | 1-5/8 | 4408  | 4409  | 4410  |
| 1.750  | 1-3/4 | 4411  | 4412  | 4413  |
| 2.000  | 2     | 4414  | 4415  | 4416  |



| Thread Specs for Male/Female Standoffs (min) |             |              |               |
|----------------------------------------------|-------------|--------------|---------------|
| Thread Size                                  | Body Length | Thread Depth | Thread Length |
| 4-40                                         | 1/4"        | 1/8"         | 3/16"         |
|                                              | 3/8" to 2"  | 1/4"         | 3/16"         |
| 6-32 & 8-32                                  | 1/4"        | 1/8"         | 1/4"          |
|                                              | 3/8"        | 1/4"         | 1/4"          |
|                                              | 1/2"        | 11/32"       | 3/8"          |
|                                              | 5/8"-2"     | 3/8"         | 3/8"          |

# Phenolic Spacers



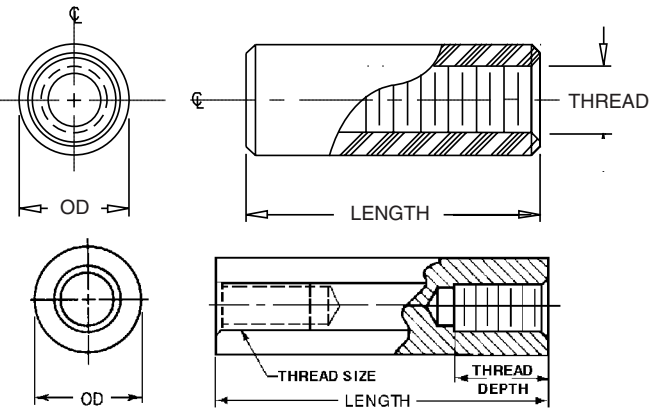
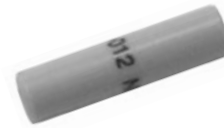
**Phenolic:** are made from paper-base, resin impregnated, heat-cured materials. High torque should not be applied to these spacers. They are the insulating spacer of choice when higher temperatures are encountered than can be withstood by nylon, or where greater strength without cold-flow is required.

- Parts are offered only as a spacer, non-threaded.

| SCREW NO. | MAJOR DIA. | HOLE SIZE |
|-----------|------------|-----------|
| #2        | 0.086      | 0.093     |
| #3        | 0.099      | 0.100     |
| #4        | 0.112      | 0.120     |
| #5        | 0.125      | 0.130     |
| #6        | 0.138      | 0.144     |
| #8        | 0.164      | 0.169     |
| #10       | 0.190      | 0.196     |
| #12       | 0.216      | 0.220     |

| LENGTH | O.D.  | #2   | #4    | #6    | #8    | #10   |
|--------|-------|------|-------|-------|-------|-------|
| .125   | 1/8   | 3/16 | 8040A | 8041A |       |       |
|        |       | 1/4  |       | 8140  | 8141  |       |
|        |       | 5/16 |       |       | 8042A | 8043A |
| .187   | 3/16  | 3/16 | 8040B | 8041B |       |       |
|        |       | 1/4  |       | 8143  | 8144  |       |
|        |       | 5/16 |       |       | 8042B | 8043B |
| .250   | 1/4   | 3/16 | 8040C | 8041C |       |       |
|        |       | 1/4  |       | 8146  | 8147  |       |
|        |       | 5/16 |       |       | 8042C | 8043C |
| .312   | 5/16  | 3/16 | 8040D | 8041D |       |       |
|        |       | 1/4  |       | 8149  | 8150  |       |
|        |       | 5/16 |       |       | 8042D | 8043D |
| .375   | 3/8   | 3/16 | 8040E | 8041E |       |       |
|        |       | 1/4  |       | 8152  | 8153  |       |
|        |       | 5/16 |       |       | 8042E | 8043E |
| .437   | 7/16  | 3/16 | 8040F | 8041F |       |       |
|        |       | 1/4  |       | 8155  | 8156  |       |
|        |       | 5/16 |       |       | 8042F | 8043F |
| .500   | 1/2   | 3/16 | 8040G | 8041G |       |       |
|        |       | 1/4  |       | 8158  | 8159  |       |
|        |       | 5/16 |       |       | 8042G | 8043G |
| .562   | 9/16  | 3/16 | 8040H | 8041H |       |       |
|        |       | 1/4  |       | 8161  | 8162  |       |
|        |       | 5/16 |       |       | 8042H | 8043H |
| .625   | 5/8   | 3/16 | 8040J | 8041J |       |       |
|        |       | 1/4  |       | 8164  | 8165  |       |
|        |       | 5/16 |       |       | 8042J | 8043J |
| .687   | 11/16 | 3/16 | 8040K | 8041K |       |       |
|        |       | 1/4  |       | 8167  | 8168  |       |
|        |       | 5/16 |       |       | 8042K | 8043K |
| .750   | 3/4   | 3/16 | 8040L | 8041L |       |       |
|        |       | 1/4  |       | 8170  | 8171  |       |
|        |       | 5/16 |       |       | 8042L | 8043L |
| .812   | 13/16 | 3/16 | 8040M | 8041M |       |       |
|        |       | 1/4  |       | 8173  | 8174  |       |
|        |       | 5/16 |       |       | 8042M | 8043M |
| .875   | 7/8   | 3/16 | 8040N | 8041N |       |       |
|        |       | 1/4  |       | 8176  | 8177  |       |
|        |       | 5/16 |       |       | 8042N | 8043N |
| .937   | 15/16 | 3/16 | 8040P | 8041P |       |       |
|        |       | 1/4  |       | 8179  | 8180  |       |
|        |       | 5/16 |       |       | 8042P | 8043P |
| 1.000  | 1     | 3/16 | 8040Q | 8041Q |       |       |
|        |       | 1/4  |       | 8182  | 8183  |       |
|        |       | 5/16 |       |       | 8042Q | 8043Q |

| PART NO. | LENGTH        | O.D. | THREAD |               | MIL           |               |
|----------|---------------|------|--------|---------------|---------------|---------------|
|          |               |      | SIZE   | DEPTH         | NUMBER        |               |
| 2640     | 1/4           | 1/4  | 6-32   | THRU          | NL523 W01 004 |               |
| 2642     | 3/8           | 3/8  |        | 5/32          |               |               |
| 2641     | 1/2           | 1/4  |        | 5/32          |               |               |
| 2643     |               | 3/8  |        | 5/32          |               |               |
| 2600     |               | 1/2  |        | 9/64          |               |               |
| 2644     |               | 3/8  |        | 1/4           |               |               |
| 2601     | 5/8           | 1/2  | 8-32   | 3/16          | NL523 W01 005 |               |
| 2607     |               | 3/8  | 3/16   | NL523 W02 005 |               |               |
| 2602     | 3/4           | 3/8  | 6-32   | 1/4           | NL523 W01 006 |               |
| 2645     |               | 1/2  |        |               | NL523 W02 006 |               |
| 2608     |               | 1/2  | 8-32   |               | NL523 W02 006 |               |
| 2603     | 1             | 3/8  | 6-32   | 3/8           | NL523 W01 008 |               |
| 2646     |               | 1/2  |        |               | 8-32          | NL523 W02 008 |
| 2609     |               | 3/4  | 10-32  |               | NL523 W03 008 |               |
| 2615     | 1-1/4         | 3/8  | 6-32   |               | NL523 W01 010 |               |
| 2604     |               | 1/2  | 8-32   |               | NL523 W02 010 |               |
| 2610     |               | 3/4  | 10-32  |               | NL523 W03 010 |               |
| 2616     |               | 1    | 1/4-20 | 7/16          | NL523 W04 010 |               |
| 2622     | 1-1/2         | 1/2  | 6-32   | 9/16          | NL523 W01 012 |               |
| 2647     |               | 3/8  |        | 8-32          |               | 3/8           |
| 2605     |               | 1/2  | 10-32  | NL523 W03 012 |               |               |
| 2611     |               | 3/4  | 1/4-20 | 1/2           | NL523 W04 012 |               |
| 2617     | 2             | 1    | 6-32   | 3/8           | NL523 W01 016 |               |
| 2623     |               | 1/2  | 8-32   |               | NL523 W02 016 |               |
| 2606     |               | 3/4  | 10-32  |               | NL523 W03 016 |               |
| 2612     |               | 1    | 1/4-20 |               | 5/8           | NL523 W04 016 |
| 2618     | 2-1/2         | 1/2  | 6-32   | 1/2           | NL523 W02 020 |               |
| 2624     |               | 3/8  | 8-32   | 3/8           |               | NL523 W03 020 |
| 2648     |               | 1/2  | 10-32  |               |               | 3/4           |
| 2613     |               | 1    | 1/4-20 | 5/8           |               | NL523 W04 020 |
| 2619     | 3             | 1/2  | 8-32   | 3/8           | NL523 W01 024 |               |
| 2649     |               | 3/4  | 10-32  |               | NL523 W03 024 |               |
| 2625     |               | 1    | 1/4-20 |               | 5/8           | NL523 W04 024 |
| 2614     | 4             | 3/4  | 10-32  | 3/8           | NL523 W03 032 |               |
| 2620     |               | 1    | 1/4-20 | 5/8           | NL523 W04 032 |               |
| 2626     |               |      |        |               | NL523 W01 032 |               |
| 2650     | NL523 W02 032 |      |        |               |               |               |
| 2621     | 5             | 1    | 1/4-20 | 5/8           | NL523 W03 032 |               |
| 2627     |               |      |        |               | NL523 W04 032 |               |
| 2628     |               |      |        |               | NL523 W01 040 |               |
| 2629     | 6             |      |        |               | NL523 W04 040 |               |



- Ceramic standoffs are Grade L-5 Steatite, glazed and fired at high temperature.
- Threaded from each end as indicated in table.
- The ideal Insulator, Steatite exhibits exceptional strength in compression and tension, but is weak in shear (torsion), as are all glass-type materials.
- Continuous safe operating temperature rating of 930°C (1700°F).

| SCREW NO. | MAJOR DIA. | HOLE SIZE |
|-----------|------------|-----------|
| #2        | 0.086      | 0.093     |
| #3        | 0.099      | 0.100     |
| #4        | 0.112      | 0.120     |
| #5        | 0.125      | 0.130     |
| #6        | 0.138      | 0.144     |
| #8        | 0.164      | 0.169     |
| #10       | 0.190      | 0.196     |
| #12       | 0.216      | 0.220     |

# Numeric Index

| Part No. | Page | Part No. | Page | Part No. | Page | Part No. | Page | Part No.  | Page |
|----------|------|----------|------|----------|------|----------|------|-----------|------|
| 100      | 22   | 325      | 27   | 829      | 29   | 1074     | 29   | 1617      | 36   |
| 101      | 24   | 327      | 9    | 830      | 29   | 1075     | 29   | 1620      | 36   |
| 102      | 22   | 331      | 9    | 846      | 29   | 1076     | 29   | 1621      | 36   |
| 103      | 22   | 350      | 9    | 847      | 29   | 1156     | 29   | 1632      | 36   |
| 107      | 27   | 389      | 9    | 848      | 29   | 1158     | 29   | 1633      | 36   |
| 108      | 25   | 401      | 22   | 849      | 29   | 1207     | 28   | 1634      | 36   |
| 109      | 24   | 425      | 22   | 850      | 29   | 1235     | 28   | 1635      | 36   |
| 110      | 19   | 425AA    | 22   | 853      | 29   | 1275     | 13   | 1636      | 36   |
| 114      | 37   | 430      | 27   | 854      | 29   | 1275N    | 13   | 1637      | 36   |
| 119      | 37   | 432      | 22   | 855      | 29   | 1280     | 28   | 1638      | 36   |
| 120      | 37   | 455      | 20   | 857      | 29   | 1339-48  | 8    | 1639      | 36   |
| 124      | 25   | 459      | 13   | 858      | 29   | 1410     | 30   | 1640      | 36   |
| 128      | 25   | 460      | 22   | 859      | 29   | 1411     | 30   | 1641      | 36   |
| 131      | 37   | 462      | 22   | 860      | 29   | 1412     | 30   | 1642      | 36   |
| 136      | 19   | 476      | 20   | 861      | 29   | 1413     | 30   | 1643      | 36   |
| 137      | 15   | 533      | 34   | 862      | 29   | 1414     | 30   | 1675      | 10   |
| 147      | 22   | 539      | 34   | 863      | 29   | 1415     | 30   | 1676      | 10   |
| 157      | 24   | 603P     | 6    | 864      | 29   | 1416     | 30   | 1682      | 11   |
| 159      | 19   | 604      | 8    | 865      | 29   | 1458     | 23   | 1686      | 11   |
| 180      | 37   | 605      | 8    | 866      | 29   | 1464     | 14   | 1687      | 11   |
| 181      | 37   | 606      | 8    | 867      | 29   | 1477BB   | 16   | 1688      | 11   |
| 182      | 37   | 607      | 8    | 868      | 29   | 1477RB   | 16   | 1689      | 11   |
| 183      | 37   | 608      | 35   | 869      | 29   | 1477RR   | 16   | 1809BB    | 16   |
| 184      | 37   | 610P     | 7    | 870      | 29   | 1482     | 14   | 1809RB    | 16   |
| 185      | 23   | 612      | 35   | 871      | 29   | 1485     | 30   | 1809RR    | 16   |
| 186      | 23   | 615P     | 6    | 872      | 29   | 1488     | 30   | 1813BB    | 16   |
| 187      | 24   | 623P     | 6    | 873      | 29   | 1496     | 30   | 1813RB    | 16   |
| 192      | 22   | 625P     | 6    | 874      | 29   | 1497     | 30   | 1813RR    | 16   |
| 200      | 25   | 627      | 8    | 875      | 29   | 1499     | 23   | 1814-5    | 13   |
| 203      | 25   | 628      | 8    | 876      | 29   | 1503     | 26   | 1814BB    | 16   |
| 204      | 20   | 629      | 8    | 877      | 29   | 1505     | 26   | 1814RB    | 16   |
| 205      | 23   | 647      | 8    | 879      | 29   | 1506     | 26   | 1814RR    | 16   |
| 207-03   | 13   | 650      | 35   | 899      | 13   | 1507     | 26   | 1828      | 15   |
| 210      | 10   | 651      | 35   | 900      | 29   | 1509     | 23   | 1835      | 15   |
| 211      | 20   | 652      | 35   | 901      | 29   | 1510-08  | 8    | 1837      | 17   |
| 212      | 20   | 653      | 35   | 914      | 29   | 1510-12  | 8    | 1839      | 17   |
| 235      | 25   | 654      | 35   | 928      | 29   | 1510-24  | 8    | 2056      | 36   |
| 251      | 24   | 655      | 35   | 929      | 29   | 1510-36  | 8    | 2057      | 36   |
| 255      | 21   | 656      | 35   | 930      | 29   | 1514     | 13   | 2058      | 32   |
| 257      | 13   | 657      | 8    | 938      | 34   | 1516     | 10   | 2100-2119 | 41   |
| 269BB    | 16   | 658      | 8    | 939      | 34   | 1517     | 13   | 2120-2129 | 42   |
| 269RB    | 16   | 659      | 8    | 1004     | 29   | 1596-12  | 8    | 2135      | 33   |
| 269RR    | 16   | 685P     | 6    | 1055     | 29   | 1596-24  | 8    | 2136      | 33   |
| 285      | 21   | 699      | 7    | 1060     | 29   | 1596-36  | 8    | 2137      | 33   |
| 286      | 23   | 799      | 13   | 1062     | 29   | 1596-48  | 8    | 2138      | 33   |
| 289      | 21   | 813      | 29   | 1064     | 29   | 1596-60  | 8    | 2139      | 33   |
| 295      | 20   | 820      | 29   | 1066     | 29   | 1598     | 26   | 2170      | 32   |
| 300      | 9    | 821      | 29   | 1068     | 29   | 1604     | 36   | 2172      | 32   |
| 320      | 9    | 823      | 34   | 1070     | 29   | 1610     | 36   | 2174      | 32   |
| 321      | 27   | 828      | 29   | 1071     | 29   | 1616     | 36   | 2175      | 32   |

# Numeric Index

| Part No.  | Page | Part No.  | Page | Part No.     | Page | Part No.     | Page | Part No.    | Page |
|-----------|------|-----------|------|--------------|------|--------------|------|-------------|------|
| 2177      | 32   | 2668      | 31   | 3086         | 35   | 8340R-8340ZM | 47   | 9396A-9396Y | 47   |
| 2184      | 33   | 2669      | 31   | 3087         | 35   | 8360-8375    | 47   | 9397A-9397Y | 47   |
| 2185      | 32   | 2670      | 31   | 3089         | 35   | 8360R-8360ZM | 47   | 9398A-9398Q | 47   |
| 2186      | 32   | 2671      | 31   | 3090         | 35   | 3880-8391    | 47   | 9399A-9399Q | 47   |
| 2187      | 32   | 2672      | 31   | 3091         | 35   | 8380R-8380X  | 47   | 9403A-9403Y | 48   |
| 2188      | 32   | 2673      | 31   | 3092         | 35   | 8400-8455    | 44   | 9404A-9404Y | 48   |
| 2189      | 32   | 2674      | 31   | 3093         | 35   | 8400T-8400ZG | 48   | 9405A-9405Q | 48   |
| 2190      | 33   | 2675      | 31   | 3094         | 35   | 8420T-8420ZG | 48   | 9406A-9406Q | 48   |
| 2192      | 33   | 2576      | 31   | 3095         | 35   | 8440T-8440ZG | 48   | 9500        | 38   |
| 2193      | 33   | 2677      | 31   | 3096         | 35   | 8460-8471    | 48   | 9501        | 38   |
| 2194      | 33   | 2678      | 31   | 3097         | 35   | 8460T-8460X  | 48   | 9502        | 38   |
| 2320-2334 | 43   | 2679      | 31   | 3098         | 35   | 84080-8491   | 46   | 9503        | 38   |
| 2340-2344 | 41   | 2681      | 31   | 3099         | 35   | 8480R-8480X  | 46   | 9522        | 39   |
| 2350      | 37   | 2682      | 31   | 3501         | 26   | 8500-8511    | 46   | 9524        | 39   |
| 2351      | 37   | 2683      | 31   | 3502         | 26   | 8500R-8500X  | 46   | 9540AB      | 39   |
| 2352      | 37   | 2684      | 31   | 4000-4044    | 50   | 8520-8531    | 46   | 9542AA      | 39   |
| 2353      | 37   | 2685      | 31   | 4050-4064    | 51   | 8520R-8520X  | 46   | 9545        | 39   |
| 2354      | 37   | 2686      | 31   | 4050J        | 51   | 8540-8551    | 46   | 9550AA      | 39   |
| 2355      | 37   | 2687      | 31   | 4050N        | 51   | 8540R-8540X  | 46   | 9551AB      | 39   |
| 2370-2374 | 42   | 2688      | 31   | 4051J        | 51   | 8700-8729    | 41   | 9552AA      | 39   |
| 2455      | 33   | 2689      | 31   | 4051N        | 51   | 8732-8759    | 41   | 9555AD      | 39   |
| 2456      | 33   | 2690      | 31   | 4065A-4065Q  | 50   | 8760-8789    | 42   |             |      |
| 2457      | 33   | 2691      | 31   | 4067A-4067Q  | 50   | 8760R-8760Y  | 42   |             |      |
| 2458      | 33   | 2692      | 32   | 4068A-4068Q  | 50   | 8761R-8761Y  | 42   |             |      |
| 2459      | 33   | 2693      | 32   | 4069A-4069Q  | 50   | 8762R-8762Y  | 42   |             |      |
| 2461      | 33   | 2694      | 32   | 4070A-4070Q  | 50   | 8820-8849    | 43   |             |      |
| 2463      | 33   | 2713BB    | 18   | 4071C-4071Q  | 51   | 8820R-8820Y  | 43   |             |      |
| 2464      | 33   | 2713RB    | 18   | 4072C-4072Q  | 51   | 8821R-8821Y  | 43   |             |      |
| 2465      | 33   | 2713RR    | 18   | 4073J        | 51   | 8822R-8822Y  | 43   |             |      |
| 2514      | 31   | 2802      | 18   | 4300-4317    | 51   | 9000-9029    | 41   |             |      |
| 2515      | 31   | 2803      | 18   | 4300J        | 51   | 9030-9059    | 42   |             |      |
| 2517      | 31   | 2804      | 18   | 4301J        | 51   | 91103        | 32   |             |      |
| 2518      | 31   | 2809      | 18   | 4375-4399    | 51   | 91106        | 32   |             |      |
| 2534      | 31   | 3002      | 29   | 4400-4416    | 51   | 91107        | 32   |             |      |
| 2535      | 31   | 3003      | 29   | 7902-7920    | 42   | 91114        | 32   |             |      |
| 2536      | 31   | 3004      | 29   | 8000C-8000ZD | 49   | 91116        | 32   |             |      |
| 2537      | 31   | 3005      | 29   | 8001C-8001ZD | 49   | 91117        | 32   |             |      |
| 2538      | 31   | 3006      | 29   | 8002C-8002ZD | 49   | 9130-9159    | 43   |             |      |
| 2600-2629 | 53   | 3007      | 29   | 8040A-8040Q  | 52   | 9160-9174    | 50   |             |      |
| 2640-2650 | 53   | 3008      | 29   | 8041A-8041Q  | 52   | 9180-9194    | 50   |             |      |
| 2651      | 31   | 3009      | 29   | 8042A-8042Q  | 52   | 9200-9227    | 46   |             |      |
| 2652      | 31   | 3010      | 29   | 8043A-8043Q  | 52   | 9228-9255    | 47   |             |      |
| 2660      | 31   | 3011      | 29   | 8140-8183    | 52   | 9284-9311    | 48   |             |      |
| 2661      | 31   | 3012      | 29   | 8216-8231    | 44   | 9325P        | 6    |             |      |
| 2662      | 31   | 3013      | 29   | 8248-8263    | 44   | 9375A-9375Q  | 41   |             |      |
| 2663      | 31   | 3015      | 14   | 8280-8295    | 44   | 9380A-9380G  | 42   |             |      |
| 2664      | 31   | 3021-3029 | 45   | 8300-8307    | 44   | 9389A-9389Y  | 46   |             |      |
| 2665      | 31   | 3083      | 35   | 8320-8335    | 47   | 9390A-9390Y  | 46   |             |      |
| 2666      | 31   | 3084      | 35   | 8320R-8320ZM | 47   | 9391A-9391Q  | 46   |             |      |
| 2667      | 31   | 3085      | 35   | 8340-8354    | 47   | 9392A-9392Q  | 46   |             |      |

# Technical Information

## DECIMAL EQUIVALENTS OF PARTS OF AN INCH

|       |         |
|-------|---------|
| 1/64  | .015625 |
| 1/32  | .03125  |
| 3/64  | .04687  |
| 1/16  | .0625   |
| 5/64  | .078125 |
| 3/32  | .09375  |
| 7/64  | .109375 |
| 1/8   | .125    |
| 9/64  | .140625 |
| 5/32  | .15625  |
| 11/64 | .171875 |
| 3/16  | .1875   |
| 13/64 | .203125 |
| 7/32  | .21875  |
| 15/64 | .234375 |
| 1/4   | .25     |
| 17/64 | .265625 |
| 9/32  | .28125  |
| 19/64 | .296875 |
| 5/16  | .3125   |
| 21/64 | .328125 |
| 11/32 | .34375  |
| 23/64 | .359375 |
| 3/8   | .375    |
| 25/64 | .390625 |
| 13/32 | .40625  |
| 27/64 | .421875 |
| 7/16  | .4375   |
| 26/64 | .453125 |
| 15/32 | .46875  |
| 31/64 | .484375 |
| 1/2   | .5      |
| 33/64 | .515625 |
| 17/32 | .53125  |
| 35/64 | .546875 |
| 9/16  | .5625   |
| 37/64 | .578125 |
| 19/32 | .59375  |
| 39/64 | .609375 |
| 5/8   | .625    |
| 41/64 | .640625 |
| 21/32 | .65625  |
| 43/64 | .671875 |
| 11/16 | .6875   |
| 45/64 | .703125 |
| 23/32 | .71875  |
| 47/64 | .734375 |
| 3/4   | .75     |
| 49/64 | .765625 |
| 25/32 | .78125  |
| 51/64 | .796875 |
| 13/16 | .8125   |
| 53/64 | .828125 |
| 27/32 | .84375  |
| 55/64 | .859375 |
| 7/8   | .875    |
| 57/64 | .890625 |
| 29/32 | .90625  |
| 59/64 | .921875 |
| 15/16 | .9375   |
| 61/64 | .953125 |
| 31/32 | .96875  |
| 63/64 | .984375 |
| 1     | 1.      |

## TECHNICAL INFORMATION

**MACHINE SCREW SIZES & STUD HOLE TABLE**

| SCREW NO. | MAX DIAMETER | HOLE SIZE |
|-----------|--------------|-----------|
| #2        | .0860        | .093      |
| #3        | .0990        | .100      |
| #4        | .1120        | .120      |
| #5        | .1250        | .130      |
| #6        | .1380        | .144      |
| #8        | .1640        | .169      |
| #10       | .1900        | .196      |
| #12       | .2160        | .220      |

**COPPER MEASURING CHART FOR USE WITH MICROMETER**

| 18 Ga.<br>7/26<br>10/28<br>16/30<br>19/.009<br>41/34<br>65/36<br>20/31                                                                                                                            | 20 Ga.<br>7/28<br>10/30<br>16/32<br>20/33<br>26/34<br>41/36 | 21 Ga.<br>7/29<br>7/.0117<br>10/31<br>20/34 | 22 Ga.<br>7/30<br>7/.0092<br>7/.0096<br>8/31<br>10/32<br>14/33<br>16/34<br>26/36 | 23 Ga.<br>7/31<br>8/.008<br>10/33<br>13/34<br>20/36 | 24 Ga.<br>7/32<br>16/36 | 25 Ga.<br>7/34 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------|----------------|
| Sizes:<br>#26-.0159 #28-.0126 #30-.010 #32-.0079 #34-.0063 #36-.0050<br>#27-.0142 #29-.0113 #31-.0089 #33-.0071 #65-.0056<br>ie; 7/26 means 7 strands of number 26 wire which makes 18 gauge wire |                                                             |                                             |                                                                                  |                                                     |                         |                |

**CONDUCTOR**

| AWG | Solid Diameter | STRANDED       |                 | Diameter Over Strand Conductor |
|-----|----------------|----------------|-----------------|--------------------------------|
|     |                | No. of Strands | Dia. of Strands |                                |
| 30  | .010           | 7              | .004            | .014                           |
| 28  | .012           | 7              | .005            | .016                           |
| 26  | .015           | 7              | .006            | .020                           |
| 24  | .200           | 7              | .008            | .025                           |
| 24  |                | 16             | .006            | .025                           |
| 22  | .024           | 7              | .010            | .033                           |
| 20  | .032           | 10             | .010            | .041                           |
| 18  | .040           | 16             | .010            | .052                           |
| 16  | .050           | 19             | .011            | .065                           |
| 14  | .065           | 19             | .014            | .078                           |

| mm  | Inch  |
|-----|-------|
| 0.1 | 0.004 |
| 0.2 | 0.008 |
| 0.3 | 0.012 |
| 0.4 | 0.016 |
| 0.5 | 0.020 |
| 0.6 | 0.024 |
| 0.7 | 0.028 |
| 0.8 | 0.031 |
| 0.9 | 0.035 |
| 1   | 0.039 |
| 1.1 | 0.043 |
| 1.2 | 0.047 |
| 1.3 | 0.051 |
| 1.4 | 0.055 |
| 1.5 | 0.059 |
| 1.6 | 0.063 |
| 1.7 | 0.067 |
| 1.8 | 0.071 |
| 1.9 | 0.075 |
| 2   | 0.079 |
| 2.1 | 0.083 |
| 2.2 | 0.087 |
| 2.3 | 0.091 |
| 2.4 | 0.094 |
| 2.5 | 0.098 |
| 2.6 | 0.102 |
| 2.7 | 0.106 |
| 2.8 | 0.110 |
| 2.9 | 0.114 |
| 3   | 0.118 |



**Aero-Space Southwest, Inc.**  
21450 N. Third Avenue  
Phoenix, AZ 85027

Tel: (800) 289-2779 • Fax: (623) 582-2019  
[www.aerospacesw.com](http://www.aerospacesw.com)



**Bisco Industries, Inc.**  
1500 N. Lakeview Ave  
Anaheim, CA 92807

Tel: (800) 323-1232 • Fax: (714) 876-2410  
[www.biscoind.com](http://www.biscoind.com)



**Electronic Hardware Ltd.**  
13257 Saticoy Street  
North Hollywood, CA 91605

Tel: (818) 982-6100 • Fax: (818) 764-1889  
[www.electronichardware.com](http://www.electronichardware.com)



**Heilind Electronics, Inc.**  
58 Jonspin Road  
Wilmington, MA 01887

Tel: (800) 400-7041 • Fax: (978) 658-0278  
[www.heilind.com](http://www.heilind.com)



**Master Distributors**  
1220 Olympic Blvd.  
Santa Monica, CA 90404

Tel: (310) 452-1229 • Fax: (310) 399-8600  
[www.masterdistributors.com](http://www.masterdistributors.com)



**Genie Group, Inc.**  
300 Beasley Drive  
Franklin, TN 37064

Tel: (615) 771-9412 • Fax: (800) 322-3113  
[www.geniegroup.com](http://www.geniegroup.com)



**Allied Electronics**  
7410 Pebble Drive  
Fort Worth, TX 76118

Tel: (800) 433-5700 • Fax: (817) 595-6444  
[www.alliedelec.com](http://www.alliedelec.com)



**D.B. Roberts Co.**  
18 Terry Avenue  
Burlington, MA 01803

Tel: (800) 800-6887 • Fax: (781) 273-0110  
[www.dbroberts.com](http://www.dbroberts.com)



**Force Electronics, Inc.**  
6701 Katella Ave, Suite 200  
Cypress, CA 90630

Tel: (888) 411-3672 • Fax: (714) 220-1324  
[www.force-elec.com](http://www.force-elec.com)



**Leff Electronic Inc.**  
455 North Center Avenue  
New Stanton, PA 15672

Tel: (724) 925-3001 • Fax: (724) 925-3002  
[www.leff.com](http://www.leff.com)



**Newark InOne**  
4801 N. Ravenswood Ave.  
Chicago, IL 60640-4496

Tel: (800) 463-9275 • Fax: (888) 551-4801  
[www.newarkinone.com](http://www.newarkinone.com)



**Tresco**  
736 Greenway Road, PO Box 1860  
Boone, NC 28607

Tel: (800) 752-8708 • Fax: (828) 264-7204  
[www.tresco.com](http://www.tresco.com)

# **ABBATRON**

## **HH Smith**

632 Arch Street Meadville, PA 16335  
1-888-847-6484 • [www.abbatron.com](http://www.abbatron.com)

Products in this catalog are available through:

