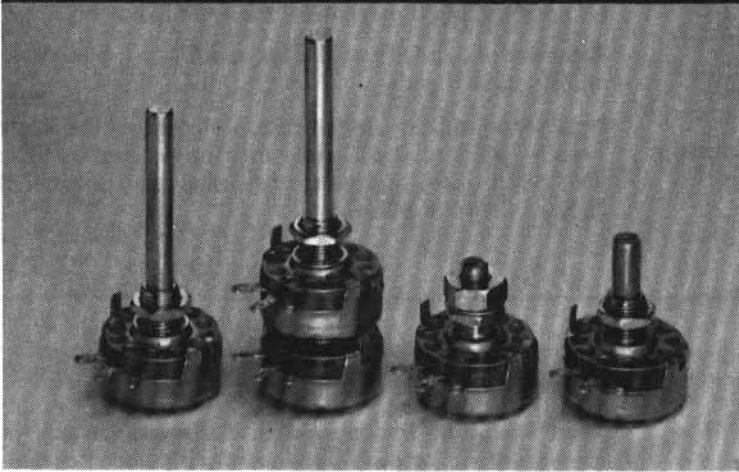


Type J

Hot-Molded Panel Potentiometers



2 Watts

Features

- ~~2.25~~ 2.25 Watts @ 70°C
- 50 Ohms to 5 Megohms
- Multiple Sections/Concentric Shafts
- ~~UL Approved Switches~~
- ~~Styles RV4, 2RV7~~
- Linear and Non-Linear Tapers
- ~~Attenuators~~

Benefits

- High Power Capabilities
- Wide Resistance Range
- ~~Independent Control of Two Circuits~~
- ~~Approved for Switching Primary Power~~
- ~~Meets MIL-R-94 Requirements~~
- Versatility
- Versatility

AVAILABILITY

Groupings

The Type J Hot-Molded Panel Potentiometers are divided into two groups.

OEM standard components—These OEM components (Bushing/Resistance/Taper Combinations and Bushing/Shaft/Taper Combinations (listed in the table on Page 196) are stocked as components at our manufacturing facilities.

They offer a wider range of possible combinations than the distributor stocked potentiometers but do require assembly.

All custom components—All other components listed are available. Since they are not stocked, they require fabrication. Contact factory for information.

SPECIFICATIONS

General

Temperature range – -55°C to $+120^{\circ}\text{C}$.

Total resistance values – 50 ohms to 5.0 megohms.

Total resistance tolerances – $\pm 10\%$ or $\pm 20\%$.

Tapers – Available in the following resistance ranges:

| TAPER | TOTAL RESISTANCE RANGE |
|--------------|-------------------------|
| U | 50 Ohms to 5.0 Megohms |
| A, B, S & DB | 250 Ohms to 5.0 Megohms |

See chart on Page 193 for explanation of tapers. Special tapers, where practical, can be supplied.

End resistance – See chart on Page 193.

Switches – Single pole, single throw snap switch that “closes at start of clockwise rotation”. Underwriter rating 2 amperes 125 volts RMS 60 Hertz. Underwriter Laboratories approval file number E-10392. Also rated 10 amperes 10 volts direct current noninductive. Meets 3 ampere 117 volts MIL-R-94 specification. Switches can be operated 5000 mechanical cycles at full rating.

Attenuators – See Page 192 for L, Bridged-T, Straight-T and Bridged-H pads.

Applicable military specification – Many of the single variable resistors listed herein may be ordered as Style RV4 of MIL-R-94; and many of the duals may be ordered as Style 2RV7 of MIL-R-94.

Electrical

Power – ~~2.5~~² watts maximum at $+70^{\circ}\text{C}$ (single resistors only) provided voltage rating is not exceeded.

Power derating – Derate power linearly from $+70^{\circ}\text{C}$ to zero at $+120^{\circ}\text{C}$. Derate 50 percent for non-metallic mounting and for resistors with “A,” “B,” “S,” and “DB” tapers. For rheostat applications see Page 193.

For derating of Dual and Triple resistors refer to Page 193.

Voltage – 500 volts maximum working voltage (RMS or DC), or as determined by $E_{\text{max}} = \sqrt{PR}$, whichever is less (at sea level).

Dielectric withstanding voltage – Maximum continuous voltage 500 volts RMS at sea level, 300 volts RMS at 3.4 inches (86,36 mm) mercury. Will withstand a one second

test of 1000 volts RMS at sea level or 500 volts RMS at 3.4 inches (86,36 mm) mercury.

Taps – Single or multiple electrical taps are available at 35 percent ± 3 percent, 50 percent ± 3 percent, or 65 percent ± 3 percent of mechanical rotation. Unless otherwise specified, low series tap resistance is provided. See dimensions on Page 200 for tap terminal locations. Consult factory for other available taps.

Capacitance – See Page 193 for explanation.

Operational

Load life – 10 percent maximum change in total resistance as a result of a 1000 hour test at rated power across entire element in still air at $+70^{\circ}\text{C}$ (1.5 hours “ON”, 0.5 hour “OFF”).

Rotational life – 10 percent maximum change in total resistance as a result of a 100,000 mechanical cycle life test without load (single section resistors only).

Mechanical

Shafts – Diameter of single or outer concentric shaft 0.250 inch (6,35mm); diameter of inner concentric shafts 0.125 inch (3,17mm). Minimum length 0.125 inch (3,17mm) longer than bushing. Maximum length 6.000 inches (152,40mm).

Lengths available in 1/64 inch (0,40mm) increments. All shaft lengths are measured from the mounting surface of the resistor to the free end of the shaft with plain, screw-driver slotted, or flatted shaft endings available. Special shaft endings can be supplied.

Bushings – All bushings have a 32-NEF-2A thread and are .375 inch (9,52mm) in diameter.

All bushing lengths are measured from the mounting surface.

Standard locking bushings will prevent shaft rotation with torques up to 40 inch-ounces (2,88 kgf-cm) after lock nuts have been tightened with a torque of 10 inch pounds (11,52 kgf-cm).

Hardware – Resistors are normally supplied with one mounting nut, M-2786, and one internal tooth lock washer, M-2898. Resistors with standard locking bushings are normally supplied with one lock nut, B-13750, in addition to the above. Standard locking bushings with MAXIMUM shaft extension of .125 inch (3,18 mm) beyond the bushing can be supplied with acorn lock nut, M-3296, instead of lock nut, B-13750. Unless otherwise specified, all hardware shipped in bulk. For hardware dimensions see Page 200.

Mechanical (continued)

Locating lugs – Two locating lugs are available so resistors may be indexed with respect to the surface on which they are mounted. Lug option 1 standard. See dimensions on Page 200.

Turning torque – at +25°C minimum torque 1 inch-ounce (0,07 kgf-cm). Maximum torque as follows:

Single – 6 inch-ounces (0,43 kgf-cm)

Dual – 12 inch-ounces (0,86 kgf-cm)

Dual concentric types have a maximum torque of 6 inch-ounces (0,43 kgf-cm) on each shaft. Triple concentric types have a maximum torque of 6 inch-ounces (0,43 kgf-cm) on the outer shaft and 12 inch-ounces (0,86 kgf-cm) on the inner shaft. Immersion sealed types require an additional torque up to 6 inch-ounces (0,43 kgf-cm). Maximum additional torque required to actuate switch is 15 inch-ounces (1,08 kgf-cm).

Stop torque – 12 inch-pounds (13,82 kgf-cm) minimum.

Immersion (Immersion sealed types only) – No continuous stream of bubbles (4 or more) emanating from the resistor as a result of the immersion test (1 minute in water at +85°C).

Rotation – Mechanical rotation without switch is 312° ± 3°; with switch 333° ± 3°. Electrical rotation is 292° nominal.

Backlash – Maximum backlash: single resistors ± 1½°, dual resistors ± 3°, triple resistors ± 6°.

Construction – Materials are essentially non-magnetic; terminals are treated for easy soldering.

~~Immersion sealed types, commonly referred to as “water-tight”, are optional. These immersion sealed types incorporate an internal “O” ring between the shaft and bushing. External surfaces are given special treatment so that the entire resistor is immersion sealed. This feature is not available when concentric shafts or switches are required.~~

~~A panel watertight bushing is also optional. This option is provided with an external “O” ring plus the features of the immersion sealed type. This feature is not available when concentric shafts are required. When furnished with a switch the assembly is not immersion sealed.~~

Marking – Clarostat part number and nominal total resistance are marked in two lines. Other marking possible, limited to maximum of 13 characters in each of two lines. “Type J” always included.

Environmental

Vibration – 2 percent maximum total resistance change and 5 percent maximum resistance setting change. (Single and dual resistors tested per method 204, condition “C” of MIL-STD-202. Triple resistors tested per method 204, condition “A” of MIL-STD-202.)

Shock – 2 percent maximum total resistance change and 5 percent maximum resistance setting change. (Single and dual resistors tested per method 213, condition “I” of MIL-STD-202. Triple resistors tested per method 213, condition “G” of MIL-STD-202.)

Moisture resistance – 10 percent maximum total resistance change. (Tested per method 106 of MIL-STD-202. Resistors with solid shafts only.)

Corrosion resistance – Tested per Method 101 of MIL-STD-202.

Effect of soldering – 2 percent maximum change in total resistance as a result of immersing the terminals in 350°C solder to within 0.125 inch (3,18 mm) of the resistor body for 5 seconds.

Temperature cycling – 3 percent maximum change in total resistance as a result of the temperature cycling test (five cycles –55°C to +120°C).

Low temperature operation – 3 percent maximum change in total resistance as a result of the low temperature operation test (–55°C for two hours without load and 45 minutes with rated load).

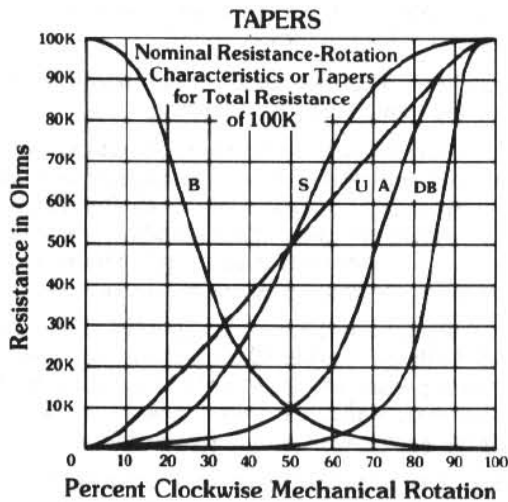
Low temperature storage – 2 percent maximum change in total resistance as a result of the storage test (24 hours at –63°C).

Temperature characteristics – Maximum percent temporary total resistance change from the +25°C value. See table below.

| Nominal Resistance | Degrees Celsius — “U” Linear Taper | | | | | | |
|--------------------|------------------------------------|-------|-------|-------|-------|-------|--------|
| | – 55° | – 25° | 0° | + 25° | + 55° | + 85° | + 120° |
| 100 Ohms | + 4.5 | + 2.5 | + 1.5 | 0 | ± 1.0 | ± 1.5 | + 3.5 |
| 1,000 Ohms | + 5.5 | + 3.0 | + 1.5 | 0 | ± 1.0 | ± 2.0 | + 4.5 |
| 10,000 Ohms | + 7.0 | + 3.5 | + 2.0 | 0 | ± 1.0 | ± 2.5 | + 5.5 |
| 100,000 Ohms | + 8.0 | + 4.0 | + 2.0 | 0 | ± 1.5 | ± 3.0 | + 6.0 |
| 1 Megohm | + 10.0 | + 5.0 | + 2.5 | 0 | ± 1.5 | ± 3.5 | + 7.5 |

For “S,” “A,” “B” and “DB” tapers multiply percentage figures shown above by 1.25.

Taper Data



Tapers A, DB, S and U are measured between the wiper and the counter-clockwise terminals; taper B is measured between the wiper and the clockwise terminals.

END RESISTANCE

| TAPER | MINIMUM RESISTANCE BETWEEN TERMINALS 1 and 2 | MINIMUM RESISTANCE BETWEEN TERMINALS 2 and 3 |
|-------|--|--|
| U & S | 1 | 1 |
| A | 1 | 2 |
| B | 2 | 1 |
| DB | 2 | 2 |

- 1 Less than .004% of total resistance, or less than 4 ohms, whichever is greater.
- 2 Less than 1% of total resistance, or less than 4 ohms, whichever is greater.
- 3 Less than 4 ohms.

Additional Ratings

Multiple resistor power derating — The permissible power dissipation in one resistor element is a function of the power dissipation in the other elements. Maximum continuous power rating in watts with entire resistor elements in the circuit are as follows:

$$\left(\frac{W_1}{2.25}\right)^2 + \left(\frac{W_2}{1.8}\right)^2 + \left(\frac{W_3}{1.8}\right)^2 = 1 \text{ (Maximum)}$$

Where W_1 = Watts in entire first or panel resistor element
 W_2 = Watts in entire second or middle resistor element.
 W_3 = Watts in entire third or rear resistor element.

| | First or Panel Resistor Element W_1 | Second or Middle Resistor Element W_2 | Third or Rear Resistor Element W_3 |
|----------------|---------------------------------------|---|--------------------------------------|
| DUAL SECTION | 2.25 Watts | 0 Watt | — |
| | 2.00 Watts | 0.83 Watt | — |
| | 1.75 Watts | 1.13 Watts | — |
| | 1.50 Watts | 1.34 Watts | — |
| | 1.25 Watts | 1.49 Watts | — |
| | 1.00 Watts | 1.61 Watts | — |
| | 0.75 Watts | 1.70 Watts | — |
| | 0.50 Watts | 1.76 Watts | — |
| | 0.25 Watts | 1.79 Watts | — |
| | 0 Watt | 1.80 Watts | — |
| TRIPLE SECTION | 2.0 Watts | 0.5 Watt | 0.65 Watt |
| | 1.5 Watts | 1.0 Watt | 0.89 Watt |
| | 1.5 Watts | 0.5 Watt | 1.24 Watts |
| | 1.0 Watt | 1.5 Watts | 0.59 Watt |
| | 1.0 Watt | 1.0 Watt | 1.27 Watts |
| | 1.0 Watt | 0.5 Watt | 1.53 Watts |
| | 0.5 Watt | 1.5 Watts | 0.90 Watt |
| | 0.5 Watt | 1.0 Watt | 1.44 Watts |
| 0.5 Watt | 0.5 Watt | 1.68 Watts | |

Derating with respect to rotation — rheostat application

| Percent Rotation | Multiply Wattage Rating By | Percent Rotation | Multiply Wattage Rating By |
|------------------|----------------------------|------------------|----------------------------|
| 100 | 1.00 | 40 | 0.81 |
| 90 | 0.99 | 30 | 0.68 |
| 80 | 0.98 | 20 | 0.49 |
| 70 | 0.96 | 10 | 0.23 |
| 60 | 0.93 | 0 | 0.11 |
| 50 | 0.89 | | |

Capacitance — The capacitance between terminals #1 and #3 with terminal #2 "floating" is approximately 2 to 3 pF at 1 KHz.

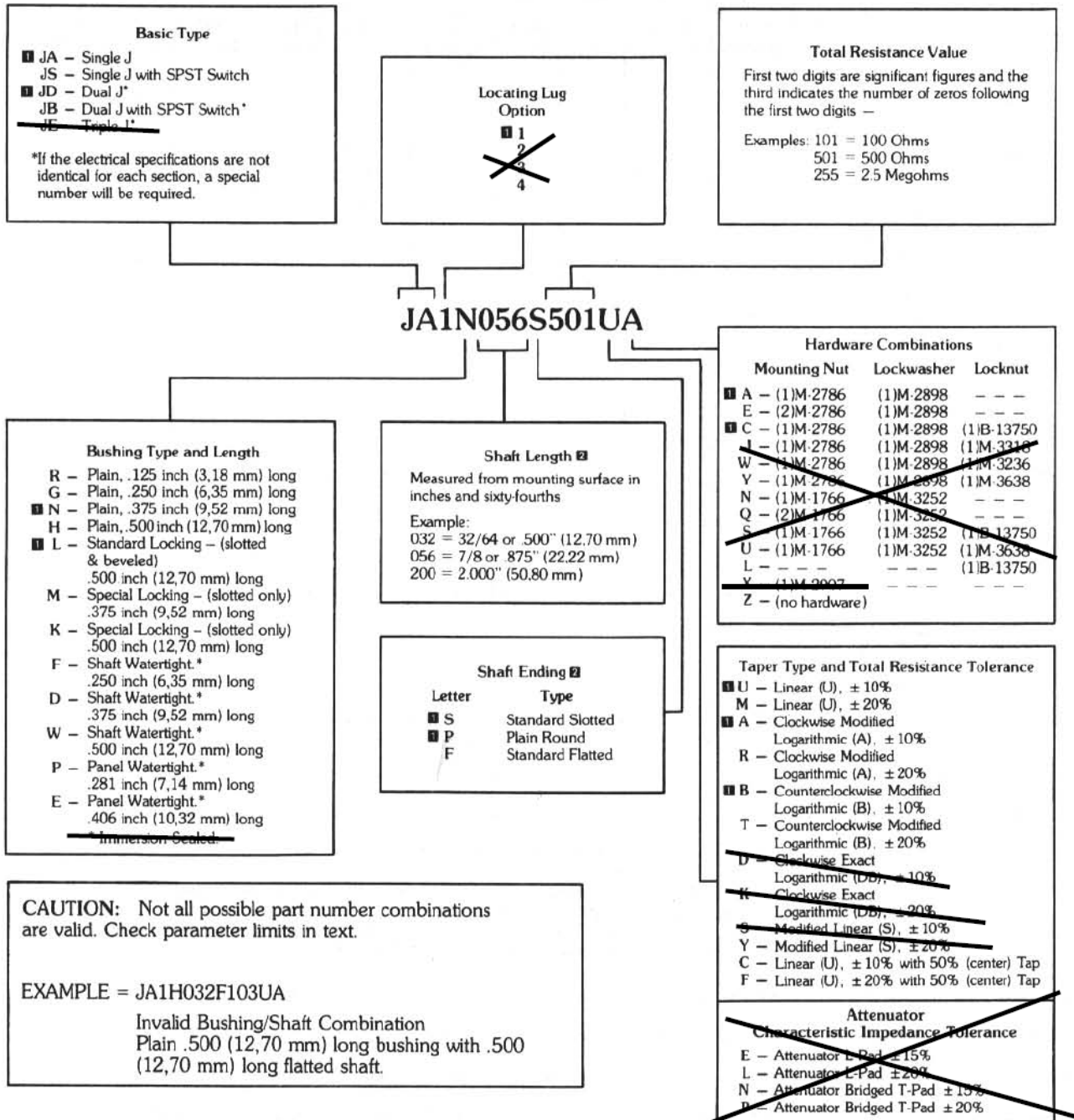
The capacitance between terminal #1 (grounded to bushing) and terminal #3 (shaft in extreme clockwise position) is approximately 10 to 12 pF at 1 KHz.

The capacitance between all terminals shorted together and the bushing is approximately 15 to 20 pF at 1 KHz.

In all cases capacitance indicated is for the potentiometer only and does not include capacitance of connecting wires.

Hot-Molded Panel Potentiometers







Explanation of Part Numbers



~~■ THESE CONFIGURATIONS ARE AVAILABLE AS A SPECIAL ORDER ONLY.~~

~~■ CONCENTRIC AND SPECIAL SHAFTS REQUIRE SPECIAL PART NUMBERS ISSUED BY THE FACTORY.~~

Available Catalog Order Number Values

| Taper | | "U" Linear | | | | | | | Non-Linear | | | |
|-------------------------|--|------------|---|---|-----------|-----------|---|-----------|--|---|-----------|-----------|
| | | | | | | | | | "A" | "B" | | |
| Basic Type | | Single J | | | | | | | Dual J  | Single J | | |
| Bushings Length, Inches | | 1/4 | 1/2 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 |
| Bushings Type | | Plain | Lock. | Plain | Plain | Plain | Plain | Plain | Plain | Plain | Plain | Plain |
| Shaft Length, Inches | | 5/8 | 5/8 | 1/2 | 5/8 | 3/4 | 7/8 | 2 | 2 | 7/8 | 2 | 2 |
| Shaft Ending | | Slot. | Slot. | Slot. | Slot. | Slot. | Slot. | Plain | Plain | Slot. | Plain | Plain |
| Resistance (ohms) | Code  | JA1G 040S | JA1L  040S | JA1N  032S | JA1N 040S | JA1N 048S | JA1N  056S | JA1N 200P | JD1N 200P | JA1N  056S | JA1N 200P | JA1N 200P |
| 100 | 101 | — | — | — | — | — | — | — | — | * | * | * |
| 1,000 | 102 | — | — | — | — | — | — | — | — | — | — | — |
| 10,000 | 103 | — | — | — | — | — | — | — | — | — | — | — |
| 100,000 | 104 | — | — | — | — | — | — | — | — | — | — | — |
| 1,000,000 | 105 | — | — | — | — | — | — | — | — | — | — | — |
| 150 | 151 | — | — | — | — | — | — | — | — | * | * | * |
| 1,500 | 152 | — | — | — | — | — | — | — | — | — | — | — |
| 15,000 | 153 | — | — | — | — | — | — | — | — | — | — | — |
| 150,000 | 154 | — | — | — | — | — | — | — | — | — | — | — |
| 200 | 201 | — | — | — | — | — | — | — | — | * | * | * |
| 2,000 | 202 | — | — | — | — | — | — | — | — | — | — | — |
| 20,000 | 203 | — | — | — | — | — | — | — | — | — | — | — |
| 200,000 | 204 | — | — | — | — | — | — | — | — | — | — | — |
| 2,000,000 | 205 | — | — | — | — | — | — | — | — | — | — | — |
| 250 | 251 | — | — | — | — | — | — | — | — | — | — | — |
| 2,500 | 252 | — | — | — | — | — | — | — | — | — | — | — |
| 25,000 | 253 | — | — | — | — | — | — | — | — | — | — | — |
| 250,000 | 254 | — | — | — | — | — | — | — | — | — | — | — |
| 2,500,000 | 255 | — | — | — | — | — | — | — | — | — | — | — |
| 350 | 351 | — | — | — | — | — | — | — | — | — | — | — |
| 3,500 | 352 | — | — | — | — | — | — | — | — | — | — | — |
| 35,000 | 353 | — | — | — | — | — | — | — | — | — | — | — |
| 350,000 | 354 | — | — | — | — | — | — | — | — | — | — | — |
| 3,500,000 | 355 | — | — | — | — | — | — | — | — | — | — | — |
| 50 | 500 | — | — | — | — | — | — | — | — | — | * | * |
| 500 | 501 | — | — | — | — | — | — | — | — | — | — | — |
| 5,000 | 502 | — | — | — | — | — | — | — | — | — | — | — |
| 50,000 | 503 | — | — | — | — | — | — | — | — | — | — | — |
| 500,000 | 504 | — | — | — | — | — | — | — | — | — | — | — |
| 5,000,000 | 505 | — | — | — | — | — | — | — | — | — | — | — |
| 750 | 751 | — | — | — | — | — | — | — | — | — | — | — |
| 7,500 | 752 | — | — | — | — | — | — | — | — | — | — | — |
| 75,000 | 753 | — | — | — | — | — | — | — | — | — | — | — |
| 750,000 | 754 | — | — | — | — | — | — | — | — | — | — | — |

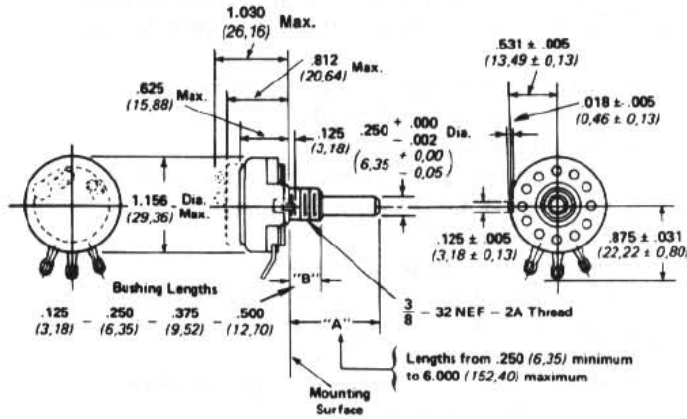
- 1 Dual J potentiometers have the same resistance value and taper in each element.
- 2 "Code" as listed in the table above represents the Clarostat potentiometer part number in three segments. The listings in the horizontal row to the right of the "Code" heading are the prefix. The listings in the vertical column below the "Code" heading are the middle segment. The letter representing the taper, listed in the top horizontal row, is the suffix. All three segments must be added together to form a part number. Refer to Page 194 for additional Explanation of Part Numbers.
- 3 For the Style RV4 Military Version add the desired ohmic code number to RV4IAYSA--A in place of the dashes.
- 4 For the Style RV4 Military Version add the desired ohmic code number to RV4NAYSB--A in place of the dashes.
- 5 For the Style RV4 Military Version add the desired ohmic code number to RV4NAYS--A in place of the dashes.
- 6 For the Style RV4 Military Version add the desired ohmic code number to RV4NAYSB--C in place of the dashes.

— = Available as a Special Order only. Contact factory for information.
 * = Not Available.

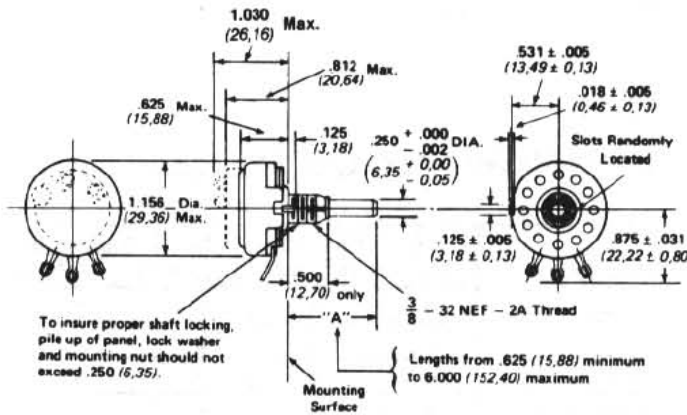
DIMENSIONS

FOR REFERENCE ONLY

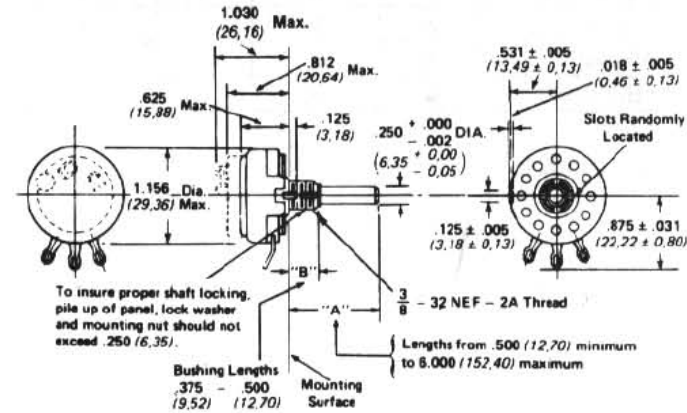
Single Section Resistors



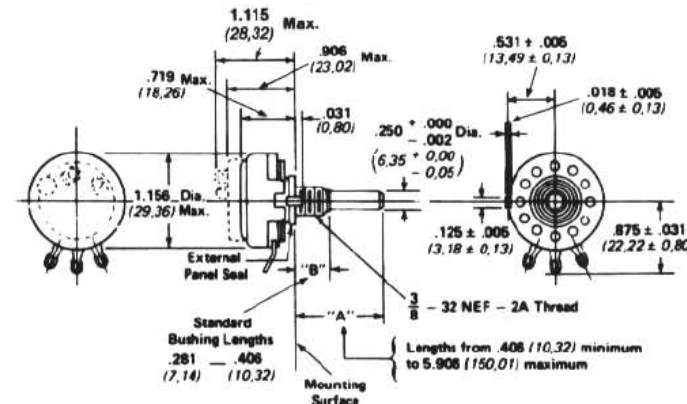
With or Without Switch
Plain Shaft Ending
With Plain bushing or Shaft Watertight Bushing



With or Without Switch
Plain Shaft Ending
With Standard Locking Bushing



With or Without Switch
Plain Shaft Ending
With Special Locking Bushing
(For Use with Jam Nut M-3638)



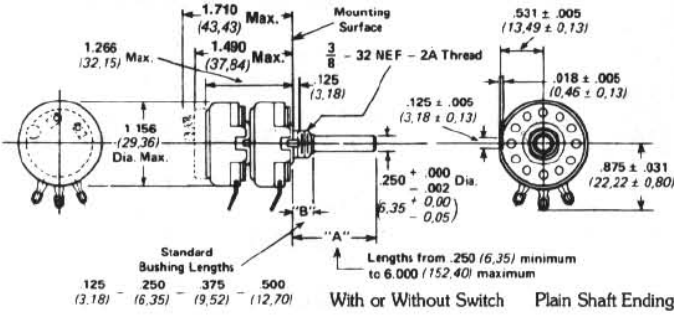
With or Without Switch
Plain Shaft Ending
With Panel Watertight Bushing

DIMENSIONS

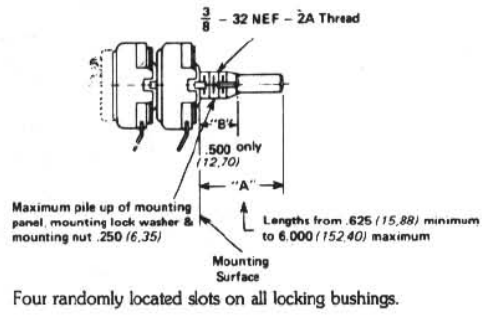
FOR REFERENCE ONLY

Dual Section Resistors

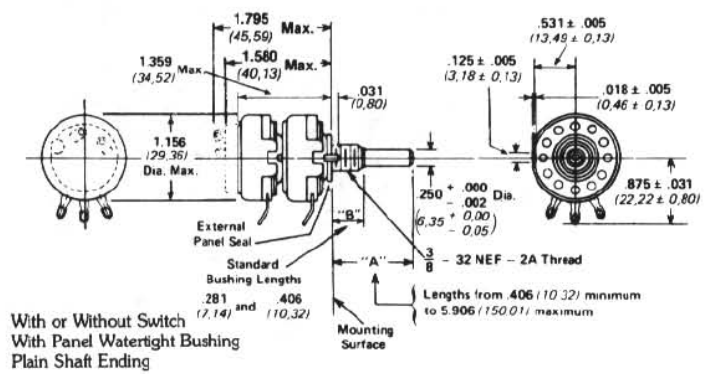
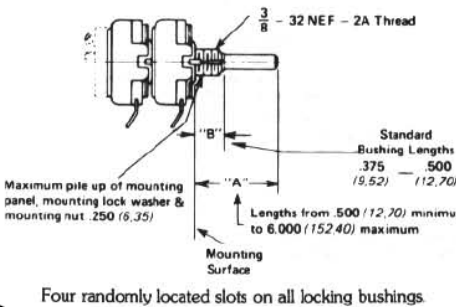
Plain or Shaft Watertight Bushing



Standard Locking Bushing



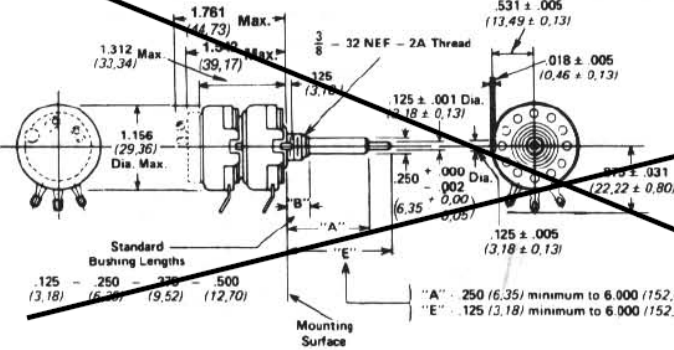
**Special Locking Bushing
(For Use with Jam Nut M-3638)**



Four randomly located slots on all locking bushings.

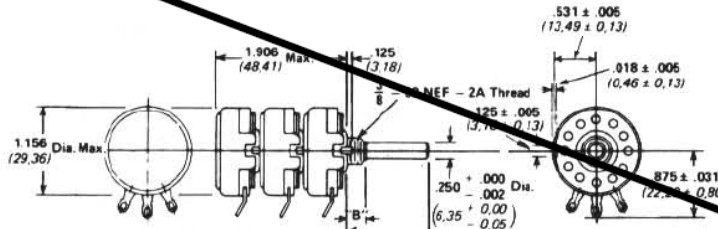
With or Without Switch
With Panel Watertight Bushing
Plain Shaft Ending

With or Without Switch
Separate concentric Shafts for Independent Operation of Each Resistor
Outer Shaft Operates Panel Section
Inner Shaft Operates Switch and Rear Section
Plain Shaft Ending

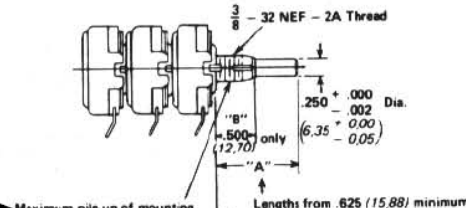


Triple Section Resistors

Plain or Shaft Watertight Bushing



Standard Locking Bushing

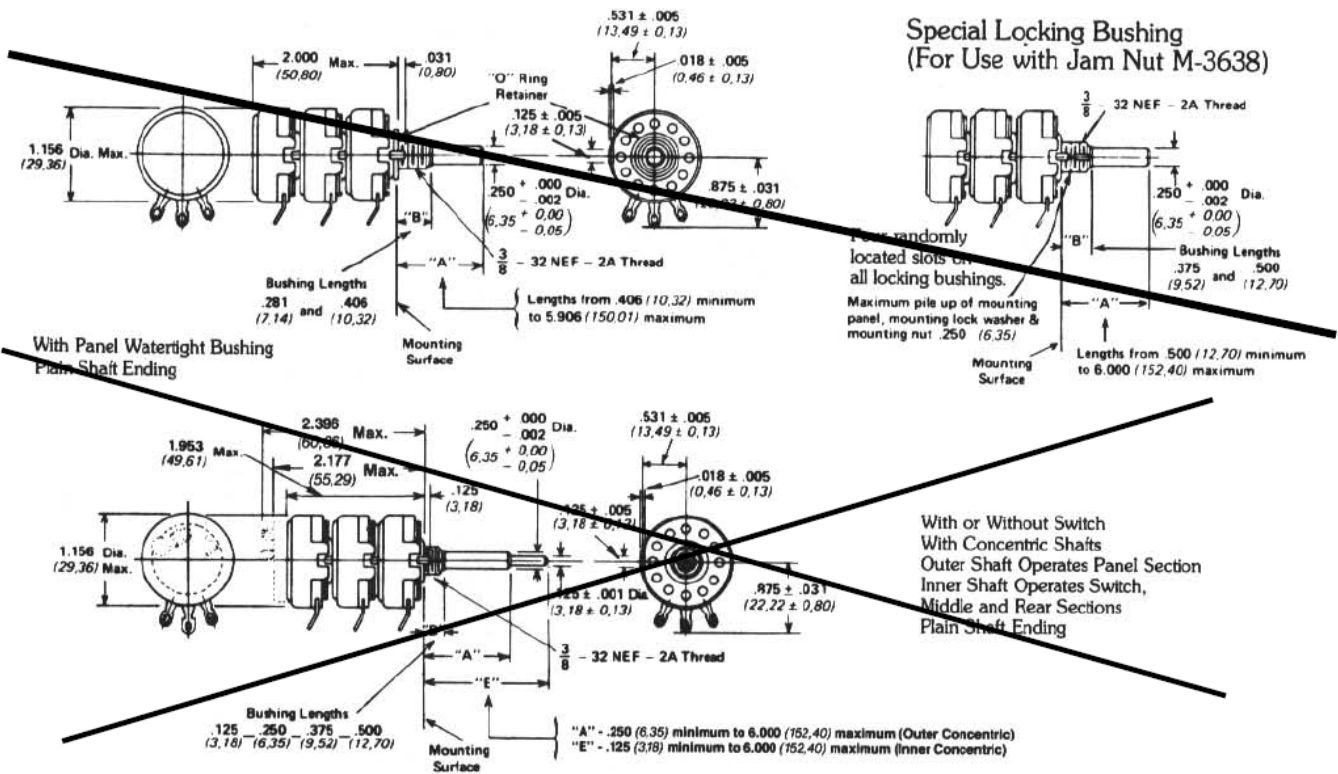


Maximum pile up of mounting panel, mounting lock washer & mounting nut .250 (6.35) Lengths from .625 (15.88) minimum to 6.000 (152.40) maximum

DIMENSIONS

FOR REFERENCE ONLY

Triple Section Resistors

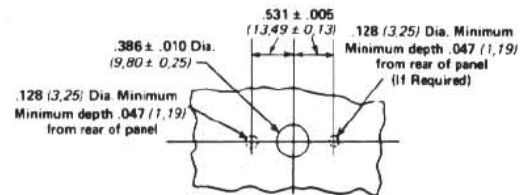
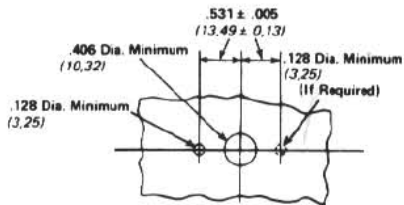


DIMENSIONS COMMON TO ALL UNITS

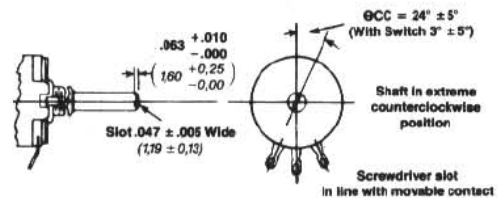
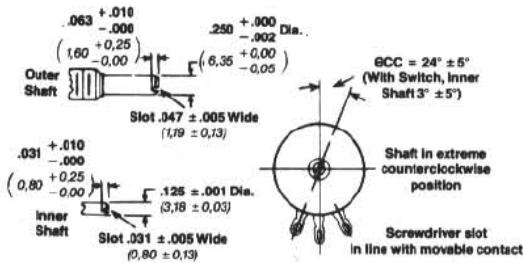
Basic dimensions in inches.
Dimensions shown in parentheses are in millimeters.

TOLERANCES
Dimensional tolerance ±.016 (0,40)
Angular tolerance ±5°
Except as specified.
NOT TO SCALE

Mounting Holes



Standard Slotted Shaft Ending

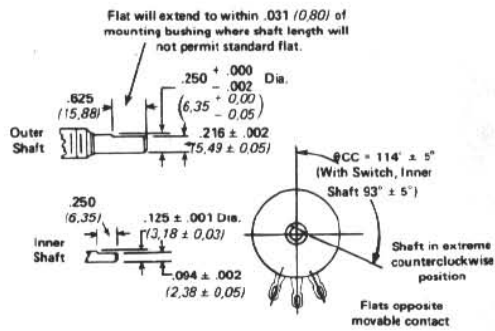


All .250 (6,35) diameter shafts supplied with maximum chamfer .031 (0,80) x 45° at the shaft end.
All .125 (3,18) diameter shafts supplied with maximum chamfer .016 (0,40) x 45° at the shaft end.

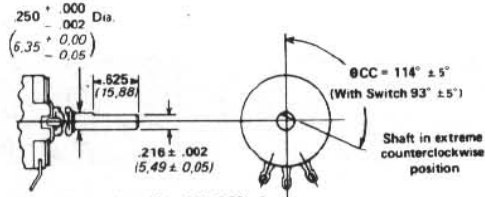
DIMENSIONS COMMON TO ALL UNITS

FOR REFERENCE ONLY

Standard Flatted Shaft Ending



Dimensions for resistors with concentric shafts.



Flat will extend to within .031 (0.80) of mounting bushing where shaft length will not permit standard flat.

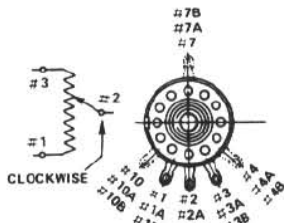
Flat opposite movable contact

Dimensions for resistors with solid shafts.

All .250 (6,35) diameter shafts supplied with maximum chamfer .031 (0,80) x 45° at the shaft end.

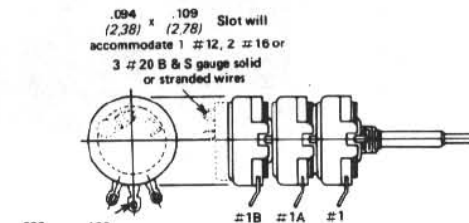
All .125 (3,18) diameter shafts supplied with maximum chamfer .016 (0,40) x 45° at the shaft end.

Terminal Connections to Resistance Elements



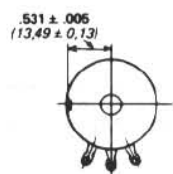
- #1 Extreme Counterclockwise End
- #2 Movable Contact Brush
- #3 Extreme Clockwise End
- #4 Tap 65% Effective or Special Between 50% and 100%

- #7 Tap 50% Effective Clockwise
- #10 Tap 35% Effective Clockwise or Special Between 0 and 50%
- Tap Location Tolerances ± 3%

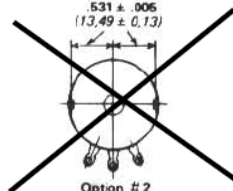


- #1B #1A #1
- #2B #2A #2
- #3B #3A #3
- #7B #7A #7
- #10B #10A #10

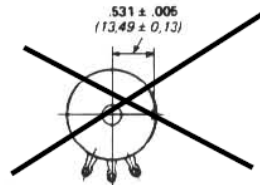
Locating Lug Options



Option #1
Standard Locating Lug
(Used Unless Otherwise Specified)



Option #2



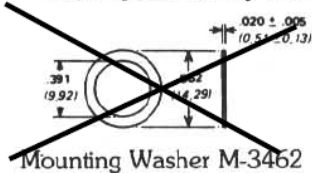
Option #3



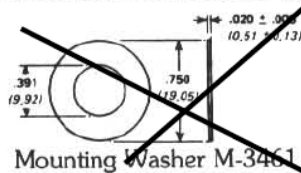
Option #4

Mounting Hardware

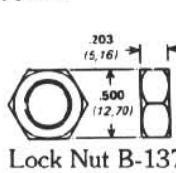
When specified, any of the hardware illustrated can be supplied.



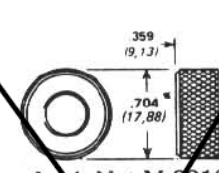
Mounting Washer M-3462



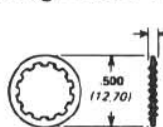
Mounting Washer M-3461



Lock Nut B-13750



Lock Nut M-7318



Lock Washer M-2898



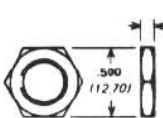
Lock Washer M-3252



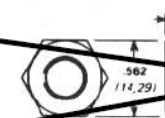
Jam Lock Nut M-3638



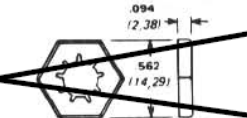
Acorn Lock Nut M-3236



Mounting Nut M-2786



Mounting Nut M-1766



Pal Nut M-2907