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# VARIABLE CAPACITORS

Electronic Accuracy through Mechanical Precision



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WELLINGTON

REC. - 8 MAY 1985

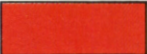
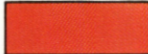
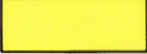
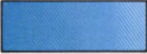
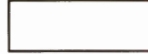
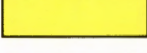
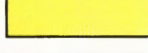
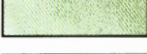
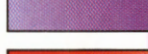
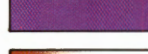
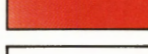
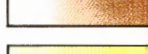
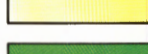
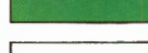
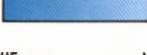
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# VARIABLE CAPACITORS

Electronic Accuracy through Mechanical Precision

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HF 3 to 30 MHz      VHF 30 to 300 MHz      L UHF 300 to 3000 MHz      S      C      X SHF 3 to 30 GHz      K      Q V W EHF 30 TO 300 GHz



# Contents

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| TUNING TOOLS, TAPS & HARDWARE .....                           | 20       | HF<br>3 to 30<br>MHz | VHF<br>30 to 300<br>MHz | L<br>UHF<br>300 to 3000<br>MHz | S<br>C     | X<br>SHF<br>3 to 30<br>GHz |
| PROTOTYPING KITS, CARE & HANDLING .....                       | 21       |                      |                         |                                | K<br>Q V W | EHF<br>30 TO 300<br>GHz    |



Corporate headquarters and expanded manufacturing facilities in Boonton, New Jersey



For nearly 4 decades the name Johanson has been synonymous with leadership in the design and manufacture of high quality variable capacitors. Electronic engineers have looked to Johanson for the know-how to solve their critical application problems. We are proud to introduce in this catalog our most recent state of the art products: the MICROWAVE DIODE HOLDER, designed to relax costly mechanical tolerances while securing and tuning microwave diodes into precise attitudes for optimum circuit performance, the "high hat" SEAL-TRIM® tailor-made for automatic tuning, and the NON-MAGNETIC air capacitor for medical electronics and other magnetically sensitive applications.

When you specify Johanson, you are specifying the finest variable capacitors made.



## High Reliability



....THE INDUSTRY STANDARD OF EXCELLENCE.

When required by aerospace and defense contracts, Johanson capacitors are available in high reliability configurations. Inspection and testing of high reliability capacitors are conducted in our in-house test laboratory. To order high reliability units, add an "R" prefix letter to the standard Johanson part number.

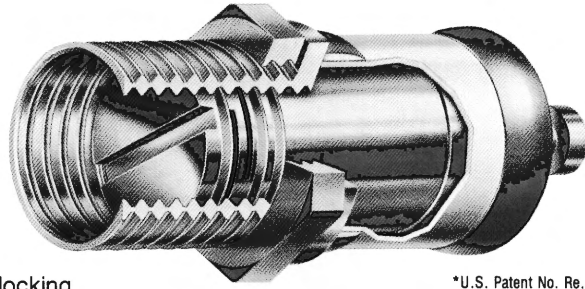
Electronic Accuracy through Mechanical Precision

# Air Dielectric Variable Capacitors



## description

**STANDARD** variable air capacitors are designed specifically for RF applications, VHF through microwave, and have become the industry standard of excellence. High Q and temperature stability are a result of proper attention to geometry and choice of optimum materials. The heart of this trimmer is the one piece self-locking constant torque drive mechanism\* illustrated above. This mechanism utilizes transverse slots to create a spring effect between two threaded sections resulting in substantial contact areas which insure uniform torque, high Q and low dynamic tuning noise.



\*U.S. Patent No. Re. 30,406

**MINIATURE** variable air capacitors offer an even further size reduction of the standard air capacitors coupled with finer tuning resolution and ultra high Q making them ideal for use in microwave circuits.

Both standard and miniature capacitors are available in vertical mounting configurations which save board space and allow top tuning. **VERTICAL MOUNT** capacitors are available in single, dual and low inductance leads with upright or inverted tuning.

**EXTENDED RANGE** capacitors are available in the 5200, 5700 and 5800 series. Normally used in applications where space is at a premium they offer high volumetric efficiency with smaller physical dimensions than standard units per given capacitance range.

Keeping pace with the growth of medical electronics, Johanson also produces **NON-MAGNETIC** air capacitors for low magnetic signature applications.

Where **HIGH VOLTAGE** is a requirement, the 5300 series air capacitors are an excellent replacement for comparable range glass capacitors. Utilizing the basic design of the standard air capacitor, these units offer the same advantages plus a 500 VDC rating.

High Reliability versions are available on special order; to order add an "R" prefix letter to the standard Johanson part number.

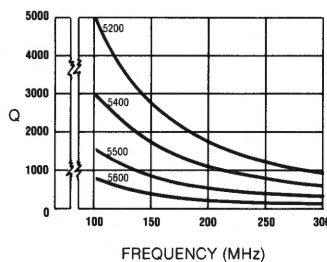
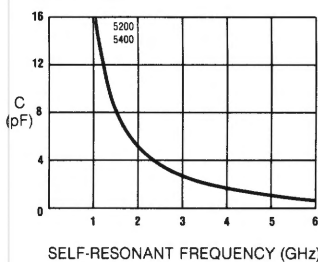
## applications

■ RF Amplifiers and Oscillators ■ Impedance matching ■ Filter tuning ■ Crystal trimming ■ Interstage coupling

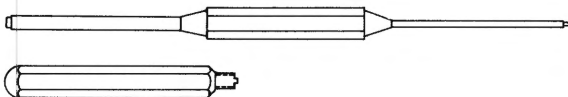
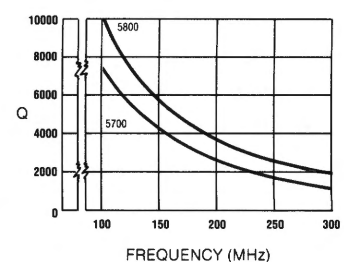
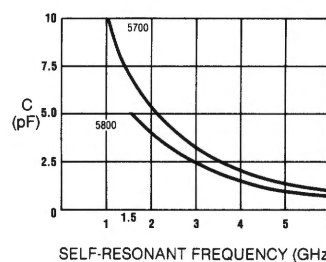
## characteristics

- Rated Voltage 250 VDC (5300 series 500 VDC)
- Torque 5200, 5400, 5500 & 5600 series 1 to 5 oz. in., 5700 series .4 to 4 oz. in., 5800 series .3 to 3 oz. in. & 5300 series 1 to 6 oz. in.
- Insulation Resistance  $>10^8$  Meg  $\Omega$  @ 500VDC
- Contact Resistance  $<.01\Omega$
- Self-Resonant Frequency to  $>5$  GHz (5700 & 5800 series to  $>6$  GHz)
- Vibration 60 g, 10-2000 Hz
- Shock 1500 g, 0.5 milliseconds
- MIL-C-14409 qualified
- 574°F solder used in construction
- Operating temperature  $-65^\circ\text{C}$  to  $+125^\circ\text{C}$

STANDARD AIR DATA



MINIATURE AIR DATA



JMC Tuning Tool 8777

JMC Mounting Tool 4956 — for 5700 series  
4958 — for 5800 series

## STANDARD pF RANGES & ACTUAL SIZES

**5200  
SERIES**  
.8 to 10pF



**5400  
SERIES**  
1 to 14pF  
1 to 16pF



**5500  
SERIES**  
1 to 20pF



**5600  
SERIES**  
1 to 30pF



**5700  
SERIES**  
.6 to 6pF  
.8 to 10pF



**5800  
SERIES**  
.35 to 3.5pF  
.5 to 5pF



**5300  
SERIES**  
1 to 10pF



STANDARD

MINIATURE

HIGH  
VOLTAGE

## STANDARD MOUNTING CONFIGURATIONS

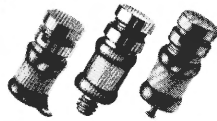


FIGURE  
1

LUG  
THREADED  
STUD

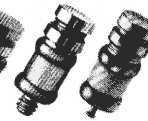


FIGURE  
2



FIGURE  
3



FIGURE  
4



FIGURE  
5



FIGURE  
6



FIGURE  
7



FIGURE  
8



FIGURE  
9



FIGURE  
10

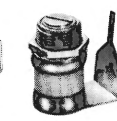


FIGURE  
11



FIGURE  
12



FIGURE  
13

LUG  
THREADED  
STUD

P.C.

VERTICAL

## STANDARD AIR CAPACITORS

| JMC P/N<br>MIL SPEC      | RANGE<br>pF             | FIGURE<br>#             | TC<br>PPM/°C | MIN. Q @<br>100 MHz | DIMENSIONS (INCHES) |     |     |     |         |  |
|--------------------------|-------------------------|-------------------------|--------------|---------------------|---------------------|-----|-----|-----|---------|--|
|                          |                         |                         |              |                     | A                   | B   | C   | D   | E       |  |
| <b>5200</b><br>PC25J100  | .8 to 10<br>>6<br>TURNS | 1<br>(LUG)              | 0 ± 15       | 5000                | .30                 | .21 | .06 | .08 | .09     |  |
| <b>5400</b><br>PC25J140  | 1 to 14<br>>6<br>TURNS  |                         | 0 ± 25       | 3000                | .30                 | .21 | .06 | .08 | .09     |  |
| <b>5500</b><br>PC25J200  | 1 to 20<br>>12<br>TURNS |                         | 0 ± 30       | 1500                | .49                 | .25 | .06 | .08 | .09     |  |
| <b>5600</b>              | 1 to 30<br>>20<br>TURNS |                         | 0 ± 30       | 800                 | .68                 | .25 | .06 | .08 | .09     |  |
| <b>5257</b>              | .8 to 10<br>>6<br>TURNS | 2<br>(THREADED<br>STUD) | 0 ± 15       | 5000                | .29                 | .21 | .19 | .08 | .112-40 |  |
| <b>5459</b>              | 1 to 14<br>>6<br>TURNS  |                         | 0 ± 20       | 3000                | .28                 | .21 | .19 | .08 | .086-56 |  |
| <b>5558</b>              | 1 to 20<br>>12<br>TURNS |                         | 0 ± 50       | 1500                | .49                 | .25 | .19 | .08 | .086-56 |  |
| <b>5606</b>              | 1 to 30<br>>20<br>TURNS |                         | 0 ± 30       | 800                 | .68                 | .25 | .19 | .08 | .112-40 |  |
| <b>5201</b><br>*PC26T100 | .8 to 10<br>>6<br>TURNS | 5<br>(P.C.)             | 0 ± 15       | 5000                | .31                 | .19 | .31 | .08 | .29     |  |
| <b>5401</b><br>*PC26T140 | 1 to 14<br>>6<br>TURNS  |                         | 0 ± 25       | 3000                | .31                 | .19 | .50 | .08 | .29     |  |
| <b>5501</b><br>*PC26T200 | 1 to 20<br>>12<br>TURNS |                         | 0 ± 30       | 1500                | .58                 | .16 | .50 | .08 | .55     |  |

\* CONSULT FACTORY FOR DETAILS.

JOHANSON MANUFACTURING CORPORATION, ROCKAWAY VALLEY ROAD, BOONTON, NEW JERSEY 07005 (201) 334-2676 TWX 710-987-8367



# STANDARD AIR CAPACITORS cont.

| JMC P/N<br>MIL SPEC | RANGE<br>pF             | FIGURE #<br>(PAGE 3) | TC<br>PPM/°C | MIN. Q @<br>100 MHz | DIMENSIONS (INCHES) |     |     |     |     |  |
|---------------------|-------------------------|----------------------|--------------|---------------------|---------------------|-----|-----|-----|-----|--|
|                     |                         |                      |              |                     | A                   | B   | C   | D   | E   |  |
| 5601<br>PC26J300    | 1 to 30<br>>20<br>TURNS | 6<br>(P.C.)          | 0 ± 30       | 800                 | .76                 | .16 | .50 | .08 | .74 |  |
| 5202<br>PC31J100    | .8 to 10<br>>6<br>TURNS | 3<br>(TURRET)        | 0 ± 15       | 5000                | .29                 | .21 | .11 | .08 | .09 |  |
| 5402<br>PC31J140    | 1 to 14<br>>6<br>TURNS  |                      | 0 ± 25       | 3000                | .29                 | .21 | .11 | .08 | .09 |  |
| 5502<br>PC31J200    | 1 to 20<br>>12<br>TURNS |                      | 0 ± 30       | 1500                | .49                 | .25 | .11 | .08 | .09 |  |
| 5602                | 1 to 30<br>>20<br>TURNS |                      | 0 ± 30       | 800                 | .68                 | .25 | .11 | .08 | .09 |  |

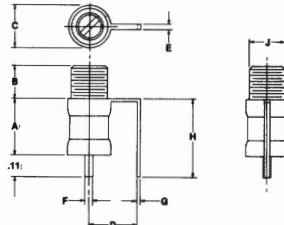
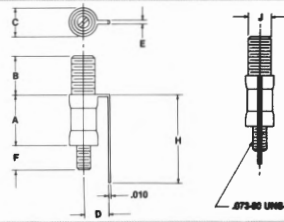
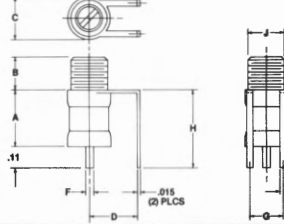
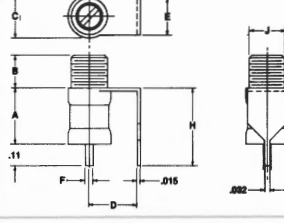
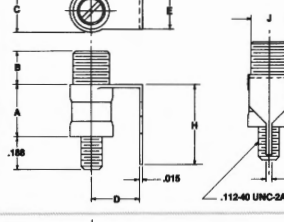
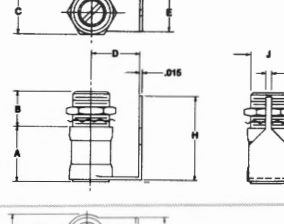
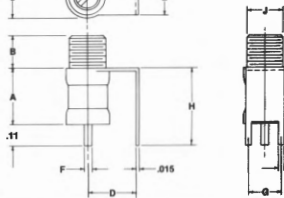
# MINIATURE AIR CAPACITORS

| JMC P/N<br>MIL SPEC | RANGE<br>pF               | FIGURE #<br>(PAGE 3)    | TC<br>PPM/°C | MIN. Q @<br>100 MHz | DIMENSIONS (INCHES) |     |              |     |     |     |  |
|---------------------|---------------------------|-------------------------|--------------|---------------------|---------------------|-----|--------------|-----|-----|-----|--|
|                     |                           |                         |              |                     | A                   | B   | C            | D   | E   | F   |  |
| 5700<br>PC25J060    | .6 to 6<br>>8<br>TURNS    | 1<br>(LUG)              | 0 ± 15       | 10000               | .27                 | .21 | .235<br>.215 | .16 | .06 | .33 |  |
| 5749                | .6 to 6<br>>8<br>TURNS    | 2<br>(THREADED<br>STUD) | 0 ± 15       | 10000               | .27                 | .21 | .235<br>.215 | .11 | .06 | —   |  |
| 5800<br>PC27J3R5    | .35 to 3.5<br>>9<br>TURNS |                         | 0 ± 15       | 10000               | .26                 | .22 | .160<br>.150 | .13 | .06 | —   |  |
| 5701<br>PC26J060    | .6 to 6<br>>8<br>TURNS    | 5<br>(P.C.)             | 0 ± 15       | 10000               | .29                 | .19 | .235<br>.215 | .25 | .06 | .26 |  |
| 5801<br>PC28J3R5    | .35 to 3.5<br>>9<br>TURNS | 4<br>(P.C.)             | 0 ± 15       | 10000               | .28                 | .21 | .160<br>.150 | .22 | .06 | .25 |  |
| 5702<br>PC31J060    | .6 to 6<br>>8<br>TURNS    | 3<br>(TURRET)           | 0 ± 15       | 10000               | .27                 | .21 | .235<br>.215 | .08 | .06 | .06 |  |
| 5802<br>PC29J3R5    | .35 to 3.5<br>>9<br>TURNS |                         | 0 ± 15       | 10000               | .26                 | .22 | .160<br>.150 | .08 | .06 | .04 |  |

\* CONSULT FACTORY FOR DETAILS.



# VERTICAL MOUNT AIR CAPACITORS

| JMC P/N<br>MIL SPEC    | RANGE<br>pF               | FIGURE #<br>(page 3) | TC<br>PPM/°C | MIN. Q @<br>100 MHz | TORQUE<br>OZ. IN. | DIMENSIONS (INCHES) |     |                     |     |     |     |      |     |     |                                                                                       |
|------------------------|---------------------------|----------------------|--------------|---------------------|-------------------|---------------------|-----|---------------------|-----|-----|-----|------|-----|-----|---------------------------------------------------------------------------------------|
|                        |                           |                      |              |                     |                   | A                   | B   | C                   | D   | E   | F   | G    | H   | J   |                                                                                       |
| 5853<br>*PC30J5R0      | .6 to 5<br>>9<br>TURNS    | 7                    | 0 ± 50       | 7500                | .3 to 3           | .27                 | .23 | $\frac{.160}{.150}$ | .12 | .02 | .03 | .01  | .48 | .12 |    |
| 8050                   | .7 to 6<br>>8<br>TURNS    |                      | 0 ± 15       | 10000               | .4 to 4           | .29                 | .17 | $\frac{.235}{.215}$ | .16 | .03 | .04 | .01  | .40 | .19 |                                                                                       |
| 8051<br>*PC30J3R5      | .6 to 3.5<br>>9<br>TURNS  |                      | 0 ± 15       | 10000               | .3 to 3           | .27                 | .20 | $\frac{.160}{.150}$ | .12 | .02 | .03 | .01  | .48 | .12 |                                                                                       |
| 8052                   | 1 to 10<br>>7<br>TURNS    |                      | 0 ± 15       | 5000                | 1 to 5            | .30                 | .16 | $\frac{.295}{.275}$ | .20 | .04 | .06 | .015 | .40 | .23 |                                                                                       |
| 8053<br>*PC32T140      | 1.5 to 14<br>>6<br>TURNS  |                      | 0 ± 25       | 3000                | 1 to 5            | .30                 | .16 | $\frac{.295}{.275}$ | .20 | .04 | .06 | .015 | .40 | .23 |                                                                                       |
| 8054                   | 1.5 to 20<br>>12<br>TURNS |                      | 0 ± 30       | 1500                | 1 to 5            | .58                 | .13 | $\frac{.295}{.275}$ | .20 | .04 | .06 | .015 | .70 | .23 |                                                                                       |
| 8055                   | .6 to 3.5<br>>9<br>TURNS  | 8                    | 0 ± 15       | 10000               | .3 to 3           | .27                 | .20 | $\frac{.160}{.150}$ | .12 | .02 | .13 | —    | .48 | .12 |    |
| 5453-0                 | 1.5 to 16<br>>7<br>TURNS  | 9                    | 0 ± 30       | 3000                | 1 to 5            | .30                 | .16 | $\frac{.295}{.275}$ | .20 | .03 | .06 | .22  | .43 | .23 |   |
| 5753                   | 1 to 10<br>>8<br>TURNS    |                      | 0 ± 50       | 7500                | .4 to 4           | .29                 | .20 | $\frac{.235}{.215}$ | .16 | .03 | .04 | .16  | .38 | .19 |                                                                                       |
| 8098                   | 1.5 to 30<br>>20<br>TURNS |                      | 0 ± 30       | 800                 | 1 to 5            | .49                 | .40 | $\frac{.295}{.275}$ | .28 | .04 | .06 | .22  | .72 | .23 |                                                                                       |
| 5243<br>(NON-MAGNETIC) | 1.5 to 10<br>>6<br>TURNS  | 12                   | 50 ± 50      | 4000                | 1 to 5            | .30                 | .16 | $\frac{.295}{.275}$ | .28 | .25 | .06 | —    | .44 | .23 |  |
| 8093                   | 1.5 to 14<br>>6<br>TURNS  |                      | 0 ± 20       | 2000                | 1 to 5            | .30                 | .16 | $\frac{.295}{.275}$ | .28 | .25 | .06 | —    | .44 | .23 |                                                                                       |
| 8090                   | 1 to 10<br>>6<br>TURNS    | 10                   | 0 ± 20       | 2000                | 1 to 5            | .30                 | .16 | $\frac{.295}{.275}$ | .28 | .25 | .03 | —    | .44 | .23 |  |
| 8091                   | 1.5 to 14<br>>6<br>TURNS  | 11                   | 0 ± 20       | 2000                | 1 to 5            | .30                 | .18 | $\frac{.295}{.275}$ | .28 | .25 | .03 | —    | .44 | .23 |  |
| 8092                   | 1.5 to 14<br>>6<br>TURNS  | 13                   | 0 ± 20       | 2000                | 1 to 5            | .30                 | .16 | $\frac{.295}{.275}$ | .28 | .25 | .06 | .22  | .41 | .23 |  |

# Giga-Trim<sup>®</sup> Comparison Data



| JOHANSON<br>SERIES NUMBER | CAPACITANCE<br>RANGE pF | TEMPERATURE<br>COEFFICIENT PPM/°C | MINIMUM Q @<br>250 MHz |
|---------------------------|-------------------------|-----------------------------------|------------------------|
| 27260                     | .3 to 1.2 (>5 TURNS)    | 0 ± 50                            | 5000                   |
| 7260                      | .3 to 1.2 (>3 TURNS)    | 350 ± 75                          | 4000                   |
| 37260                     | .3 to 1.2 (>5 TURNS)    | 200 ± 50                          | 5000                   |
| 27270                     | .6 to 4.5 (>8 TURNS)    | 0 ± 50                            | 3000                   |
| 7270                      | .6 to 4.5 (>5 TURNS)    | 350 ± 75                          | 2000                   |
| 37270                     | .6 to 4.5 (>8 TURNS)    | 350 ± 75                          | 3000                   |
| 27280                     | .4 to 2.5 (>4 TURNS)    | 0 ± 50                            | 4000                   |
| 7280                      | .4 to 2.5 (>3 TURNS)    | 350 ± 75                          | 3000                   |
| 37280                     | .4 to 2.5 (>4 TURNS)    | 300 ± 75                          | 4000                   |
| 27290                     | .8 to 8 (>16 TURNS)     | 0 ± 75                            | 3000<br>@ 100 MHz      |
| 7290                      | .8 to 8 (>10 TURNS)     | 350 ± 75                          | 2000<br>@ 100 MHz      |
| 37290                     | .8 to 8 (>16 TURNS)     | 350 ± 75                          | 3000<br>@ 100 MHz      |

| HIGH PERFORMANCE SERIES<br>27260 & 37260                     | HIGH PERFORMANCE SERIES<br>27270 & 37270                     | HIGH PERFORMANCE SERIES<br>27280 & 37280                     | HIGH PERFORMANCE SERIES<br>27290 & 37290                    |
|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------|
| <p>FIXED LENGTH .225<br/>.075 DIA.<br/>NO EXTERNAL SLOTS</p> | <p>FIXED LENGTH .314<br/>.118 DIA.<br/>NO EXTERNAL SLOTS</p> | <p>FIXED LENGTH .225<br/>.118 DIA.<br/>NO EXTERNAL SLOTS</p> | <p>FIXED LENGTH .48<br/>.118 DIA.<br/>NO EXTERNAL SLOTS</p> |
| STANDARD SERIES<br>7260                                      | STANDARD SERIES<br>7270                                      | STANDARD SERIES<br>7280                                      | STANDARD SERIES<br>7290                                     |
| <p>.215 @ MAX. 'C'<br/>.177 @ MIN. 'C'<br/>.075 DIA.</p>     | <p>.327 @ MAX. 'C'<br/>.247 @ MIN. 'C'<br/>.118 DIA.</p>     | <p>.215 @ MAX. 'C'<br/>.177 @ MIN. 'C'<br/>.118 DIA.</p>     | <p>.577 @ MAX. 'C'<br/>.417 @ MIN. 'C'<br/>.118 DIA.</p>    |

# high performance Giga-Trim® *Johanson*

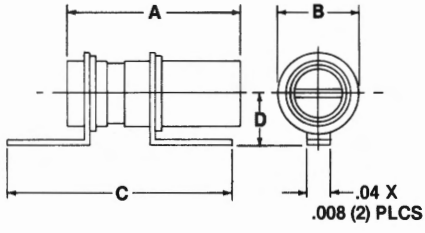
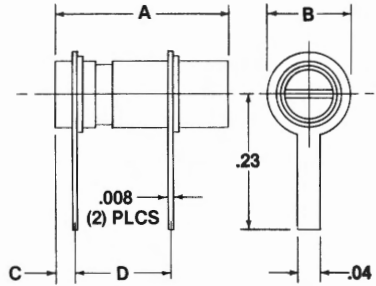
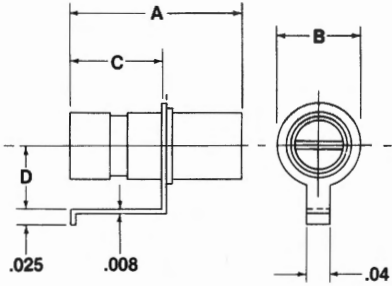
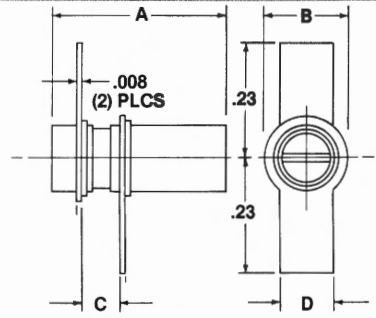
## STANDARD pF RANGES & ACTUAL SIZES

60 SERIES  
.3 to 1.2pF

70 SERIES  
.6 to 4.5pF

80 SERIES  
.4 to 2.5pF

90 SERIES  
.8 to .8pF

|                                                                                                                          | JMC P/N<br>(MIL SPEC) | RANGE<br>pF              | TC<br>PPM/°C | MIN. Q @<br>250 MHz | TORQUE<br>OZ. IN | DIMENSIONS (INCHES) |     |     |     |                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------|--------------|---------------------|------------------|---------------------|-----|-----|-----|---------------------------------------------------------------------------------------|
|                                                                                                                          |                       |                          |              |                     |                  | A                   | B   | C   | D   |                                                                                       |
| STANDARD CONFIGURATIONS<br>STYLE SL<br> | 27261SL<br>PC22J1R2   | .3 to 1.2<br>>5<br>TURNS | 0 ± 50       | 5000                | .1 to 1          | .23                 | .09 | .45 | .06 |    |
|                                                                                                                          | 27271SL<br>PC22J4R5   | .6 to 4.5<br>>8<br>TURNS | 0 ± 50       | 3000                | .2 to 2          | .31                 | .14 | .45 | .08 |                                                                                       |
|                                                                                                                          | 27281SL<br>PC22J2R5   | .4 to 2.5<br>>4<br>TURNS | 0 ± 50       | 4000                | .2 to 2          | .23                 | .14 | .40 | .08 |                                                                                       |
|                                                                                                                          | 27291SL<br>PC22K080   | .8 to 8<br>>16<br>TURNS  | 0 ± 75       | 3000<br>@ 100 MHz   | .2 to 2          | .48                 | .14 | .57 | .08 |                                                                                       |
| STYLE 1<br>                            | 27261<br>PC21J1R2     | .3 to 1.2<br>>5<br>TURNS | 0 ± 50       | 5000                | .1 to 1          | .23                 | .09 | .01 | .08 |   |
|                                                                                                                          | 27271<br>PC21J4R5     | .6 to 4.5<br>>8<br>TURNS | 0 ± 50       | 3000                | .2 to 2          | .31                 | .14 | .03 | .13 |                                                                                       |
|                                                                                                                          | 27281<br>PC21J2R5     | .4 to 2.5<br>>4<br>TURNS | 0 ± 50       | 4000                | .2 to 2          | .23                 | .14 | .01 | .08 |                                                                                       |
|                                                                                                                          | 27291<br>PC21K080     | .8 to 8<br>>16<br>TURNS  | 0 ± 75       | 3000<br>@ 100 MHz   | .2 to 2          | .48                 | .14 | .04 | .25 |                                                                                       |
| STYLE 3<br>                           | 27263<br>PC24J1R2     | .3 to 1.2<br>>5<br>TURNS | 0 ± 50       | 5000                | .1 to 1          | .23                 | .09 | .09 | .08 |  |
|                                                                                                                          | 27273<br>PC24J4R5     | .6 to 4.5<br>>8<br>TURNS | 0 ± 50       | 3000                | .2 to 2          | .31                 | .14 | .16 | .11 |                                                                                       |
|                                                                                                                          | 27283<br>PC24J2R5     | .4 to 2.5<br>>4<br>TURNS | 0 ± 50       | 4000                | .2 to 2          | .23                 | .14 | .09 | .11 |                                                                                       |
|                                                                                                                          | 27293<br>PC24K080     | .8 to 8<br>>16<br>TURNS  | 0 ± 75       | 3000<br>@ 100 MHz   | .2 to 2          | .48                 | .14 | .25 | .11 |                                                                                       |
| STYLE 4<br>                           | 27264<br>PC23J1R2     | .3 to 1.2<br>>5<br>TURNS | 0 ± 50       | 5000                | .1 to 1          | .23                 | .09 | .06 | .04 |  |
|                                                                                                                          | 27274<br>PC23J4R5     | .6 to 4.5<br>>8<br>TURNS | 0 ± 50       | 3000                | .2 to 2          | .31                 | .14 | .06 | .09 |                                                                                       |
|                                                                                                                          | 27284<br>PC23J2R5     | .4 to 2.5<br>>4<br>TURNS | 0 ± 50       | 4000                | .2 to 2          | .23                 | .14 | .06 | .09 |                                                                                       |
|                                                                                                                          | 27294<br>PC23K080     | .8 to 8<br>>16<br>TURNS  | 0 ± 75       | 3000<br>@ 100 MHz   | .2 to 2          | .48                 | .14 | .05 | .09 |                                                                                       |

## optional configurations

To order following, substitute last digit of JMC P/N with style number. Example: .3 to 1.2pF unit in STYLE "O" is 27260, .8 to 8pF unit in STYLE "6" is 27296.

STYLE  
0



STYLE  
2



STYLE  
5



STYLE  
6



STYLE  
7



STYLE  
8



STYLE  
9



# Seal-Trim® Variable Capacitors



## description

The SEAL-TRIM® is a high performance THIN-TRIM® variable ceramic capacitor encapsulated in a moistureproof housing. This design eliminates intrusion of dirt, dust, solder flux and cleaning agents during assembly and atmospheric contamination during use. These capacitors offer low drift rates and high Q, making them ideal for higher frequency applications beyond the limits of ordinary ceramic variable capacitors. The incorporation of the Johanson square drive tuning mechanism insures captive, non-slip, tamper-proof adjustments which are not subject to backlash problems associated with screwdriver type adjustment slots.

The latest SEAL-TRIM® development is the 9630 "high-hat" series featuring a recessed top surface to assist in engagement of automatic tuning tools with the rotor adjusting mechanism.

High Reliability versions are available on special order; to order add an "R" prefix letter to the standard Johanson part number.



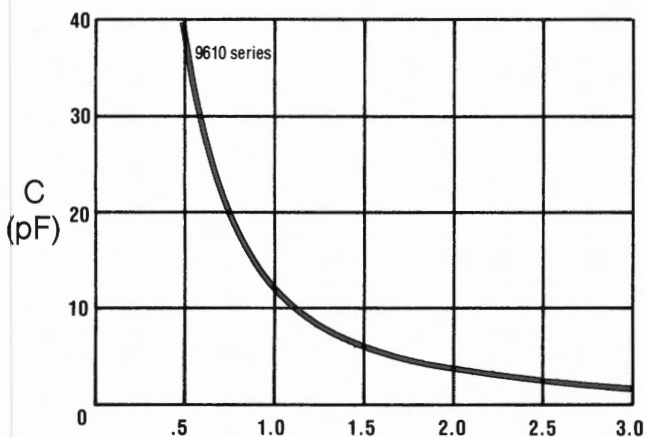
\*U.S. Patent No. 4,179,722

## applications

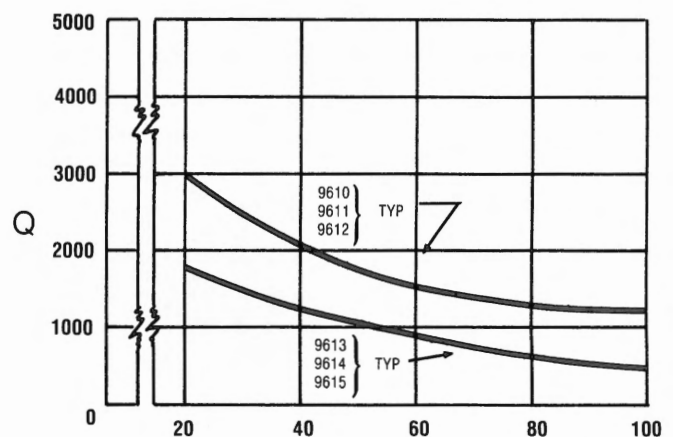
- Microprocessor clocks
- Interstage coupling
- Impedance matching
- Crystal trimming
- Antenna tuning
- Filter networks

## characteristics

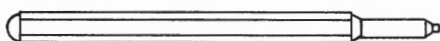
- Rated voltage 400 VDC, 9690 series  
250 VDC, 9620, 9610 & 9630 series
- Insulation resistance  $>10^4$  Meg  $\Omega$
- Vibration 15 g, 10-2000 Hz
- Shock 100 g, 6 milliseconds
- Resistant to soldering heat  
MIL-STD-202, Method 210, Condition C
- Operating temperature  $-20^\circ\text{C}$  to  $+85^\circ\text{C}$
- Conforms with specification MIL-C-81
- Moisture resistance MIL-STD-202, Method 106
- Impervious to cleaning solvents and solder flux MIL-STD-202, Method 215
- Solderability MIL-STD-202, Method 208



SELF-RESONANT FREQUENCY (GHz)



FREQUENCY (MHz)



JMC Tuning Tools

- 4192 ——— for 9620 and 9630 series
- 4193 ——— for 9610 series
- 2190 ——— for 9690 series



| ACTUAL SIZE                                          | JMC P/N | RANGE pF  | TC PPM/°C   | MIN. Q@ 100 MHz | TORQUE OZ. IN. | DIMENSIONS (INCHES) |
|------------------------------------------------------|---------|-----------|-------------|-----------------|----------------|---------------------|
|                                                      | 9620    | .5 to 2.5 | 100 ± 150   | 1000            | .05 to 1       |                     |
|                                                      | 9621    | 1 to 5    | 0 ± 400     | 1000            | .05 to 1       |                     |
|                                                      | 9622    | 2.5 to 10 | 100 ± 600   | 1000            | .05 to 1       |                     |
|                                                      | 9626    | 6 to 25   | -1500 ± 900 | 300             | .05 to 1       |                     |
|                                                      | 9628    | 5 to 15   | -300 ± 300  | 750             | .05 to 1       |                     |
|                                                      | 9629    | 5 to 20   | -450 ± 300  | 500             | .05 to 1       |                     |
|                                                      | 9610    | 1 to 4.5  | 50 ± 150    | 1000            | .2 to 2        |                     |
|                                                      | 9611    | 2.5 to 10 | -100 ± 500  | 1000            | .2 to 2        |                     |
|                                                      | 9612    | 4 to 18   | -300 ± 800  | 700             | .2 to 2        |                     |
|                                                      | 9613    | 6 to 35   | -1500 ± 900 | 200             | .2 to 2        |                     |
|                                                      | 9614    | 7 to 40   | -1500 ± 900 | 200             | .2 to 2        |                     |
|                                                      | 9615    | 5 to 25   | -400 ± 500  | 200             | .2 to 2        |                     |
|                                                      | 9616    | 8 to 50   | -1500 ± 900 | 200             | .2 to 2        |                     |
|                                                      | 9692    | 6 to 25   | -200 ± 400  | 2000 @ 1MHz     | .2 to 2        |                     |
|                                                      | 9694    | 7.5 to 50 | -1500 ± 900 | 1000 @ 1MHz     | .2 to 2        |                     |
|                                                      | 9697    | 20 to 100 | -1500 ± 900 | 1000 @ 1MHz     | .2 to 2        |                     |
| new product<br>"high hat"<br>for<br>automatic tuning | 9630    | .5 to 2.5 | 100 ± 150   | 1000            | .05 to 1       |                     |
|                                                      | 9631    | 1 to 5    | 0 ± 400     | 1000            | .05 to 1       |                     |
|                                                      | 9632    | 2.5 to 10 | 100 ± 600   | 1000            | .05 to 1       |                     |
|                                                      | 9636    | 6 to 25   | -1500 ± 900 | 300             | .05 to 1       |                     |
|                                                      | 9638    | 5 to 15   | -300 ± 300  | 750             | .05 to 1       |                     |
|                                                      | 9639    | 5 to 20   | -450 ± 300  | 500             | .05 to 1       |                     |

strip-line  
configuration

| <br>Add code after JMC P/N, example:<br>9613 SL | JMC P/N            | DIMENSIONS |           |
|-------------------------------------------------|--------------------|------------|-----------|
|                                                 |                    | A          | B         |
|                                                 | 9620 & 9630 series | .32        | .09 & .12 |
|                                                 | 9610 series        | .52        | .11       |
|                                                 | 9690 series        | .64        | .13       |

# Thin-Trim® Variable Capacitors

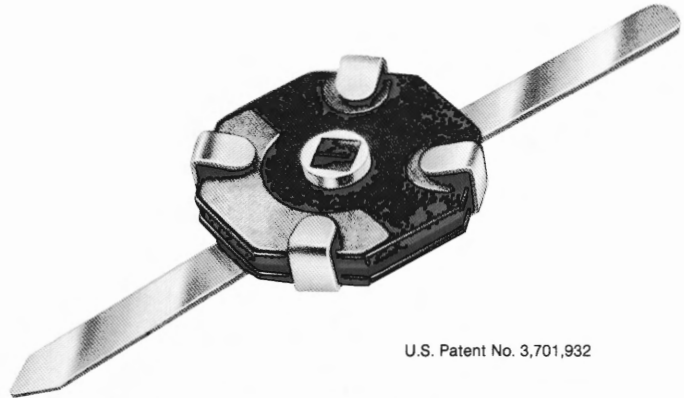
*Johanson*

## description

THIN-TRIM® capacitors are an advanced development in miniaturized variable capacitors for applications in circuits where size and performance are critical.

The THIN-TRIM® capacitor embodies a radical reduction in size and weight over standard ceramic capacitors, with a proportional improvement in electrical characteristics. The capacitor consists of a metallic rotor suspended under spring pressure between two metalized dielectric disks. In addition to physically securing the assembly, the springs serve as both the internal electrical connection and the external terminals, simplifying the construction and further reducing size. The incorporation of the Johanson square drive tuning mechanism insures captive, non-slip, tamper-proof adjustments which are not subject to backlash problems associated with screwdriver type adjustment slots.

The latest addition to the THIN-TRIM® line is the 9910 series, a drop in replacement for the 9mm size requirements. High Reliability versions are available on special order; to order add an "R" prefix letter to the standard Johanson part number.



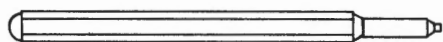
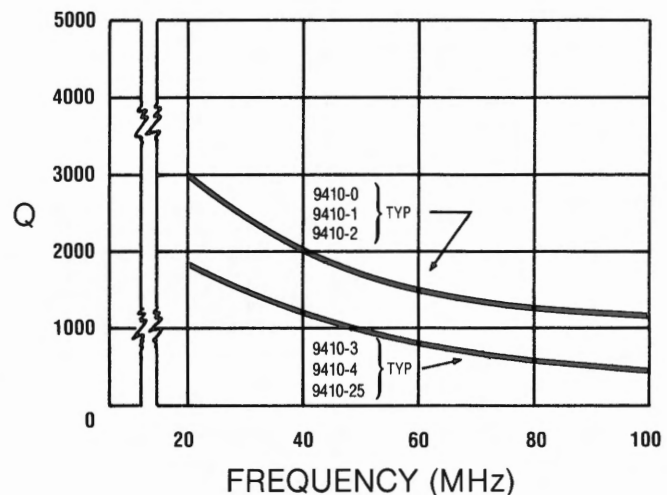
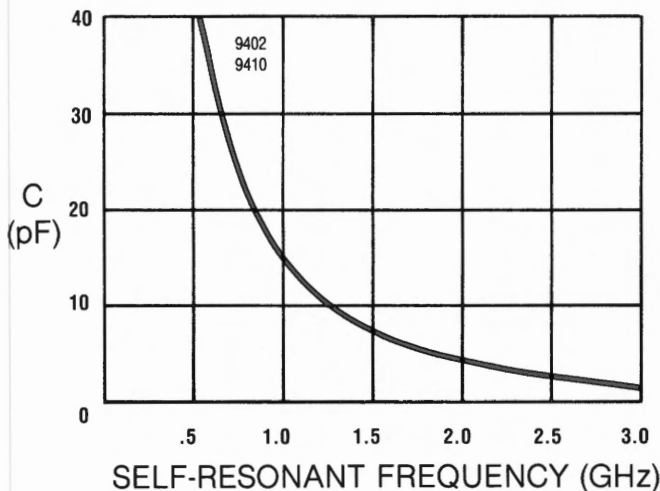
U.S. Patent No. 3,701,932

## applications

- Electronic watches      ■ Avionics equipment      ■ Telemetry      ■ Filter networks
- Impedance matching      ■ Crystal trimming

## characteristics

- Rated voltage 400 VDC, 9910 series  
250 VDC, 9401, 9402 & 9410 series
- Insulation resistance  $>10^4$  Meg  $\Omega$
- Vibration 15 g, 10-2000Hz
- Resistant to soldering heat  
MIL-STD-202, Method 210, Condition C
- Solderability MIL-STD-202, Method 208
- Operating temperature  $-20^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Shock 100 g, 6 milliseconds
- Conforms with specification MIL-C-81
- Moisture resistance MIL-STD-202, Method 106
- Impervious to cleaning solvents and  
solder flux MIL-STD-202, Method 215



JMC Tuning Tools

- 4192 ————— for 9401 and 9402 series
- 4193 ————— for 9410 series
- 2190 ————— for 9910 series



| ACTUAL SIZE     | JMC P/N | RANGE pF  | TC PPM/°C    | MIN. Q @ 100 MHz | TORQUE OZ. IN. | COLOR CODE | DIMENSIONS (INCHES) |
|-----------------|---------|-----------|--------------|------------------|----------------|------------|---------------------|
|                 | 9401-0  | .25 to .7 | 50 ± 50      | 1000             | .05 to .5      | RED        |                     |
|                 | 9401-1  | .5 to 1.3 | NPO ± 100    | 1000             | .05 to .5      | BLACK      |                     |
|                 | 9401-2  | .6 to 2   | - 400 ± 200  | 1000             | .05 to .5      | BLUE       |                     |
|                 | 9401-4  | 1.5 to 4  | - 1100 ± 300 | 500              | .05 to .5      | BROWN      |                     |
|                 | 9402-0  | .5 to 2.5 | 100 ± 100    | 3000             | .05 to 1       | RED        |                     |
|                 | 9402-1  | 1 to 5    | 100 ± 200    | 1000             | .05 to 1       | BLACK      |                     |
|                 | 9402-2  | 2.5 to 10 | - 50 ± 100   | 1000             | .05 to 1       | BLUE       |                     |
|                 | 9402-6  | 6 to 25   | - 1100 ± 300 | 300              | .05 to 1       | YELLOW     |                     |
|                 | 9402-8  | 5 to 15   | - 300 ± 300  | 750              | .05 to 1       | NONE       |                     |
|                 | 9402-9  | 5 to 20   | - 450 ± 300  | 500              | .05 to 1       | GRAY       |                     |
|                 | 9410-0  | 1 to 4.5  | 50 ± 50      | 1000             | .2 to 2        | RED        |                     |
|                 | 9410-1  | 2.5 to 10 | - 100 ± 200  | 1000             | .2 to 2        | BLACK      |                     |
|                 | 9410-2  | 4 to 18   | - 400 ± 200  | 700              | .2 to 2        | BLUE       |                     |
|                 | 9410-3  | 6 to 35   | - 1100 ± 300 | 200              | .2 to 2        | ORANGE     |                     |
|                 | 9410-4  | 7 to 40   | - 1100 ± 300 | 200              | .2 to 2        | BROWN      |                     |
|                 | 9410-5  | 8 to 50   | - 1500 ± 500 | 200              | .2 to 2        | GREEN      |                     |
|                 | 9410-25 | 5 to 25   | NPO ± 150    | 200              | .2 to 2        | YELLOW     |                     |
| new product<br> | 9912    | 6 to 25   | - 350 ± 200  | 2000 @ 1MHz      | .2 to 2        | BLUE       |                     |
|                 | 9914    | 7.5 to 50 | - 1200 ± 400 | 1000 @ 1MHz      | .2 to 2        | BROWN      |                     |
|                 | 9917    | 20 to 100 | - 1500 ± 700 | 1000 @ 1MHz      | .2 to 2        | WHITE      |                     |

## special terminal configurations

| Add code after JMC P/N, example:<br>9410-3 SL-2 | JMC P/N     | SL-1     |  |  |  | SL-2         |  |  | PC      |  |
|-------------------------------------------------|-------------|----------|--|--|--|--------------|--|--|---------|--|
|                                                 |             |          |  |  |  |              |  |  |         |  |
|                                                 |             | A        |  |  |  | A B C        |  |  | A B     |  |
|                                                 | 9401 series | .20      |  |  |  | .18 .025 .23 |  |  | .20 .09 |  |
|                                                 | 9402 series | .20      |  |  |  | .18 .025 .23 |  |  | .20 .09 |  |
|                                                 | 9410 series | .25 Max. |  |  |  | .25 .03 .30  |  |  | .20 .20 |  |
|                                                 | 9910 series | —        |  |  |  | — — —        |  |  | .33 .20 |  |

# Microwave Tuning Elements



Microwave tuning elements are an economical means of introducing a variable reactance to waveguides, cavities and other microwave structures. They are excellent for applications requiring precision, low loss high resolution tuning. The self-locking, constant torque drive mechanism (U.S. Patent No. Re. 30,406) eliminates the need for locking nuts and assures stable, noise free adjustment in application from DC to W band. A microwave tuning element consists of a mounting bushing with an integral tuning rotor.

High Reliability versions are available on special order; to order add an "R" prefix letter to the standard Johanson part number.

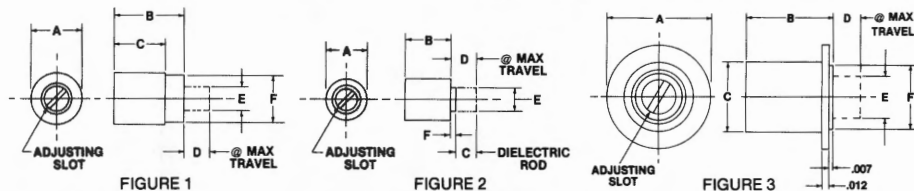
## applications

- Combine filters
- Interdigital filters
- Impedance transformers
- Impatt and Gunn oscillators
- Coaxial structures
- Attenuators
- Microstrip and strip-line circuits
- Waveguide circuitry

| NOMINAL FREQUENCY SELECTION GUIDE |            |         |
|-----------------------------------|------------|---------|
| OPERATING FREQUENCY (GHz)         |            |         |
| JMC SERIES                        | MINIMUM    | MAXIMUM |
| 6922                              | 10         | 30      |
| 6960                              | 20         | 100     |
| 6961                              | 8          | 26      |
| 6933                              | 12         | 60      |
| 6934                              | 7          | 18      |
| 6935                              | 5          | 15      |
| 6950                              | BROAD BAND |         |
| 6952                              | 4          | 8       |
| 6924                              | 8          | 26      |
| 6925                              | 7          | 16      |
| 6926                              | 4          | 15      |
| 6927                              | 6          | 10      |
| 6928                              | 4          | 8       |
| 6929                              | 4          | 6       |
| 6948                              | 5          | 11      |
| 6965                              | 2          | 5       |
| 6939                              | 5          | 60      |
| 6940                              | 2.5        | 9       |
| 6941                              | 2          | 9       |
| 6930                              | 4          | 18      |

## mmWAVE

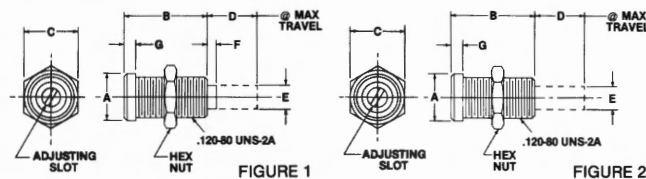
The millimeter wave tuning elements are higher frequency versions of both the metallic and dielectric tuning elements described in this catalog.



| JMC P/N | FIGURE # | NOMINAL FREQUENCY BAND | ROD MATERIAL | DIMENSIONS (INCHES) |      |      |      |      |      | INTERNAL THREAD UNS-2 |
|---------|----------|------------------------|--------------|---------------------|------|------|------|------|------|-----------------------|
|         |          |                        |              | A                   | B    | C    | D    | E    | F    |                       |
| 6922    | 1        | X and K                | —            | .085                | .120 | .090 | .040 | .042 | .072 | .060-108              |
| 6960-0  | 2        | K and up               | SAPPHIRE     | .062                | .075 | .030 | .040 | .035 | .010 | .045-200              |
| 6960-1  | 2        | K and up               | QUARTZ       | .062                | .075 | .030 | .040 | .035 | .010 | .045-200              |
| 6961-0  | 3        | X and K                | —            | .185 / .181         | .150 | .120 | .048 | .072 | .110 | .094-80               |
| 6961-1  | 3        | BROAD BAND             | ECCOSORB     | .180                | .177 | .120 | .055 | .062 | .110 | .094-80               |

## DIELECTRIC

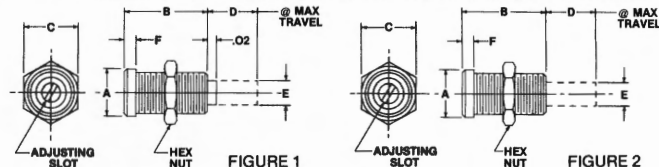
The use of dielectric tuning elements is suggested whenever the lowest loss tuning for high frequency applications is required. In addition to low loss properties, dielectric tuning elements increase the net effective tuning resolution beyond that of their metallic counterparts.



| JMC P/N | FIGURE # | NOMINAL FREQUENCY BAND | ROD MATERIAL | DIMENSIONS (INCHES) |      |      |       |      |       |      | INTERNAL THREAD UNS-2 |
|---------|----------|------------------------|--------------|---------------------|------|------|-------|------|-------|------|-----------------------|
|         |          |                        |              | A                   | B    | C    | D     | E    | F     | G    |                       |
| 6933-0  | 1        | X and K                | SAPPHIRE     | .135                | .240 | .160 | .168  | .062 | .020  | .035 | .094-80               |
| 6933-1  | 2        | X and K                | SAPPHIRE     | .135                | .240 | .160 | .130  | .035 | —     | .035 | .094-80               |
| 6933-2  | 1        | K                      | QUARTZ       | .135                | .240 | .160 | .168  | .062 | .020  | .035 | .094-80               |
| *6933-4 | 1        | X and K                | SAPPHIRE     | .135                | .240 | .160 | .168  | .062 | .020  | .035 | .094-80               |
| 6934-0  | 1        | C, X and K             | SAPPHIRE     | .267                | .210 | .280 | .115  | .152 | .009  | .035 | .190-64               |
| 6934-1  | 1        | C, X and K             | INVAR        | .267                | .210 | .280 | .115  | .152 | .009  | .035 | .190-64               |
| 6934-2  | 1        | C, X and K             | INVAR        | .267                | .359 | .280 | .265  | .152 | .010  | .144 | .190-64               |
| *6934-3 | 1        | X and K                | ALUMINA      | .267                | .359 | .280 | 1.205 | .152 | .95   | .144 | .190-64               |
| *6934-4 | 1        | X and K                | ALUMINA      | .267                | .359 | .280 | 1.105 | .152 | .85   | .144 | .190-64               |
| *6934-5 | 1        | X and K                | ALUMINA      | .267                | .359 | .280 | .905  | .152 | .65   | .144 | .190-64               |
| 6935-0  | 1        | X and K                | SAPPHIRE     | .267                | .359 | .280 | .265  | .152 | .010  | .144 | .190-64               |
| 6935-1  | 1        | X and K                | SAPPHIRE     | .267                | .359 | .280 | 1.260 | .152 | 1.005 | .144 | .190-64               |
| 6935-9  | 1        | X and K                | ALUMINA      | .267                | .359 | .280 | .525  | .152 | .270  | .144 | .190-64               |

## RESISTIVE

The 6950 series tuning elements provide a method of attenuating varying amounts of microwave energy when mounted properly in microwave amplifiers, oscillators and other microwave circuitry. The magnetically loaded epoxide rod was chosen for its broad band lossy properties.



| JMC P/N | FIGURE # | NOMINAL FREQUENCY BAND | ROD MATERIAL | DIMENSIONS (INCHES) |      |      |      |      |      | INTERNAL THREAD UNS-2 | EXTERNAL THREAD UNS-2 |
|---------|----------|------------------------|--------------|---------------------|------|------|------|------|------|-----------------------|-----------------------|
|         |          |                        |              | A                   | B    | C    | D    | E    | F    |                       |                       |
| 6950-0  | 1        |                        |              | .135                | .240 | .160 | .168 | .062 | .035 | .094-80               | .120-80               |
| 6950-1  | 2        | BROAD BAND             | ECCOSORB     | .135                | .240 | .160 | .130 | .078 | .035 | .094-80               | .120-80               |
| 6952-0  | 2        |                        |              | .267                | .359 | .280 | .250 | .152 | .144 | .190-64               | .234-64               |

## METALLIC

Metallic tuning elements consist of a mounting bushing with an integral tuning rotor. The rotor's patented low noise, self-locking torque mechanism provides smooth, high resolution tuning over its entire travel without need of locknuts or jam screws.

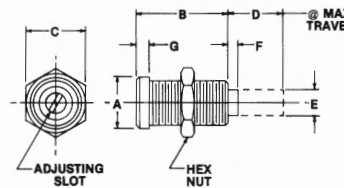


FIGURE 1

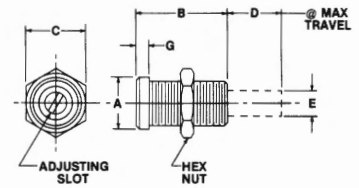


FIGURE 2

| JMC<br>P/N | FIGURE<br># | NOMINAL<br>FREQUENCY BAND | DIMENSIONS (INCHES) |      |      |      |      |      |      | INTERNAL<br>THREAD UNS-2 | EXTERNAL<br>THREAD UNS-2 |
|------------|-------------|---------------------------|---------------------|------|------|------|------|------|------|--------------------------|--------------------------|
|            |             |                           | A                   | B    | C    | D    | E    | F    | G    |                          |                          |
| 6924-0     | 2           | X and K                   | .135                | .240 | .156 | .148 | .072 | —    | .035 | .094-80                  | .120-80                  |
| 6924-1     | 1           | X and K                   | .135                | .120 | .156 | .075 | .072 | .047 | .035 | .094-80                  | .120-80                  |
| 6924-3     | 1           | X and K                   | .135                | .120 | .156 | .030 | .072 | .002 | .035 | .094-80                  | .120-80                  |
| 6925-0     | 2           | C and X                   | .210                | .250 | .220 | .148 | .125 | —    | .037 | .156-64                  | .190-64                  |
| *6925-4    | 2           | C and X                   | .210                | .250 | .220 | .148 | .125 | —    | .037 | .156-64                  | .190-64                  |
| *6925-5    | 2           | C and X                   | .210                | .125 | .220 | .023 | .125 | —    | .037 | .156-64                  | .190-64                  |
| 6925-7     | 1           | C and X                   | .210                | .250 | .220 | .193 | .125 | .045 | .037 | .156-64                  | .190-64                  |
| 6925-8     | 1           | C and X                   | .210                | .170 | .220 | .078 | .125 | .010 | .042 | .156-64                  | .190-64                  |
| 6926-0     | 2           | C and X                   | .267                | .210 | .280 | .106 | .160 | —    | .035 | .190-64                  | .234-64                  |
| 6926-1     | 2           | C and X                   | .267                | .130 | .280 | .025 | .160 | —    | .035 | .190-64                  | .234-64                  |
| 6926-5     | 1           | C and X                   | .267                | .187 | .280 | .106 | .160 | .023 | .031 | .190-64                  | .234-64                  |
| 6926-7     | 1           | C and X                   | .267                | .210 | .280 | .180 | .160 | .074 | .035 | .190-64                  | .234-64                  |
| 6927-0     | 2           | C and X                   | .267                | .360 | .280 | .256 | .160 | —    | .145 | .190-64                  | .234-64                  |
| *6927-3    | 2           | C and X                   | .267                | .360 | .280 | .255 | .160 | —    | .145 | .190-64                  | .234-64                  |
| 6928-0     | 2           | C                         | .267                | .450 | .280 | .345 | .160 | —    | .240 | .190-64                  | .234-64                  |
| *6928-3    | 2           | C                         | .267                | .450 | .280 | .340 | .160 | —    | .240 | .190-64                  | .234-64                  |
| 6929-0     | 2           | C                         | .210                | .552 | .218 | .450 | .125 | —    | .042 | .156-64                  | .190-64                  |
| 6948-0     | 2           | C and X                   | .375                | .363 | .380 | .234 | .210 | —    | .040 | .250-64                  | .312-64                  |
| 6965-0     | 2           | L and S                   | .531                | .720 | .560 | .500 | .345 | —    | .040 | .375-64                  | .469-32                  |

\*SLOTTED BUSHING STANDARD

†"MAX. STOP" BUSHING STANDARD

## INDUCTIVE / CAPACITIVE

Designed specifically for filter applications, the LC tuning elements are variations of the standard metallic units. When used in filter sections of approximately 76 ohms impedance, LC tuning elements offer optimum resonator Q for high selectivity. Combine, interdigital and coaxial cavity filters are among the suggested applications for LC tuning elements.

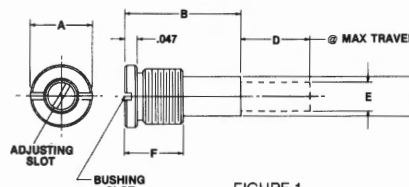


FIGURE 1

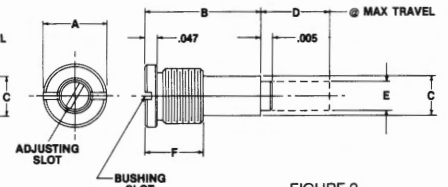
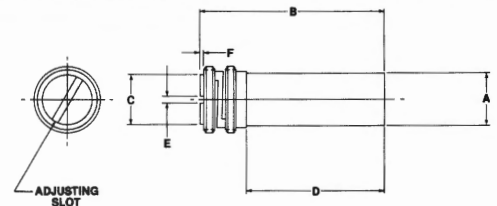


FIGURE 2

| JMC<br>P/N | FIGURE<br># | NOMINAL<br>FREQUENCY GHz | DIMENSIONS (INCHES) |       |      |      |      |      |   | INTERNAL<br>THREAD UNS-2 | EXTERNAL<br>THREAD UNS-2 |
|------------|-------------|--------------------------|---------------------|-------|------|------|------|------|---|--------------------------|--------------------------|
|            |             |                          | A                   | B     | C    | D    | E    | F    | G |                          |                          |
| 6939-2     | 1           | 6 to 10                  | .187                | .482  | .120 | .148 | .072 | .232 | — | .094-80                  | .156-64                  |
| 6939-3     | 1           | 10 to 25                 | .187                | .277  | .120 | .148 | .072 | .152 | — | .094-80                  | .156-64                  |
| 6939-5     | 1           | 8 to 12                  | .187                | .402  | .120 | .148 | .072 | .152 | — | .094-80                  | .156-64                  |
| 6939-9     | 1           | 5 to 6.5                 | .187                | .602  | .120 | .148 | .072 | .152 | — | .094-80                  | .156-64                  |
| 6939-23    | 2           | 20 to 60                 | .187                | .195  | .120 | .108 | .072 | .152 | — | .094-80                  | .156-64                  |
| 6940-1     | 1           | 4 to 7                   | .265                | .557  | .170 | .450 | .125 | .232 | — | .156-64                  | .234-64                  |
| 6940-3     | 1           | 6 to 9                   | .265                | .557  | .170 | .148 | .125 | .232 | — | .156-64                  | .234-64                  |
| 6941-1     | 1           | 2 to 3                   | .281                | 1.232 | .210 | .346 | .160 | .232 | — | .190-64                  | .250-64                  |
| 6941-2     | 1           | 1.5 to 2                 | .281                | 1.582 | .210 | .346 | .160 | .232 | — | .190-64                  | .250-64                  |

## TUNING ROTORS

Extended range high Q dielectric rotors are used where direct insertion of the tuning element is desired. Taps designed specifically to insure proper fit are available from the factory, see page 20.



| JMC<br>P/N | NOMINAL<br>FREQUENCY BAND | ROD<br>MATERIAL | DIMENSIONS (INCHES) |       |      |       |      |         | THREAD<br>UNS-2A |
|------------|---------------------------|-----------------|---------------------|-------|------|-------|------|---------|------------------|
|            |                           |                 | A                   | B     | C    | D     | E    | F       |                  |
| 6930-0     | C, X and K                | FUSED QUARTZ    | .320                | .652  | .320 | .372  | .060 | .030    | .375-64          |
| 6930-1     |                           | ALUMINA         | .152                | 1.304 | .145 | 1.170 | .020 | .010    | .190-64          |
| 6930-2     |                           | ALUMINA         | .152                | 1.454 | .145 | 1.320 | .020 | .010    | .190-64          |
| 6930-3     |                           | ALUMINA         | .152                | .479  | .145 | .345  | .020 | .010    | .190-64          |
| 6930-4     |                           | SAPPHIRE        | .035                | .222  | .060 | .100  | .015 | .020    | .094-80          |
| 6930-5     |                           | ALUMINA         | .152                | .629  | .145 | .495  | .020 | .010    | .190-64          |
| 6930-6     |                           | ALUMINA         | .152                | .354  | .145 | .220  | .020 | .010    | .190-64          |
| 6930-7     |                           | ALUMINA         | .152                | .884  | .145 | .750  | .020 | .010    | .190-64          |
| 6930-8     |                           | SAPPHIRE        | .062                | .260  | .060 | .138  | .015 | .020    | .094-80          |
| 6930-9     |                           | SAPPHIRE        | .062                | .300  | .060 | .178  | .015 | .020    | .094-80          |
| 6930-10    |                           | SAPPHIRE        | .152                | .369  | .145 | .235  | .020 | .010    | .190-64          |
| 6930-11    | FUSED QUARTZ              | .062            | .260                | .060  | .138 | .015  | .020 | .094-80 |                  |

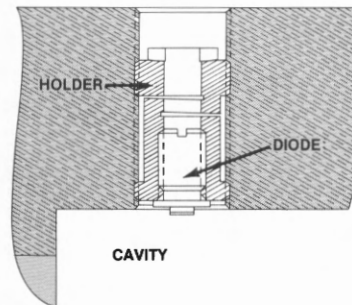
# Adjustable Microwave Diode Holder

*Johanson*

## description *new product*

Johanson microwave diode holders are an efficient and inexpensive means of securing and tuning microwave diodes into precise attitudes for optimum circuit performance. The patented self-locking, constant torque drive mechanism (U.S. Patent No. Re. 30,406) results in very low dynamic noise and high Q throughout the full travel excursion of the diode holder. The center access hole will accept a torque screwdriver so that the diode can be mounted without danger of physical damage. Advantages offered include: relaxation of costly mechanical tolerances, one-hand tuning in cramped quarters, ultra precise adjustment and excellent diode to holder thermal conductivity. The type illustrated is designed for use with G.E. case styles FTC, FTG and Varian N33, N34, N57 or equivalents.

High Reliability versions are available on special order; to order add an "R" prefix letter to the standard Johanson part number.



## features

- Precise Positioning Resolution
- Good Thermal Conductivity for Effective Heat Dissipation
- Adjustable under Dynamic Operating Conditions
- Self-locking Torque Mechanism
- Cost Effective

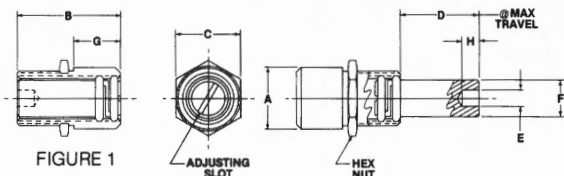


FIGURE 1

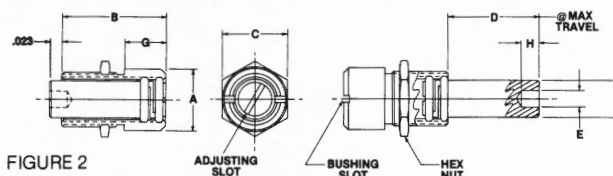


FIGURE 2

| JMC<br>P/N | FIGURE<br># | NOMINAL<br>FREQUENCY BAND | DIMENSIONS (INCHES)             |      |      |      |      |      |      |      | INTERNAL<br>THREAD UNS-2 | EXTERNAL<br>THREAD UNS-2 |
|------------|-------------|---------------------------|---------------------------------|------|------|------|------|------|------|------|--------------------------|--------------------------|
|            |             |                           | A                               | B    | C    | D    | E    | F    | G    | H    |                          |                          |
| 6926-8     | 2           | BROAD BAND                | .267                            | .187 | .280 | .106 | .067 | .160 | .031 | .090 | .190-64                  | .234-64                  |
| 6928-1     | 1           |                           | .267                            | .450 | .280 | .345 | .069 | .160 | .240 | .100 | .190-64                  | .234-64                  |
| *6928-5    | 1           |                           | .267                            | .450 | .280 | .345 | .102 | .160 | .240 | .100 | .190-64                  | .234-64                  |
| *6928-7    | 1           |                           | .267                            | .450 | .280 | .345 | .069 | .160 | .240 | .100 | .190-64                  | .234-64                  |
| 6929-1     | 1           |                           | $\frac{7}{32}$ A.F.<br>HEX HEAD | .552 | .281 | .078 | .067 | .125 | .050 | .075 | .156-64                  | .190-64                  |
| 6933-7     | 1           |                           | .135                            | .240 | .160 | .030 | .062 | .072 | .035 | .047 | .094-80                  | .120-80                  |
| 6935-13    | 1           |                           | .267                            | .359 | .280 | .030 | .152 | .162 | .144 | .055 | .190-64                  | .234-64                  |

\*SLOTTED BUSHING STANDARD

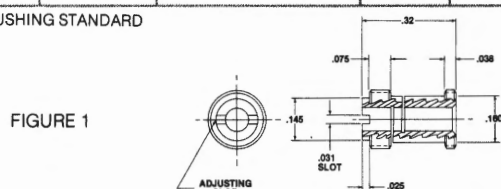


FIGURE 1

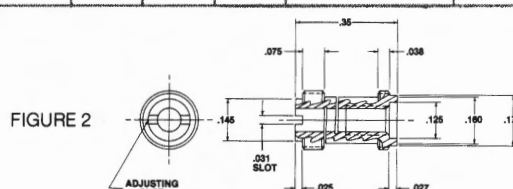
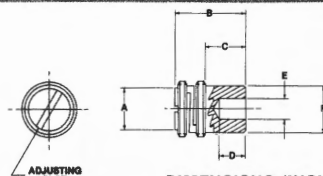


FIGURE 2

| JMC<br>P/N | FIGURE<br># | NOMINAL<br>FREQUENCY BAND | INTERNAL<br>THREAD UNC-2 | EXTERNAL<br>THREAD UNS-2 |
|------------|-------------|---------------------------|--------------------------|--------------------------|
| H-6951-0   | 1           | BROAD BAND                | .099-48                  | .200-80                  |
| H-6951-1   | 2           |                           | (.150 FULL THREAD)       |                          |



| JMC<br>P/N | NOMINAL<br>FREQUENCY BAND | DIMENSIONS (INCHES) |      |      |      |      |      | THREAD<br>UNS-2A |
|------------|---------------------------|---------------------|------|------|------|------|------|------------------|
|            |                           | A                   | B    | C    | D    | E    | F    |                  |
| L-6996-10  | BROAD BAND                | .120                | .180 | .078 | .075 | .067 | .125 | .156-64          |
| L-6997-7   |                           | .145                | .450 | .346 | .100 | .069 | .160 | .190-64          |
| L-6997-8   |                           | .145                | .210 | .106 | .090 | .067 | .160 | .190-64          |
| L-6997-11  |                           | .145                | .450 | .346 | .100 | .102 | .160 | .190-64          |

# Variable Ceramic Capacitors



## description

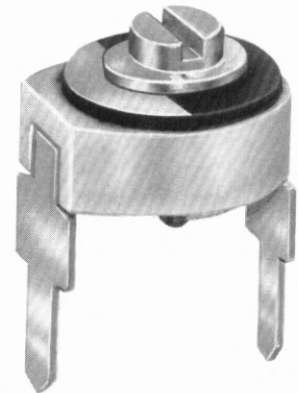
These ceramic trimmer capacitors are designed for broadband applications, from audio to 500 MHz, and afford an ideal low cost means of trimming circuitry.

## applications

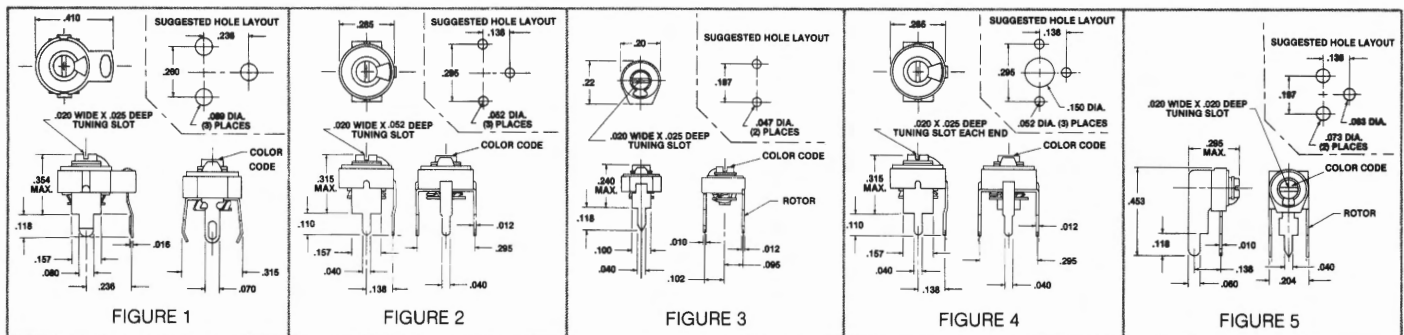
- All varieties of communication and test equipment
- CATV amplifiers
- Crystal oscillators
- Impedance matching
- LC Filters

## characteristics

- Operating temperature  $-55^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Rated voltage 250 VDC
- Insulation resistance  $>10^4$  Meg  $\Omega$  @ 250 VDC



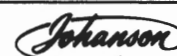
JMC Tuning Tool 8777 ————— for this series



| ACTUAL SIZE                                                                         | JMC P/N | RANGE pF  | FIGURE # | TC PPM/ $^{\circ}\text{C}$ | MIN. Q @ 10 MHz | TORQUE OZ. IN. | COLOR CODE |
|-------------------------------------------------------------------------------------|---------|-----------|----------|----------------------------|-----------------|----------------|------------|
|  | 9300    | 2 to 8    | 1        | NPO $\pm 200$              | 300             | .56 to 5.6     | RED        |
|                                                                                     | 9301    | 2 to 12   | 1        | NPO $\pm 200$              | 300             | .56 to 5.6     | NONE       |
|                                                                                     | 9302    | 2.5 to 23 | 1        | $-450 \pm 200$             | 300             | .56 to 5.6     | BLUE       |
|                                                                                     | 9303    | 4 to 34   | 1        | $-550 \pm 800$             | 300             | .56 to 5.6     | ORANGE     |
|                                                                                     | 9304    | 5.5 to 45 | 1        | $-1400 \pm 800$            | 200             | .56 to 5.6     | BROWN      |
|                                                                                     | 9305    | 6 to 55   | 1        | $-1400 \pm 800$            | 200             | .56 to 5.6     | GREEN      |
|                                                                                     | 9314    | 6 to 60   | 1        | $-1400 \pm 800$            | 200             | .56 to 5.6     | PINK       |
|                                                                                     | 9315    | 6 to 70   | 1        | $-1400 \pm 800$            | 200             | .56 to 5.6     | GRAY       |
|  | 9328    | 12 to 100 | 1        | $-1400 \pm 800$            | 200 @ 1 MHz     | .56 to 5.6     | WHITE      |
|                                                                                     | 9306    | 2 to 8    | 2        | NPO $\pm 200$              | 300             | .56 to 5.6     | RED        |
|                                                                                     | 9307    | 2 to 12   | 2        | NPO $\pm 200$              | 300             | .56 to 5.6     | NONE       |
|                                                                                     | 9308    | 2.5 to 23 | 2        | $-450 \pm 200$             | 300             | .56 to 5.6     | BLUE       |
|                                                                                     | 9309    | 4 to 34   | 2        | $-550 \pm 800$             | 300             | .56 to 5.6     | ORANGE     |
|                                                                                     | 9310    | 5.5 to 45 | 2        | $-1400 \pm 800$            | 200             | .56 to 5.6     | BROWN      |
|                                                                                     | 9311    | 6 to 55   | 2        | $-1400 \pm 800$            | 200             | .56 to 5.6     | GREEN      |
|                                                                                     | 9338    | 6 to 70   | 2        | $-1400 \pm 800$            | 200             | .56 to 5.6     | GRAY       |
|                                                                                     | 9339    | 12 to 100 | 2        | $-1400 \pm 800$            | 200 @ 1 MHz     | .56 to 5.6     | WHITE      |

| ACTUAL SIZE                                                                         | JMC P/N | RANGE pF    | FIGURE # | TC PPM/ $^{\circ}\text{C}$ | MIN. Q @ 10 MHz | TORQUE OZ. IN. | COLOR CODE |
|-------------------------------------------------------------------------------------|---------|-------------|----------|----------------------------|-----------------|----------------|------------|
|  | 9371    | 1.8 to 5    | 3        | NPO $\pm 250$              | 300             | .3 to 3        | BLACK      |
|                                                                                     | 9372    | 3 to 10     | 3        | $-600 \pm 300$             | 300             | .3 to 3        | NONE       |
|                                                                                     | 9373    | 3.5 to 18   | 3        | $-800 \pm 300$             | 300             | .3 to 3        | BLUE       |
|                                                                                     | 9374    | 5 to 25     | 3        | $-1500 \pm 500$            | 200             | .3 to 3        | PURPLE     |
|                                                                                     | 9376    | 9 to 50     | 3        | $-1500 \pm 500$            | 200 @ 1 MHz     | .3 to 3        | GREEN      |
|  | 9390    | 2 to 8      | 4        | NPO $\pm 200$              | 300             | .56 to 5.6     | RED        |
|                                                                                     | 9391    | 2 to 12     | 4        | NPO $\pm 200$              | 300             | .56 to 5.6     | NONE       |
|                                                                                     | 9392    | 2.5 to 23   | 4        | $-450 \pm 200$             | 300             | .56 to 5.6     | BLUE       |
|                                                                                     | 9393    | 4 to 34     | 4        | $-550 \pm 800$             | 300             | .56 to 5.6     | ORANGE     |
|                                                                                     | 9394    | 5.5 to 45   | 4        | $-1400 \pm 800$            | 200             | .56 to 5.6     | BROWN      |
|                                                                                     | 9395    | 6 to 55     | 4        | $-1400 \pm 800$            | 200             | .56 to 5.6     | GREEN      |
|                                                                                     | 9396    | 6 to 70     | 4        | $-1400 \pm 800$            | 200             | .56 to 5.6     | GRAY       |
|                                                                                     | 9397    | 12 to 100   | 4        | $-1400 \pm 800$            | 200 @ 1 MHz     | .56 to 5.6     | WHITE      |
|  | 9380    | 1.8 to 6    | 5        | NPO $\pm 250$              | 300             | .5 to 3        | RED        |
|                                                                                     | 9381    | 2.8 to 12.5 | 5        | $-600 \pm 300$             | 300             | .5 to 3        | NONE       |
|                                                                                     | 9382    | 3.5 to 20   | 5        | $-750 \pm 300$             | 300             | .5 to 3        | BLUE       |
|                                                                                     | 9383    | 5 to 30     | 5        | $-1500 \pm 500$            | 200             | .5 to 3        | ORANGE     |
|                                                                                     | 9384    | 9 to 50     | 5        | $-1500 \pm 500$            | 200 @ 1 MHz     | .5 to 3        | BROWN      |

# Tuning Tools



## SQUARE DRIVE TUNING TOOLS

| JMC P/N | APPLICATION                                                                      |
|---------|----------------------------------------------------------------------------------|
| 2190    | { 9690 SEAL-TRIM® SERIES<br>9910 THIN-TRIM® SERIES                               |
| 4192    | { 9401 } THIN-TRIM® SERIES<br>{ 9402 }<br>{ 9620 } SEAL-TRIM® SERIES<br>{ 9630 } |
| 4193    | { 9410 THIN-TRIM® SERIES<br>99610 SEAL-TRIM® SERIES                              |

## ROUND NUT WRENCHES

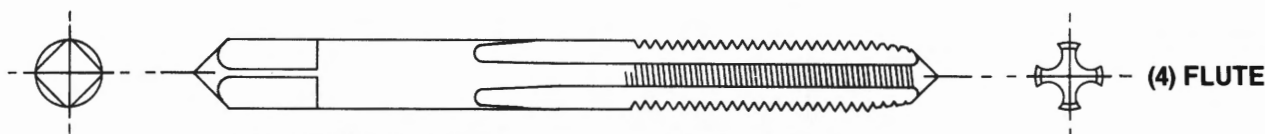
|      |                           |
|------|---------------------------|
| 4956 | 5700 MINIATURE AIR SERIES |
|------|---------------------------|

|      |                           |
|------|---------------------------|
| 4958 | 5800 MINIATURE AIR SERIES |
|------|---------------------------|

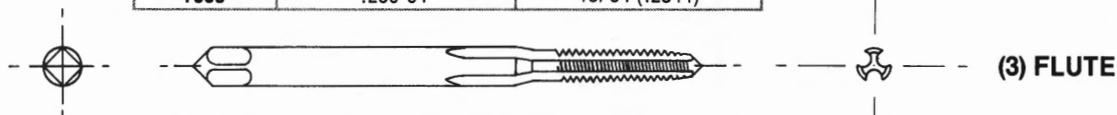
## SLOT TUNING TOOLS

|      |                                                                                                                     |
|------|---------------------------------------------------------------------------------------------------------------------|
| 8762 | { 7260 } GIGA-TRIM® SERIES<br>{ 27260 }<br>{ 37260 }<br>6922 TUNING ELEMENT                                         |
| 8777 | { 5200, 5300, 5400, 5500, 5600 } STANDARD AIR SERIES<br>{ 5700 MINIATURE AIR SERIES<br>9300 VARIABLE CERAMIC SERIES |
|      | { 27270, 37270 } GIGA-TRIM® SERIES<br>{ 27280, 37280 }<br>{ 27290, 37290 }<br>5800 MINIATURE AIR SERIES             |

## Taps



| JMC P/N | THREAD SIZE | RECOMMENDED TAP DRILL |
|---------|-------------|-----------------------|
| 7059    | .156-64     | 9/64 (.1406)          |
| 7060    | .120-80     | 7/64 (.1094)          |
| 7061    | .190-64     | #17 (.173)            |
| 7062    | .234-64     | 7/32 (.2187)          |
| 7063    | .250-64     | 15/64 (.2344)         |



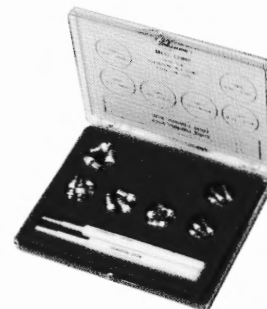
| JMC P/N | THREAD SIZE | RECOMMENDED TAP DRILL |
|---------|-------------|-----------------------|
| 7064    | .094-80     | #45 (.082)            |

## Hardware

|  | JMC P/N | MOUNTING THREAD UNS-2 |  | JMC P/N | MOUNTING THREAD UNS-2 |
|--|---------|-----------------------|--|---------|-----------------------|
|  | 6515    | .234-64               |  | 1999    | .234-64               |
|  | 6516    | .190-64               |  | 1994    | .190-64               |
|  | 6517    | .120-80               |  | 1993    | .120-80               |
|  | 8705    | .234-64               |  | 6546    | .234-64               |
|  | 8702    | .190-64               |  | 4825    | .190-64               |
|  | 8701    | .120-80               |  | 4680    | .120-80               |
|  | 4613    | .234-64               |  | 3469    | .234-64               |
|  | 6486    | .190-64               |  | 4537    | .190-64               |
|  | 6487    | .120-80               |  | 6389    | .120-80               |

# Prototyping Kits

*Johanson*



For prototyping specify:

## AIR DIELECTRIC

| JK-500 CAPACITOR KIT \$90.00 |      |             |  |
|------------------------------|------|-------------|--|
| QTY.                         | UNIT | RANGE pF    |  |
| 3                            | 5201 | .8 to 10    |  |
| 3                            | 5202 | .8 to 10    |  |
| 3                            | 5701 | .6 to 6     |  |
| 3                            | 5702 | .6 to 6     |  |
| 3                            | 5801 | .35 to 3.5  |  |
| 3                            | 5802 | .35 to 3.5  |  |
| 1                            | 8777 | TUNING TOOL |  |

## GIGA-TRIM®

| JK-272 CAPACITOR KIT \$99.50 |       |             |  |
|------------------------------|-------|-------------|--|
| QTY.                         | UNIT  | RANGE pF    |  |
| 3                            | 27261 | .3 to 1.2   |  |
| 3                            | 26263 | .3 to 1.2   |  |
| 3                            | 27271 | .6 to 4.5   |  |
| 3                            | 27284 | .4 to 2.5   |  |
| 3                            | 27285 | .4 to 2.5   |  |
| 3                            | 27291 | .8 to 8     |  |
| 1                            | 8762  | TUNING TOOL |  |
| 1                            | 8777  | TUNING TOOL |  |

| JK-372 CAPACITOR KIT \$99.50 |       |             |  |
|------------------------------|-------|-------------|--|
| QTY.                         | UNIT  | RANGE pF    |  |
| 3                            | 37261 | .3 to 1.2   |  |
| 3                            | 37263 | .3 to 1.2   |  |
| 3                            | 37271 | .6 to 4.5   |  |
| 3                            | 37284 | .4 to 2.5   |  |
| 3                            | 37285 | .4 to 2.5   |  |
| 3                            | 37291 | .8 to 8     |  |
| 1                            | 8762  | TUNING TOOL |  |
| 1                            | 8777  | TUNING TOOL |  |

## SEAL-TRIM®

| JK-960 CAPACITOR KIT \$69.00 |      |             |  |
|------------------------------|------|-------------|--|
| QTY.                         | UNIT | RANGE pF    |  |
| 3                            | 9610 | 1 to 4.5    |  |
| 3                            | 9611 | 2.5 to 10   |  |
| 3                            | 9612 | 4 to 18     |  |
| 3                            | 9613 | 6 to 35     |  |
| 3                            | 9614 | 7 to 40     |  |
| 3                            | 9615 | 5 to 25     |  |
| 3                            | 4193 | TUNING TOOL |  |

| JK-962 CAPACITOR KIT \$69.00 |      |             |  |
|------------------------------|------|-------------|--|
| QTY.                         | UNIT | RANGE pF    |  |
| 4                            | 9620 | .5 to 2.5   |  |
| 4                            | 9621 | 1 to 5      |  |
| 4                            | 9622 | 2.5 to 10   |  |
| 4                            | 9629 | 5 to 20     |  |
| 3                            | 4192 | TUNING TOOL |  |

| JK-969 CAPACITOR KIT \$55.00 |      |             |  |
|------------------------------|------|-------------|--|
| QTY.                         | UNIT | RANGE pF    |  |
| 4                            | 9692 | 6 to 25     |  |
| 4                            | 9694 | 7.5 to 50   |  |
| 4                            | 9697 | 20 to 100   |  |
| 2                            | 2190 | TUNING TOOL |  |

## THIN-TRIM®

| JK-940 CAPACITOR KIT \$55.00 |        |             |  |
|------------------------------|--------|-------------|--|
| QTY.                         | UNIT   | RANGE pF    |  |
| 5                            | 9410-0 | 1 to 4.5    |  |
| 5                            | 9410-1 | 2.5 to 10   |  |
| 5                            | 9410-2 | 4 to 18     |  |
| 5                            | 9410-3 | 6 to 35     |  |
| 3                            | 4193   | TUNING TOOL |  |

| JK-941 CAPACITOR KIT \$67.50 |        |             |  |
|------------------------------|--------|-------------|--|
| QTY.                         | UNIT   | RANGE pF    |  |
| 5                            | 9401-0 | .25 to .7   |  |
| 5                            | 9401-1 | .5 to 1.3   |  |
| 5                            | 9401-2 | .6 to 2     |  |
| 5                            | 9401-4 | 1.5 to 4    |  |
| 3                            | 4192   | TUNING TOOL |  |

| JK-942 CAPACITOR KIT \$59.00 |        |             |  |
|------------------------------|--------|-------------|--|
| QTY.                         | UNIT   | RANGE pF    |  |
| 4                            | 9402-0 | .5 to 2.5   |  |
| 4                            | 9402-1 | 1 to 5      |  |
| 4                            | 9402-2 | 2.5 to 10   |  |
| 4                            | 9402-6 | 6 to 25     |  |
| 4                            | 9402-8 | 5 to 15     |  |
| 4                            | 9402-9 | 5 to 20     |  |
| 3                            | 4192   | TUNING TOOL |  |

## MICROWAVE TUNING ELEMENT

| JK-690 TUNING ELEMENT KIT \$105.00 |        |               |             |  |
|------------------------------------|--------|---------------|-------------|--|
| QTY.                               | UNIT   | @ MAX. TRAVEL | ROD DIA.    |  |
| 5                                  | 6924-0 | .148          | .072        |  |
| 5                                  | 6925-0 | .148          | .125        |  |
| 5                                  | 6926-0 | .106          | .160        |  |
| 5                                  | 6927-0 | .256          | .160        |  |
| 3                                  | 6928-0 | .345          | .160        |  |
| 3                                  | 6929-0 | .450          | .125        |  |
| 4                                  | 6933-0 | .168          | .062        |  |
| 3                                  | 6935-0 | .265          | .152        |  |
| 1                                  | 7060   |               | .120-80 TAP |  |
| 1                                  | 7061   |               | .190-64 TAP |  |
| 1                                  | 7062   |               | .234-64 TAP |  |

## VARIABLE CERAMIC

| JK-930 CAPACITOR KIT \$69.00 |      |             |  |
|------------------------------|------|-------------|--|
| QTY.                         | UNIT | RANGE pF    |  |
| 5                            | 9307 | 2 to 12     |  |
| 5                            | 9308 | 2.5 to 23   |  |
| 5                            | 9309 | 4 to 34     |  |
| 5                            | 9310 | 5.5 to 45   |  |
| 5                            | 9311 | 6 to 55     |  |
| 10                           | 9372 | 3 to 10     |  |
| 10                           | 9374 | 5 to 25     |  |
| 3                            | 9382 | 3.5 to 20   |  |
| 1                            | 8777 | TUNING TOOL |  |

## Care and Handling

**MOUNTING:** Recommended mounting torque for bushing mounted capacitors:

| BUSHING THREAD | TORQUE OZ. IN. |
|----------------|----------------|
| .234-64        | 50             |
| .190-64        | 30             |
| .120-80        | 10             |

**SOLDERING:** Use low temperature solder. Use a temperature controlled 40 watt iron for most applications. Solder joint should be made in 3 seconds or less. Do not solder directly to bushing or stator.

**CLEANING:** Capacitors should be protected from penetration of cleaning solvents as they tend to wash in flux and wash out lubricant.

**AIR CAPACITORS** Clean with seal caps securely in place.  
**GIGA-TRIM® CAPACITORS** Install after circuit boards are cleaned. If not possible, use a small plastic cap to prevent solvent from washing out rotor lubricant.  
**SEAL-TRIM® CAPACITORS** Withstand solvent cleaning and are well suited to water cleaning  
**THIN-TRIM® CAPACITORS** Withstand solvent cleaning. Rough torque or binding of the rotor can be caused by dirty solvents. If this occurs, reclean the capacitor in fresh solvent and dry thoroughly.

**ADJUSTING:** Always use the recommended tuning tool. Johanson tuning tools are designed specifically for tuning Johanson products; use of other tools may damage the internal bushing thread causing the rotor to bind.



Electronic Accuracy through Mechanical Precision