

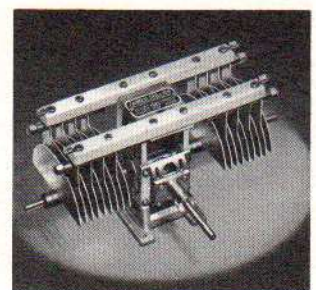
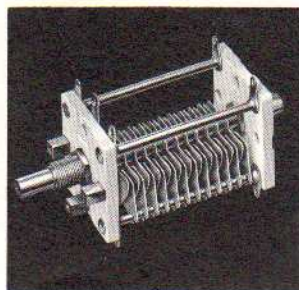
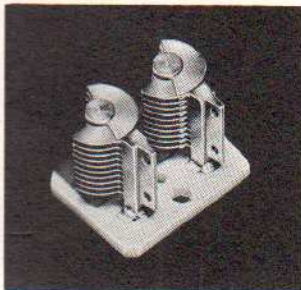


JAMES MILLEN

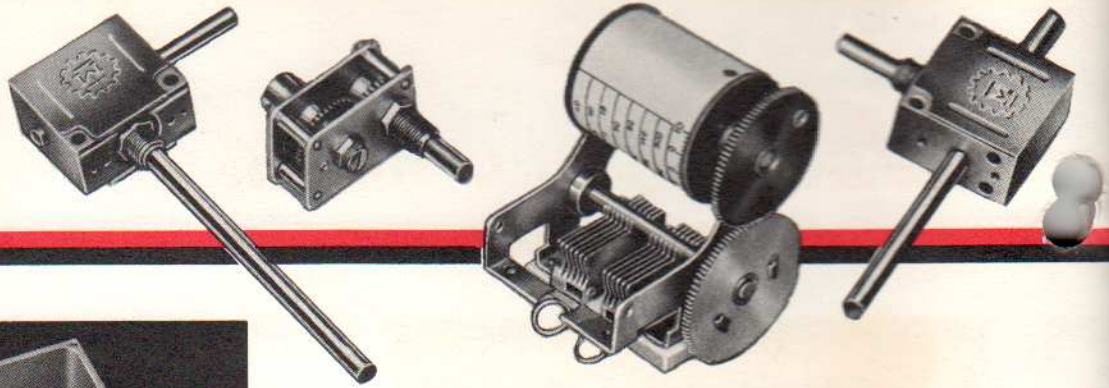
MANUFACTURING COMPANY, INC.

ENGINEERS'
GUIDE TO
CAPACITORS

"SPECIAL" AND STANDARD CAPACITORS

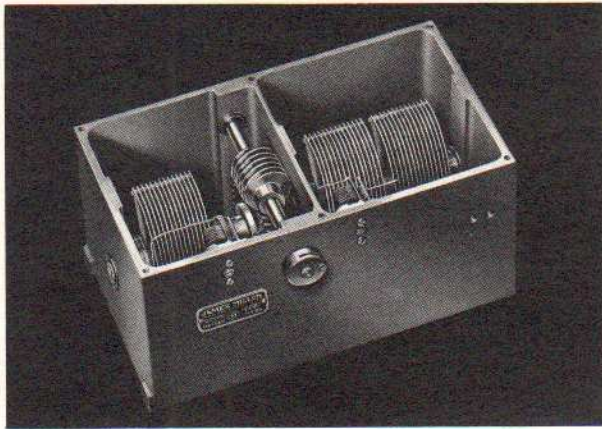


"Designed for Application"®



"SPECIAL" CAPACITORS

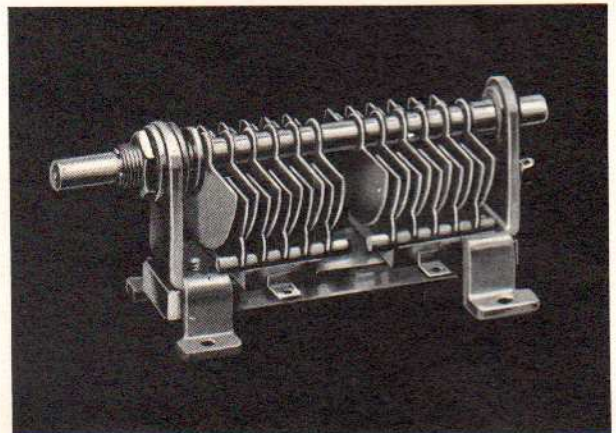
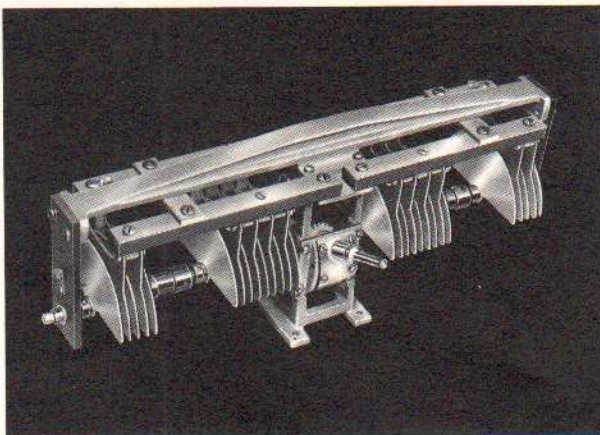
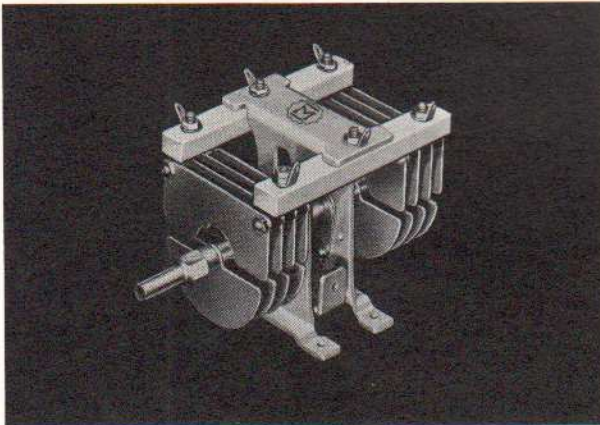
"Designed for Application"®



At James Millen Manufacturing Co., Inc. "special" capacitor designs and developments are the commonplace. Orders for unusual "special" capacitors are a specialty with us where we have the vast amount of standard parts and pieces of capacitor hardware to accomplish an infinite variety of specialized capacitors from the basic unit up to a completely new design. Whether it is a "special" capacitor to fit into a one inch cube or a capacitor a foot long, or custom units with low voltages required in solid state circuits to 9000 volt applications, James Millen Manufacturing Co., Inc. can design and produce it. Regardless of the size, voltage, or capacity, and whether it is an inline drive, right angle drive, gear box driven, or motor driven our facilities can manufacture a "special" capacitor to meet your specifications. Balanced low-torque constructions are also available to meet all the needs of the Armed Services and highly specialized research programs.

Since James Millen Manufacturing Co., Inc. manufactures and designs a wide range of shaft hardware (knobs, drives, couplings, locks and gears) we can incorporate these into "special" capacitor designs to meet practically any equipment need, as well as its commercial or MIL specifications.

The samples shown on this page give you an idea of the many thousands of "special" capacitors designed, developed and built by James Millen Manufacturing Co., Inc. The capacitor experience of James Millen Manufacturing Co., Inc. is based upon years of custom manufacturing for companies such as R.C.A., Foxboro Company, and John Oster Mfg. Co. This experience plus the available tooling will give you an unusual advantage in obtaining "special" capacitors with speedy delivery, exacting quality and custom design at a sensible price.





22000 SERIES AND 23000 SERIES VARIABLE AIR CAPACITORS



22000 GK

FEATURES: "Designed for Application", the 22000 Series is a precision variable air capacitor similar to the 23000 Series, but as a single section only. Rotor and stator plates are soldered to supports to eliminate microphonics. Uniformly spaced, brass plates are cadmium-plated. On special order, plates may be silver-plated.

AVAILABLE MODIFICATIONS: (see story on right) Standard capacitors are Style GK, unless otherwise specified.

STYLE GK — SINGLE SECTION — SINGLE END PLATE 0.020" AIR GAP — 800 V. PEAK

Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dimension "S"	Dimension "X"
22006	7.5 mmf	2.8 mmf	1	1	1 5/8"	1 1/8"
22015	18.5 mmf	2.9 mmf	2	2	1 5/8"	1 1/8"
22030	30.0 mmf	3.7 mmf	3	3	1 3/4"	1 1/4"
22035	35.0 mmf	3.8 mmf	3	4	1 3/4"	1 1/4"
22050	53.5 mmf	4.0 mmf	5	5	1 7/8"	1 3/8"
22065	69.5 mmf	4.5 mmf	7	6	2"	1 7/16"
22075	81.0 mmf	4.8 mmf	8	7	2 1/8"	1 1/2"
22100	107.0 mmf	6.0 mmf	10	10	2 1/4"	1 3/4"
22140	148.5 mmf	7.5 mmf	13	14	2 1/2"	2"

0.060" AIR GAP — 2000 V. PEAK

22910	12.5 mmf	4.1 mmf	3	3	1 7/8"	1 1/4"
22915	19.5 mmf	4.7 mmf	4	5	2"	1 5/8"
22920	21.5 mmf	4.7 mmf	5	5	2 1/8"	1 3/4"

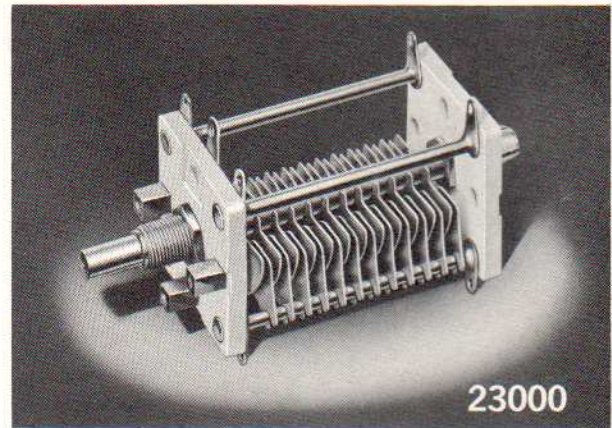
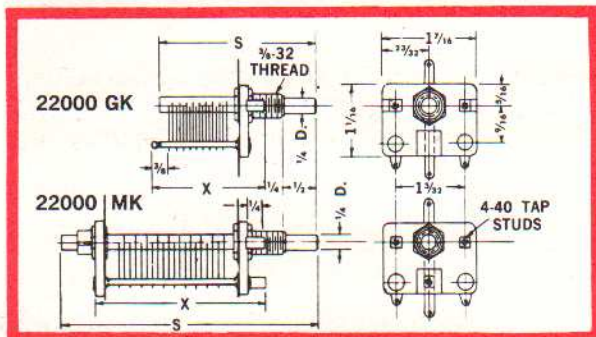
Capacitors with more capacity must be style MK with double bearing

STYLE MK — DOUBLE BEARING — DOUBLE END PLATE 0.020" AIR GAP — 800 V. PEAK

22200 MK	207.0 mmf	11.1 mmf	20	20	3 1/16"	2 7/16"
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0.060" AIR GAP — 2000 V. PEAK

22935 MK	35.0 mmf	6.5 mmf	9	9	3 5/8"	2 3/16"
22950 MK	57.0 mmf	8.5 mmf	13	13	4 1/4"	3"



23000

FEATURES: The 23000 Series is available as a single or dual section variable air capacitor precision-built for smooth rotation. All plates (rotor and stator) are soldered to supporting members to insure permanent bonding and elimination of microphonics. Plates are brass and are cadmium-plated. On special order, plates may be silver-plated. Ceramic insulators are Grade L4 or better. The design provides for stud mounting, single hole bushing mounting, or both.

AVAILABLE MODIFICATIONS: The standard designs are listed on these two pages but James Millen Mfg. Co., Inc. is completely tooled to provide different combinations with single or double bearings, single or double spacing, or dual end plates. Any practical combination is possible for special capacitors from standard parts. Each of the styles below can be designed to special order. Specify one or more of the following designations preceded by the Millen catalog number. Standard capacitors are Style TM, unless otherwise specified.

- | | |
|-----------------------------|--------------------------|
| E. Special shaft extension* | S. Slotted shaft |
| G. Single end plate | T. Balanced rotor |
| K. Single section | (dual section) |
| LN. Locknut on shaft | U. Insulating knob |
| M. Double end plate | X. Rear shaft extension* |
| R. Inline rotor | Y. Air gap: 0.060" — |
| (dual section) | 2000 V. peak |

(*) Indicate length measured from end of bearing

STYLE TG — BALANCED ROTOR — DUAL SECTION —

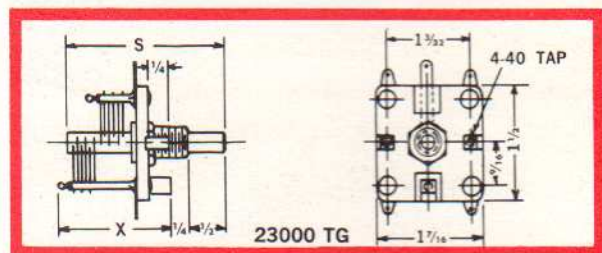
MODEL SPECIFICATIONS: Air gap: 0.020" — 800 V. peak. Single end plate construction.

STYLE TGY — BALANCED ROTOR — DUAL SECTION —

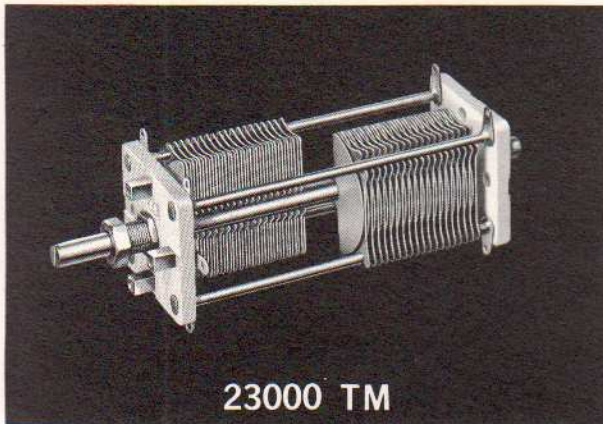
MODEL SPECIFICATIONS: Air gap: 0.060" — 2000 V. peak. Single end plate construction.

Millen Cat. No.	Max. Cap. Per Sec.	Min. Cap. Per Sec.	Rotor Plates	Stator Plates	Dimension "S"	Dimension "X"
23910 TGY	11.0 mmf	4.3 mmf	2	3	2 1/4"	1 3/4"
23915 TGY	15.0 mmf	4.9 mmf	3	4	2 5/8"	2 1/8"
23920 TGY	19.5 mmf	6.0 mmf	4	5	3 1/4"	2 3/4"
23930 TGY	28.0 mmf	7.4 mmf	6	7	3 9/16"	3 1/16"

Capacitors with more capacity must be Style TMY with double bearing



23000 SERIES VARIABLE AIR CAPACITORS



23000 TM

FEATURES: (see story on left, page 4)
 AVAILABLE MODIFICATIONS: (see story on left, page 4)

STYLE TM — BALANCED ROTOR — DUAL SECTION — DOUBLE BEARING

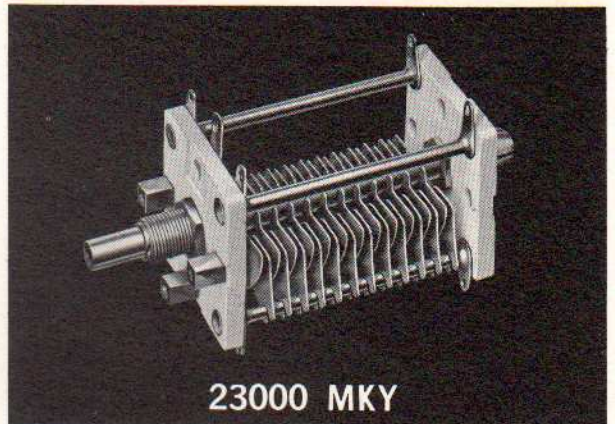
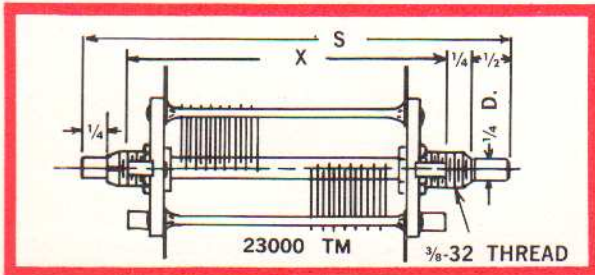
MODEL SPECIFICATIONS: Air gap: 0.020" — 800 V. peak.
 Double end plate construction. Double bearing.

Millen Cat. No.	Max. Cap. Per Sec.	Min. Cap. Per Sec.	Rotor Plates	Stator Plates	Dimension "S"	Dimension "X"
23015 TM	16.5 mmf	3.0 mmf	2	2	3 1/8"	1 7/8"
23030 TM	32.5 mmf	5.0 mmf	3	3	3 1/8"	1 7/8"
23050 TM	55.0 mmf	6.0 mmf	5	5	3 7/16"	2 3/8"
23075 TM	83.5 mmf	7.0 mmf	8	7	4 1/8"	2 7/8"
23100 TM	107.5 mmf	9.0 mmf	10	10	4 7/16"	3 1/4"
23140 TM	146.5 mmf	10.0 mmf	13	13	5"	3 3/4"

STYLE TMY — BALANCED ROTOR — DUAL SECTION — DOUBLE BEARING

MODEL SPECIFICATIONS: Air gap: 0.060" — 2000 V. peak.
 Double end plate construction. Double bearing.

23912 TMY	12.5 mmf	3.6 mmf	3	3	4 7/16"	3 3/16"
23925 TMY	27.5 mmf	8.2 mmf	6	6	4 11/16"	3 1/2"
23935 TMY	35.0 mmf	9.5 mmf	8	7	5 1/4"	4"



23000 MKY

STYLE MK — SINGLE SECTION — DOUBLE BEARING

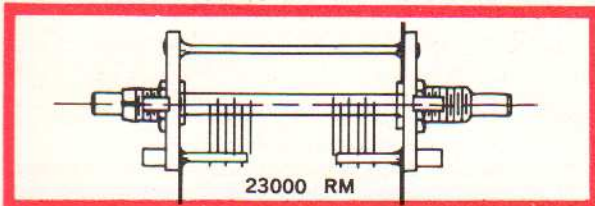
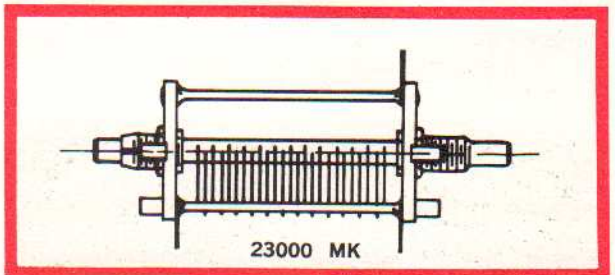
MODEL SPECIFICATIONS: Air gap: 0.020" — 800 V. peak.
 Double end plate construction, single section. Double bearing.

Millen Cat. No.	Max. Cap. Per Sec.	Min. Cap. Per Sec.	Rotor Plates	Stator Plates	Dimension "S"	Dimension "X"
23025 MK	25.5 mmf	4.2 mmf	3	2	2 5/8"	1 7/16"
23050 MK	55.0 mmf	6.0 mmf	5	5	2 3/4"	1 5/8"
23065 MK	64.0 mmf	6.0 mmf	6	6	2 3/4"	1 1/16"
23075 MK	83.5 mmf	7.0 mmf	8	7	2 9/16"	1 3/4"
23100 MK	100.1 mmf	7.0 mmf	10	10	3 7/16"	2"
23140 MK	146.5 mmf	10.0 mmf	13	13	3 7/16"	2 1/8"

STYLE MKY — 0.060" AIR GAP — SINGLE SECTION — DOUBLE BEARING

MODEL SPECIFICATIONS: Air gap: 0.060" — 2000 V. peak.
 Double end plate construction, single section. Double bearing.

23907 MKY	7.0 mmf	3.5 mmf	2	1	2 3/4"	1 1/16"
23912 MKY	13.5 mmf	4.8 mmf	3	3	2 13/16"	1 3/4"
23915 A	19.5 mmf	5.0 mmf	4	5	4 1/4"	1 7/32"
23920 MKY	20.0 mmf	5.6 mmf	4	5	3 1/8"	1 7/8"
23928 MKY	28.5 mmf	6.5 mmf	7	6	3 7/16"	2 3/8"
23940 MKY	39.0 mmf	8.0 mmf	9	9	4 1/16"	2 5/8"
23950 MKY	54.5 mmf	10.5 mmf	13	12	4 1/2"	3 7/16"

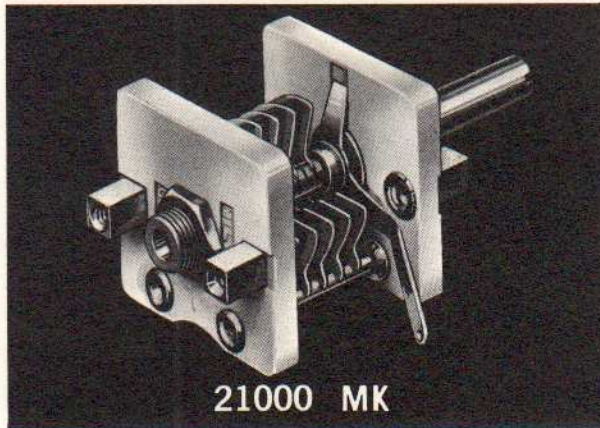


STYLE RM — INLINE ROTOR — DUAL SECTION — DOUBLE BEARING

MODEL SPECIFICATIONS: same physical dimensions as Style TM above. Double end plate construction, dual section.
 Air gap: 0.020" — 800 V. peak.



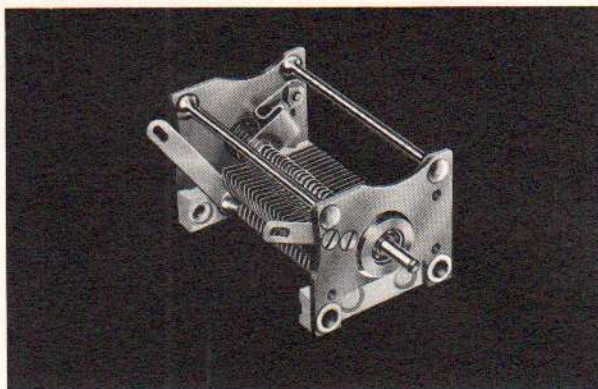
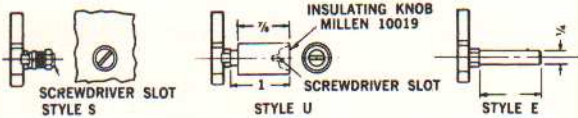
21000 SERIES VARIABLE AIR CAPACITORS



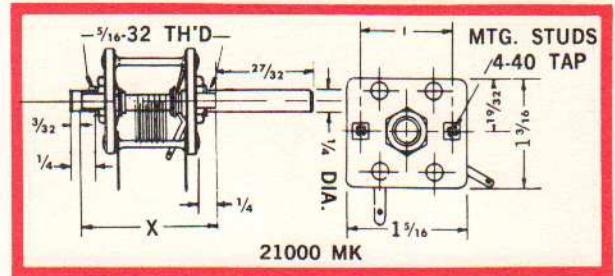
FEATURES: The 21000 Series is a smaller version of the popular Millen 23000 Series variable air capacitors. Single and dual sections are precision-built for smooth rotation. All plates (rotor and stator) are soldered to supporting members to insure permanent bonding and elimination of microphonics. Non-chatter brass bearings; brass plates are silver-plated. Uniform air gaps on all plates. Grade L4 ceramic end plate.

AVAILABLE MODIFICATIONS: James Millen Mfg. Co., Inc. is prepared to furnish from available tooling the combinations of modifications listed below. When ordering for special requirements specify one or more of the following designations preceded by the Millen catalog number. Standard capacitors are Style MK unless otherwise specified.

- E. Special shaft extension*
 - K. Single section
 - LN. Locknut on shaft
 - M. Double end plate
 - R. Inline rotor (dual section)
 - S. Slotted shaft
 - T. Balanced rotor (dual section)
 - U. Insulating knob (Millen 10019)
 - X. Rear shaft extension*
 - Y. Air gap: 0.045" — 1400 V. peak
- (*) Indicate length measured from end of bearing



Example of a special 21000 capacitor. Plates gold-plated, rotor shaft equipped with ballbearing race.



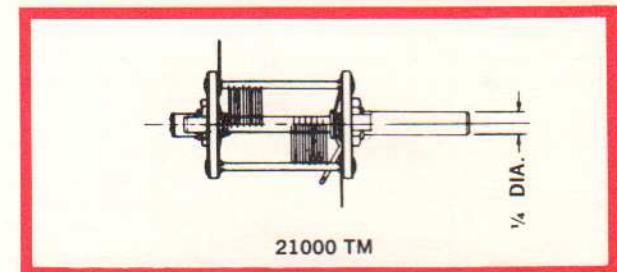
STYLE MK — SINGLE SECTION — DOUBLE BEARING
MODEL SPECIFICATIONS: Air gap: 0.015" — 600 V. peak.
 Double end plate, single section. Double bearing.

Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "X"
21015	20.0 mmf	2.8 mmf	2	3	1 7/16"
21020	23.1 mmf	2.88 mmf	3	3	1 7/16"
21025	28.5 mmf	3.0 mmf	3	4	1 7/16"
21030	31.3 mmf	3.03 mmf	4	4	—
21035	40.0 mmf	3.1 mmf	5	5	1 5/8"
21045	43.7 mmf	3.3 mmf	6	5	1 5/8"
21048	47.7 mmf	3.34 mmf	6	6	1 5/8"
21050	56.0 mmf	3.5 mmf	7	7	1 5/8"
21052	51.9 mmf	3.42 mmf	7	6	1 5/8"
21075	84.5 mmf	4.5 mmf	10	11	1 3/4"
21100	104.5 mmf	6.1 mmf	13	14	1 3/4"
21140	145.8 mmf	7.9 mmf	19	18	2 3/8"

STYLE MK — 0.045" AIR GAP — SINGLE SECTION — DOUBLE BEARING

MODEL SPECIFICATIONS: Air gap: 0.045" — 1400 V. peak.
 Double end plate, single section. Double bearing. No. 21935 supplied with rear contact spring.

21904	3.8 mmf	2.5 mmf	1	1	1 7/16"
21906	6.3 mmf	3.6 mmf	1	2	1 7/16"
21910	10.7 mmf	4.0 mmf	3	3	1 1/2"
21920	22.5 mmf	4.7 mmf	7	7	1 5/16"
21925	27.0 mmf	5.4 mmf	9	8	2 1/8"
21935	39.5 mmf	6.7 mmf	13	12	2 3/4"



STYLE TM — BALANCED ROTOR — DUAL SECTION — DOUBLE BEARING

MODEL SPECIFICATIONS: Air gap: 0.015" — 600 V. peak.
 Double end plate, dual section. Double bearing.

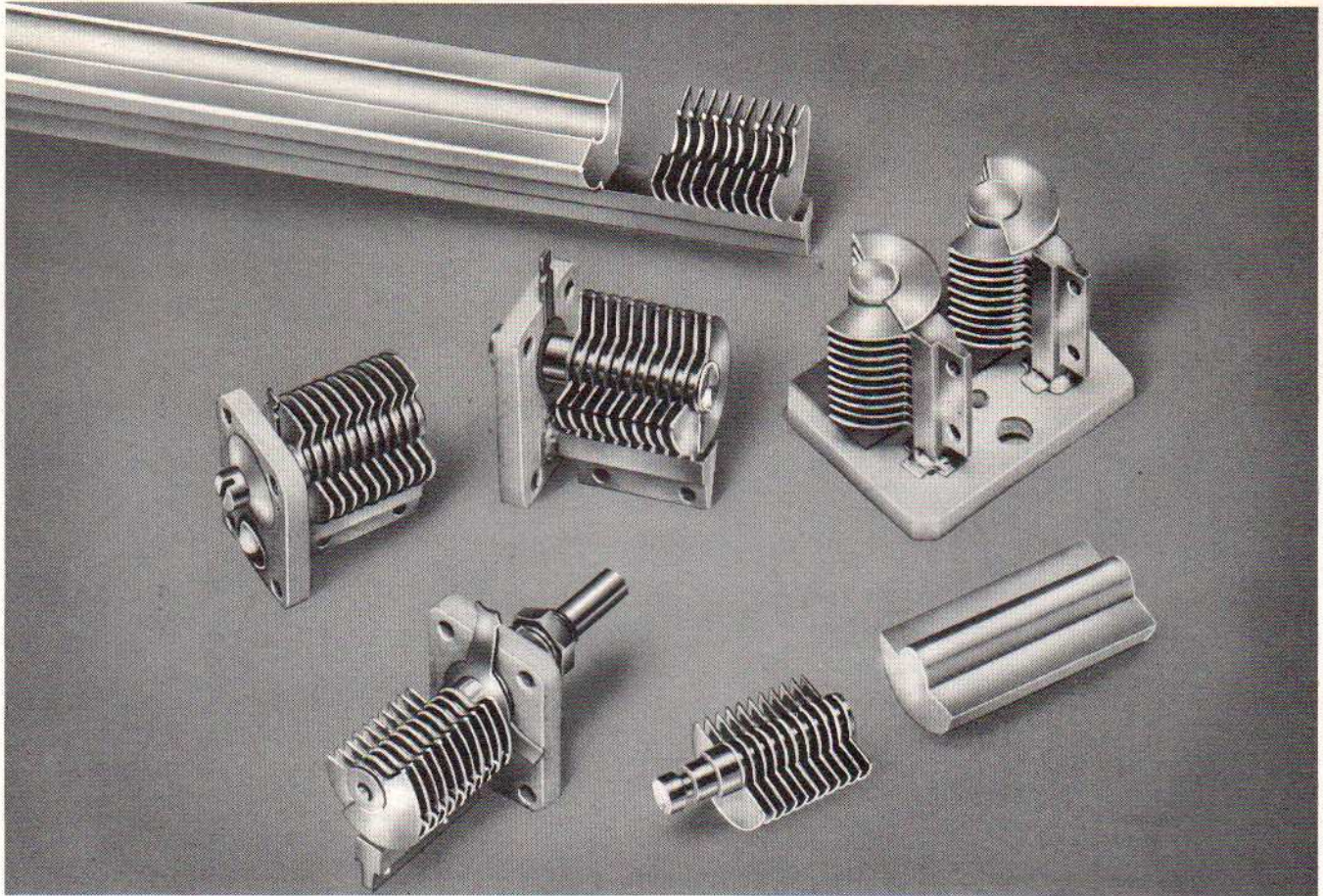
Millen Cat. No.	Max. Cap. Per Sec.	Min. Cap. Per Sec.	Rotor Plates	Stator Plates	Dim. "X"
21110 TM	113.0 mmf	8.2 mmf	13	14	3 3/4"

STYLE TMY — BALANCED ROTOR — DUAL SECTION — DOUBLE BEARING

MODEL SPECIFICATIONS: Air gap: 0.045" — 1400 V. peak.
 Double end plate, dual section. Double bearing.



25000 SERIES MINIATURIZED HIGH RELIABILITY

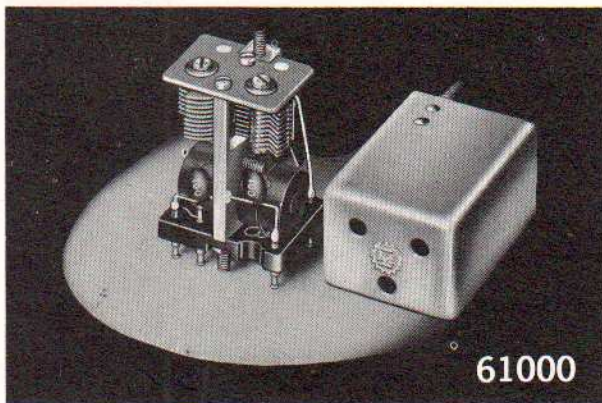


EXPLANATION OF 25000 SERIES MACHINED FROM SOLID BARS OF EXTRUDED BRASS

Modern demands for miniature precision, high Q variable air dielectric capacitors with high reliability require that all of the stator plates be machined from a solid block of extruded brass and that all of the rotor plates be machined from a solid block of extruded brass. Staked, soldered, or washer-spacer types of construction are adequate for larger capacitors with wider air gaps but are entirely inadequate for miniature high reliability capacitors for use at high

frequencies. The stator terminal is an integral part of the stator. Alignment of shaft with rotor is perfect since the shaft is an integral part of the rotor. There are no pins or press fits.

This method of construction assures a high reliability, high Q capacitor in a minimum space. For high reliability miniature capacitors, milled construction is essential.

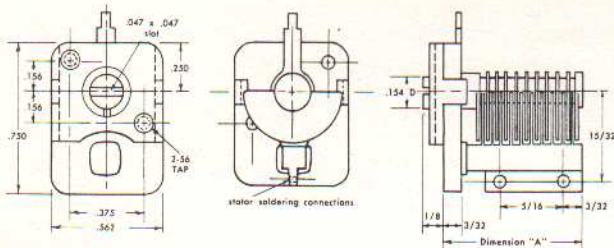
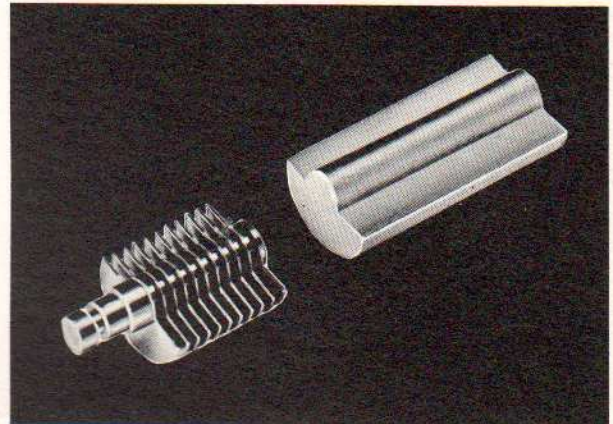
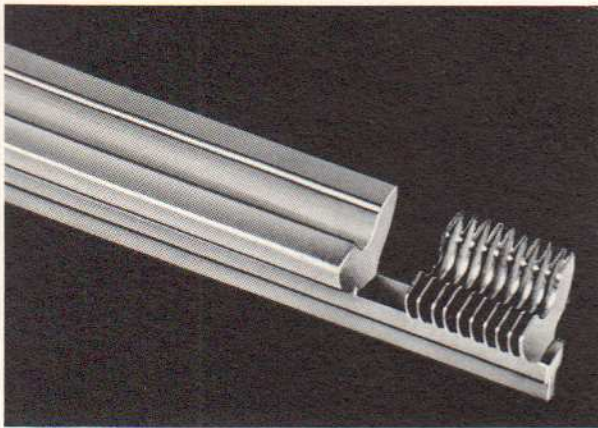


61000 SERIES MINIATURE I.F. TRANSFORMERS

MODEL SPECIFICATIONS: The 61000 Series are extremely high Q — approximately 200 — with all adjustments on top. Small size: $1\frac{1}{16}$ " x $1\frac{1}{16}$ " x $1\frac{1}{8}$ ". Air capacitor tuned. Rugged construction and high electrical stability. Double capacitor was designed and manufactured for a high reliability, high Q, double-tuned I.F. transformer.

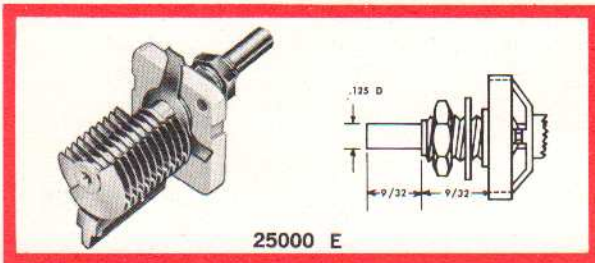
**"DESIGNED FOR APPLICATION"
MADE TO SPECIAL REQUIREMENT**

VARIABLE CAPACITORS MACHINED FROM SOLID BARS OF EXTRUDED BRASS



DESIGN AND MANUFACTURING FACILITIES AVAILABLE FOR SPECIAL REQUIREMENTS

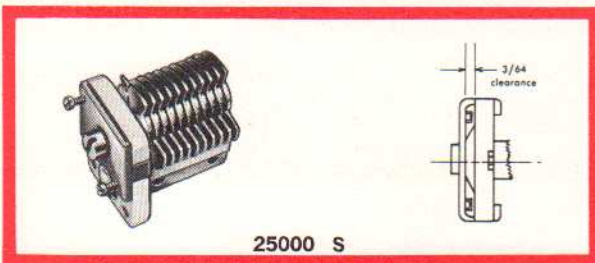
Special 25000 Series capacitors which can be manufactured using all or part of the tooling for standard capacitors are designed and manufactured to order. Examples of this type of "Designed for Application" capacitors are special values of maximum capacity (up to 35 pf), and the double capacity assembly illustrated above. This special double capacitor was designed and manufactured for a high reliability, high Q, double-tuned I.F. transformer.



25000 E SERIES

MODEL SPECIFICATIONS: $\frac{1}{8}$ " diameter extended shaft. Single hole mounting. Air gap: 0.010".

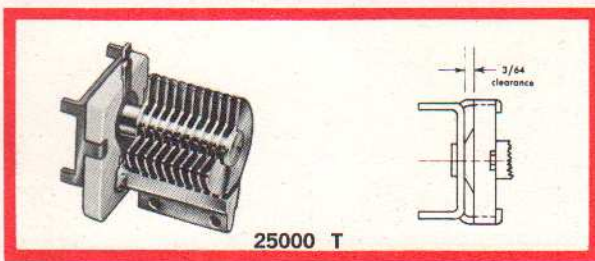
Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "A"
25009 E	9.3 mmf	1.55 mmf	3	3	$1\frac{1}{32}$ "
25012 E	12.75 mmf	1.88 mmf	4	4	$\frac{7}{16}$ "
25015 E	15.7 mmf	2.4 mmf	5	4	$\frac{1}{2}$ "
25025 E	25.2 mmf	3.2 mmf	8	7	$\frac{5}{8}$ "
25035 E	35.0 mmf	4.4 mmf	11	10	$2\frac{3}{32}$ "



25000 S SERIES

MODEL SPECIFICATIONS: Screwdriver slot and bracket for mounting by two 2-56 screws. Air gap: 0.010".

Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "A"
25009 S	9.3 mmf	1.55 mmf	3	3	$1\frac{1}{32}$ "
25012 S	12.75 mmf	1.88 mmf	4	4	$1\frac{1}{32}$ "
25015 S	15.7 mmf	2.2 mmf	5	4	$\frac{7}{16}$ "
25025 S	25.5 mmf	3.0 mmf	8	7	$\frac{9}{16}$ "
25035 S	35.8 mmf	4.0 mmf	11	10	$2\frac{3}{32}$ "



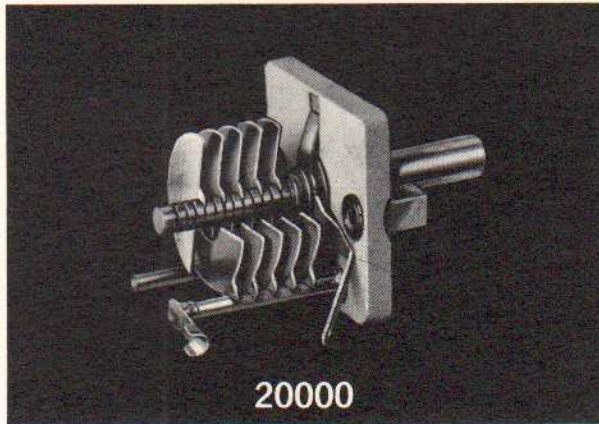
25000 T SERIES

MODEL SPECIFICATIONS: Screwdriver slot and bracket for mounting by four turn-down tabs. Air gap: 0.010".

Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "A"
25009 T	9.3 mmf	1.55 mmf	3	3	$1\frac{1}{32}$ "
25012 T	12.75 mmf	1.88 mmf	4	4	$1\frac{1}{32}$ "
25015 T	15.7 mmf	2.2 mmf	5	4	$\frac{7}{16}$ "
25025 T	25.5 mmf	3.0 mmf	8	7	$\frac{9}{16}$ "
25035 T	35.8 mmf	4.0 mmf	11	10	$2\frac{3}{32}$ "



20000 AND 26000 SERIES VARIABLE AIR CAPACITORS



FEATURES: The Millen 20000 Series and 26000 Series (at right) are designed by James Millen Mfg. Co., Inc. to meet the rigid requirements of a compact, high quality variable air capacitor. Resists temperature, moisture and vibration. Brass rotor and stator plates are soldered to brass supports. Brass rotor and stator assemblies are copper flashed and silver-plated. Rotor contacts are also silver-plated. Other metal parts are brass; nickel-plated. Straight line capacity characteristic. Grade L4 ceramic insulation.

AVAILABLE MODIFICATIONS: Available either with hexagonal collar or slotted shaft to permit rotor adjustment with wrench or screwdriver, or with extended shaft for knob control or shaft coupling. For one or more special modifications specify designations after Millen catalog number.

- | | |
|-----------------------------|-----------------------------------|
| E. Special shaft extension* | X. Rear shaft extension |
| LN. Locknut on shaft | Y. Air gap: 0.045" — 1400 V. peak |
| S. Slotted shaft | |
| U. Insulating knob | |

(*) Indicate length measured from end of bearing

0.015" AIR GAP

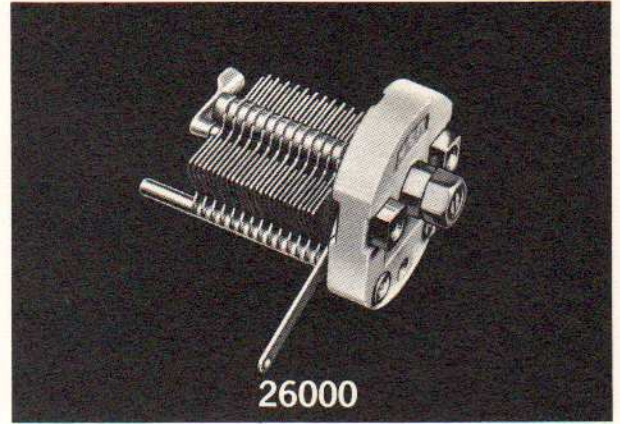
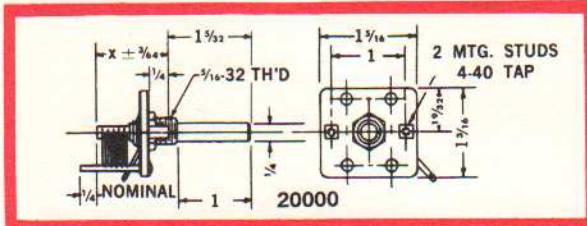
MODEL SPECIFICATIONS: Air gap: 0.015" — 600 V. peak. Single end plate construction, single section.

Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "X"	Freq.
20005	4.5 mmf	2.0 mmf	1	1	3/4"	3 MC
20015	20.0 mmf	2.8 mmf	2	3	3/4"	3 MC
20025	28.5 mmf	2.8 mmf	3	4	7/8"	3 MC
20035	40.0 mmf	2.8 mmf	5	5	1 1/16"	3 MC
20050	59.0 mmf	3.9 mmf	7	7	1"	3 MC
20075	88.5 mmf	4.4 mmf	10	11	1 1/4"	3 MC
20100	111.0 mmf	5.2 mmf	13	14	1 1/2"	3 MC

0.045" AIR GAP

MODEL SPECIFICATIONS: Air gap: 0.045" — 1400 V. peak.

20904	3.8 mmf	2.5 mmf	1	1	7/8"	3 MC
20905	6.3 mmf	— mmf	1	2	7/8"	3 MC
20910	11.0 mmf	3.0 mmf	3	3	1"	3 MC
20920	22.5 mmf	5.3 mmf	7	7	1 1/2"	3 MC
20925	27.0 mmf	5.4 mmf	9	8	1 3/4"	3 MC
20935	39.5 mmf	6.7 mmf	13	12	2 1/8"	3 MC



FEATURES: (26000 Series, see story on left)

AVAILABLE MODIFICATIONS: (see story on left)

0.015" AIR GAP

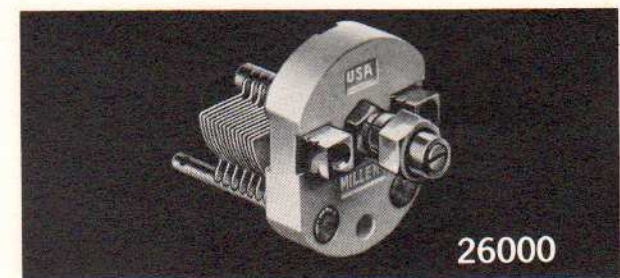
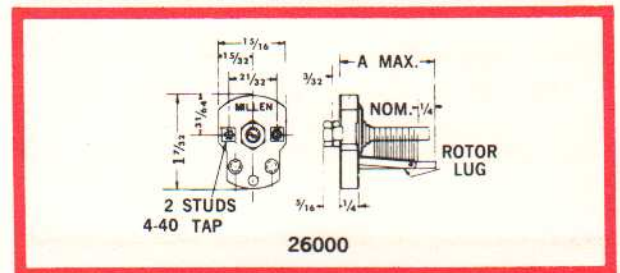
MODEL SPECIFICATIONS: Air gap: 0.015" — 600 V. peak. Single end plate construction, single section.

Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "A"	Freq.
26010	11.0 mmf	2.9 mmf	1	2	7/8"	3 MC
26020	22.5 mmf	3.0 mmf	3	3	1 5/16"	3 MC
26025	27.5 mmf	3.0 mmf	3	4	1 5/16"	3 MC
26035	36.0 mmf	3.2 mmf	5	4	1"	3 MC
26048	48.7 mmf	3.9 mmf	6	6	1 1/8"	3 MC
26050	59.0 mmf	3.9 mmf	7	7	1 1/8"	3 MC
26075	89.5 mmf	4.5 mmf	10	11	1 5/16"	3 MC
26100	109.0 mmf	5.5 mmf	13	14	1 7/16"	3 MC

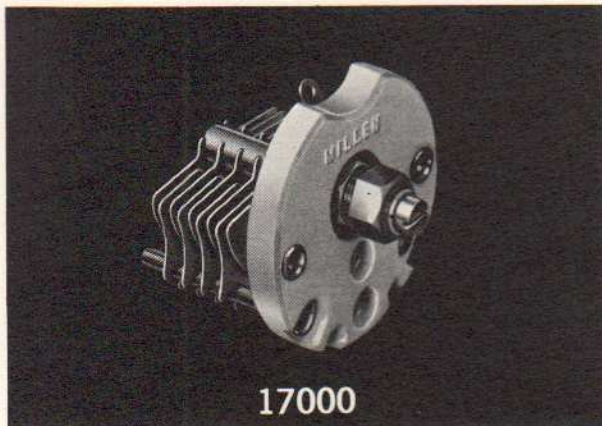
0.045" AIR GAP

MODEL SPECIFICATIONS: Air gap: 0.045" — 1400 V. peak. Single end plate construction, single section.

26910	11.0 mmf	3.3 mmf	3	4	1 1/8"	3 MC
26920	22.5 mmf	5.3 mmf	7	7	1 5/8"	3 MC
26930	31.5 mmf	5.6 mmf	10	10	1 15/16"	3 MC
26935	39.5 mmf	6.8 mmf	13	12	2 1/16"	3 MC



17000 SERIES AND 19000 SERIES TUNING CAPACITORS



17000

FEATURES: The 17000 Series is a single section tuning capacitor with a Grade L4 ceramic front plate. Soldered brass plates are cadmium-plated, and uniformly spaced.

AVAILABLE MODIFICATIONS: For 17000 Series (and 19000 Series at right.) Any practical combination is possible for special capacitors from standard parts. Each of the styles below can be designed to special order. Specify one or more of the following designations preceded by the Millen catalog number.

- E. Special shaft extension^(*)
- LN. Locknut on shaft
- S. Slotted shaft
- U. Insulating knob
- W. Air gap: 0.040" —
- X. Rear shaft extension
- Y. Air gap: 0.066" —

(*) Indicate length measured from end of bearing

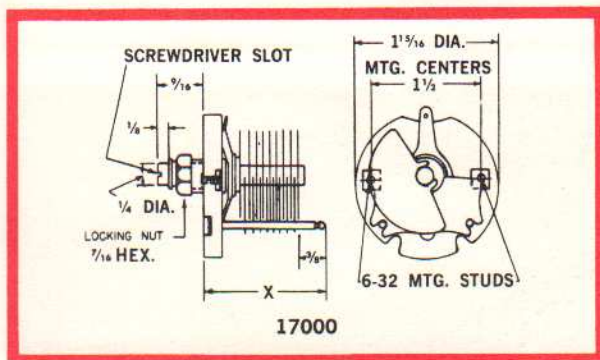
MODEL SPECIFICATIONS: Straight line capacity. Air gap: 0.022" — 850 V. peak. Wide air gap capacitors may be supplied. Specify type number followed by the designation of W or Y. Air gap: (W) 0.040" — 1350 V. peak; (Y) 0.066" — 2250 V. peak.

17000 SERIES — 0.022" AIR GAP — 850 V. PEAK

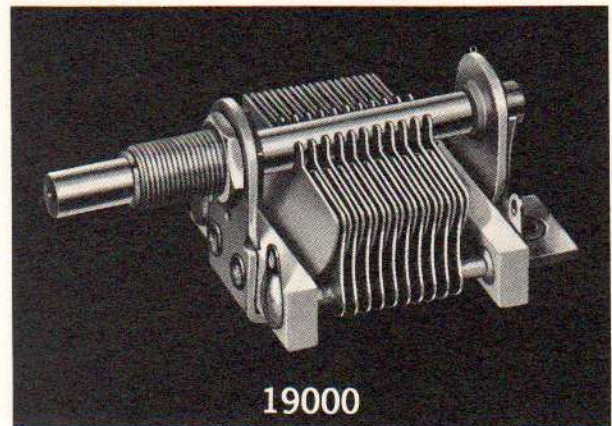
Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "X"
17025	26.0 mmf	2.0 mmf	2	2	1 1/8"
17035	36.0 mmf	2.0 mmf	3	2	1 1/8"
17050	53.0 mmf	2.5 mmf	4	3	1 1/4"
17075	71.0 mmf	4.2 mmf	4	5	1 3/16"
17100	97.0 mmf	4.5 mmf	7	6	1 7/16"
17140	139.0 mmf	5.3 mmf	9	9	1 11/16"

17000 SERIES — 0.066" AIR GAP — 2250 V. PEAK

Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "X"
17925	25.8 mmf	4.5 mmf	5	4	1 5/8"
17935	36.0 mmf	6.5 mmf	6	5	1 3/4"
17950	49.5 mmf	6.8 mmf	9	8	2 1/16"



17000



19000

FEATURES: The 19000 Series is a versatile single section tuning capacitor to meet special requirements available below. Threaded brass front bearing and tapped end brackets permit panel or base mounting. This series has Grade L4 ceramic insulators, soldered brass rotors and stators; rotor shaft supported on bearings at both front and rear of capacitor. Brass plates are cadmium-plated.

AVAILABLE MODIFICATIONS: (see story on left)

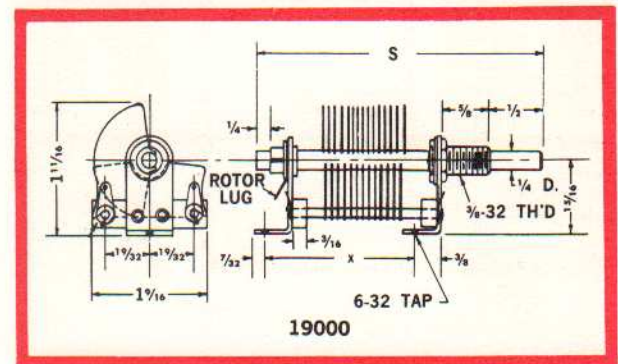
MODEL SPECIFICATIONS: Straight line capacity characteristic. Single spaced types have 0.022" air gap — 850 V. peak. The 19000 Series may be supplied with wide air gaps. Specify type number followed by the designation of W or Y. Air gap: (W) 0.040" — 1350 V. peak; (Y) 0.066" — 2250 V. peak.

19000 SERIES — 0.022" AIR GAP — 850 V. PEAK

Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "S"	Dim. "X"
19025	30.5 mmf	5.7 mmf	2	2	2 5/8"	7/8"
19035	39.1 mmf	6.0 mmf	3	2	2 5/8"	7/8"
19050	58.0 mmf	6.5 mmf	4	3	2 13/16"	1"
19075	80.5 mmf	7.5 mmf	5	5	2 7/8"	1 1/8"
19100	107.0 mmf	8.2 mmf	7	6	3"	1 1/4"
19140	148.0 mmf	9.7 mmf	9	9	3 3/16"	1 3/8"
19200	232.5 mmf	11.7 mmf	14	13	3 1/2"	1 3/4"
19250	272.5 mmf	13.0 mmf	17	16	3 3/4"	2"
19280	296.5 mmf	13.4 mmf	18	17	3 7/8"	2 1/16"
19335	339.0 mmf	14.7 mmf	21	20	4 1/8"	2 3/8"

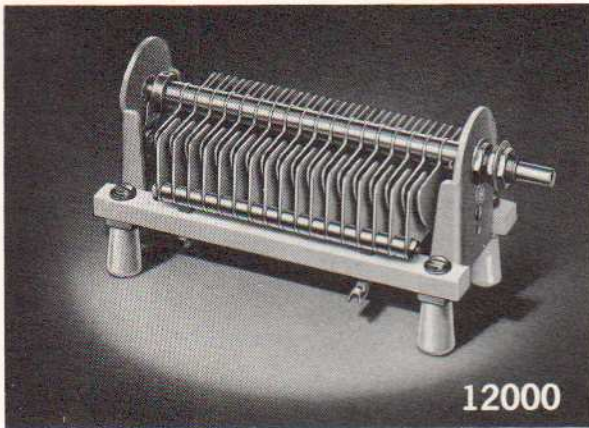
19000 SERIES — 0.066" AIR GAP — 850 V. PEAK

Millen Cat. No.	Max. Cap.	Min. Cap.	Rotor Plates	Stator Plates	Dim. "S"	Dim. "X"
19935	40.0 mmf	8.8 mmf	6	6	3 5/8"	1 3/4"
19950	60.0 mmf	11.6 mmf	9	9	4"	2 1/4"



19000

12000 SERIES TRANSMITTING CAPACITORS

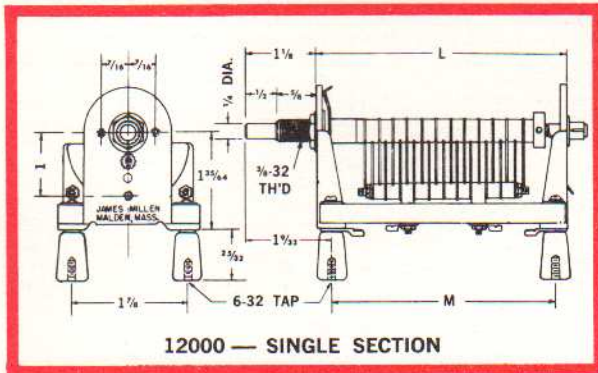


FEATURES: The 12000 Series has rigid, heavy channeled aluminum end plates. Grade L4 ceramic insulations, polished or plain edge contact plates. One-piece rotor contact spring and connection lug. Compact, easy to mount with connector lugs in convenient locations. Hardware is brass; nickel-plated.

AVAILABLE MODIFICATIONS: The group illustration below shows an assortment of 12000 Series capacitors. Any practical combination is possible for special capacitors from standard parts. Each of the styles below can be designed to special order. Specify one or more of the following designations preceded by the Millen catalog number. For large capacities, special end plates and an over-the-top tie bar may be used to provide a very rugged capacitor (see illustration below.) Stops are available.

- A. 3000 V. peak.
- E. Special shaft extension*
- H. Unpolished plates
- J. Polished plates
- K. Single section
- LN. Locknut on shaft
- R. Inline rotor (dual section)
- S. Slotted shaft
- U. Insulating knob
- X. Rear shaft extension
- B. Air gap: 0.176" — 6000 V. peak

(* Indicate length measured from end of bearing)



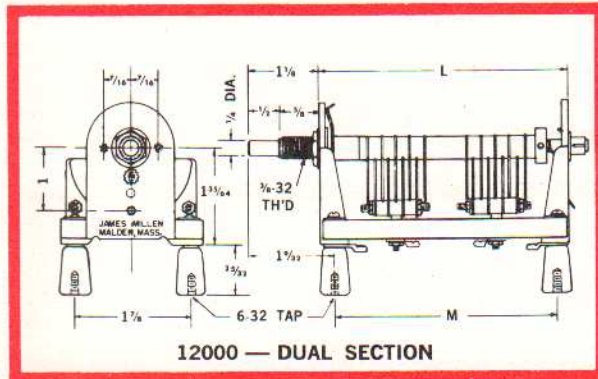
SINGLE SECTION — 0.077" AIR GAP

MODEL SPECIFICATIONS: Polished or unpolished plates available. Air gap: 0.077" — 3000 V. peak. Single section construction, double end plate. Double bearing.

Millen Cat. No.	Max. Cap. Per Sec.	Min. Cap. Per Sec.	Rotor Plates	Stator Plates	Dimension "L" "M"	Plates
12521	20 mmf	4.5 mmf	3	2	3 1/16" 2 1/16"	Plain
12536	35 mmf	5.8 mmf	5	4	3 1/2" 2 3/4"	Plain
12551	49 mmf	8.1 mmf	6	6	3 1/2" 2 3/4"	Plain
12576	71 mmf	9.5 mmf	9	8	4" 3 3/4"	Plain
12510	96 mmf	11. mmf	12	11	4" 3 9/16"	Plain
12515	150 mmf	16. mmf	18	17	5 1/4" 4 3/4"	Plain

SINGLE SECTION — 0.176" AIR GAP

12935	28 mmf	9.7 mmf	7	6	4" 3 9/16"	Polished
12936	28 mmf	9.7 mmf	7	6	4" 3 9/16"	Plain



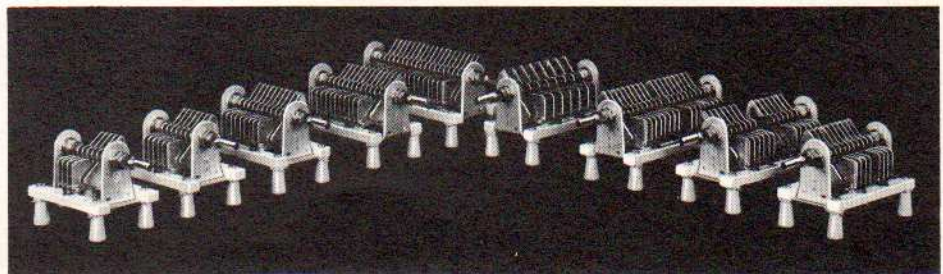
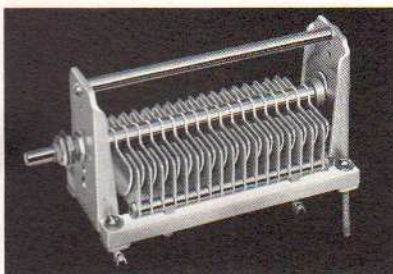
DUAL SECTION — 0.077" AIR GAP

MODEL SPECIFICATIONS: Polished or unpolished plates are available. Air gap: 0.077" — 3000 V. peak. Dual section construction, double end plate. Double bearing.

12035	35 mmf	5.6 mmf	5	4	4" 3 9/16"	Polished
12036	35 mmf	5.6 mmf	5	4	4" 3 9/16"	Plain
12050	49 mmf	8. mmf	6	6	5 1/4" 4 3/4"	Polished
12051	49 mmf	8. mmf	6	6	5 1/4" 4 3/4"	Plain
12075	71 mmf	9.5 mmf	9	8	5 1/4" 4 3/4"	Polished
12076	71 mmf	9.5 mmf	9	8	5 1/4" 4 3/4"	Plain

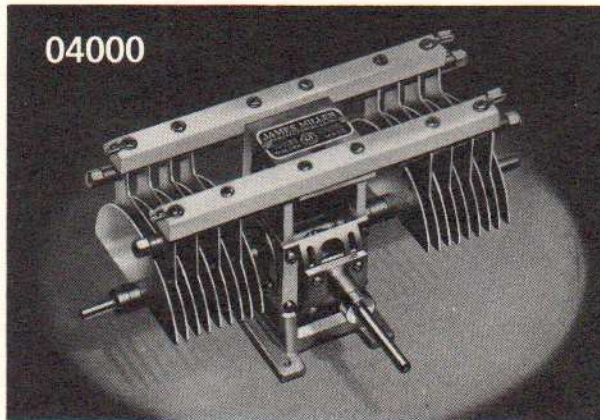
DUAL SECTION — 0.176" AIR GAP

MODEL SPECIFICATIONS: Polished plates only. Air gap: 0.176" — 6000 V. peak. Dual section construction, double end plate. Double bearing.





04000 SERIES AND 14000 SERIES TRANSMITTING CAPACITORS



04000

FEATURES: The 04000 Series of variable air transmitting capacitors permits more efficient use of newer tubes — more compact and symmetrical circuit arrangements and consequent better neutralization. Has center-fed rotors for better high frequency current distribution. Constant impedance, heavy current, multiple finger rotor contactor of unique design. Other features include: Grade L4 ceramic insulation, terminals in convenient places, and sturdy cast aluminum right angle 1/1 drive. The adjustable drive shaft angle is for either vertical or sloping panels. Ideal for heavy duty industrial electronic heating applications as well as amateur and commercial transmitters. All hardware is brass; nickel-plated.

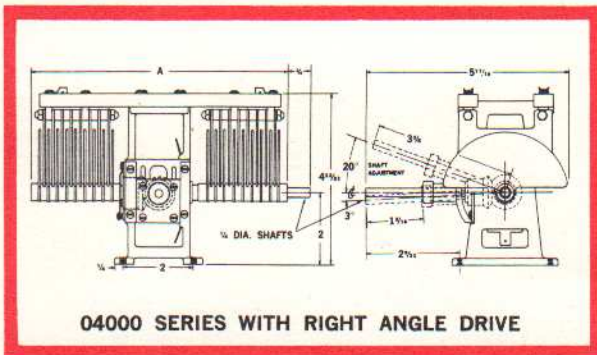
AVAILABLE MODIFICATIONS: Peak voltage ratings of 3000, 6000, and 9000 volts can be obtained. Heavy gauge rounded and polished aluminum plates; however, unpolished plates are available on 3000 V. capacitors. To specify capacitors other than standard, use the following designations.

- A. 3000 volts
- B. 6000 volts
- C. 9000 volts
- E. Special shaft extension*
- H. Unpolished plates
- J. Polished plates

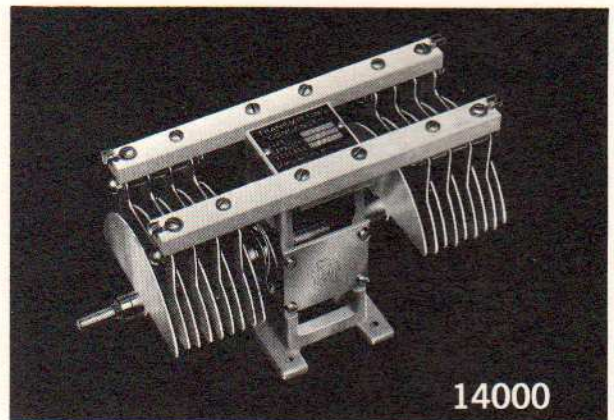
(*) Indicate length measured from mounting surface

MODEL SPECIFICATIONS: Grade L4 ceramic bars are 6 7/8" long, except for No. 04060 which is 10" long. Rotor plate radius, 1 3/4". Gear ratio: 1-1. Mounting dimensions: drive shaft center to base 2"; overall height 4 7/8"; overall distance behind panel 3 3/4"; plate thickness 0.050"; area of mounting base 2 1/2" x 3". Diameter of drive shaft is 1/4". Angle of adjustment of drive shaft from 3° below horizontal to 20° above.

Millen Cat. No.	Capacity MMF	Dim. "A"	Ceramic	Plates Per Sec.	Air Gap	Peak Voltage
04050	9.3- 48.	8"	6 7/8"	5R-4S	.171"	6000
04060	13.0- 59.	12 5/8"	10"	8R-7S	.265"	9000
04100	12.8- 85.	9 3/4"	6 7/8"	8R-7S	.171"	6000
04200	10.7-204.	7 1/4"	6 7/8"	8R-8S	.077"	3000



04000 SERIES WITH RIGHT ANGLE DRIVE



14000

**"DESIGNED FOR APPLICATION"
MADE TO SPECIAL REQUIREMENT**

FEATURES: The 14000 Series transmitting capacitors have center-fed rotors for better high frequency current distribution, and Grade L4 ceramic insulation. "Designed for Application" — terminals are in convenient places. End drive or right angle drive. Rounded polished heavy gauge aluminum plates. Heavy cast aluminum mounting frame is employed. Direct drive from end of rotor shaft. Rotor plate diameter is 3 1/2". For single-ended applications connect sections in parallel to obtain advantage of center-feed and elimination of shorted frame loops.

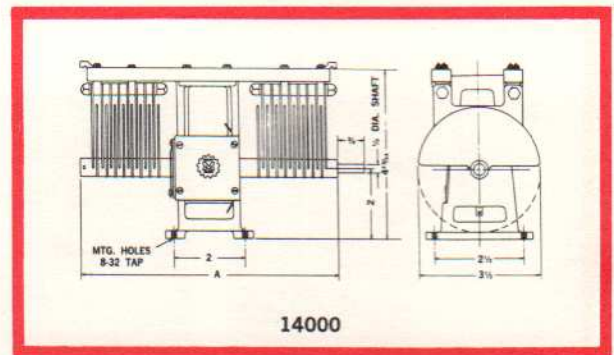
AVAILABLE MODIFICATIONS: Peak voltage ratings of 3000, 6000, and 9000 volts can be obtained. Rounded polished heavy gauge aluminum plates; unpolished plates are available on 3000 V. capacitors. To specify capacitors other than standard, use the following designations for particular applications.

- A. 3000 volts
- B. 6000 volts
- C. 9000 volts
- E. Special shaft extension*
- H. Unpolished plates
- J. Polished plates

(*) Indicate length measured from mounting surface

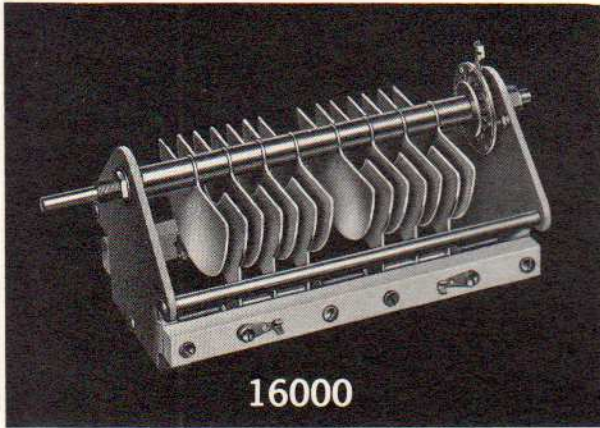
MODEL SPECIFICATIONS: Ceramic bars 6 7/8" long, except for No. 14060 which is 10" long. Mounting dimensions: drive shaft center to base 2"; overall height 4 7/8"; overall distance behind panel 3 3/4"; plate thickness 0.050"; area of mounting base 2 1/2" x 3".

Millen Cat. No.	Capacity MMF	Dim. "A"	Ceramic	Plates Per Sec.	Air Gap	Peak Voltage
14050	9.3- 48.	8"	6 7/8"	5R-4S	.171"	6000
14060	13.0- 59.	12 5/8"	10"	8R-7S	.265"	9000
14100	12.8- 85.	9 3/4"	6 7/8"	8R-7S	.171"	6000
14200	10.7-204.	7 1/4"	6 7/8"	8R-8S	.077"	3000



14000

16000 SERIES TRANSMITTING CAPACITORS



FEATURES: The 16000 Series has sturdy construction, thick, round-edged, polished aluminum plates with $1\frac{3}{4}$ " radius. Also has constant impedance, heavy current, multiple finger rotor contactor of unique design. Available in single and double sections and many capacities and plate spacings. Other features: aluminum frame, Grade L4 ceramic bars, brass hardware, nickel-plating.

AVAILABLE MODIFICATIONS: Available in single and double sections and many capacities and plate spacings. Any practical combination is possible for special capacitors from standard parts. Each of the styles below can be designed to special order. Specify one or more of the following designations preceded by the Millen catalog number.

- E. Special shaft extension*
- H. Unpolished plates
- J. Polished plates
- K. Single section
- LN. Locknut on shaft
- R. Inline rotor (dual section)
- S. Slotted shaft
- U. Insulating knob
- X. Rear shaft extension*

(*) Indicate length measured from mounting surface

SINGLE SECTION — 0.171" AIR GAP — 6000 V. PEAK

Millen Cat. No.	Capacity MMF	Dimension "A" "B"		Plates Per Sec.
16550	13. - 52	$3\frac{3}{8}$ "	$2\frac{3}{4}$ "	5R- 4S
16510	17. -101	$6\frac{1}{4}$ "	$5\frac{5}{8}$ "	9R- 8S
16520	37. -203	$9\frac{1}{2}$ "	$8\frac{7}{8}$ "	18R-16S
16530	45. -297	$12\frac{1}{2}$ "	$11\frac{7}{8}$ "	25R-24S

SINGLE SECTION — 0.265" AIR GAP — 9000 V. PEAK

Millen Cat. No.	Capacity MMF	Dimension "A" "B"		Plates Per Sec.
16559	11. - 65	$6\frac{1}{4}$ "	$5\frac{5}{8}$ "	8R- 7S
16512	40. -128	$11\frac{1}{2}$ "	$10\frac{7}{8}$ "	16R-14S

DOUBLE SECTION — 0.077" AIR GAP — 3000 V. PEAK

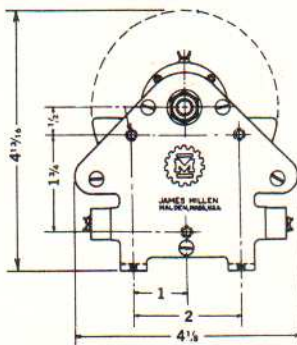
Millen Cat. No.	Capacity MMF	Dimension "A" "B"		Plates Per Sec.
16200	15. -195	$6\frac{1}{4}$ "	$5\frac{5}{8}$ "	8R- 8S
16250	20. -255	$9\frac{1}{2}$ "	$8\frac{7}{8}$ "	10R-10S

DOUBLE SECTION — 0.171" AIR GAP — 6000 V. PEAK

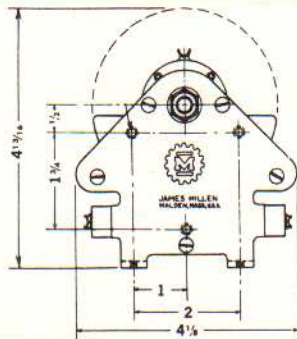
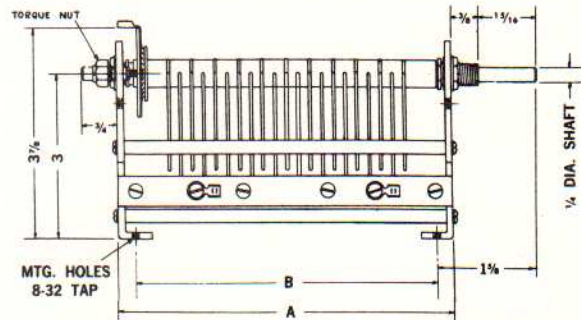
Millen Cat. No.	Capacity MMF	Dimension "A" "B"		Plates Per Sec.
16030	8.5- 27	$4\frac{1}{4}$ "	$3\frac{5}{8}$ "	3R- 2S
16050	12. - 51	$6\frac{1}{4}$ "	$5\frac{5}{8}$ "	5R- 4S
16100	19. -101	$9\frac{1}{2}$ "	$8\frac{7}{8}$ "	9R- 8S

DOUBLE SECTION — 0.265" AIR GAP — 9000 V. PEAK

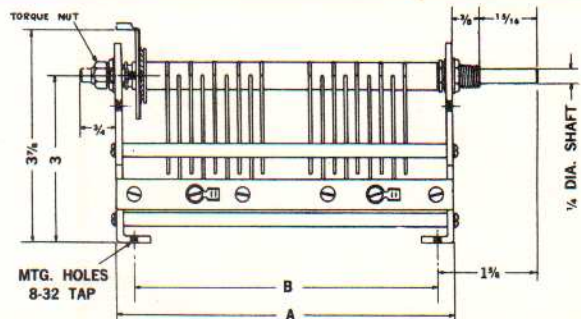
Millen Cat. No.	Capacity MMF	Dimension "A" "B"		Plates Per Sec.
16029	11. - 29	$6\frac{1}{4}$ "	$5\frac{5}{8}$ "	4R- 3S
16059	20. - 64	$11\frac{1}{2}$ "	$10\frac{7}{8}$ "	8R- 7S



16000 SERIES
SINGLE SECTION



16000 SERIES
DUAL SECTION

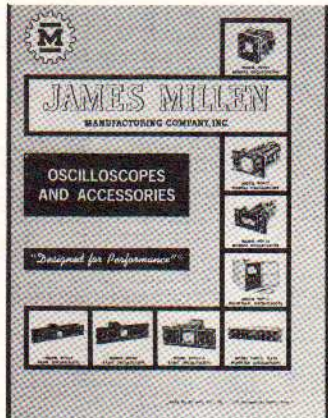
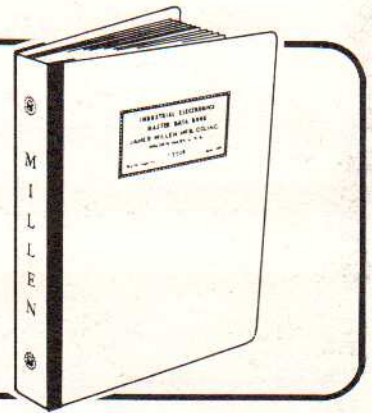




**JAMES
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LITERATURE

**MILLEN MASTER
DATA BOOK**

INDUSTRIAL ELECTRONICS MASTER DATA BOOK contains dimensioned drawings and specifications for all Millen components and equipment. Available to industry personnel, qualified engineers, purchasing agents and design draftsmen upon request.



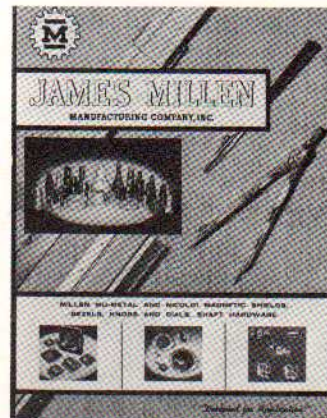
OSCILLOSCOPES

Complete oscilloscopes catalog featuring Millen miniature, module scopes. Basic, rack-mounted and industrial scopes explained in detail. Technical information for all scopes and accessories included.



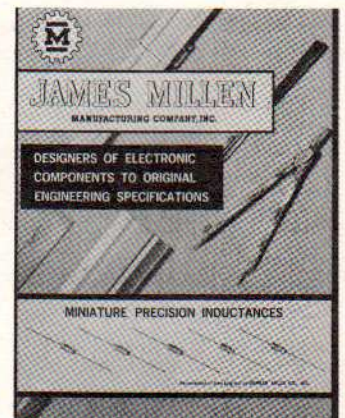
GRID DIP METER

Complete description, features and illustrations of laboratory and industrial grid dip meters and antenna bridge. "Designed for Performance" by James Millen Mfg. Co., Inc.



**MAGNETIC SHIELDS
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Mu-metal and Nicoloi magnetic shields providing reference data and specifications for cathode ray and multiplier photo tubes. Also specifications for **Bezels, Knobs, and Dials**.



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Specifications for **Encapsulated Inductances** including the **J301** miniature series and **34301** standard series; **J300** Non-Encapsulated miniature inductances; and **J302** Encapsulated series for printed wiring.

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MacNabb, Schroeder & Loomis
820 East 64th Street

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