JAMES MILLEN

MANUFACTURING COMPANY, INC.

Radio Engineers and Manufacturers

CONDENSED GENERAL CATALOG No. 95

JAMES MILLEN

MALDEN · MASSACHUSETTS

ONE INCH INSTRUMENTATION OSCILLOSCOPE

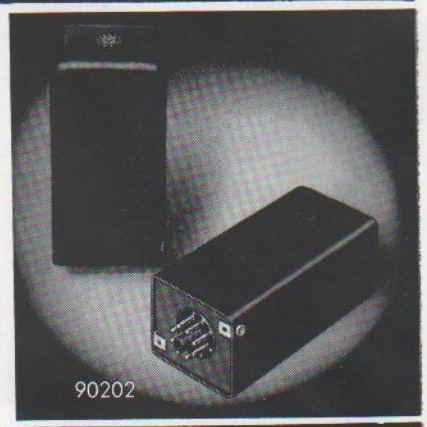
Miniaturized, packaged panel mounting cathode ray oscilloscope designed for use in instrumentation in place of the conventional "pointer type" moving coil meters uses the 1" tube. Panel bezel matches in size and type the standard 2" square meters. Magnitude, phase displacement, wave shape, etc. are constantly visible on scope

No. 90901, 1CP1, less tube.....
No. 90911, 1EP1, less tube.....

POWER SUPPLY FOR OSCILLOSCOPE

750 volts d.c. at 3 ma. and 6.3 volts a.c. at 600 ma. 117 volts 50–60 cycle input. Designed especially for use with No. 90901 and No. 90911 one inch instrumentation oscilloscopes. 4⅝ in. high x 1⅞ x 2⅛. Octal plug for input and output. Entire assembly including rectifier is encapsulated.

No. 90202 Power Supply (complete).....



GRID DIP METER

The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.7 MC to 300 MC with generous over laps plus an arbitrary scale for use with special application inductors. Internal terminal strip permits battery operation for antenna measurement.

No. 90651, with tube.....

Additional Inductors for Lower Frequencies

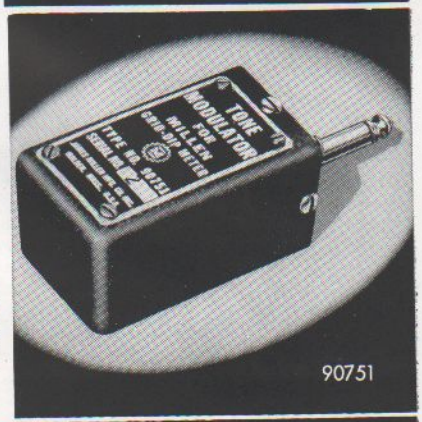
No. 46702—925 to 2000 KC.....
No. 46703—500 to 1050 KC.....
No. 46704—325 to 600 KC.....
No. 46705—220 to 350 KC.....

TONE MODULATOR

The No. 90751 Tone Modulator is a small package containing a transistor audio oscillator and its mercury battery, which plugs into the 'phone jack of a Grid Dip Meter to modulate the signal at approximately 800 cycles for applications requiring a modulated signal.

Dimensions: only 2¾ x 1⅝ x 1⅜ in.

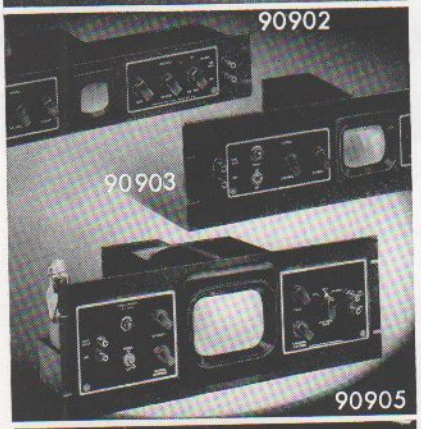
No. 90751, less battery.....



COMPACT OSCILLOSCOPES

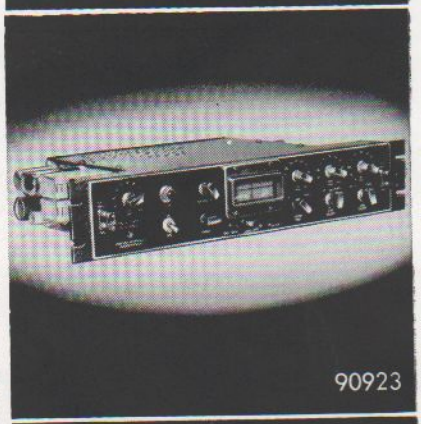
The No. 90923 Oscilloscope is an extremely compact (3½ inch high) rack panel type, general purpose oscilloscope, utilizing the type 3XP1, 3XP2, 3XP7, or 3XP11, 3 inch by 1½ inch rectangular face cathode ray tube.

No. 90923, with tubes.....



The No. 90902, No. 90903 and No. 90905 Rack Panel Oscilloscopes, for two, three and five inch tubes, respectively, are inexpensive *basic units* comprising power supply, brilliancy and centering controls, safety features, magnetic shielding, switches, etc. As a transmitter monitor, no additional equipment or accessories are required. The well-known trapezoidal monitoring patterns are secured by feeding modulated carrier voltage from a pickup loop directly to vertical plates of the cathode ray tube and audio modulating voltage to horizontal plates. By the addition of such units as sweeps, pulse generators, amplifiers, servo sweeps, etc., all of which can be conveniently and neatly constructed on companion rack panels, the original basic 'scope unit may be expanded to serve any conceivable industrial or laboratory application.

No. 90902, less tubes.....
No. 90903, less tubes.....
No. 90905, less tubes.....



'SCOPE AMPLIFIER—SWEEP UNIT

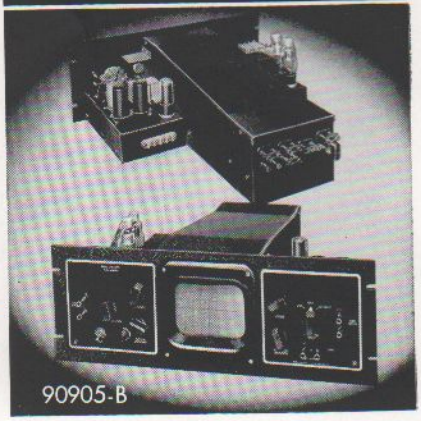
Vertical and horizontal amplifiers along with hard-tube, saw tooth sweep generator. Complete with power supply mounted on a standard 5¼" rack panel.

No. 90921, with tubes.....

FLAT FACE OSCILLOSCOPE

90905-B 5-inch Rack Mounting Basic Oscilloscope features include: balanced deflection, front panel input terminals, rear panel input terminals, astigmatism control, blanking input terminals, flat face precision tolerance Dumont 5ADP1 tube, 1800 or 2500 volts accelerating, good sensitivity, sharp focus, horizontal selector switch, 60 cycle sine wave sweep available, power supply available to operate external equipment, minimum control interaction, rugged construction, light filter. 7 x 19 in. panel.

No. 90905-B Oscilloscope, less tubes.....



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90672

ANTENNA BRIDGE

The Millen 90672 Antenna Bridge is an accurate and sensitive bridge for measuring impedances in the range of 5 to 500 ohms (or 20 to 2000 ohms with balun) at radio frequencies up to 200 mc. The variable element is an especially designed differential variable capacitor capable of high accuracy and permanency of calibration. Readily driven by No. 90651 Grid Dipper.

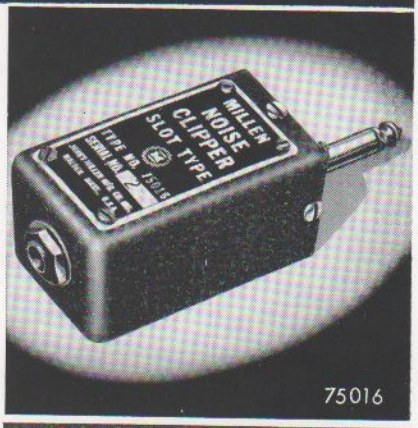
No. 90672.....

AUDIO CLIPPER

The No. 75016 Audio Clipper is a small plug-in symmetrical type clipper with self-contained mercury batteries. It may be used to clip noise for C-W reception as well as for A-M or SSB, or it may be used to clip a sine wave input to form a square wave output.

Dimensions: only 2¾ x 1 5/16 x 1 3/16 in.

No. 75016, less batteries.....

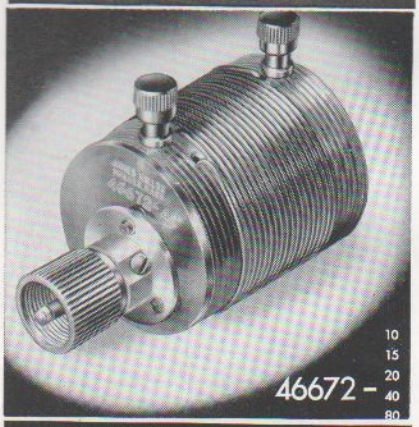


75016

BALUNS

The No. 46672 (1 for each amateur band) wound Balun is an accurate 2 to 1 turns ratio, high Q auto transformer with the residual reactances tuned out and with very tight coupling between the two halves of the total winding. The points of series and parallel resonance are selected so that each Balun provides an accurate 4 to 1 impedance ratio over the entire band of frequencies for which it was designed. Suitable for use with the No. 90672 Antenna Bridge or medium power transmitters.

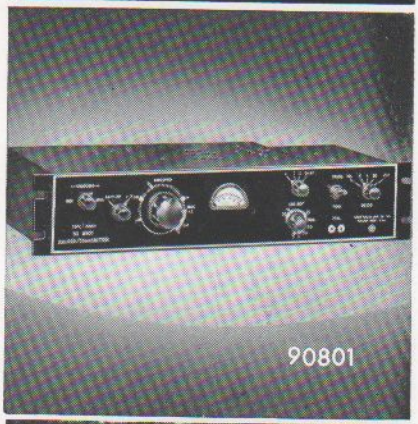
No. 46672–80/40/20/15/10.....


46672 – 10 15 20 40 80

50 WATT EXCITER-TRANSMITTER

Modern design includes features and shielding for TVI reduction, bandswitching for 4–7–14–21–28 megacycle bands, circuit metering. Conservatively rated for use either as a transmitter or exciter for high power PA stages. 5763 oscillator-buffer-multiplier and 6146 power amplifier. Rack mounted.

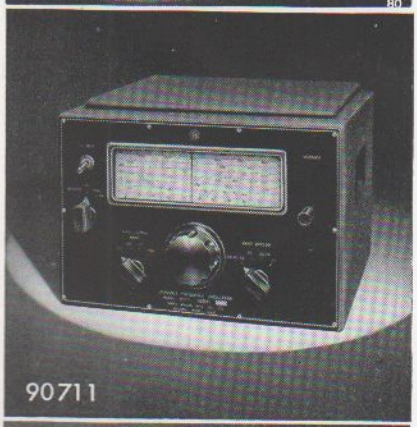
No. 90801, less tubes.....


90801

VARIABLE FREQUENCY OSCILLATOR

The No. 90711 is a complete transmitter control unit with 6SK7 temperature-compensated, electron coupled oscillator of exceptional stability and low drift, a 6SK7 broad-band buffer or frequency doubler, a 6AG7 tuned amplifier which tracks with the oscillator tuning, and a regulated power supply. Output sufficient to drive a 6146 is available on 160, 80 and 40 meters and reduced output is available on 20 meters. Since the output is isolated from the oscillator by two stages, zero frequency shift occurs when the output load is varied from open circuit to short circuit. The entire unit is unusually solidly built so that no frequency shift occurs due to vibration. The keying is clean and free from annoying chirp, quick drift, jump, and similar difficulties often encountered in keying variable frequency oscillators.

No. 90711, with tubes.....


90711

HIGH VOLTAGE POWER SUPPLY

The No. 90281 high voltage power supply has a d.c. output of 700 volts, with maximum current of 235 ma. In addition, a.c. filament power of 6.3 volts at 4 amperes is also available so that this power supply is an ideal unit for use with transmitters, such as the Millen No. 90801, as well as general laboratory purposes. The power supply uses two No. 816 rectifiers. The panel is standard 8¾" x 19" rack mounting.

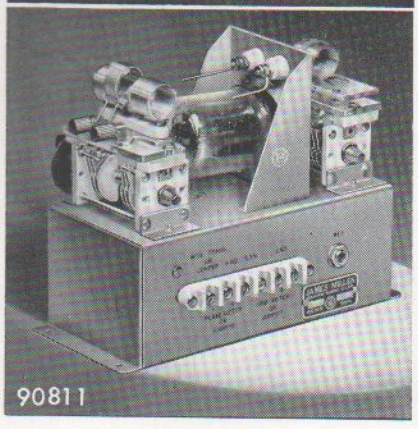
No. 90281, less tubes.....


90281

HIGH FREQUENCY RF AMPLIFIER

A physically small unit capable of a power output of 70 to 85 watts on 'Phone or 87 to 110 watts on C-W on 20, 15, 11, 10, 6 or 2 meter amateur bands. Provision is made for quick band shift by means of the No. 48000 series VHF plug-in coils. The No. 90811 unit uses either an 829-B or 3E29.

No. 90811 with 10 meter band coils, less tube.....


90811

RF POWER AMPLIFIER

This 500 watt amplifier may be used as the basis of a high power amateur transmitter. The No. 90881 RF power amplifier is wired for use with the popular "812A" type tubes. Other popular tubes may be used. The amplifier is of unusually sturdy mechanical construction, on a 10½" relay rack panel. Plug-in inductors are furnished for operation on 10, 20, 40 or 80 meter amateur bands. The standard Millen No. 90801 exciter unit is an ideal driver for the No. 90881 RF power amplifier.

No. 90881, with one set of coils, but less tubes.....


90881

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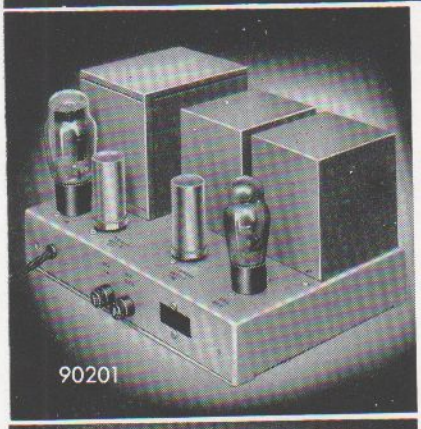
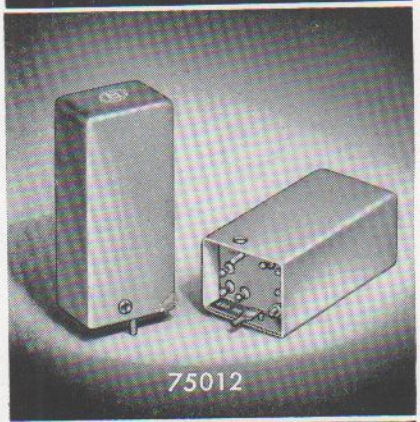


REGULATED POWER SUPPLY

A compact, uncased, regulated power supply, either for table use in the laboratory or for incorporation as an integral part of larger equipment. 250 v.d.c. unregulated at 115 ma. 105 v.d.c. regulated at 35 ma. Minus 105 v.d.c. regulated bias at 4 ma. 6.3 v. a.c. at 4.2 amps.
No. 90201, with tubes.....

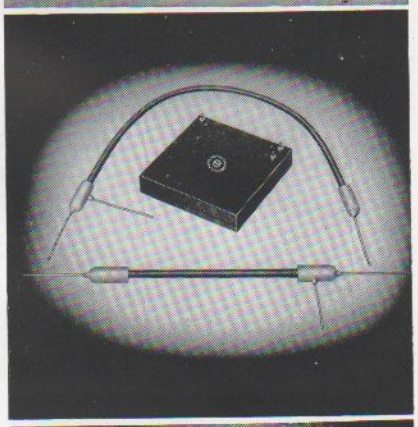
INSTRUMENT DIAL

The No. 10030 is an extremely sturdy instrument type indicator. Control shaft has 1 to 1 ratio. Veeder type counter is direct reading in 99 revolutions and vernier scale permits readings to 1 part in 100 of a single revolution. Has built-in dial lock and ¼" drive shaft coupling. May be used with multi-revolution transmitter controls, etc., or through gear reduction mechanism for control of fractional revolution capacitors, etc., in receivers or laboratory instruments.
No. 10030.....



PHASE-SHIFT NETWORK

A complete and laboratory aligned pair of phase-shift networks in a single compact 2" x 1 7/16" x 4" case with characteristics so as to provide a phase shift between the two networks of 90° ± 1.3° over a frequency range of 225 cycles to 2750 cycles. Well adapted for use in either single sideband transmitter or receiver. Possible to obtain a 40 db suppression of the unwanted sideband. The No. 75012 precision adjusted phase-shift network eliminates the necessity of complicated laboratory equipment for network adjustment.
No. 75012.....



DELAY LINES

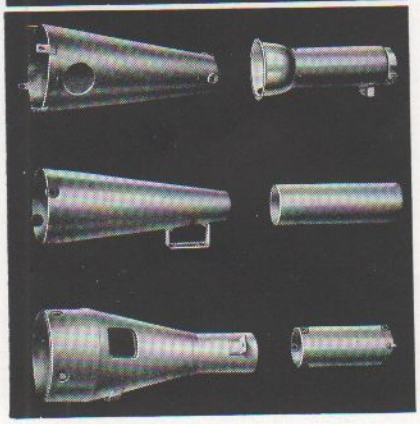
No. 34751—Sealed flexible distributed constants line. Excellent rise time. 1350 ohms, 22 inches per microsecond or 550 ohms, 50 inches per mu.-sec. Delay cut to specifications.
No. 34700—Hermetically sealed encased line. Good rise time. 0–0.45 mu.-sec. 1350 ohm line or 0.22 mu.-sec. 500 ohm line in 1" x 1" x 5½" in case. Also larger standard cases and cases made to order. Special impedances 400 to 2200 ohms.
No. 34600—Lumped delay line built to specifications. Delays 0.05 mu.-sec. to 250 mu.-sec. Impedance 50 ohms to 2000 ohms.

PHOTO MULTIPLIER SHIELDS MU-METAL

The photo multiplier tube operates most effectively when perfectly shielded. Careful study has proven that mu-metal provides superior shielding. Millen Mu-Metal shields are available from stock for the most popular tubes.
No. 80801B for the 1P21, 1P22, 1P28, 931A
No. 80802B for the 5819, 6217, 6292, 6342.
No. 80802C for the 6199, 6291, 6467.....
No. 80802E for the 6810A, 6903.....
No. 80802F for the 6372.....
No. 80803J for the 6363, K1197.....
No. 80805M for the 6364.....

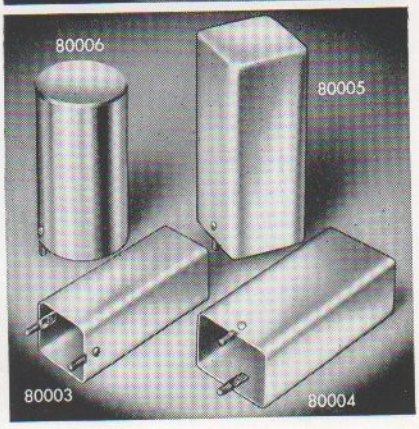
BEZELS FOR CATHODE RAY TUBES

Standard types are of satin finish black plastic. 5" size has neoprene support cushion and green lucite filter. 3" and 2" sizes have integral cushioning.
No. 80075—5".....
No. 80073—3".....
No. 80072—2".....
No. 80071—1".....



CATHODE RAY TUBE SHIELDS

For many years we have specialized in the design and manufacture of magnetic metal shields of nicoloi and mumetal for cathode ray tubes in our own complete equipment, as well as for applications of all other principal complete equipment manufacturers. Stock types as well as special designs to customers' specifications promptly available.
No. 80045—Nicoloi for 5BP1.....
No. 80055—Nicoloi for 5CP1.....
No. 80043—Nicoloi for 3" tube.....
No. 80042—Nicoloi for 2" tube.....



SHIELD CASES ALUMINUM

Effective RF shielding for coils and transformers can be provided by Millen Aluminum cans. Available in several sizes from stock.
No. 80003—1⅜" x 1⅜" x 4".....
No. 80004—1⅞" x 1 7/16" x 4½".....
No. 80005—2" x 2" x 4⅛".....
No. 80006—2⅛" round x 4".....
No. 80007—2¼" round x 2⅜" open ends

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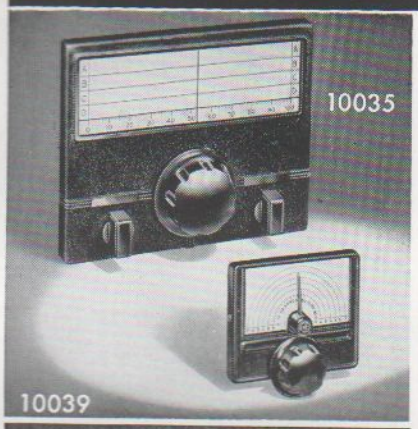
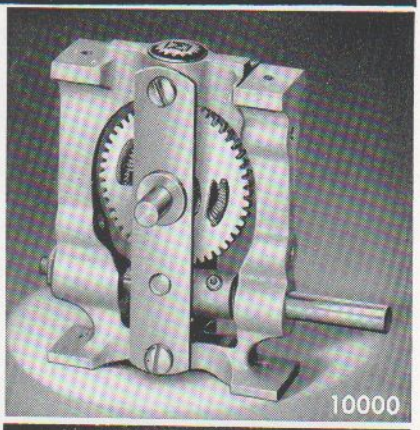


PANEL DIALS

The No. 10035 illuminated panel dial has 12 to 1 ratio; size, 8½" x 6½". Small No. 10039 has 8 to 1 ratio; size, 4" x 3¼". Both are of compact mechanical design, easy to mount and have totally self-contained mechanism, thus eliminating back of panel interference. Provision for mounting and marking auxiliary controls, such as switches, potentiometers, etc., provided on the No. 10035. Standard finish, either size, flat black art metal.

No. 10039.....
No. 10035.....



WORM DRIVE UNIT

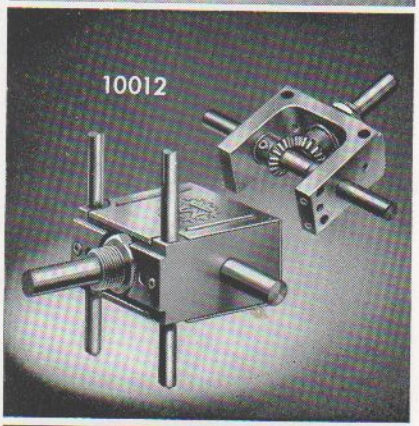
Cast aluminum frame may be panel or base mounted. Spring loaded split gears to minimize back lash.
Standard ratio 16/1. Also in 48/1 on request.

No. 10000—(state ratio).....

DIALS AND KNOBS

Just a few of the many stock types of small dials and knobs are illustrated herewith. 10007 is 1⅜" diameter, 10009 is 2¾" and 10008 is 3½".

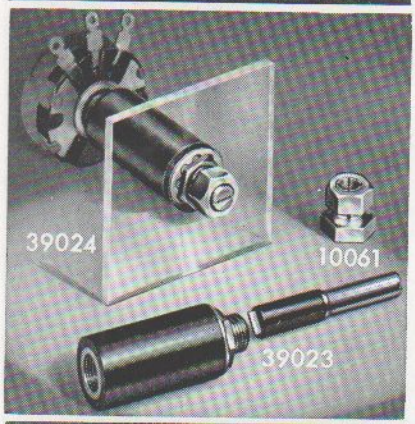
No. 10002.....
No. 10007.....
No. 10008.....
No. 10009.....
No. 10015.....
No. 10018.....
No. 10021.....
No. 10065.....



RIGHT ANGLE DRIVE

Extremely compact, with provisions for many methods of mounting. Ideal for operating potentiometers, switches, etc., that must be located, for short leads, in remote parts of chassis.

No. 10012.....



HIGH VOLTAGE INSULATED SHAFT EXTENSION

No. 10061 shaft locks and the No. 39023 insulated high voltage potentiometer extension mountings are available as a single integrated unit—the No. 39024. The proper shaft length is independent of the panel thickness. The standard shaft has provision for screw driver adjustment. Special shaft arrangements are available for industrial applications. Extension shaft and insulated coupling are molded as a single unit to provide accuracy of alignment and ease of installation.

No. 39023, non locking type.....
No. 39024, locking type.....

SHAFT LOCKS

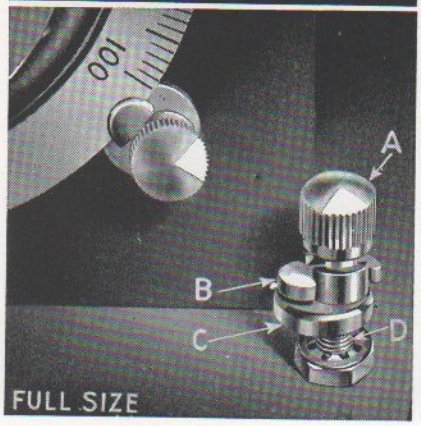
In addition to the original No. 10060 and No. 10061 "DESIGNED FOR APPLICATION" shaft locks, we can also furnish such variations as the No. 10062 and No. 10063 for easy thumb operation as illustrated above. The No. 10061 instantly converts any plain "¼ shaft" volume control, condenser, etc. from "plain" to "shaft locked" type. Easy to mount in place of regular mounting nut.

No. 10060.....
No. 10061.....
No. 10062.....
No. 10063.....

TRANSMISSION LINE PLUG

An inexpensive, compact, and efficient polystyrene unit for use with the 300 ohm ribbon type polyethylene transmission lines. Fits into standard Millen No. 33102 (crystal) socket. Pin spacing ½", diameter .095".

No. 37412.....



DIAL LOCK

Compact, easy to mount, positive in action, does not alter dial setting in operation! Rotation of knob "A" depresses finger "B" and "C" without imparting any rotary motion to Dial. Single hole mounted.

No. 10050.....

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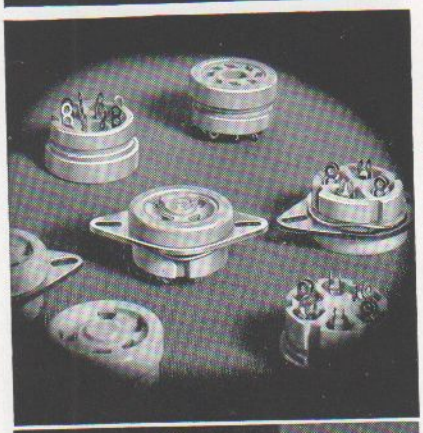


TUBE SOCKETS DESIGNED FOR APPLICATION

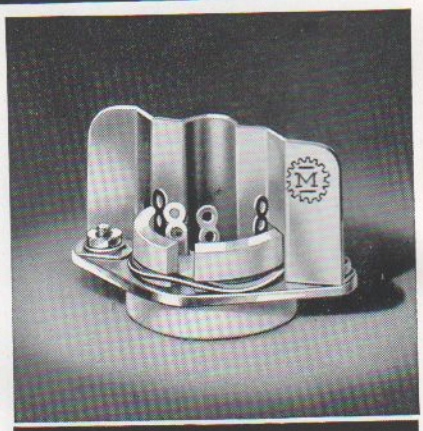
MODERN SOCKETS for MODERN TUBES! Long Flashover path to chassis permits use with transmitting tubes, 866 rectifiers, etc. Long leakage path between contacts. Contacts are type proven by hundreds of millions already in government, commercial and broadcast service, to be extremely dependable. Sockets may be mounted either with or without metal flange. Mounts in standard size chassis hole. All types have barrier between contacts and chassis. All but octal and crystal sockets also have barriers between individual contacts in addition.

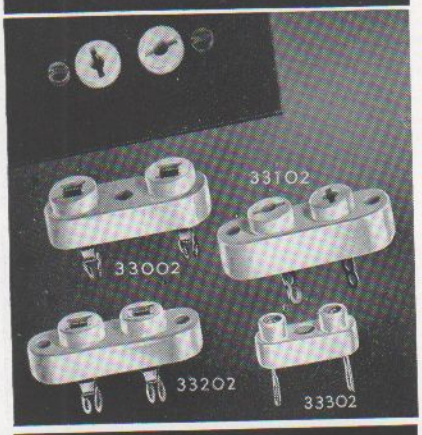
The No. 33888 shield is for use with the 33008 octal socket. By its use, the electrostatic isolation of the grid and plate circuits of single-ended metal tubes can be increased to secure greater stability and gain.

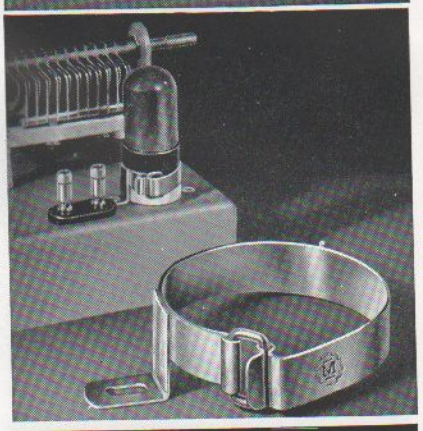
The 33087 tube clamp is easy to use, easy to install, effective in function. Available in special sizes for all types of tubes. Single hole mounting. Spring steel, cadmium plated.

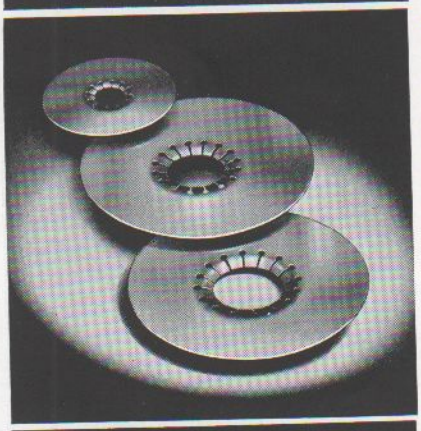
Cavity Socket Contact Discs, 33446 are for use with the "Lighthouse" ultra high frequency tube. This set consists of three different size unhardened beryllium copper multifinger contact discs. Heat treating instructions forwarded with each kit for hardening after spinning or forming to frequency requirements.

Voltage regulator dual contact bayonet socket, 33991 black phenolic insulation and 33992 with low loss mica filled phenolic insulation.

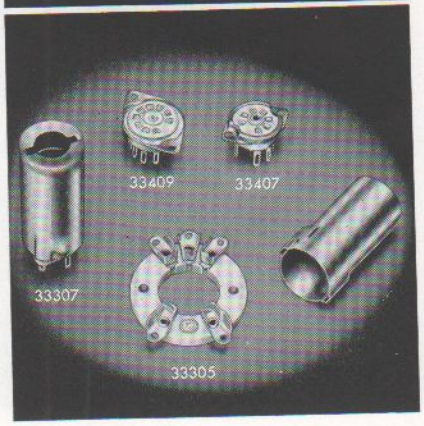






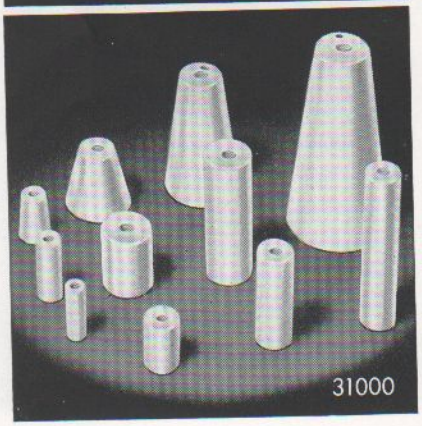


No. 33004—4 Pin Tube Socket.....
No. 33005—5 Pin Tube Socket.....
No. 33006—6 Pin Tube Socket.....
No. 33008—8 Pin Tube Socket.....
No. 33888—Shield for 33008.....
No. 33087—Tube Clamp.....
No. 33002—Crystal Socket ¾'' x .125''..
No. 33102—Crystal Socket .487'' x .095''
No. 33202—Crystal Socket ½'' x .125''..
No. 33302—Crystal Socket .487'' x .050''
No. 33446—Contact Discs.....
No. 33991—Socket for 991.....
No. 33992—Socket for 991.....
No. 33207—829 Socket.....
No. 33305—Acorn Socket.....
No. 33307—Miniature Socket and Shield, ceramic.....
No. 33309—Noval Socket and Shield, ceramic.....
No. 33405—5 Pin Socket Eimac.....
No. 33407—Miniature Socket only, ceramic
No. 33409—Noval Socket only, ceramic..



STAND-OFF INSULATORS

Steatite insulators are available in a variety of sizes—Listed below are some of the most popular.



No. 31001—Stand-off ½'' x 1''.....
No. 31002—Stand-off ½'' x 2½''.....
No. 31003—Stand-off ¾'' x 2''.....
No. 31004—Stand-off ¾'' x 3½''.....
No. 31006—Stand-off 5/32'' x ⅜''.....
No. 31007—Stand-off ⅜'' x 1''.....
No. 31011—Cone ¾'' x ½'' (box of 5)..
No. 31012—Cone 1'' x 1''.....
No. 31013—Cone 1½'' x 1''.....
No. 31014—Cone 2'' x 1''.....
No. 31015—Cone 3'' x 1½''.....

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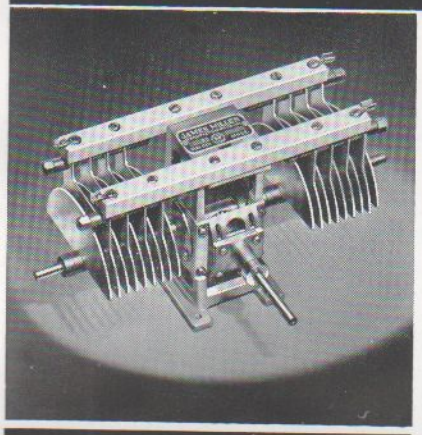
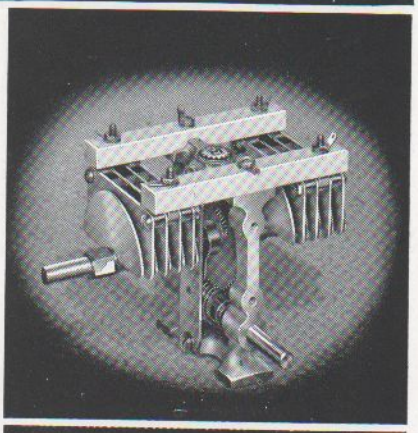
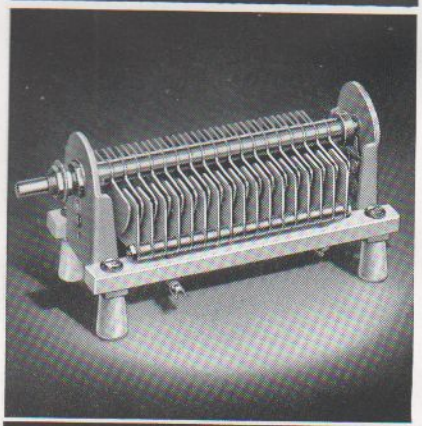


04000 and 11000 SERIES TRANSMITTING CONDENSERS

Another member of the "Designed for Application" series of transmitting variable air capacitors is the 04000 series with peak voltage ratings of 3000, 6000, and 9000 volts. Right angle drive, 1–1 ratio. Adjustable drive shaft angle for either vertical or sloping panels. Sturdy construction, thick, round-edged, polished aluminum plates with 1¾" radius. Constant impedance, heavy current, multiple finger rotor contactor of new design. Available in all normal capacities.

The 11000 series has 16/1 ratio center drive and fixed angle drive shaft.

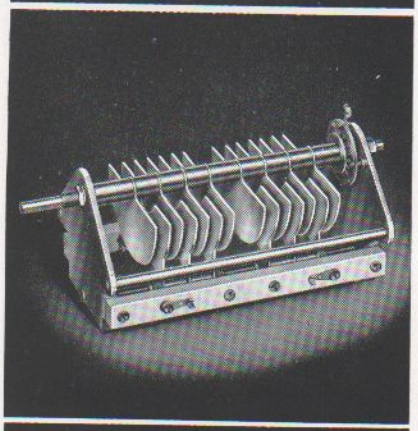




12000 and 16000 SERIES TRANSMITTING CONDENSERS

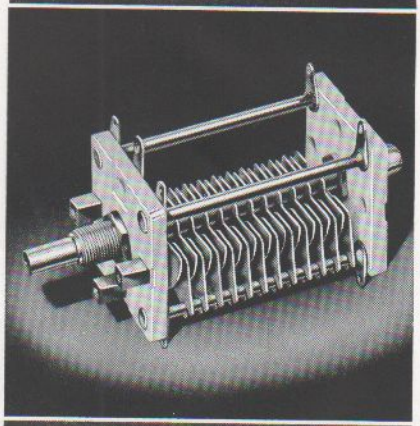
Rigid heavy channeled aluminum end plates. Isolantite insulation, polished or plain edges. One piece rotor contact spring and connection lug. Compact, easy to mount with connector lugs in convenient locations. Same plate sizes as 11000 series above.

The 16000 series has same plate sizes as 04000 series. Also has constant impedance, heavy current, multiple finger rotor contactor of new design. Both 12000 and 16000 series available in single and double sections and many capacities and plate spacing.



THE 28000–29000 SERIES VARIABLE AIR CAPACITORS

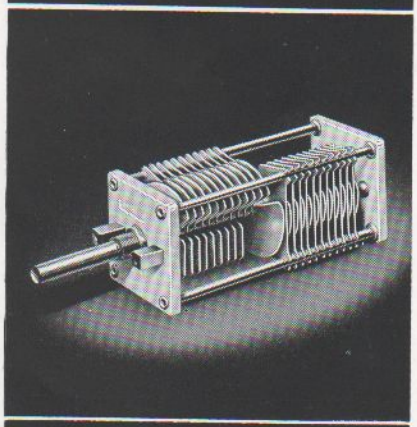
"Designed for Application," double bearings, steatite end plates, cadmium or silver plated brass plates. Single or double section .022" or .066" air gap. End plate size: 19/16" x 11/16". Rotor plate radius: ¾". Shaft lock, rear shaft extension, special mounting brackets, etc., to meet your requirements. The 28000 series has semi-circular rotor plate shape. The 29000 series has approximately straight frequency line rotor plate shape. Prices quoted on request. Many stock sizes.



NEUTRALIZING CAPACITOR

Designed originally for use in our own No. 90881 Power Amplifier, the No. 15011 disc neutralizing capacitor has such unique features as rigid channel frame, horizontal or vertical mounting, fine thread over-size lead screw with stop to prevent shorting and rotor lock. Heavy rounded-edged polished aluminum plates are 2" diameter. Glazed Steatite insulation.

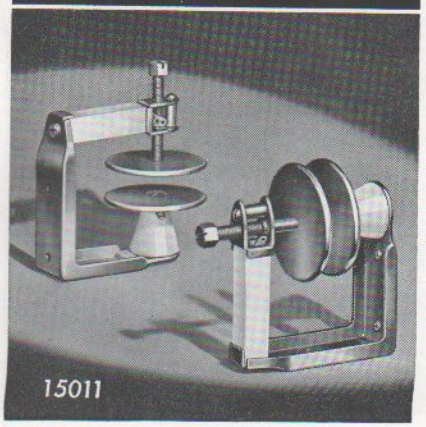
No. 15011 .....



PERMEABILITY TUNED CERAMIC FORMS

In addition to the popular shielded plug-in permeability tuned forms, 74000 series, the 69040 series of ceramic permeability tuned unshielded forms are available as standard stock items. Winding diameters available from 3/16" to ½" and winding space from 1 1/32" to 1½".

No. 69041—(Copper Slug) .....
No. 69042—(Iron Core) .....
No. 69043—(Copper Slug) .....
No. 69044—(Iron Core) .....
No. 69045—(Copper Slug) .....
No. 69046—(Iron Core) .....
No. 69047—(Copper Slug) .....
No. 69048—(Iron Core) .....
No. 69051—(Copper Slug) .....
No. 69052—(Iron Core) .....
No. 69054—(Iron Core) .....
No. 69055—(Copper Slug) .....
No. 69056—(Iron Core) .....
No. 69057—Copper Slug) .....
No. 69058—(Iron Core) .....
No. 69061—(Copper Slug) .....
No. 69062—(Iron Core) .....



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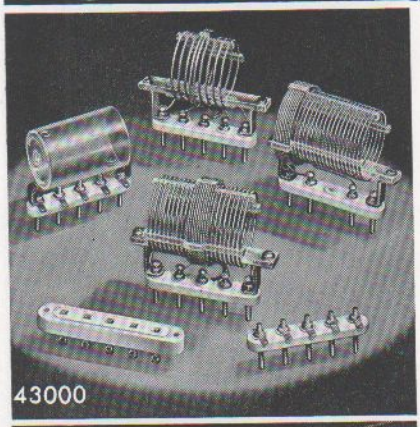


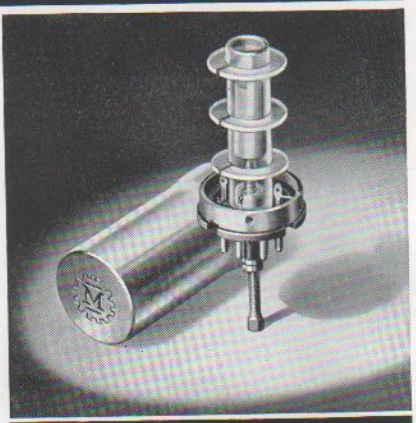
TRANSMITTING TANK COILS

A full line—all popular wattages for all bands. Send for special catalog sheet.

TUNABLE COIL FORM

Standard octal base of low loss mica-filled bakelite, polystyrene ½" diameter coil form, heavy aluminum shield, iron tuning slug of high frequency type, suitable for use up to 35 mc. Adjusting screw protrudes through center hole of standard octal socket.

No. 74001, with iron core.....
No. 74002, less iron core.....



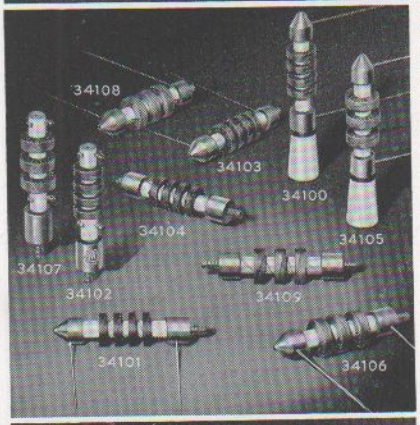
RF CHOKES

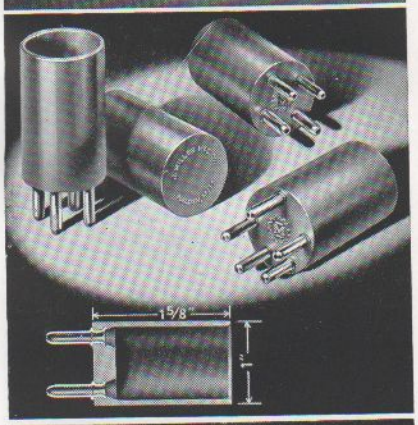
Many have copied, few have equalled, and none have surpassed the genuine original design Millen Designed for Application series of midget RF Chokes. The more popular styles now in constant production are illustrated herewith. Special styles and variations to meet unusual requirements quickly furnished.

Figures 1 and 4 illustrate special types of RF chokes available on order. The popular 34300 and 34200 series are shown in figures 2 and 3 respectively.

General Specifications: 2.5 mh, 250 ma for types 34100, 34101, 34102, 34103, 34104 and 1 mh, 300 ma for types 34105, 34106, 34107, 34108, 34109.

No. 34100.....
No. 34101.....
No. 34102.....
No. 34103.....
No. 34104.....

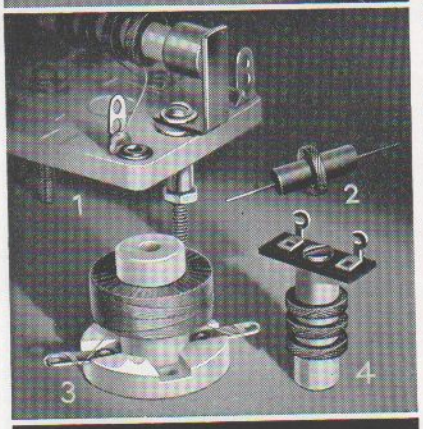




MIDGET COIL FORMS

Made of low loss mica filled brown bakelite. Guide funnel makes for easy threading of leads through pins.

No. 45000.....
No. 45004.....
No. 45005.....



OCTAL BASE AND SHIELD

Low loss phenolic base with octal socket plug and aluminum shield can 1 7/16 x 1 7/8 x 3 15/16.

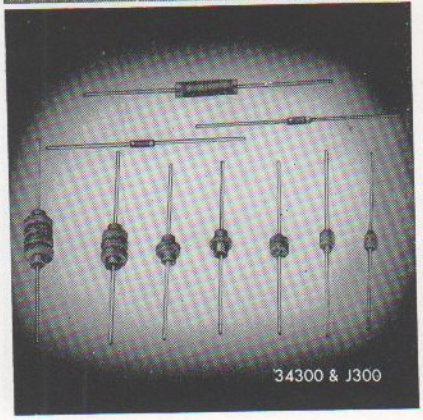
No. 74400.....

MINIATURE POWDERED IRON CORE RF INDUCTANCES

The No. J300—Miniature powdered iron core inductances. 0.107 in dia. x ⅜ in. long. Inductances from 3.3 microhenries to 2.5 millihenries ± 5%. EIA standard values plus 25, 50, 150, 250, 350, 500, and 2500 microhenries. Three layer solenoids from 39 to 350 microhenries. ¼ in. wide single pi from 360 to 2500 microhenries. Special coils on order.

PHENOLIC FORM RF INDUCTANCES

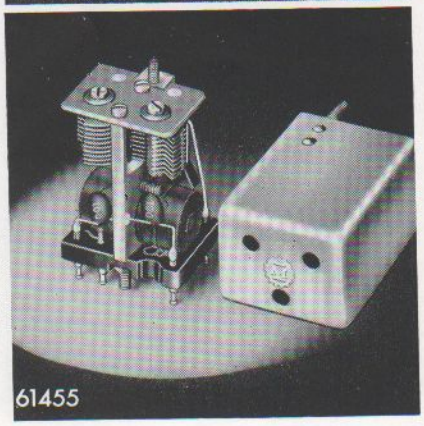
The No. 34300 Inductances—Phenolic coil form with axial leads. Inductances from 1 microhenry to 2.5 millihenries ± 5%. RETMA standard values plus 25, 50, 150, 250, 350, 500, and 2500 microhenries. Solenoids from 1 to 16 microhenries. Single pi from 18 to 300 microhenries. Multiple pi for higher inductances. Forms 7/32" dia. x 7/16 in. long, 3/16" x 3/8", 1/4" x 3/4", and 1/4" x 1". Special coils on order.



MINIATURE IF TRANSFORMERS

Extremely high Q—approximately 200—Variable Coupling—(under, critical, and over) with all adjustments on top. Small size 1 1/16" x 1 9/16" x 1 7/8" Molded terminal base. Air capacitor tuned. Coils completely enclosed in cup cores. Tapped primary and secondary. Rugged construction. High electrical stability.

No. 61455, 455 kc. Universal Trans.....
No. 61453, 455 kc. BFO.....
No. 61160, 1600 kc. Universal Trans.....
No. 61163, 1600 kc. BFO.....



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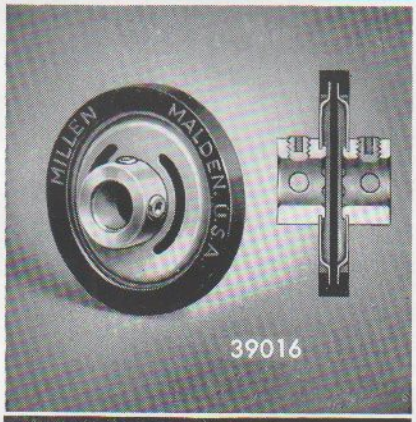
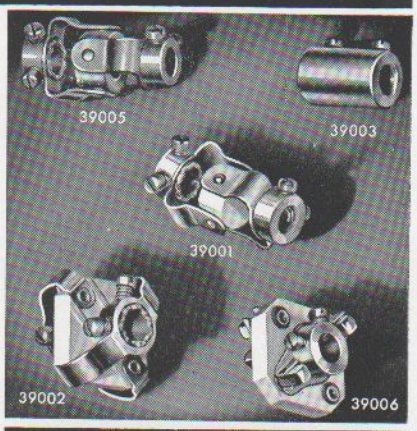


FLEXIBLE COUPLINGS

The No. 39000 series of Millen "Designed for Application" flexible coupling units include, in addition to improved versions of the conventional types, also such exclusive original designs as the No. 39001 insulated universal joint and the No. 39006 "slide-action" coupling (in both steatite and bakelite insulation).

The No. 39006 "slide-action" coupling permits longitudinal shaft motion, eccentric shaft motion and out-of-line operation, as well as angular drive without backlash.

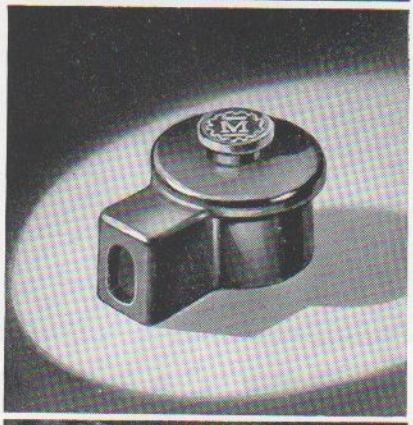
The No. 39005 and 39005-B (high torque) are similar to the No. 39001, but are not insulated. The steatite insulated No. 39001 has a special anti-backlash pivot and socket grip feature. All of the above illustrated units are for ¼" shaft and are standard production type units. The No. 39016 incorporates features which have long been desired in a flexible coupling. No Back Lash—Higher Flexibility—Higher Breakdown Voltage—Smaller Diameter—Shorter Length—Higher Alignment Accuracy—Higher Resistance to Mechanical Shock—Solid Insulating Barrier Diaphragm—Molded as a Single Unit.



CERAMIC PLATE OR GRID CAPS

Soldering lug and contact one-piece. Lug ears annealed and solder dipped to facilitate each combination "mechanical plus soldered" connection of cable.

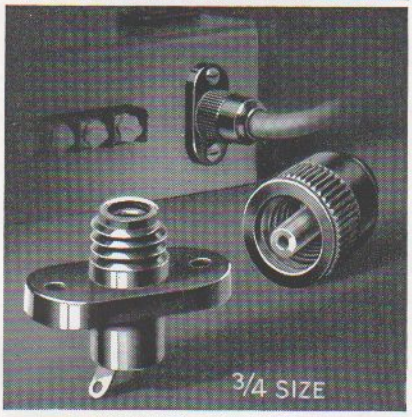
No. 36001—5/16"
No. 36002—⅜"
No. 36004—¼"



SNAP LOCK PLATE CAP

For Mobile, Industrial and other applications where tighter than normal grip with multiple finger 360° low resistance contact is required. Contact self-locking when cap is pressed into position. Insulated snap button at top releases contact grip for easy removal without damage to tube.

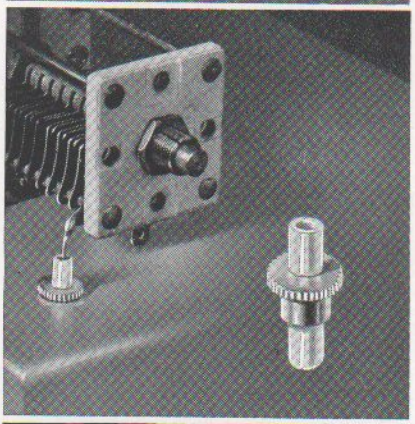
No. 36011—5/16"
No. 36012—⅜"



SAFETY TERMINAL

Combination high voltage terminal and thru-bushing Tapered contact pin fits firmly into conical socket providing large area, low resistance connection. Pin is swivel mounted in cap to prevent twisting of lead wire.

No. 37001, Black or Red
No. 37501, Low loss



THRU-BUSHING

Efficient, compact, easy to use and neat appearing. Fits ¼" hole in chassis. Held in place with a drop of solder or a "nick" from a crimping tool.

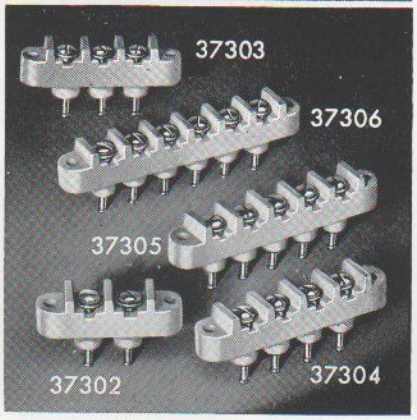
No. 32150

POSTS, PLATES, AND PLUGS

The No. 37200 series, including both insulated and non-insulated binding posts with associated plates and plugs, provide various combinations to meet most requirements. The posts have captive heads and keyed mounting.

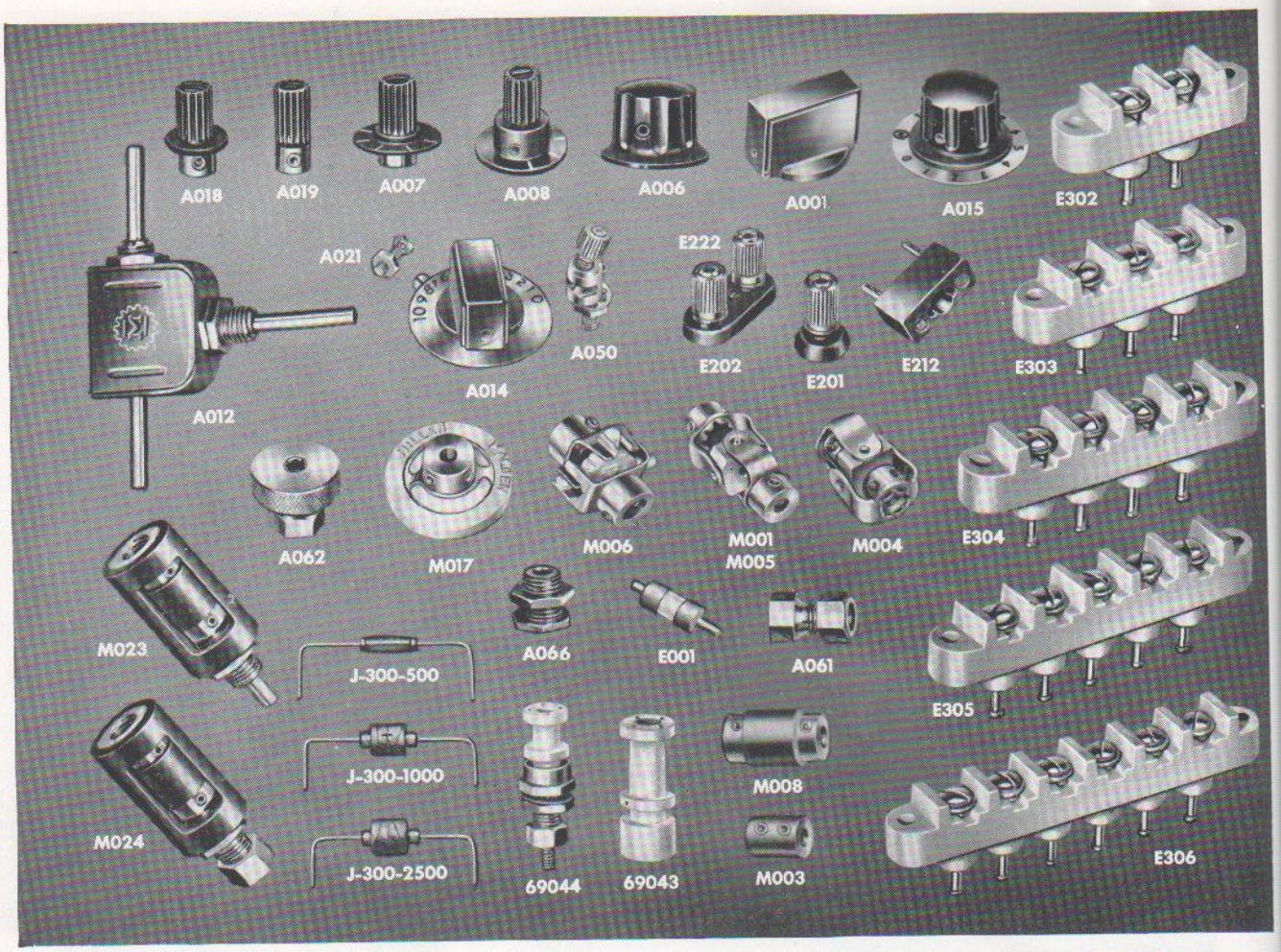
The No. 37291 and No. 37223 are standard in black or red with other colors on special order. No. 37201, No. 37202, and No. 37204 and No. 37222 are available in black, red, or low loss. The No. 37202 is also available in steatite.

No. 37201—Single plates, pr.
No. 37291—Single plates (tapered), pr.
No. 37202—Dual plates, pr.
No. 37204—Double dual plates, pr.
No. 37212—Dual plug
No. 37222—Non-insulated binding post, ea.
No. 37223—Insulated binding posts, ea.



STEATITE TERMINAL STRIPS

Terminal and lug are one piece. Lugs are turret type and are free floating so as not to strain L4 ceramic on wide temperature variations. Easy to mount with series of round holes. 1400 volt and 3500 volt series.



MINIATURIZED COMPONENTS

DESIGNED for APPLICATION miniaturized components developed for use in our own equipment such as the 90901 Oscilloscope, are now available for separate sale. Many of these parts are similar, in most details except size, to their equivalents in our standard component parts group. In certain devices where complete miniaturization is not paramount, a combination of standard and miniature components may possibly be used to advantage. For convenience, we have also listed on this page the extremely small sized coil forms from our standard catalog.

CODE	DESCRIPTION
A001	Bar knob for ⅛'' shaft. ½'' high by ¾'' long.
A006	Fluted black plastic knob with brass insert for ⅛'' shaft. ½'' high by ¾'' diameter.
A007	¼'' black plastic dial knob with brass insert for ⅛'' shaft. ⅝'' diameter dial. 5/16'' high.
A008	¼'' black plastic knob. Same as no. A007 except for style.
A012	Right angle drive for ⅛'' shafts. Single hole mounting.
A014	1'' bar dial for ⅛'' shaft. ½'' high. 180° or 280° dials for clockwise or counter-clockwise rotation.
A015	1'' fluted knob dial for ⅛'' shaft. ½'' high. Same dial plates as no. A014.
A017	1⅛'' diameter fluted black plastic knob for ⅛'' shaft.
A018	Knob, same as no. A007 except with ⅜'' diameter skirt.
A019	Knob, same as no. A007, but without dial.
A021	Miniature metal index for miniature dials.
A050	Miniature dial lock.
A061	Shaft lock for ⅛'' diameter shaft. ¼''-32 bushing. Nickel plated brass.
A062	Shaft lock with knurled locking nut.
A066	Shaft bearing for ⅛'' diameter shafts. Nickel plated brass. Fits 17/64'' diameter hole.

CODE	DESCRIPTION
E001	Steatite ceramic standoff or tie-point. Integral mounting eyelet. 0.205'' overall diameter.
E201	Black or red plastic binding post plates for No. E222.
E202	Black or red plastic plates for two binding posts spaced ½''.
E212	Black or red plastic plug for two binding posts spaced ½''.
E222	Metal binding post with jack top.
E302A	to E306A Steatite ceramic terminal strips. 5/16'' wide. Terminals spaced ⅜'' on centers. Screw type or solder type thru-terminals.
J300–3.3	to J300–2500 Complete line of miniature inductances 3.3 to 2500 microhenries. ⅜'' long. Diameter 0.115'' to 0.297''.
M001	Insulated universal joint style flexible coupling for ⅛'' dia. shafts.
M003	Solid coupling for ⅛'' dia. shafts. Nickel plated brass.
M004	Universal joint style flexible coupling for ⅛'' diameter shafts. Inverted hubs for short length. Not insulated.
M005	Universal joint style flexible coupling for ⅛'' diameter shafts. External hub for maximum flexibility. Not insulated.
M006	Universal joint style flexible coupling for ⅛'' diameter shafts. Spring finger. Steatite ceramic insulation.
M008	Plastic insulated coupling with nickel plated brass inserts for ⅛'' diameter shafts.
M017	Plastic insulated flexible coupling for ⅛'' diameter shafts. 17/32'' long by 15/16'' diameter. Bronze yoke.
M023	Insulated shaft extension for ¼''-32 bushing and ⅛'' shaft. For mounting sub-miniature potentiometer.
M024	Locking insulated shaft extension similar to no. M023.
69043	Steatite ceramic coil form. Adjustable core. Winding space ¼'' diameter by 13/32'' long. Mounting 4-40 hole.
69044	Steatite ceramic coil form. Adjustable core. Winding space 0.187'' diameter by 3/16'' long. No. 10-32 mounting.

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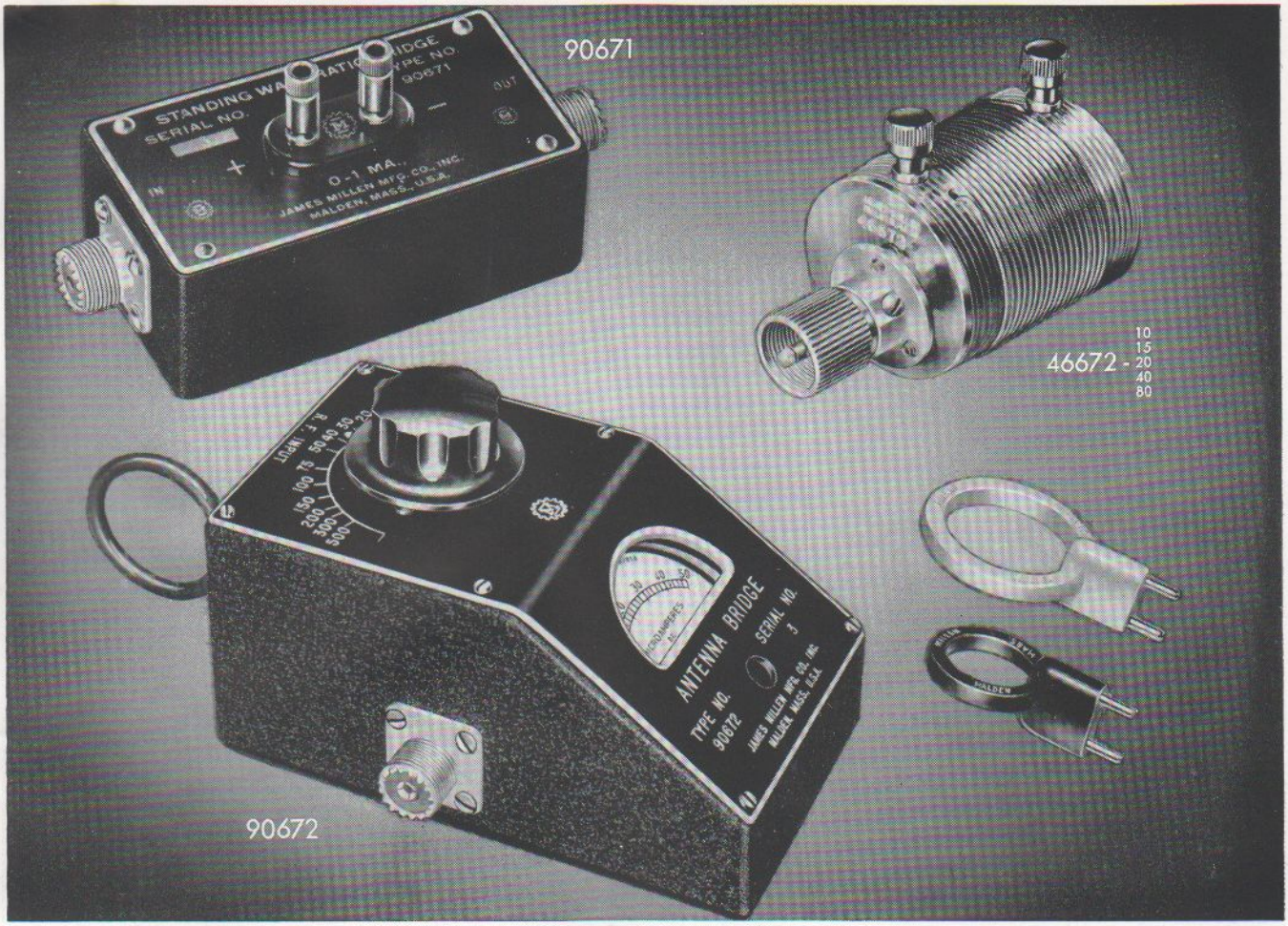

The Bridges and Baluns

Increased interest in matching impedances between antennas, feed lines, coupling networks, filters, and transmitters has indicated the need for equipment for making accurate impedance measurements at radio frequencies. In the past the only equipment available was extremely expensive and complicated to operate. Millen DESIGNED for APPLICATION bridges have brought accurate radio frequency measurements to the individual station engineer and operator, antenna production line, amateur operator, serviceman.

NO. 90672 ANTENNA BRIDGE

The No. 90672 Antenna Bridge is an accurate and sensitive bridge for measuring impedance in the range of 5 to 50 ohms for unbalanced impedances and 20 to 2000 ohms for balanced input (using the 4:1 balun described at right) at radio frequencies up to 140 mc. The variable element in this bridge is an especially designed differential capacitor of high accuracy and permanency of calibration over a wide range of frequencies. The bridge is entirely different in design from others designed for this type of service because it employs no variable resistors of any sort. The No. 90672 was designed to use a grid dip meter such as the Millen No. 90651 or its industrial counterparts the No. 90661 or the No. 90662, as a source of RF signal. No d.c. or 60 cycle power required. Length 5⅝ inches, Width 3½ inches, plus rf connector. Height 3⅞ inches including knob. Weight 1⅝ pounds.

NO. 90671 STANDING WAVE RATIO BRIDGE

The Millen S.W.R. bridge provides easy and inexpensive measurement of standing wave ratio on coaxial cable. As assembled the bridge is set up for 52 ohm line. An accurate 75 ohm resistor is mounted inside the case for substitution in the circuit when 75 ohm line is used. The S.W.R. Bridge is an r-f bridge in which the resistance of an antenna transmission line and antenna, as seen by the transmitter, is compared to a 51 ohm or 75 ohm resistor. An external 0 to 1 ma. meter is used to indicate the amount of deviation from balance. The meter reading is changed to standing wave ratio by using the calibration curve supplied.

NO. 46672 BALUNS

The No. 46672 series of wound Baluns covers each of the following frequency bands:
No. 46672-10 Ten/Eleven meters (26.96–29.7 mc.)
No. 46672-15 Fifteen meters (21.0–21.45 mc.)
No. 46672-20 Twenty meters (14.0–14.35 mc.)
No. 46672-40 Forty meters (7.0–7.3 mc.)
No. 46672-80 Eighty/Seventy-Five meters (3.5–4.0 mc.)

The No. 46672 wound Balun is an accurate 2-to-1 turns ratio, high Q auto transformer with the residual reactances accurately tuned out and with very tight coupling between the two halves of the total winding. The residual reactances are tuned out by carefully selected fixed capacitors. The points of series and parallel resonance are selected so that each Balun provides an accurate 4-to-1 impedance ratio over the entire band of frequencies for which it was designed.
A balanced impedance connected to the terminal posts of the Balun will appear at the co-axial cable connector as an unbalanced impedance equal to one-fourth the impedance connected to the binding posts. The 2-to-1 turns ratio produces a 4-to-1 impedance ratio. For example, a properly terminated balanced 600-ohm line connected to the binding posts will appear as 150 ohms at the co-axial terminal which is connected between the grounded center-tap and one end of the coil.
The two chief applications of the No. 46672 series of Baluns are:
1. A convenient means of connecting a balanced impedance to the Millen No. 90672 Antenna Bridge for measurement.

and

2. For coupling the unbalanced output from an amateur transmitter to a balanced transmission line.

Impedance ratio—4-to-1 ± 5%
Length—3⅜ inches including coaxial connector.
Width—2⅝ inches including binding posts.
Diameter—2 inches.
Weight—5 ounces.

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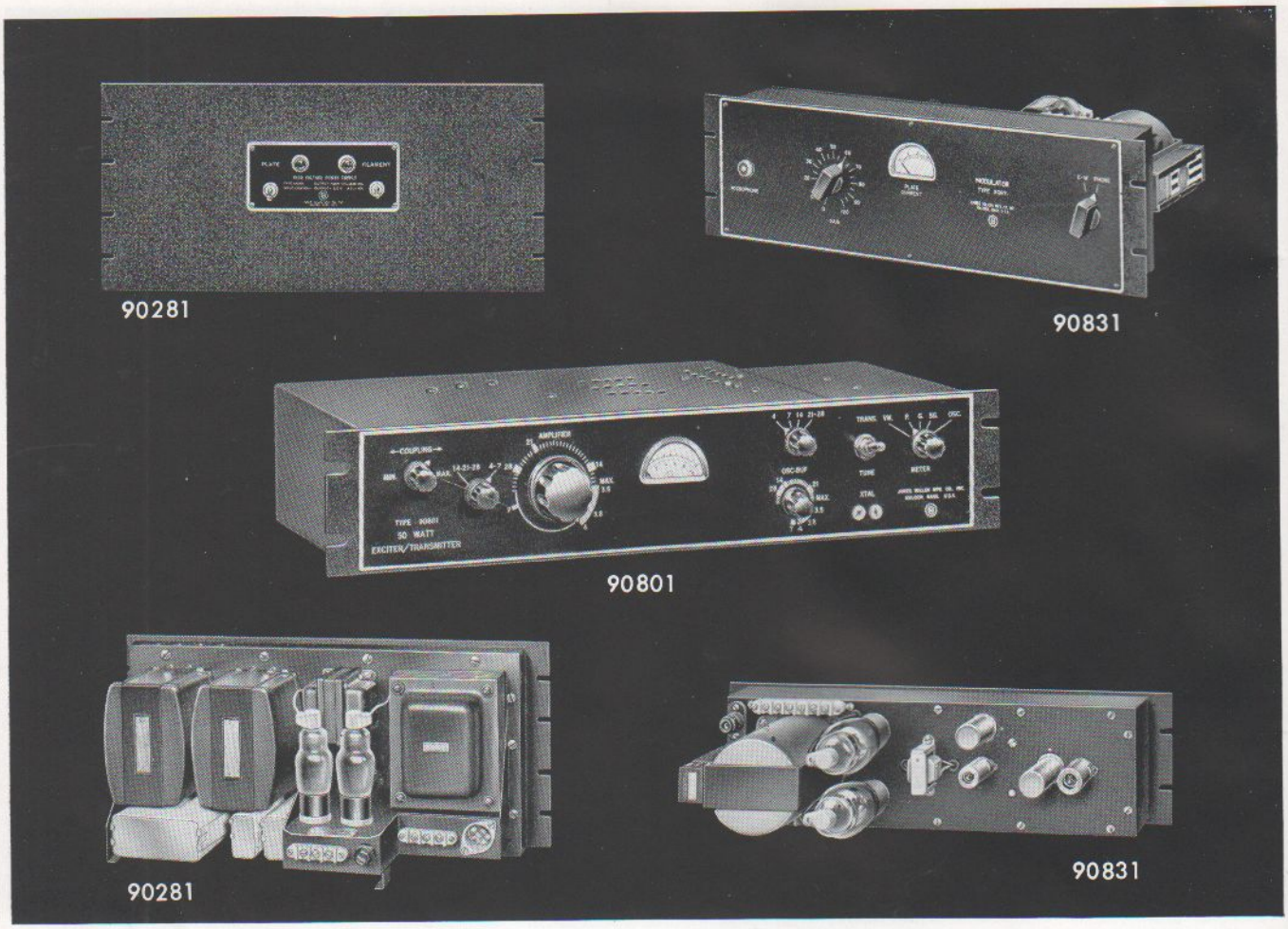

Exciters, Modulators and Power Supplies

EXCITER-TRANSMITTER

The 90801 Exciter-Transmitter is of the most modern design including features and shielding for TVI reduction, band-switching for the 4–7–14–21 and 28 megacycle bands, circuit metering. Conservatively rated for use either as a transmitter or exciter. 5763 oscillator-buffer-multiplier and 6146 power amplifier. 90 watts input for CW. Can be keyed in the oscillator and/or amplifier or by means of keyed external V.F.O. such as the 90711. 67 watts input phone. Rack mounted. 3½" panel height.

No. 90801, less tubes.....

MODULATOR

The 90831 40 watt modulator designed especially for use with 90801 transmitter. 12AX7 speech amplifier-6C4 voltage amplifier-class AB1 6146's. Suitable for modulating transmitters with power input up to 80 watts. Gain is ample for the use of low level, high impedance crystal or dynamic microphones. Frequency response is adjusted for good communication intelligibility with limited side bands. Modulator incorporates a switch for complete change-over of modulator and transmitter from CW to 'phone. Rack mounted. 5¼" panel height.

No. 90831, less tubes.....

HIGH VOLTAGE POWER SUPPLY

The 90281 high voltage power supply has a d.c. output of 550 to 700 volts, with maximum current of 235 ma. In addition, a.c. filament power of 6.3 volts at 4 amperes is also available. This power supply is an ideal unit for use with transmitters as well as general laboratory purposes. A single power supply will provide high voltage for both the 90801 Transmitter and the 90831 Modulator. Uses 2 — 816 mercury vapor rectifiers and incorporates a two section filter which results in excellent regulation and very low ripple. Rack mounted. 8¾" panel height.

No. 90281, less tubes.....

LOW VOLTAGE POWER SUPPLY
(not illustrated)

The 90201 is a compact uncased regulated and general purpose power supply either for table use, in the laboratory or for incorporation as an integral part of larger equipments. It will provide modulator and exciter low voltage as well as bias and heater voltages when used with the 90801 and 90831. Its multiple outputs include 250 volt 125 ma. unregulated — 105 volt 35 ma. regulated-bias voltage of minus 100 volts — 6.3 volt filament power at 4.2 amperes.

Model 90201, with tubes.....

JAMES MILLEN MFG. CO., INC.
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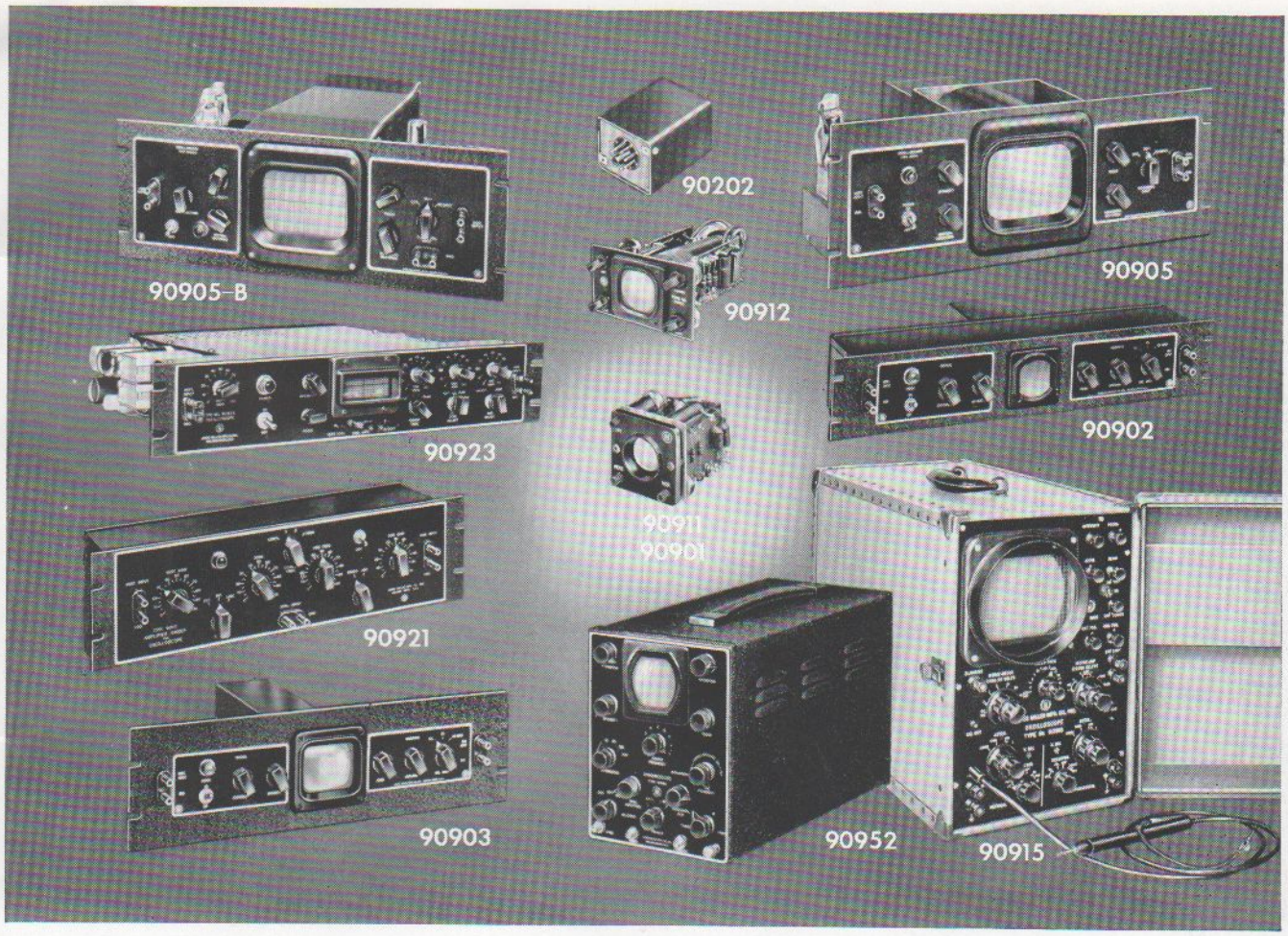

"Designed for Application" • Oscilloscopes and Accessories

The extensive Millen "Designed for Application" line of oscilloscopes and accessories includes five instrumentation oscilloscopes, six rack mounted basic oscilloscopes, an insulated industrial oscilloscope, a miniature synchroscope-oscilloscope, two compact rack mounted complete oscilloscopes, a rack mounted basic oscilloscope for military applications, two amplifier-sweeps, and a plug-in power supply.

INSTRUMENTATION OSCILLOSCOPES

Miniaturized, packaged panel mounting cathode ray oscilloscopes designed for use in instrumentation in place of conventional "pointer type" moving coil meter. Magnitude, phase displacement, wave shape, etc. are readily displayed.

No. 90901 uses type 1CP1 fixed focus one inch cathode ray tube. $2^{11}/_{32}$" x 2¾" panel. Panel bezel matches in size and type the standard 2" square meters.

No. 90911 uses Type 1EP1 cathode ray tube. Balanced deflection. Blanking input. Sharp focus. Panel matches 2" square meters. Flat face RCA 1¼" diameter tube.

No. 90912 uses type 2BP1 two inch cathode ray tube. 3" x 5" panel. Sharp focus. Good sensitivity. Accelerating voltage 500 to 875 volts. Min. control interaction.

No. 90912-R uses type 3UP1 2⅛" x $1^{9}/_{16}$" rectangular cathode ray tube.

No. 90913 uses type 3XP1 3" x 1½" rectangular cathode ray tube. 1⅛" x 2¾" useful scan. Vertical sensitivity 33 volts d.c. per inch at 2000 v. accelerating.

BASIC OSCILLOSCOPES

Rack mounted inexpensive *basic* oscilloscopes including cathode ray tube circuit, power supply; intensity, focus, and centering controls, magnetic shielding, safety features, switches, etc. The *basic* oscilloscopes in their packaged form are entirely adequate for many laboratory as well as industrial and communication uses.

No. 90902 uses type 2BP1 two inch cathode ray tube. 3½" x 19" panel. Power supply — 105–125 volts — 60 cycles. Power consumption — 19 watts.

No. 90902-M — Military version of 90902.

No. 90903 uses type 3KP1 three inch cathode ray tube. 5¼" x 19" panel. Power supply — 105–125 volts — 60 cycles. Power consumption — 19 watts.

No. 90903-R uses type 3XP1 3" x 1½" rectangular cathode ray tube. 3½" x 19" panel. Power supply 105–125 volts — 60 cycles.

No. 90905 uses type 5UP1 five inch cathode ray tube. 7" x 19" panel. Power supply 105–125 volts — 60 cycles. Power consumption — 32 watts.

No. 90905-B uses type 5ADP1 five inch flat face precision tolerance cathode ray tube. Power supply — 105–125 volts — 60 cycles. Power consumption — 35 watts.

No. 90905-R uses type B1204 $4^{5}/_{8}$" x $2^{5}/_{8}$" rectangular cathode ray tube. 3½" x 19" panel.

INDUSTRIAL OSCILLOSCOPE

Suitable for use in factory, laboratory, and the field for design, installation, maintenance, and service. Completely insulated front panel and case. Double shielded against magnetic fields. Excellent linearity. Sharp focus over entire 4" x 4" useful scan. The vertical and horizontal amplifiers are stable d.c. amplifiers and are identical, thus permitting accurate phase measurements.

No. 90915 uses type 5AQP — 1, 2, 7, or 11 flat face, precision tolerance cathode ray tube. Frequency response of either amplifier D.C. to 100 K.C. + 0–10%.

MINIATURE SYNCHROSCOPE-OSCILLOSCOPE

Compact "field service" Synchroscope or Oscilloscope. 7½" x $5^{5}/_{8}$" x 13". Weighs 17 pounds. Synchronizes to internal or external positive or negative pulses. Band width 10 cycles to 1000 KC. Sweep 6 to 300 microseconds per inch. Performance has not been sacrificed in designing this unit for light weight.

RACK MOUNTED OSCILLOSCOPES

Complete with amplifiers and sweep. Good low frequency response and linearity. For monitoring, production test, or laboratory use. Compact.

No. 90923 uses type 3XP1 3" x 1½" rectangular cathode ray tube. 3½" x 19" panel.

No. 90925 uses type B1204 $4^{5}/_{8}$" x $2^{5}/_{8}$" rectangular cathode ray tube. 3½" x 19" panel.

PLUG-IN POWER SUPPLY

Compact high voltage power supply for oscilloscopes, etc. 2" x 2½" x 5". Input 117 volts 50/60 cycles at 10 watts. Output 750 volts d.c. at 3 ma. and 6.3 volts a.c. at 600 ma. Supplies accelerating and centering potential for oscilloscopes.

No. 90202 Power Supply for Instrumentation Oscilloscopes.

AMPLIFIER/SWEEP UNITS

Horizontal and vertical amplifiers and sawtooth sweep generator for use with *basic* oscilloscopes. Match MILLEN *basic* oscilloscopes in appearance.

No. 90921 — 6SJ7 amplifiers. 6SN7-GT hard tube sweep. 5¼" x 19" rack panel.

No. 90922 — 3½" x 19" rack panel. Good low frequency linearity.

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LABORATORY DELAY LINE STANDARDS

The Millen delay line kit effectively provides a means for the development and design engineer to check the effect of various delays in their actual developmental setups without the time loss and expense of producing separate lines for each trial. Increased requirement for time delay circuits in radar, color television and other modern electronic applications has presented a problem to the design and development engineer as it has been both time consuming and expensive to obtain delay lines for developmental work as each line was necessarily cut to the estimated delay and any change in requirements necessitated the fabrication of a new delay line. The Millen delay line kit is designed to provide a ready means of obtaining various delays from .10 microseconds through 2 microseconds in increments of .05 microseconds except at the extreme ends of this range. The lines may be used repeatedly without deterioration as they are hermetically sealed, the smaller lines in glass tubes, the 1 microsecond line in a metal container.

Each set consists of:

NOMINAL DELAY	TOL.	CALIBRATION TOLERANCE
2—0.10 μs.	± 0.01 μs.	± 0.002 μs.
2—0.25 μs.	± 0.025 μs.	± 0.002 μs.
1—0.30 μs.	± 0.03 μs.	± 0.002 μs.
1—1.00 μs.	± 0.05 μs.	± 0.01 μs.

Actual delay as measured by phase shift method are marked on each delay line. The laboratory calibration of each delay line is accurate to ± 0.002 microseconds on all of the .10 microsecond, .25 microsecond and 0.3 microsecond lines and ± 0.01 microsecond on the 1 microsecond line. Combination of delay lines supplied makes possible the following delays:

0.10 μs.	0.55 μs.	1.10 μs.	1.55 μs.
0.20	0.60	1.20	1.60
0.25	0.65	1.25	1.65
0.30	0.70	1.30	1.70
0.35	0.75	1.35	1.75
0.40	0.80	1.40	1.80
0.45	0.90	1.45	1.90
0.50	1.00	1.50	2.00

Characteristic impedance — 1350 ohms ± 20%.

PHYSICAL DIMENSIONS:

0.1 μs.—15/32" dia. x 4⅛" long
0.25 μs.—15/32" dia. x 7⅜" long
0.30 μs.—15/32" dia. x 7⅜" long
1.00 μs.—4¾" x 4¾" x 1"

All seven lines are mounted in a metal case 9½" x 5" x 1¾" for convenience in storing and safety in handling.

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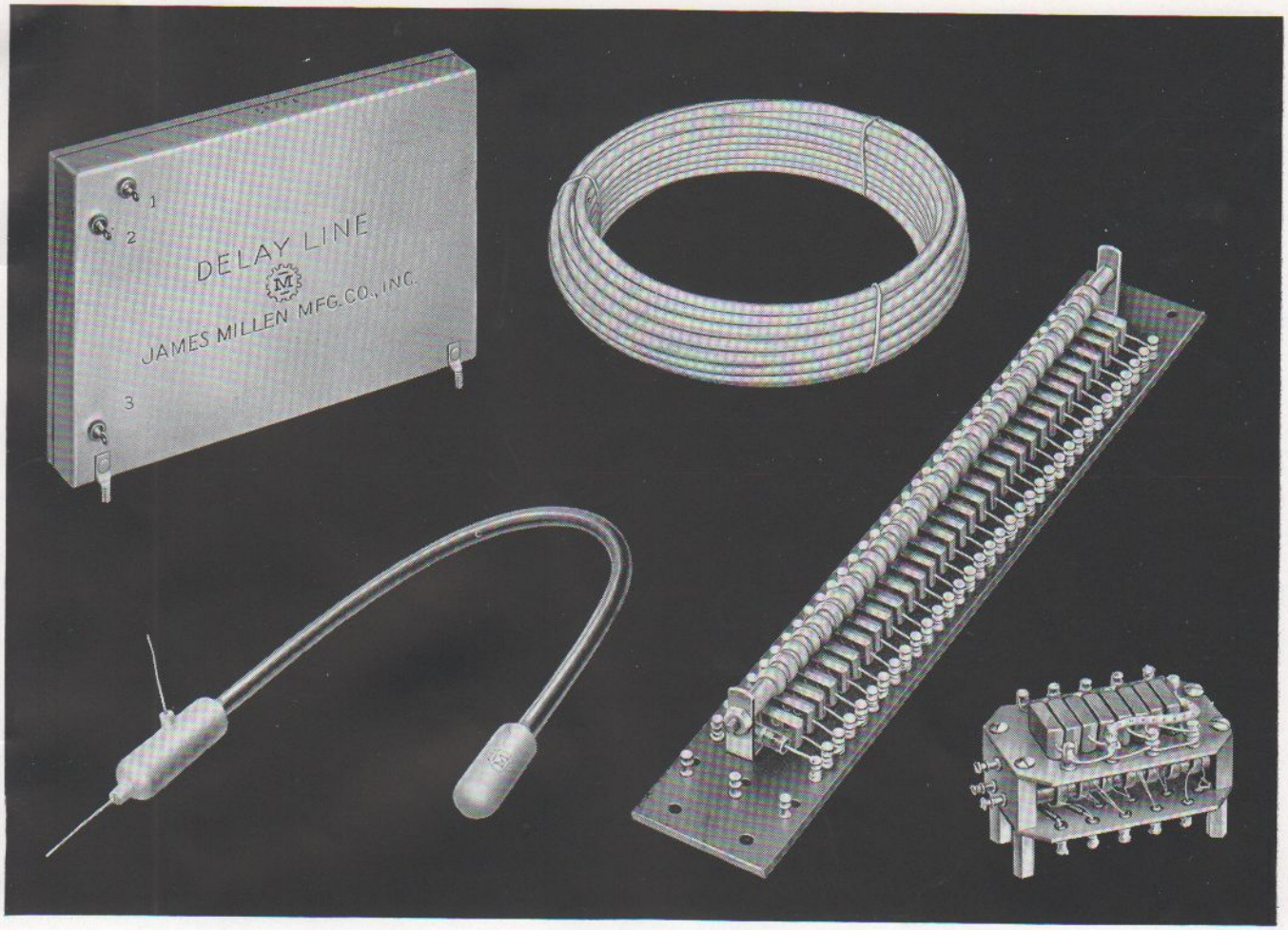

Delay Lines and Networks • *"Designed for Application"*

The James Millen Mfg. Co., Inc. has been producing continuous delay lines and lump constant delay networks since the origination of the demand for these components in pulse formation and other circuits requiring time delay. The most modern of these is the distributed constant delay line designed to comply with the most stringent electrical and mechanical requirements for military, commercial and laboratory equipment.

Distributed-constants delay line is furnished in three forms:

1. Bulk line
2. Flexible sealed completed units
3. Cased hermetically sealed completed units

The bulk delay line is approximately 5/16 in. diameter and is furnished in random lengths. It is priced "by the foot."

The flexible, sealed, complete lines are furnished with delay time of from 0.1 microseconds to 10 microseconds. The terminals are No. 18 tinned leads, extended through molded end caps. This form of line is particularly useful in applications where space is at a premium, as the line can be tucked around the edges of the chassis, in otherwise waste space. The flexible lines are furnished with terminals on both ends for transmission use or with a dummy molded end replacing one of the terminals for pulse forming lines. Delay time is specified as time required for the transmission through one length of line only.

Care must be used not to coil line around a diameter of less than 4½ in.

The cased lines are mounted in hermetically sealed metal containers with "metal to glass" terminals. Lines of this type can be furnished in values up to approximately 36 microseconds and with multiple sections, in a single case. Delay lines from 0.5 microsecond to 1.5 microseconds 1350 ohm characteristic impedance are mounted in a standard can 4¾ in. long by 4¾ in. high, by 1 in. thick. Delay lines from 0.1 microseconds to 0.5 microseconds are mounted in a standard can 1 inch by 1 inch square and length to accommodate the particular time-delay line requirements. Delay lines 550 ohm impedance from 0.1 microseconds to 0.25 microseconds are also mounted in the standard 1 x 1 inch square can.

Case size, terminal arrangement, mounting feet or ugs, etc., can be furnished to customer's requirements.

Due to the special nature of delay line applications, we list no standard units, but solicit correspondence regarding your exact requirements.

ELECTRICAL CHARACTERISTICS:

Characteristic Impedance: 1350 ohms ± 20% or 550 ohms ± 20%. Special lines of any impedance between 400 ohms and 2000 ohms can be supplied.

Time Delay: Approximately 22 inches per microsecond for 1350 ohm line. Approximately 4.1 feet per microsecond for 550 ohm line.

Frequency Response: 1350 ohm line — When a 1 microsecond square pulse is applied to the line, the leading edge of the pulse after transmission through 4 microseconds of line has a time rise of not more than 0.2 microseconds and the duration of the pulse is less than 1.5 microseconds. (Line terminated by characteristic impedance.) Rise time is a function of delay.

Band Pass: A function of delay.

Attenuation: Approximately 1.0 db. per foot for one microsecond pulse. With a four microsecond delay line terminated in its characteristic impedance and a one microsecond square pulse input, the transmitted pulse height is no less than 35% of the input pulse height.

Test Voltage: 600 volts d.c. between winding and shield, between winding and case and between shield and case.

Leakage Resistance: 100 megohms or more between winding and shield and between winding and case.

Ambient Temperature Range: Minus 50 degrees centigrade to plus 85 degrees centigrade.

Thermal Drift: Less than 0.00038 microseconds per microsecond delay per degree centigrade.

Weight: Approximately 0.6 ounce per foot.

Many special applications require lumped-constant delay line. We are in a position to manufacture such lines to your specifications. The above illustrations are typical examples. Other designs including hermetically sealed units can be supplied.

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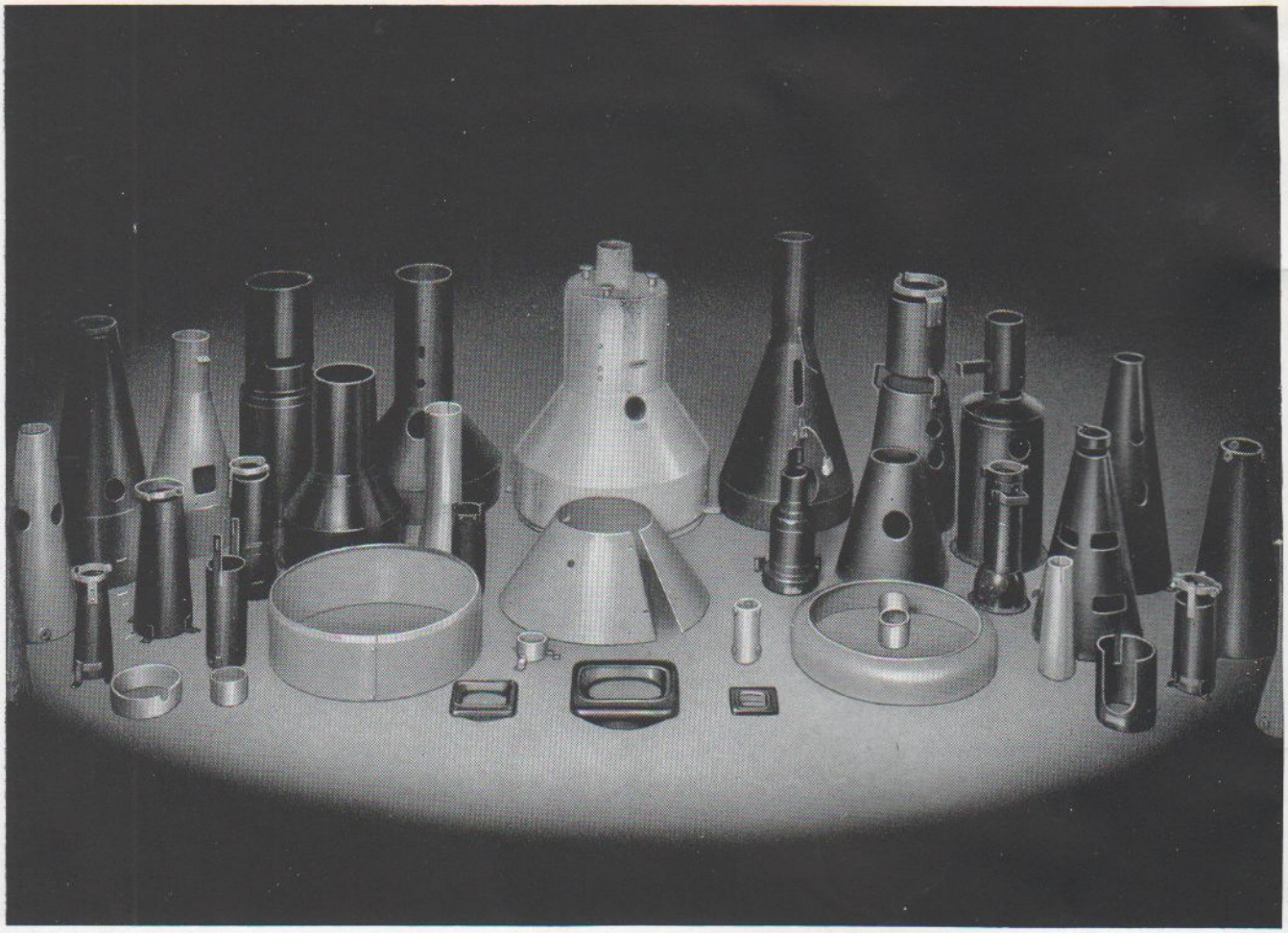

Magnetic Metal Shields

The James Millen Mfg. Co., Inc. has for many years specialized in the production of magnetic metal cathode ray tube shields and bezels for the entire electronic industry, supplying magnetic metal shields to manufacturing companies, laboratories and research organizations. The study of such problems has resulted in the use of two outstanding metals for this purpose: NICOLOI and MUMETAL. It is possible by selecting the proper material, that is, Mumetal or Nicoloi, or the correct combination of these materials, to reduce the effect of undesired magnetic fields

Mumetal is generally used on equipment requiring the most thorough shielding, and where the trouble-causing field is not of excessive magnitude. Nicoloi is very effective in reducing fields of high flux concentration. Single Nicoloi shields are satisfactory for general purpose application where the ultimate design does not necessitate too critical consideration of the effect of external fields. Where there is a combination of the requirement for optimum shielding and an abnormally high external field, the combination of Nicoloi outer shield and a Mumetal inner shield is used. The Nicoloi outer shield reduces the high field most effectively; and the Mumetal inner shield is then operating under the best condition whereby it reduces the interference from a low field to a minimum. For most applications, however, the single Mumetal shield is entirely adequate and to be recommended.

Both Nicoloi and Mumetal obtain their effectiveness due to the correct selection of alloys on one hand, and the process of annealing so as to relieve stresses and provide the best possible molecular structure for effective shielding, on the other.

Magnetic metal shields can be furnished to meet the most stringent requirements and match the color of the equipment incorporating such shields. Due to the high alloy content neither Nicoloi or Mumetal is subject to corrosion and, in general, it is recommended that a zinc chromate primer and a high heat lacquer be used in finishing the shields. Plating is generally avoided due to the possibility that the shields might become magnetized in the plating process which necessarily is done after annealing. Care is used in the selection of materials used in conjunction with the shields for such purposes as brackets, supports, etc., so as to minimize many operations on the shields after annealing.

Cold rolled or stainless steel brackets are recommended as it is impractical to use brass which would melt under the high annealing temperature. Tube clamps must necessarily be made of spring metal which would lose its temper during annealing. In order to avoid this clamps are mounted on the shields after treatment by means of spun rivets so as to avoid any shock to the shield

Shields and bezels have been designed to meet the stringent requirements of military, laboratory and industrial uses and still provide units which are economical and can be assembled into the complete equipment without complexity. Our standard shields and bezels are arranged to support the cathode ray tube from the front panel without addition of complicated supports and brackets.

Standard shields and bezels for the more popular tubes are available from stock for both production and research programs.

Many production programs, however, make desirable shields designed in conjunction with the specialized requirements of the basic apparatus. Our Custom Shield design and fabrication department is at the service of our customers for the development of magnetic metal shields for such specialized application.

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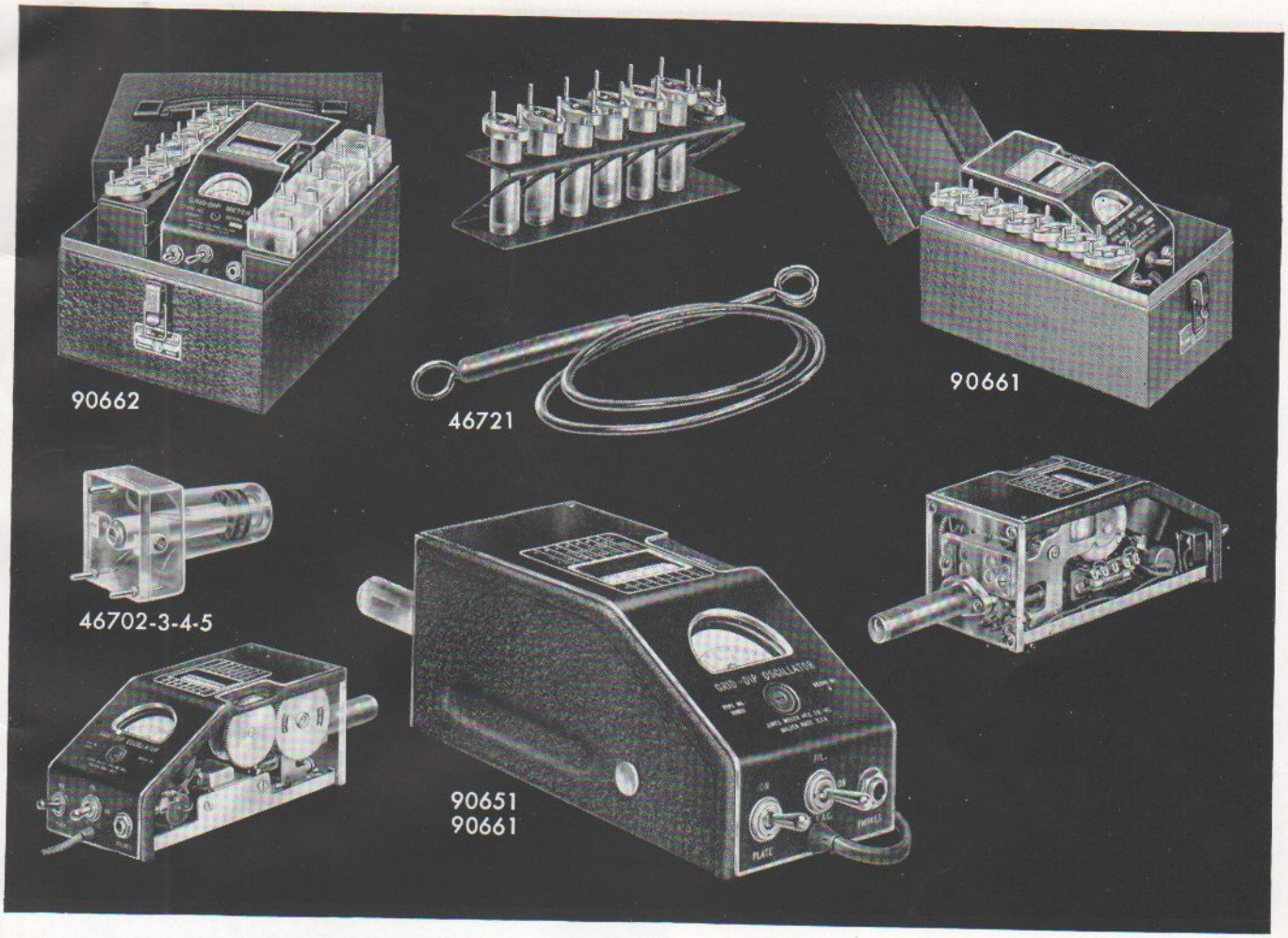

Designed for Application

Grid Dip Meters

Millen Grid Dip Meters are available to meet all various laboratory and servicing requirements.

The 90662 Industrial Grid Dip Meter hand calibrated ± 0.5% for laboratory use with a range from 225 kc. to 300 mc. incorporates features desired for both industrial and laboratory application, including three wire grounding type power cord and suitable carrying case.

The 90661 Industrial Grid Dip Meter is similar to the 90662 except for a reduced range of 1.7 to 300 mc. It likewise incorporates the three wire grounding type cord and metal carrying case.

The 90651 Standard Grid Dip Meter is a somewhat less expensive version of the grid dip meter. The ± 2.0% calibration is adequate for general usage. It is supplied without grounding lead and without carrying case. The range is 1.7 to 300 mc. Extra inductors available extends range to 220 kc.

The Millen Grid Dip Meter is a calibrated stable RF oscillator unit with a meter to read grid current. The frequency determining coil is plugged into the unit so that it may be used as a probe.

These instruments are complete with a built-in transformer type A.C. power supply and internal terminal board to provide connections for battery operation where it is desirable to use the unit on antenna measurements and other usages where A.C. power is not available. Compactness has been achieved without loss of performance or convenience of usage. The incorporation of the power supply, oscillator and probe into a single unit provides a convenient device for checking all types of circuits. The indicating instrument is a standard 2 inch instrument with an easy to read scale. The calibrated dial is a large 205° drum dial which provides seven direct reading scales, plus an additional universal scale, all with the same length and readability. Each range has its individual plug-in probe completely enclosed in a contour fitting polystyrene case for assurance of permanence of calibration as well as to prevent any possibility of mechanical damage or of unintentional contact with the components of the circuit being tested.

The Grid Dip Meters may be used as:

1. A grid Dip Oscillator
2. An Oscillating Detector
3. A Signal Generator
4. An Indicating Absorption Wavemeter

The most common usage of the Grid Dip Meter is as an oscillating frequency meter to determine the resonant frequencies of de-energized tuned circuits.

Size of Grid Dip Meter only (less probe): 7 in. x $3\frac{31}{16}$ in. x $3\frac{3}{8}$ in.

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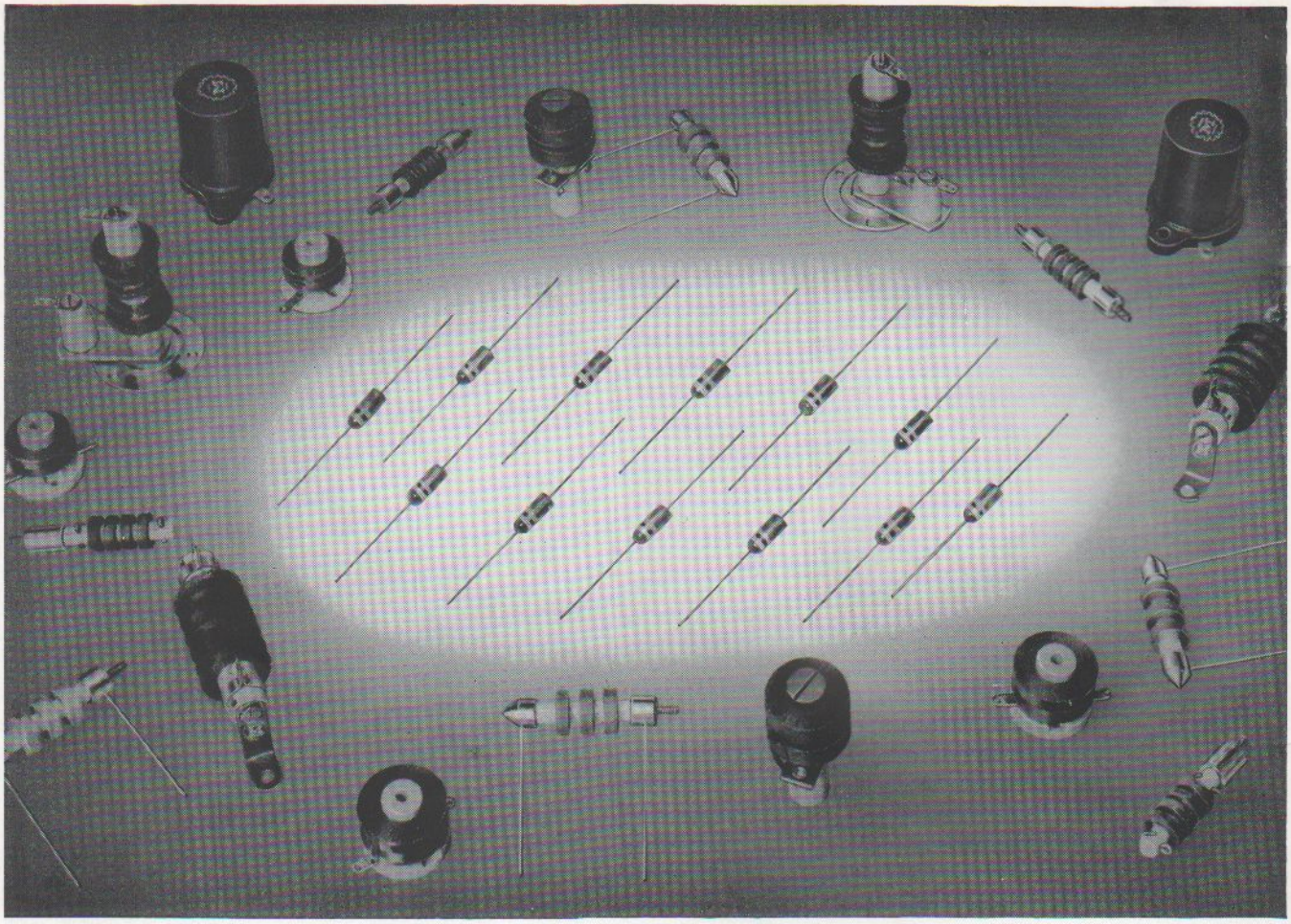

Encapsulated Inductances

Millen DESIGNED for APPLICATION encapsulated coils provide another advance in the r-f inductor field. Modern application requires miniature, heat and cold resistant, hermetically sealed, and abrasion resistant r-f inductor assemblies. The James Millen Manufacturing Company has pioneered many advances in the r-f inductor field, including the now standard 4 pi r-f choke, the axial lead r-f choke, and the miniature r-f choke. Developments have now made possible another advance, the No. 34301 and No. J301 encapsulated inductors—hermetically sealed—miniature size. Ambient temperature minus 55 degrees to plus 100 degrees C.

NO. J301 MINIATURE ENCAPSULATED INDUCTANCES

DESIGNED for APPLICATION miniature inductances are: extremely small (see table at right)—hermetically sealed—wound on axial lead Carbonyl cores—color coded. Coils are available in EIA standard values plus 25, 50, 150, 250, 350, 500, and 2500 microhenries. Current rating 100 to 1450 milliamperes depending on coil size.

NO. 34301 STANDARD ENCAPSULATED INDUCTANCES

Encapsulated DESIGNED for APPLICATION axial lead phenolic form r-f inductances. Hermetically sealed—heat resistant—abrasion proof—color coded. 0.15 to 2500 microhenries available in EIA standard values plus 25, 50, 150, 250, and 350 microhenries. Inductance ± 5%. Values available in same progression as J301 coils listed in the table at the right. Current rating 250 to 2800 milliamperes, depending on coil size. Ambient temperature range—minus 55 degrees to plus 100 degrees Centigrade. Size 3/16 inches diameter × 9/16 inches long to 3/8″ × 7/8″.

COIL NUMBER	INDUCTANCE MICROHENRIES	DIAMETER INCHES	LENGTH INCHES
J301-25	25	3/16	9/16
J301-33	33	3/16	9/16
J301-47	47	3/16	9/16
J301-50	50	3/16	9/16
J301-82	82	3/16	9/16
J301-100	100	3/16	9/16
J301-120	120	3/16	9/16
J301-150	150	3/16	9/16
J301-200	200	3/16	9/16
J301-220	220	3/16	9/16
J301-250	250	3/16	9/16
J301-300	300	3/16	9/16
J301-330	330	3/16	9/16
J301-350	350	3/16	9/16
J301-360	360	7/32	5/8
J301-390	390	7/32	5/8
J301-430	430	7/32	5/8
J301-470	470	1/4	11/16
J301-500	500	1/4	11/16
J301-510	510	1/4	11/16
J301-560	560	1/4	11/16
J301-620	620	1/4	11/16
J301-680	680	9/32	3/4
J301-750	750	9/32	3/4
J301-820	820	9/32	3/4
J301-910	910	9/32	3/4
J301-1000	1000	9/32	3/4
J301-1200	1200	5/16	13/16
J301-1300	1300	5/16	13/16
J301-1500	1500	5/16	13/16
J301-1800	1800	5/16	13/16
J301-2000	2000	3/8	7/8
J301-2200	2200	3/8	7/8
J301-2400	2400	3/8	7/8
J301-2500	2500	3/8	7/8

JAMES MILLEN MFG. CO., INC.

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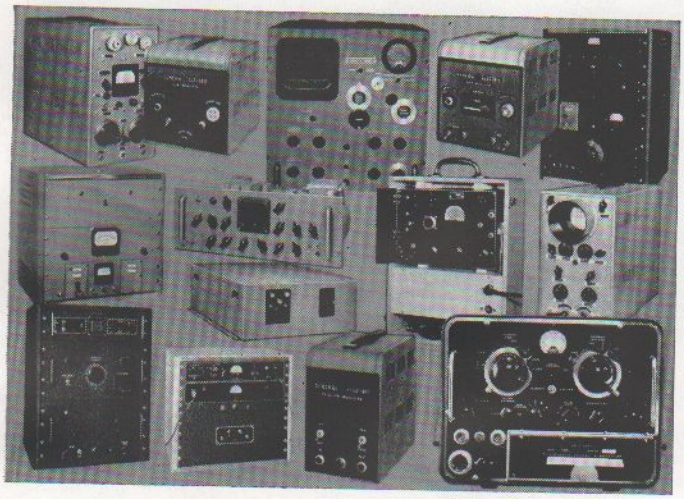
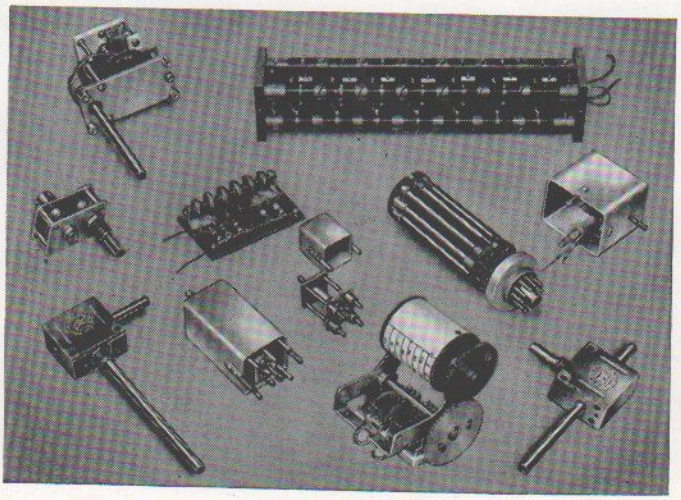
THE JAMES MILLEN MANUFACTURING COMPANY

Provides a very wide selection of standard items of their own design which are readily available for use by the engineer in design and prototype work.

Design requirements (particularly involving shields, delay lines, RF chokes, IF transformers, dials, etc.) often require variation from standard stock items. Our specialized facilities make possible the furnishing of the majority of these variations without tool cost or long delay.

Frequently, however, the design engineer will require a completely new and special component for a particular problem where no stock part or readily modifiable part is available. Here we can be of particular service "*Conserving Your Engineering Time*" as well as reducing expenses and delay for you.



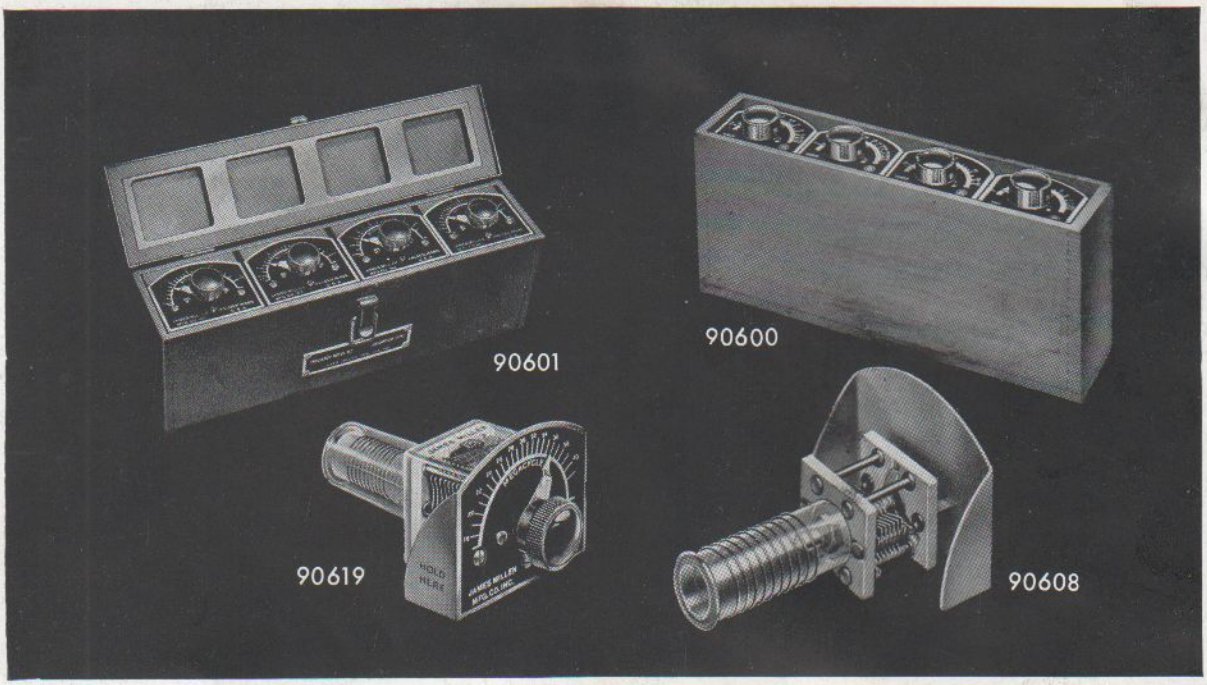


Engineering and purchasing personnel need not consult with many firms to secure their individualized special services such as design, tooling, metal working, phenolic molding, assembling, final tests, etc.

Our complete facilities make possible such services in a "Single Package".

Our versatile engineering and manufacturing facilities have made possible outstanding economies for our customers. One needed a special socket. This involved molding, special contacts, heat treating, etc. For this customer to have designed this socket, and had parts made separately would have been costly, time consuming, and would have resulted in undesirable divided responsibility. We designed the unit, made the phenolic mold, made the contact tools and dies, molded the bases, stamped and formed the contacts, assembled the complete unit, and gave the customer exactly what he desired within an extremely short time and at an appreciable saving.

Another customer had a problem on a special knob which likewise would have involved divided responsibility, considerable following, as well as expenses and time delay had they not been able to place the entire responsibility with the James Millen Manufacturing Company. This same situation applies on many other assemblies involving couplings, dial locks, condensers, and other items. This service is available to YOU to assist in obtaining economies in your research and development program, as well as in your product problems.



Midget Absorption Frequency Meters

Many amateurs and experimenters do not realize that one of the most useful "tools" of the commercial transmitter designer is a series of very small absorption type frequency meters. These handy instruments can be poked into small shield compartments, coil cans, corners of chassis, etc., to check harmonics; parasitics; oscillator-doubler, etc., tank tuning; and a host of other such applications. Quickly enables the design engineer to find out what is really "going on" in a circuit.

Types 90604 thru 90610 are extremely small and designed primarily for engineering laboratory use where they will be handled with reasonable care. The most useful combination being the group of four under code No. 90600 and covering the total range of from 3.0 to 140 megacycles. When purchased in sets of four under code No. 90600 a convenient carrying and storage case is included. Series 90601 are slightly larger and very much more rugged. They are further protected by a contour fitting transparent polystyrene case to protect against damage and dirt. This latter series is designed primarily for field use and are not quite as convenient for laboratory use as the 90605 thru 90608 types. All types have dials directly calibrated in frequency.

Code	Description	Net Price
90604	Range 160 to 210 mc.	
90605	Range 3.0 to 10 mc.	
90606	Range 9.0 to 23 mc.	
90607	Range 23 to 60 mc.	
90608	Range 50 to 140 mc.	
90609	Range 130 to 170 mc.	
90610	Range 105 to 150 mc.	
90611	Range 1.5 to 3.5 mc.	
90612	Range 3.5 to 8 mc.	
90613	Range 8 to 18.5 mc.	
90614	Range 18 to 41 mc.	
90619	Range 0.35 to 1.0 mc.—Neon Indicator	
90620	Range 0.15 .o 0.35 mc.—Neon Indicator	
90625	Range 2 to 6 mc.—Neon Indicator	
90626	Range 5.5 to 15 mc.—Neon Indicator	
90600	Complete set of 90605 thru 90608, in case	
90601	Complete set Field type Frequency Meters in metal carrying case 1.5 to 40 mc.	

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SAN FRANCISCO
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