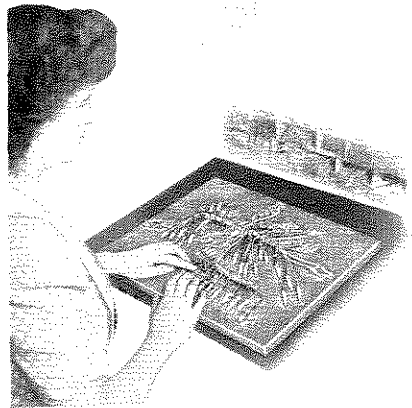
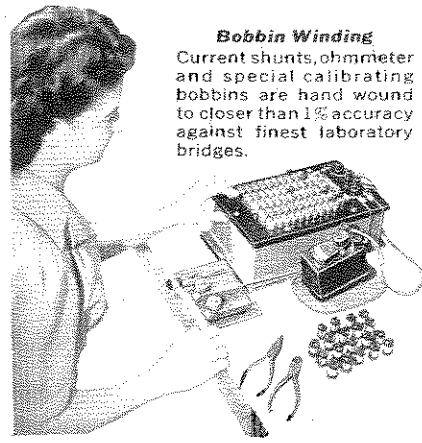


**Telephone Cabling**  
Uniform wiring and color coding maintained by exclusive use of plastic insulated, moisture resistant telephone-type cabling.

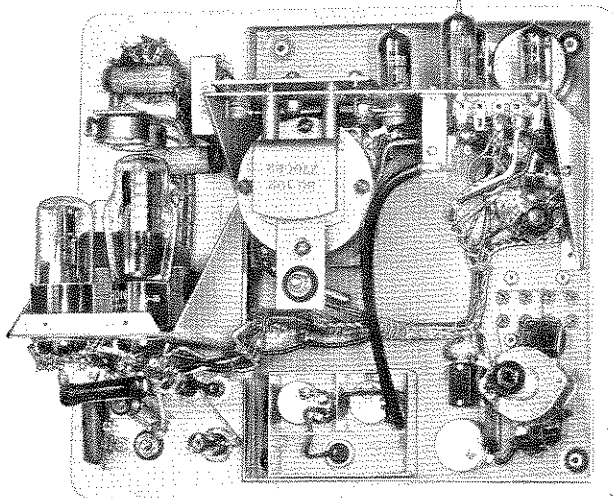


**Bobbin Winding**  
Current shunts, ohmmeter and special calibrating bobbins are hand wound to closer than 1% accuracy against finest laboratory bridges.



**Assembly**  
PRECISION Test Instruments make use of only highest quality components, carefully assembled and inspected by highly trained personnel, to insure lasting trouble-free performance.

**Wiring - Soldering**  
ONLY well trained, selected men can meet the high PRECISION standards of wiring, soldering and quality workmanship.



### The Inside Story...

There is **NOTHING ARBITRARY, NO GUESSWORK**, behind the design, materials and workmanship which disclose **"THE INSIDE STORY"** of Precision-built instruments. Examine the underside of the panel—take note of these illustrated features which are only a few of the many points revealing the infinite and painstaking care given to

### "PRECISION INDIVIDUALIZED PRODUCTION"

**PRECISION TEST EQUIPMENT IS GUARANTEED FOR ONE FULL YEAR**

against any mechanical or electrical defects! Registration-Guarantee card accompanies every instrument.

#### AUTHORIZED SALES REPRESENTATIVES

OFFICE	STATE	MAILING ADDRESS
C. R. Strassner Co.	California	1865 No. Western Ave., Los Angeles 27
A. J. Nelson Co.	Colorado	P. O. Box 5502, Denver
R. H. Van Deusen	Florida	940 Lake Elbert Dr., Winterhaven
Clark Adair	Georgia	1426 High Point Pl. N.E., Atlanta 6
Lund-Hansen Co.	Illinois	1900 West Montrose Ave., Chicago 13
J. Clancy & Co.	Indiana	P. O. Box 267, Angola
Koenig Sales Co.	Kansas	6359 Antioch Ave., Merriam
Delzell-Maynard Sales Co.	Louisiana	3409 Oaklawn Ave. Dallas, Texas
Morris F. Taylor Co.	Maryland	P. O. Box 111, Silver Spring
M & P Sales Co. Inc.	Massachusetts	1116 Great Plains Ave., Needham
Jack M. Thorpe	Michigan	4390 Haverhill Ave., Detroit 24

OFFICE	STATE	MAILING ADDRESS
Gerald A. Ellis	Minnesota	721 South Second St., Mankato
Kaelber & Mack	New York (City)	#1 Park Ave., Manhasset, L. I.
Wolfe-Marsey Sales Co.	New York	74 Park Ave., Rochester 7
F. A. Daugherty & Co.	Ohio	1120 Croyden Rd., Cleveland 24
Frank Van Gilder	Pennsylvania (East)	230 Mill Rd., Havertown
P. A. Boyd	Pennsylvania (West)	409 Todd St., Pittsburgh 21
Wm. T. Little	Tennessee	P. O. Box 308 East Point, Georgia
G. G. Willison Co.	Texas	1821 W. Alabama St., Houston 6
August J. Nelson	Virginia	1008 N. Ingleside Ave. Catonsville 28, Md.
Northwestern Agencies, Inc.	Washington	4130 First Ave. So., Seattle 4

#### EXPORT DIVISION

Morhan Exporting Corp.  
458 Broadway, New York 13, N. Y.



#### CANADA

Atlas Radio Corp. Ltd.  
560 King St. W., Toronto 2B, Ontario

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**PRECISION APPARATUS COMPANY INC., ELMHURST, L. I., NEW YORK**

Manufacturers of Fine Electronic Test Instruments for Over 20 Years

*Standard of Accuracy*

# PRECISION TEST EQUIPMENT

Convenient Terms  
can be arranged with your favorite  
authorized PRECISION Distributor.

**RADIO • TELEVISION  
ELECTRICAL  
INDUSTRIAL  
LABORATORY**



**CATALOG  
No. 22**

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EXPORT DIVISION: 458 Broadway, New York City, U.S.A. • Cables: MORHANEX

CANADIAN SALES DIVISION: ATLAS RADIO CORPORATION, 560 King Street West, Toronto 2B, Ontario

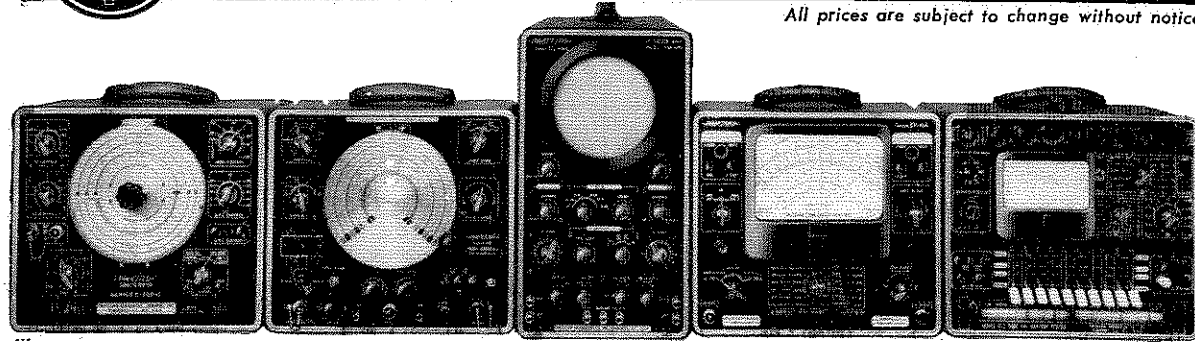




# PRECISION TEST EQUIPMENT

STANDARD OF ACCURACY

All prices are subject to change without notice



**SERIES E-200-C**  
Modern Multi-band  
SIGNAL and MARKER  
GENERATOR  
(see page 4)

**SERIES E-400**  
Wide Range H.F.  
SWEEP SIGNAL  
GENERATOR  
(see page 3)

**SERIES ES-500A**  
5 in. Hi-Sensitivity  
Wide Range  
OSCILLOSCOPE  
(see page 3)

**SERIES EV-10A**  
True Zero-Center  
VTVM-MEGOHMMETER  
with 7 in. Meter  
(see page 4)

**SERIES 612**  
Modern Free-point  
TUBE and BATTERY  
TESTER  
(see page 10)

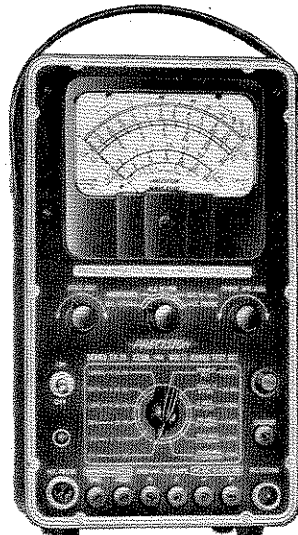
**THESE FIVE MATCHED "PRECISION" INSTRUMENTS  
PROVIDE A COMPLETE MODERN BASIC LABORATORY  
FOR TV-FM-AM AT ONLY MODERATE COST**

### OTHER MATCHED COMBINATIONS

The instruments shown above, and other "Precision" equipments, are available in various enclosure styles... Panel Mounts, Portable, Counter Types, etc. . . . designed to suit individual applications, field or shop. The illustration shows only one of the many possible "matched combinations" of diversified "Precision" Test Equipment. Each combination provides a selected and Basic, modern, efficient Laboratory at moderate cost.



**SERIES TV**  
THE SUPER HIGH VOLTAGE  
SAFETY TEST PROBE  
for High D.C. Potential  
Measurements up to  
60,000 volts.  
(see page 9)



**SERIES EV-20 VTVM  
and MULTI-RANGE TEST SET**

Complete with coaxial Circuit Isolating Test Probe, Shielded Ohmmeter Test Cable, Standard #227 Super-Flex Test Leads, Ohmmeter battery and full operating instructions.

In modern, black ripple finished cabinet. Size—10½" x 6¼" x 5".  
CODE: Party

### SERIES EV-20 VTVM and Multi-Range Test Set

TRUE ZERO — CENTER ON ALL VTVM RANGES  
WITH DIRECT PEAK READING HIGH FREQUENCY SCALES  
Plus Complete Standard 1000 Ohms/Volt Functions  
48 Ranges to 1200 Volts\*, 2000 Megohms, 12 Amperes, +63 DB

Series EV-20 is a compact, high sensitivity, laboratory-type, circuit-testing instrument, incorporating the most modern electrical and physical design. It provides unparalleled performance, accuracy and versatility required for AM-FM-TV and general electronic circuit analysis.

Functionally similar to the deluxe Series EV-10A VTVM, with extra large 7" meter, (described on Page 4) the Series EV-20 (with 4½-inch meter) affords a highly efficient instrument at moderate cost.

#### RANGE SPECIFICATIONS

- ★ **SIX ALL-ZERO CENTER VTVM RANGES:** 13/3 Megs. Constant Input Resistance. ±3, ±12, ±30, ±120, ±300, ±1200 volts. \*Direct Reading to ±60 KV when used with Series TV-4 High Voltage Test Probe described on page 9.
- ★ **SIX SELF-CONTAINED RESISTANCE RANGES:** 0-2000 - 200,000 ohms. 0-2-20-200-2000 Megohms.
- ★ **FOUR DIRECT PEAK READING HIGH FREQ. VTVM RANGES:** 0-3-12-30-120 volts. (Requires RF-10A High Freq. Vacuum Tube Probe, Net Price \$14.40. No crystal rectifiers employed.)
- ★ **SIX AC-DC AND OUTPUT VOLTAGE RANGES** at 1000 ohms per volt. 0-3-12-30-120-300-1200 volts.
- ★ **EIGHT D.C. CURRENT RANGES:** 0-300 microamps. 0-1.2-3-12-30-120-1200 MA. 0-12 Amperes.
- ★ **SIX DECIBEL RANGES** from -20 to +63DB. Calibrated for 600 ohm, 1 mw., zero DB.
- ★ **ROTARY RANGE — FUNCTION SELECTORS** eliminate frequent and inefficient shifting of test leads.

#### IMPORTANT FEATURES

- ★ **VOLTAGE REGULATED — BRIDGE CIRCUIT**
- ★ **DIRECT READING, ALL ZERO-CENTER VTVM** Indicates both Polarity and Magnitude without switching or test lead reversal.
- ★ **SHIELDED CONNECTORS** for D.C.—VTVM and RF—VTVM. Permits simultaneous and non-interfering connection of both the Circuit Isolating Test Probe and optional H.F. Vacuum Tube Probe Series RF-10A.
- ★ **DUAL - BALANCED ELECTRONIC BRIDGE OHMMETER—MEGOHMMETER** uses two 1.5 volt cells easily replaced at rear of cabinet.
- ★ **ADDITIONAL 1000 OHMS/VOLT FUNCTIONS** permit routine AC-DC voltage, DB and current measurements free of power line.
- ★ **4½" RECTANGULAR METER** — 200 microamperes, ±2%. D'Arsonval construction.
- ★ **1% Film type, Metallized and Wire-Wound resistors** for all shunts and multipliers.
- ★ **Heavy gauge, round-cornered, louvred steel case** with plastic handle. Etched, anodized, aluminum panel.

This equipment is Approved (and/or Tested) by the CSA Approval Laboratories.

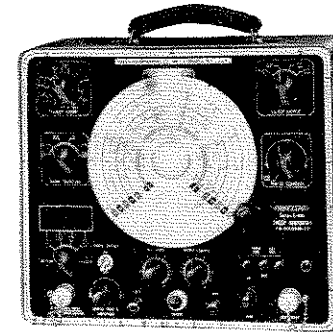


# PRECISION TEST EQUIPMENT

STANDARD OF ACCURACY

All prices are subject to change without notice

### Series E-400 Wide Range Sweep Signal Generator Narrow and Wide Band Sweep Direct Reading from 2 to 480 Megacycles DIRECTLY COVERS UHF AND VHF I.F. ALIGNMENT REQUIREMENTS



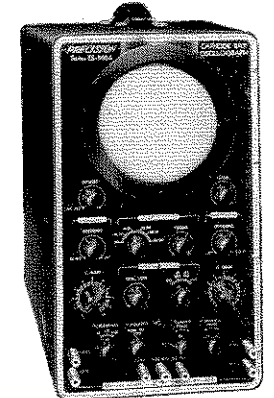
Incorporating selected and true high frequency components and circuits, Series E-400 has been Application Engineered specifically for modern F.M. and TV oscillographic alignment methods.

Stressing utmost simplicity of operation, flexibility and stability, Series E-400 affords an unparalleled standard of performance and value for the efficient TV-FM Service Lab.

#### FEATURES

- ★ **Direct Frequency Reading** — 2 to 480 MC in 7 bands without skip. Harmonically calibrated from 240 to 480 MC. Directly covers frequency requirements for I.F. alignment of UHF, VHF and color TV receivers.
- ★ **6 Position Rotary Band Switch** covers complete spectrum. No coil switching. Multiple oscillator B supply switch assures maximum frequency accuracy and stability.
- ★ **6½" Etched Aluminum Tuning Dial** — Engine turned finish.
- ★ **1500 Point Vernier Scale** for close calibration and resetting.
- ★ **Engraved Transparent Lucite Frequency Indicator.**
- ★ **Internal Retrace Blanking Circuit** eliminates dual trace of response patterns on oscillograph.
- ★ **Voltage Regulated Oscillators** free of power supply variations.
- ★ **The Basic Circuit and Tube Complement** — Uses 2 separate 6C4 high frequency beat oscillators plus a 6J6 reactance-modulated high frequency oscillator. This positively minimizes generation of unwanted extraneous signals. Also employs a 6J6 mixer-buffer, a 6C4 multiple crystal oscillator and a 6X5 final marker-mixer amplifier. 6X5 full wave rectifier. VR-105 voltage regulator. 4Y1 blanking voltage rectifier.
- ★ **Selected, True High Frequency Circuit Components.** Uses ceramic and air dielectric trimmers, coupling, by-pass and loading capacitors; rugged ceramic suspended, National Straight Line Frequency tuning condenser; modern miniature HF tubes; mica-filled low-loss sockets; shock mounted, compensated reactance modulator; copper plate shielding, etc.
- ★ **Narrow and Wide Band Sweep** — 0 to 1 MC and 0 to 15 MC.
- ★ **Dual Continuous R.F. Attenuators** triple shielded. Smooth, stepless, effective control from extra high output for single stage alignment to minimum levels for multi-stage adjustments.
- ★ **Wide Range Phasing Control** for Hor. sweep of oscillograph.
- ★ **Multiple Crystal Marker-Calibrator** built-in. Accommodates 4 rotary selected crystals. .01% accuracy 4.5 MC and 2 MC crystals furnished as standard equipment. Crystal signal separately attenuated for internal or external use.
- ★ **Crystal Calibrated and Control** — Each instrument calibrated against crystal standards. The 2 MC crystal permits crystal monitoring and calibration of external signal generators.
- ★ **Terminated RG/U Type Coaxial Output Cable** for efficient signal transmission with minimum standing wave effects.
- ★ **8 Element Double Section Balanced Line Filter** plus Thorough Multi-Section Copper Plate Shielding of instrument assures minimum leakage and radiation.
- ★ **Simultaneous A.M. and F.M. test facilities** for anti-A.M. check of F.M. second detector circuits. A.M. input jacks also permit use as a modulated H.F. A.M. Generator.
- ★ **External Deviation input facility** for sweep repetition frequencies other than internal 60 cycle source.
- ★ **Fuse Protected** at panel exterior fuse post.
- ★ **Heavy Gauge, Etched-Anodized Aluminum Panel.**
- ★ **Fully Licensed** under W. E., A. T. & T. and Pierce patents.
- ★ **Series E-400 (illustrated)** — in louvred portable copper-plated case. Size 10½" x 12" x 6". Complete with test cables, 2 crystals and elaborate Technical Manual. Code: Nancy.
- ★ **E-400-PM** — Consists of E-400 on 12¼" x 19" steel panel for standard rack mount. Complete as above. Code: Niece.

### Series ES-500A High Sensitivity, Wide Range, 5" Oscilloscope Push-Pull Vertical and Horizontal Amplifiers 20 MV. per inch "V" Sensitivity SELF-CONTAINED 1 VOLT PEAK TO PEAK CALIBRATOR



Series ES-500A affords the ultimate in performance, visibility and operational flexibility at moderate cost.

"Precision" engineers have incorporated every necessary feature which they found to be required to meet the needs of the rapidly advancing art of electronics.

Series ES-500A provides an unparalleled combination of high sensitivity, extended frequency range and other essential features specifically desired for experimental and commercial visual circuit analysis.

#### FEATURES

- ★ **High Sensitivity, Wide Range, Voltage Regulated, Push-Pull Vertical Amplifier**—.02V. per inch deflection sensitivity. 10 cycles to 1 MC response. 2 megohms input resistance. Approx. 22 mmf. input capacity.
- ★ **Compensated Vertical Input Step Attenuator**—X1, X10, X100.
- ★ **Built-in Peak to Peak Voltage Calibrator**, push-button controlled at front of panel.
- ★ **Vertical Phase-Reversing Switch** permits inversion of all patterns at will. Non-frequency discriminating.
- ★ **Extended Range, Push-Pull Horizontal Amplifier**—150 MV (.15 V) per inch high deflection sensitivity adequate for most all "H" drive purposes. 10 cycles to 1 MC response at full gain. ½ megohm, approx. 20 mmfd. input.
- ★ **Linear Multi-Vibrator Sweep Circuit**— 10 cycles to 30 KC plus internal line or external sweep.
- ★ **Amplitude Controlled, Four Way Synchron. Selection**— Internal Positive, Internal Negative, External and Line.
- ★ **"Z" Axis Modulation** input facility for blanking, timing, etc.
- ★ **Internal, Phasable 60 cycle Beam Blanking** for elimination of alignment retrace; clean display of synchron. pulses, etc.
- ★ **Sweep Phasing Control** for sinusoidal line sweep usage. Wide angle bridge circuit.
- ★ **Direct H and V Deflection Plate Connections** and Audio Monitoring phone jacks at rear. All four plates accessible.
- ★ **High Intensity CR Patterns** through use of adequate high voltage power supply with separate 2X2 rectifier.
- ★ **The Circuit and Tube Complement**—6C4 Vertical input cathode follower. 6CB6 first "V" amplifier. 6C4 "V" phase inverter. Push-Pull 6J6's vertical CR driver. 6SN7 first "H" amplifier and phase inverter. Push-Pull 12AV7 horizontal CR driver. 6SN7 Multi-vibrator linear sweep oscillator. 6C4 retrace blanking amplifier. 5Y3 low voltage rectifier. 2X2 high potential rectifier. VR-150 voltage regulator. 5CP1/A CR tube.
- ★ **7 Four-Way Lab-Type Input Terminals**—Take banana plugs, phone tips, bare wire or spade lugs.
- ★ **Light Shield and Mask** removable and rotatable.
- ★ **Extra Heavy-Duty Construction** and components to assure "Precision"-engineered performance.
- ★ **Fully Licensed** under Western Electric Co. patents.
- ★ **Series ES-500A**—In louvred, black-ripple, heavy gauge steel case. Size 8¼" x 14½" x 18". Complete with light shield, calibrating mask and comprehensive instruction manual. Code: Quack.

### Series SP-5—Oscilloscope Test Probe Set FOR TV SIGNAL TRACING, ALIGNMENT, TROUBLE SHOOTING AND WAVEFORM ANALYSIS

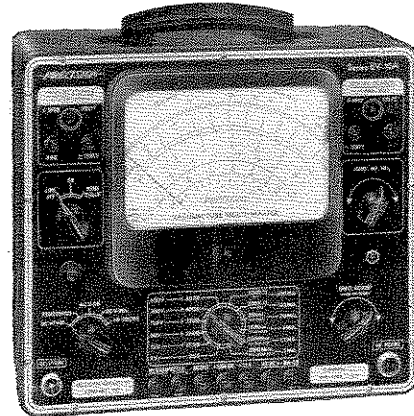
- ★ Specifically engineered for use with **PRECISION** Cathode Ray Oscillographs, Series ES-500 and ES-500A.
- ★ Set consists of shielded Master Cable and four different, detachable probe heads in custom-made vinyl carrying case.
  1. HIGH IMPEDANCE—LOW CAPACITY PROBE
  2. CRYSTAL—DEMODULATOR PROBE
  3. RESISTIVE—ISOLATING PROBE
  4. SHIELDED—DIRECT PROBE

This equipment is Approved (and/or Tested) by the CSA Approval Laboratories.



# PRECISION TEST EQUIPMENT

STANDARD OF ACCURACY



## SERIES EV-10A VTVM—Megohmmeter

TRUE ZERO-CENTER VTVM WITH 7" FULL-VIEW METER  
FOUR DIRECT PEAK READING HIGH FREQUENCY SCALES  
Plus standard 1000 Ohms per Volt Functions.  
Ranges to 6000 Volts, 2000 Megohms, 12 Amperes, +77 DB.

All prices are subject to change without notice

A WIDE-RANGE, TRUE ZERO-CENTER ELECTRONIC INSTRUMENT, stressing the utmost in performance, accuracy, and ease of manipulation. The Series EV-10A permits rapid check of voltage, current, and resistance conditions encountered in modern A.M., F.M., and TV Networks, without materially disturbing the performance of circuits under analysis.

### RANGE SPECIFICATIONS

- ★ Eight All Zero-Center VTVM Ranges.  $\pm 3$ ,  $\pm 12$ ,  $\pm 60$ ,  $\pm 120$ ,  $\pm 300$ ,  $\pm 600$ ,  $\pm 1200$ ,  $\pm 6000$  volts D.C. self-contained.
- ★ High Input Resistance— $13\frac{1}{2}$  megs. constant to 600 volts.  $26\frac{2}{3}$  megohms at 1200 volts.  $133\frac{1}{3}$  megohms at 6000 volts.
- ★ 4 Direct Reading High Freq. Ranges: 0-3-12-60-120 peak volts. (Requires Series RF-10A High Frequency Vacuum Tube Test Probe described and illustrated at left.)
- ★ Extra-High Voltage Ranges to  $\pm 60$  KV. when employed with Series TV-4 High Voltage Probe described on page 9.
- ★ Six Ohmmeter-Megohmmeter Ranges: 0-2000-200,000 ohms. 0-2-20-200-2000 megohms.
- ★ Eight Extra A.C.-D.C.-Output Voltage ranges at 1000 ohms per volt. 0-3-12-60-120-300-600-1200-6000 V.
- ★ Eight D.C. Current Ranges: 0-300 microamperes. 0-1-2-6-30-120-600-1200 MA. 0-12 amps.
- ★ Eight DB Ranges from -20 to +77DB. Calibrated for 1MW, 600 ohms zero DB.

### IMPORTANT FEATURES

- ★ Voltage Regulated-Bridge Type Circuit: affords practical freedom from tube and line voltage variations.
- ★ True Zero-Center VTVM—Indicates both magnitude and polarity without reversal of test prods on all ranges.
- ★ Rotary Range and Function Selectors minimize shifting of test leads.
- ★ Recessed 6000 volt Safety Jacks.
- ★ Shielded Coax Test-Cable Connectors permit both D.C. and R.F. probes to be connected simultaneously.
- ★ Duo-Balanced Electronic-Bridge Ohmmeter—Megohmmeter. Uses 2 self-contained, standard 1.5 volt batteries.
- ★ Special 1000 Ohms/Volt Functions permit routine AC-DC circuit tests free of need for power line connection.
- ★ Extra-large 7" Rectangular Meter. 200 microampere,  $\pm 2\%$  sensitivity.
- ★ Highest Quality Components employed throughout • 1% wire, film and matched resistors • Silverplated switch contacts • Leakage-resistant, plastic insulated hook-up wire • Etched-anodized aluminum panel • Heavy duty line cord.

- ★ EV-10A (MCP) (Illustrated) In black ripple finished, heavy gauge steel case. Size  $10\frac{1}{2}$ " x  $12\frac{1}{2}$ " x 6". Complete with tubes, battery, and test probes. Code: Plate.
- ★ EV-10A (P) In hardwood portable case with tool compartment. Size  $12\frac{1}{4}$ " x  $13\frac{1}{2}$ " x 6". Code: Phone.
- ★ EV-10A (PM) Consists of Series EV-10A on steel panel. Size  $12\frac{1}{4}$ " x  $19\frac{1}{2}$ ", for standard rack mount. Code: Panel.

★ SERIES RF-10A VACUUM TUBE R.F. PROBE  
Accessory for Series EV-10A & EV-20; affords direct high frequency peak voltage measurements. Connects directly to VTVM panel. Employs 9002 miniature tube. Code: Probe.



## Series E-200-C Signal Generator

A Modern Multi-Band Signal and Marker Generator for A.M., F.M., and Television Alignment.

Featuring "Servicing by Signal Substitution." The Dynamic Speed Approach to Receiver Alignment and Adjustment Problems.

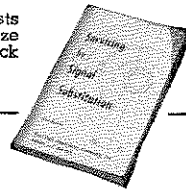
### SPECIFICATIONS

- ★ FREQUENCY COVERAGE: 88 KC. to 240 MC. on fundamental.  $6\frac{1}{2}$ " Dial direct reading in 9 bands to 240 MC. No charts required.
- ★ ACCURACY—CONSTANCY OF CALIBRATION: 1% accuracy on all bands. Uses "precision" developed "UNIT-OSCILLATOR" turret construction.
- ★ 0-1000 POINT VERNIER SCALE, direct reading to one part in 1000.
- ★ THE CIRCUIT—employs a 6AU6 in stable E.C.O. circuit—modulated by a 6U8 sine-wave audio oscillator 5Y3 Full wave rectifier.
- ★ 400 CYCLE SIN WAVE AUDIO OSCILLATOR—over 50 volts output.
- ★ DUAL R.F. ATTENUATORS—smooth stepless control of R.F. signal.
- ★ SHIELDING—Compartment shielding of vital components—Power transformer electrostatically shielded—A.C. line is R.F. filtered.
- ★ SHIELDED COAXIAL OUTPUT CABLE and (LO-HI) cable connectors.
- ★ FOUR TYPES OF SIGNALS— "Unmod. R.F.", "400 cycle Mod. R.F.", "EXTERNALLY Mod. R.F.", "400 cycle Audio Output."
- ★ DIRECT READING VARIABLE MODULATION—0-100%—triples signal utility as against obsolete fixed or stepped modulation of only 30 or 40%.
- ★ BUILT-IN A.V.C.-A.G.C. SUBSTITUTION—Overcomes alignment troubles arising from varying receiver A.V.C. and A.G.C. voltage.
- ★ HAND CALIBRATED—Each instrument is INDIVIDUALLY calibrated.
- ★ FULLY LICENSED under patents of A. T. & T. and W. E. Co's.
- ★ Not only an efficient Signal Generator for purposes of alignment but also specifically designed for "Servicing by Signal Substitution."
- ★ IDEAL MARKING GENERATOR—Exceptional stability and high accuracy renders Series E-200-C an excellent variable frequency Marker Generator for use with the Series E-400 or similar high quality Sweep Signal Generator.



★ Series E-200-C—(illustrated) In black ripple finished, portable steel case. Size  $10\frac{1}{2}$ " x  $12\frac{1}{2}$ " x 6". Complete with tubes, output cable and FREE copy of "Servicing by Signal Substitution." Code: Trade.

★ Series E-200-C-PM—Consists of E-200-C on steel panel size  $12\frac{1}{4}$ " x  $19\frac{1}{2}$ ", for standard rack mount. Code: Trace.



"SERVICING BY SIGNAL SUBSTITUTION" . . . . . The modern ECONOMICAL solution to your daily service problems. Nothing complex to learn, no extraneous equipment to purchase. A systematic method of DYNAMIC SIGNAL ANALYSIS based entirely on fundamentals. Fully described in a bound illustrated text "Servicing by Signal Substitution." This highly valuable book is supplied with Series E-200-C at no charge. Additional copies available at your Precision distributor or directly from factory at 40c per copy.

This equipment is Approved (and/or Tested) by the CSA Approval Laboratories.

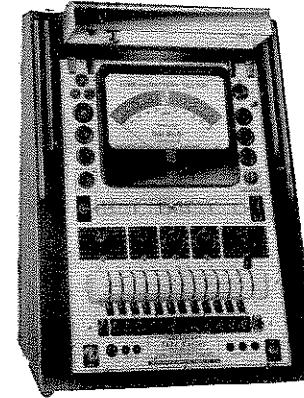


# PRECISION TEST EQUIPMENT

STANDARD OF ACCURACY

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ELECTRONAMIC (Reg. U. S. Patent Office)



## Series 10-15 Electronamic Tube Master

De Luxe Tube and Battery Merchandiser with extra-large 9" Meter

The All-Inclusive, Positive Vacuum Tube Performance Test that is not limited to Mutual Conductance Alone.

(See technical details on pages 6 and 7)

- ★ Incorporates the Electronamic tube performance and battery testing circuit, described for Series 10-54 on page 8.
- ★ Designed particularly for equipment-conscious, progressive radio service-sales organizations, and tube-selling sections of department stores.
- ★ PROMOTE CUSTOMER CONFIDENCE and tube sales via this impressive "Precision" Tube Merchandiser.
- ★ DIRECT READING non-confusing tube performance indications in large, easy reading terms of Replace-Weak-Good.
- ★ ILLUMINATED by custom-built, highly polished, plated reflector.
- ★ 10-15 Tube and Battery Merchandiser (illustrated). Heavy gauge steel cabinet in fine, dull black ripple, with chrome trim and reflector. Size 24" high,  $17\frac{1}{2}$ " wide, base depth 10" tapering to 4" at top. Code: Gable.

## Series CR-30 CATHODE RAY TUBE TESTER

TESTS ALL TV PICTURE TUBES  
(Tri-color, Magnetic and Electrostatic)  
OSCILLOSCOPE AND INDUSTRIAL CATHODE RAY TYPES

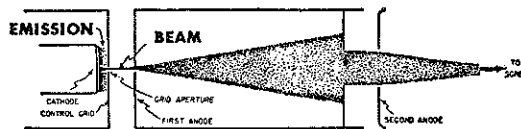
SERIES CR-30 IS A COMPLETE SELF-CONTAINED INSTRUMENT particularly engineered for the very special needs of reliable, rapid and economical cathode ray tube testing, in the field, shop or laboratory. Series CR-30 is indispensable to efficient TV Service-Installation. It provides reliable answer to the very important question, "IS IT THE CATHODE RAY TUBE OR IS IT THE TV CHASSIS?" Series CR-30 incorporates a BEAM CURRENT TEST CIRCUIT which checks overall electron-gun performance for Proportionate Picture Brightness. Additional direct testing facilities are provided for positive check of accelerating anodes and deflection plate elements.

Tri-color Picture Tube Testing Data will be made available, as soon as practical, to all owners of the Model CR-30.

The Precision CR-30 should not be confused with cable adapters connecting to ordinary receiving tube testers which were never designed to meet the very specialized needs of CR tube checking. Similarly, it is not to be confused with neon lamp units or similar devices of limited technical merit and which do not check all CR tubes or all tube elements.

### GENERAL AND TECHNICAL SPECIFICATIONS

- ★ Tests All Modern Cathode Ray Tubes—Magnetic and Electrostatic without removal from carton or TV chassis.
- ★ Tests All CR Tube Elements—Not just a limited few.
- ★ Absolute Free-Point 1A Lever Element Selection System for Short-Check, Leakage Testing and Quality Tests. Independent of multiple base pin and floating element terminations.
- ★ Beam Current Test Circuit checks all CR Tubes with Electron-gun in operation. It is the Electron Beam (and NOT total cathode emission) which traces the pictures or patterns on the face of the CR tube.
- ★ Voltage Regulated, Bridge Type VTVM provides the heart of the super-sensitive, tube quality test circuit. Such high sensitivity is also required for positive check of very low current anodes and deflection plates.
- ★ Multiple Test Sensitivities plus selectable element test potentials permit proper accommodation of all CR tube types.
- ★ Meter-Monitored, Micro-Line Voltage Adjustment provides close control of operating voltages.
- ★ Accuracy of test circuits closely maintained by use of factory adjusted internal calibrating controls; plastic insulated, telephone type cabled wiring; highest quality, conservatively rated components.
- ★ Built-in, High Speed, Roller Tube Chart.
- ★ Test Circuits Transformer isolated from power line.
- ★  $4\frac{1}{2}$ " Full Vision PACE Meter with special 4-color scale plate expressly designed and compensated for CR tube testing requirements.
- ★ Heavy Gauge Aluminum Panel, etched and anodized.
- ★ PLUS many other special "PRECISION" details and features.



SERIES CR-30—In hardwood, tapered portable case, with hinged removable cover. Extra-Wide Tool and Test Cable Compartment. Overall Dimensions  $17\frac{1}{4}$ " x  $13\frac{3}{4}$ " x  $6\frac{3}{4}$ ". Complete with standard picture tube cable, universal CR Tube Test Cable and detailed Instruction Manual. Code: Daisy.

This equipment is Approved (and/or Tested) by the CSA Approval Laboratories.

# PRECISION *Electronamic* TUBE TESTER

## PRINCIPLES OF ELECTRONAMIC TUBE TESTING

The All-inclusive, Single-operation, Positive Vacuum-Tube Performance Test  
that is not limited to Mutual Conductance Alone

☆ A most perplexing issue confronting the Radio-TV service technician is the choice of tube testing equipment that will solve his tube test problems with **greatest possible accuracy and reliability**. With this thought foremost in mind, **PRECISION** engineers have devoted much time in extensive vacuum tube testing research and development.

All varieties of tests were conducted upon thousands of tubes, at our own fully equipped laboratories and at the plants of leading tube manufacturers. From this, a vital point stood out above all others which dictated that "the resultant tube tester design cannot be based upon just one selected characteristic, such as just mutual conductance alone."

☆ A tube test based upon just any one characteristic does not fully vouchsafe the over-all performance capabilities of an amplifying tube.

When a vacuum tube is "receiver tested", the electronic circuits DEMAND PERFORMANCE predicated upon the simultaneous presence and interaction of a multiplicity of tube characteristics including the following:

- Electron Emission
- Amplification Factor
- Plate Resistance
- Mutual Conductance (Transconductance)
- Plate Current
- Power Output, etc.

☆ To perform a whole series of such individual tests, in order to evaluate the overall merit of a tube, involves a collection of laboratory equipment hardly available to the general user of vacuum tubes. In addition, these characteristics are very closely knit to operating parameters. To the electronically trained mind, this means that the predictable characteristic values are dependent upon the great variety of voltage, current and load conditions to which the tube, under consideration, may be subjected. This further means that for ANY GIVEN TUBE TYPE, there is not just one value of mutual conductance or power output, etc. characteristic of that tube.

For this very reason tube characteristic manuals list CURVES (graphs) of operation to assist the design engineer in selecting tubes and circuit parameters which he desires to employ in the particular receiver or other electronic apparatus being developed.

The printed tabular data listed in tube manufacturers' manuals is not to be considered as fixed and inflexible ratings. Rather, such examples of operating conditions are given merely as guiding information. The tubes can be and are used under any suitable conditions within their maximum ratings. The curves provide the information to determine the proper operating points which will yield a required characteristic.

☆ One other aspect of the tube engineering problem is the question of rejection limits for any particular characteristic. This actually is a double-barrelled topic. New tube production is concerned with "Production Tolerance Limits." The electronic design engineer, and of course the apparatus which uses the tubes, are further interested in "Life Test End Limits."

Electronic apparatus, using vacuum tubes, must not only perform well with tubes which are within "Production Tolerance Limits," but should be able to perform until the tube has reached its "Life Test End Limit."

Detailed specifications of such "limits" are not generally available to the field and of course, specific numerical characteristics tests (such as micromhos) are inconclusive unless compared to a detailed table of limits paralleling actual test parameters or actual testing conditions.

Moreover, numerical characteristics readings (as micromhos) are not fully meaningful unless the tester duplicates the exact voltages and loads under which the particular tube in question is actually operating in the specific circuit from which it has been removed. It would furthermore require reference to the tube's plate family and transfer characteristic curves in order to determine what the numerical characteristic SHOULD be under the particular conditions in which the receiver is using this tube.

☆ Therefore, since the numerical value (such as micromhos) of a tube characteristic varies so widely with the applied element potentials, it is necessary that TRUE vacuum tube characteristics measuring instruments provide:

1. Appropriate means for metering and reading each and every applied element potential.
2. Appropriate means for metering and reading each tube element current.

3. Suitable devices for adjustment and control of every element potential to duplicate operating conditions or to set up the specific operating point being investigated.

☆ It is obviously impractical to construct such a device, for general tube testing, as would permit the operator to do this; not only from the viewpoint of simplicity of operation, but also in consideration of the extremely high cost and physical size.

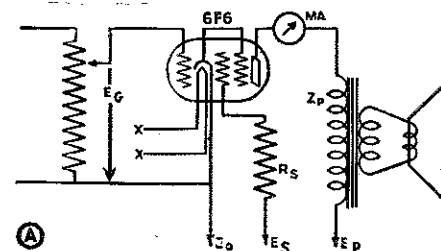
Accordingly, such equipment (for actual numerical characteristics investigations) is usually only found in research and production laboratories, which are the only places wherein such elaborate equipment might ever be required.

Needless to say, it would also not be practical for a tube tester's chart data to offer a multiplicity of alternative test settings for each and every tube.

☆ It has therefore been the constant purpose of **PRECISION** engineers to develop a tube tester circuit which would best meet the realistic needs of the electronic maintenance and Radio-TV service professions; to develop a basic test circuit affording the ultimate in correlation between test results and actual "in application" performance.

In the course of such investigations, it becomes conclusively apparent, that regardless of amplifier tube type number or variety of circuit applications, one phenomenon constantly manifests itself: the tube output (voltage or power) is the result of a plate current caused by an applied control grid voltage, which current must be adequate even at full peak operating conditions. This being a basic concept of amplifier tube operation (involving all operating characteristics), it led to the now famous, time-proven and tried, **PRECISION Electronamic** tube tester. (Reg'd U. S. Patent Office)

☆ In offering the **Electronamic** tube tester, to the discriminating purchaser, **PRECISION** does so with a "performance checked" background. Such "performance" tests, heavily emphasized during World War II, were



based upon the primary purpose of the instrument—TO FIND BAD TUBES!

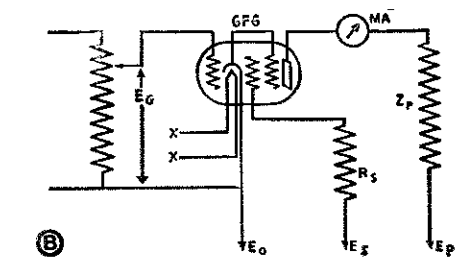
☆ To familiarize ourselves with the principles of this **PRECISION** innovation, let us briefly observe the operation of a simple pentode such as the 6F6, in a standard power amplifier stage, shown in Diagram A, with the addition of a current indicating meter in the plate circuit.

The primary purpose of this tube is to deliver electrical output to the speaker through plate load  $Z_p$ , in the following manner: with filament and plate supply operating and with zero signal applied to the input circuit, the plate milliammeter "MA" will indicate a steady current flow dependent upon cathode emissive power and the potentials of the interspaced elements. This zero signal meter reading is an indication of the tube's plate conductance. By applying an audio signal,  $E_g$ , to the input grid, THE PLATE CURRENT THROUGH  $Z_p$  MUST VARY IN ACCORD WITH THE CHANGES IN GRID VOLTAGE. This is dependent upon the mutual conductance, plate resistance, amplification factor, load resistance, etc. The greater the grid voltage swing, the greater should be the plate current excursions, and accordingly, the louder the sound from the speaker.

Let us now assume that a high order of peak grid signal voltage is applied, that is in keeping with the tube operating conditions, but severe distortion is nevertheless produced at the speaker, even though all circuit components, aside from the tube, are normal. This condition coincides with low peak plate current readings, and is usually caused by poor cathode structure and/or high plate resistance. In other words, an insufficient quantity of electrons is available to the plate circuit to handle peak power requirements.

Now let us suppose that with a normal signal applied to the input circuit, insufficient or no volume is obtained from the speaker, again assuming all circuit components, aside from the tube, are normal. This condition would indicate that the magnitude of plate current variations versus applied grid signal are not in keeping with the tube specifications and circuit requirements. This can be caused by a multiplicity of internal tube conditions, including reduced amplification factor, low mutual conductance, open, misplaced or shorted screen, control grid, suppressor, or plate, even though the tube's cathode structure may be absolutely normal.

In the case of resistance-coupled amplifiers, the change in plate current produces a change in voltage drop across the plate load resistor. This is then passed on through suitable coupling means to the succeeding stage.



☆ It can therefore again be readily seen that the overall PERFORMANCE Merit of a tube is absolutely dependent on the ability of output plate current to respond to the applied grid voltage, over the full range of possible operating conditions, which involves More than just Mutual Conductance.

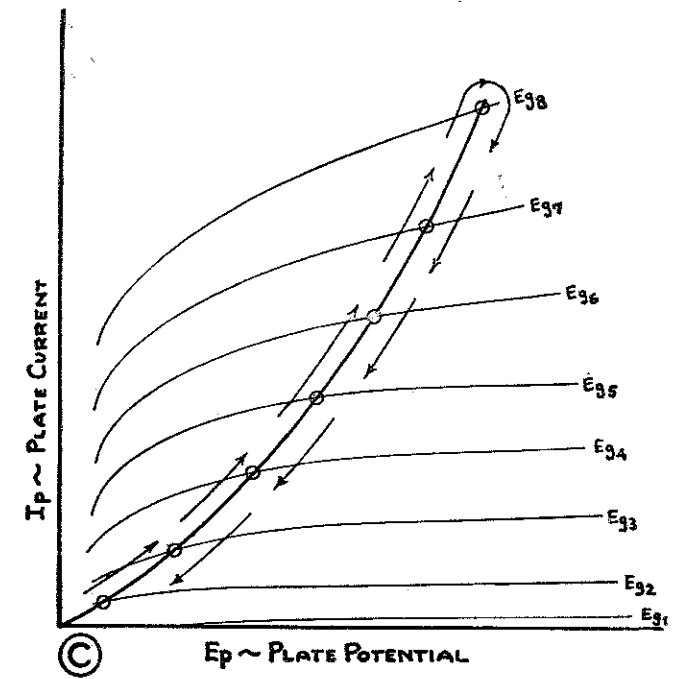
In Diagram B is shown the **PRECISION Electronamic** circuit set up to check the same type 6F6. Note that individual plate, screen and grid voltages and loads are applied to the respective elements of the tube under test and it is thereby being **Electronamically** tested as a pentode PLATE SUPPLY VOLTAGES FROM 50 TO AS HIGH AS 300 VOLTS ARE APPLIED TO THE TUBES UNDER TEST DEPENDING ON THE INDIVIDUAL TUBE'S REQUIREMENTS.

Appropriate treatment is accorded all amplifier tubes depending whether they are triodes, tetrodes, etc. Multi-purpose tubes are treated and tested as two or more completely independent tubes, WITHOUT REMOVING THE TUBE FROM THE TEST SOCKET. All plate, screen, grid and filament test voltages and respective loads are factory calibrated (per the roller chart) to assure the high tube performance correlation for which the **Electronamic** tube testers are known to the field, both civilian and the military—a performance check based upon the peak service for which the tube was designed rather than just an arbitrarily chosen low or midpoint.

☆ As previously outlined, the overall quality or performance merit of a tube is dependent on how well control grid voltage "controls" plate current over a complete range of tube application.

For this reason, the **PRECISION Electronamic** circuit places the TUBE MERIT METER in the plate or output section only of the tubes under test. Accordingly, the resultant quality or performance figure of merit involves a whole series of meaningful operational factors, not just one inconclusive characteristic, and will reject all tubes which do not come up to the same standards from which the tube chart data is prepared.

☆ Much of the success of the **Electronamic** tube tester is attributable to the ELECTRO-DYNAMIC SWEEP nature of its circuit operation. Through application of appropriately phased individual element potentials, the tube under test is dynamically swept over a Path of Operation, on a sinusoidal time base, encompassing a wide range of plate family characteristics curves. In brief, the tube under test is made to perform on a basis which involves its ability to operate at a multiplicity of potential peak



conditions rather than at just one arbitrarily chosen point.

Reference to **Diagram C** graphically and directly illustrates this **Electronamic** picture. It is this encompassing **Path of Operation**, involving More than just Mutual Conductance, which is automatically integrated by the meter as the resultant figure of merit in the direct and non-confusing terms of REPLACE-WEAK-GOOD.

☆ The very nature of the **Electronamic** circuit necessitates and assures utmost instrument flexibility, to permit positive location and selection of all tube elements. This is accomplished in the Series "10-00" MASTER TUBE TESTERS via design and use of a new LEVER TYPE master element selector system in combination with a multiple push-button short-check unit, plus specially engineered rotary, load and element potential selectors.

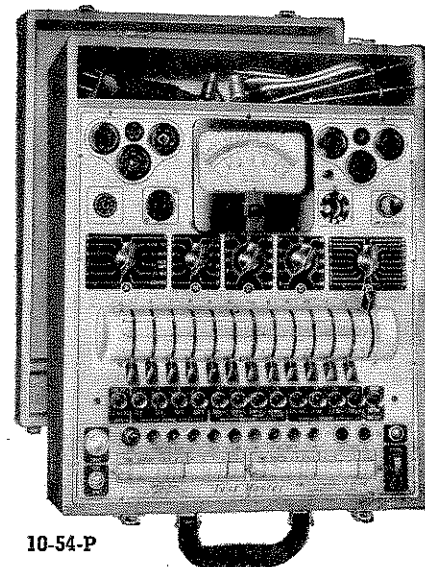
☆ Aside from the development of the complete **Electronamic** circuit, full consideration was given to the design of a Hot Cathode Leakage test, inter-element Short Check, instantaneous Filament Continuity Test and Audible Noise Test, affording maximum reliability and accurate neon lamp indications to show up physical and mechanical tube defects such as cathode to filament leakage, shorted, loose or open elements, open filaments, etc. THE CATHODE LEAKAGE CIRCUIT SENSITIVITY IS ADJUSTED TO COMPLY WITH THE APPROVED LEAKAGE SPECIFICATIONS OF LEADING TUBE MANUFACTURERS. Additional independent circuit facilities appropriately accommodate diodes, rectifiers, tuning eyes, gas rectifiers, thyratrons, etc.

☆ Modern methods of instrument construction, telephone cabled wiring and highest quality of materials afford maximum ruggedness for long-lasting satisfaction. INDIVIDUAL DUAL CALIBRATION against laboratory standards, insures maximum accuracy, and controlled, uniform **PRECISION** performance.



All prices are subject to change without notice

ELECTRONOMIC (Reg. U. S. Patent Office)



10-54-P

**CIRCUIT TESTING FEATURES**

A complete, wide-range, high speed, push-button operated, super-sensitive test set  
**Completely Self-contained**

- ★ Six D.C. Voltage Ranges: 20,000 ohms per volt.
- ★ Six A.C. Voltage Ranges: 1000 ohms per volt.
- ★ Six Output Ranges at 1000 ohms per volt. 0-6-12-60-300-1200-6000 volts.
- ★ Ranges to 30,000 Volts D.C. when used with Series TV-2 super high voltage test probe. Not included with 10-54. See page 9.
- ★ Seven D.C. Current Ranges: 0-60-120 microamperes. 0-1.2-12-120-1200 MA. and 0-12 amperes.
- ★ Four Self-Contained Resistance Ranges: 0-6000-600,000 ohms; 0-6-60 megohms.
- ★ Six Decibel Ranges from -20 to +70 DB.
- ★ Automatic Push-Button range selection.
- ★ 1% Wire, Film and Metallized Resistors.

**Series 10-54 Electronomic Test Master**

Combination Tube Performance Tester, Battery Tester, and 35 Range, Push-Button Operated, Supersensitive, A.C.-D.C. Set Tester.

Ranges to 6000 Volts, 60 Microamps, 12 amps, +70 DB, 60 Meg. 20,000 Ohms per Volt D.C.—1000 Ohms per Volt A.C.

The All-Inclusive, Positive Vacuum Tube Performance Test that is not limited to Mutual Conductance Alone.

(See technical details on pages 6 and 7)

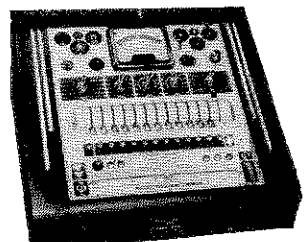
Series 10-54 affords to the discriminating instrument purchaser, THE COMPLETE PORTABLE SERVICE LABORATORY; engineered to meet the expanding needs of modern radio electronics. Provides every necessary facility for high speed, reliable tube and circuit testing associated with Industrial Electronics, Communications, Radio (A.M.-F.M.), Television, Laboratory, etc. . . .

**TUBE AND BATTERY TESTING FEATURES**

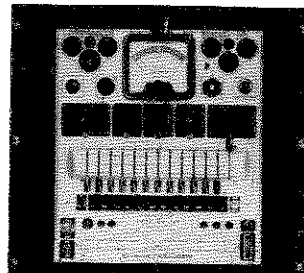
- ★ A TUBE "PERFORMANCE" TESTER: "Precision" ELECTRONOMIC circuit, effectively tests all tubes over a complete "Path of Operation" not just at one arbitrary operating point or for just one inconclusive characteristic.
- ★ TESTS ALL MODERN TUBE TYPES: Novel 9 pin, 7 pin Acom, dual capped H.F. tubes, Single-Ended TV, and F.M. amplifiers, low power transmitting tubes, sub-miniature types, etc. . . . including direct facilities up to twelve element prongs!
- ★ ABSOLUTE FREE-POINT LEVER ELEMENT SELECTION: Highest possible, practical order of obsolescence insurance. Locates every tube element regardless of base position.
- ★ ABSOLUTE FREE-POINT, INTER-ELEMENT SHORT-CHECK and Visible Filament Continuity System.
- ★ DUAL SHORT-CHECK SENSITIVITY: Permits selection of tubes for special applications.
- ★ INDIVIDUAL TUBE SECTION TESTS of multi-section tubes.
- ★ A.M. and F.M. CATHODE RAY TUNING INDICATORS directly tested.
- ★ FILAMENT VOLTAGES 3/4 to 117 V.
- ★ BALLAST UNIT TESTS.
- ★ NOISE and CONDENSER TESTS.
- ★ MICRO-LINE ADJUSTMENT via continuously variable line voltage control.
- ★ PILOT AND SIGNAL LIGHT TESTS.
- ★ ACCURACY of test circuits closely maintained by use of individual, internal calibrating controls.
- ★ HIGH SPEED ROLLER TUBE-CHART.
- ★ EXTRACTOR FUSE POST.
- ★ Test circuits completely transformer-isolated from power line.
- ★ TELEPHONE-TYPE, CABLED, plastic-insulated, moisture-resistant wire.
- ★ 4 1/2" FULL VISION METER: 50 microampere, 2% accuracy.
- ★ TESTS RADIO A, B and C DRY BATTERIES via a "PRECISION" engineered circuit which performance checks each battery under actual load conditions. Battery quality read directly on a 3-color scale.

**10-54-P** (illustrated above) Hardwood, tapered, portable case, 13 3/4" x 17 1/4" x 6 3/4". With ohmmeter batteries and high voltage test leads. Code: Habit.

**10-54-C** (see 10-12-C illustration and description below) In modern, attractively finished, steel counter cabinet. Code: Handy.



10-12-C



10-12-PM

**Series 10-12 Electronomic Tube Master**

Truly Free-Point Tube and Battery Performance Tester.

The All-Inclusive, Positive Vacuum Tube Performance Test that is not limited to Mutual Conductance Alone.

(See technical details in main catalog)

The 10-00 Series of TUBE and TEST MASTERS represent the culmination of many years' development of tube testing equipment to meet the exacting needs of the rapidly advancing field of electronics.

Incorporating the "PRECISION" ELECTRONOMIC Tube Performance Testing Circuit, plus an advanced, "PRECISION" developed, multiple element, master lever selector system, it truly can be said that the MASTER 10-00 Series offers, to the discriminating equipment purchaser, the highest possible practical order of test results and anti-obsolescence insurance.

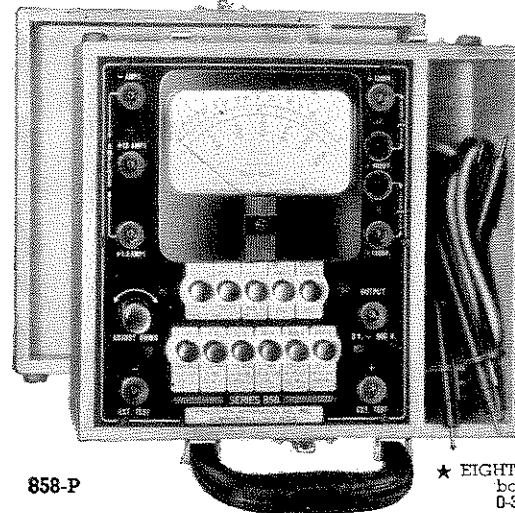
**TUBE AND BATTERY TESTING FEATURES**

The Series 10-12 Electronomic Tube Master incorporates the same time-proven circuit and exacting performance details described for the Series 10-54, above, under the heading: "Tube and Battery Testing Features."

- ★ 10-12-P (see 10-54-P illustration and description above) In hardwood, tapered, portable case with tool compartment. Code: Facit.
- ★ 10-12-C (illustrated at right) In modern, chrome-trimmed, round edged counter cabinet. Fine dull black ripple finish on heavy gauge steel. Size 17" x 17 1/8" x 7 1/2" sloping to 3" at front. Code: Faith.
- ★ 10-12-PM (illustrated at right) Consists of 10-12 chassis, mounted onto standard size steel panel, 17 1/2" x 19" with dust cover. Fine, dull black ripple finish. Code: Favor.

This equipment is Approved (and/or Tested) by the CSA Approval Laboratories.

All prices are subject to change without notice



858-P

- ★ 858-P (illustrated) In hardwood, port-and H.V. test leads, with batteries and H.V. test leads. Code: Judge.
- ★ 858-L In modern bakelite case. Size 7 1/2" x 8 1/2" x 3". Complete with batteries and H.V. test leads. Code: Jetty.

- ★ EIGHT D.C. VOLTAGE RANGES both 20,000 and 1000 ohms per volt. 0-3-6-12-60-300-600-1200-6000 volts.
- ★ EIGHT A.C. and OUTPUT VOLTAGE RANGES at 1000 ohms per volt. 0-3-6-12-60-300-600-1200-6000 volts.
- ★ EIGHT D.C. CURRENT RANGES: 0-60-120 microamperes. 0-1.2-12-120-600 MA. 0-1.2-12 amps.
- ★ SIX RESISTANCE RANGES self-contained to 60 megohms. 0-6000-60,000-600,000 ohms. 0-6-60-600 megohms.

- ★ EIGHT DB RANGES: -26 to +70DB. 600 ohm, 1 mw., zero DB reference level.
- ★ Two Pin Jacks for all standard ranges.
- ★ 4 1/2" 50 microampere meter, ±2% accuracy. Rugged, double-jewelled D'Arsonval construction.
- ★ Safety Jacks for 6000 volt ranges.
- ★ HIGHEST GRADE MATERIALS and plastic insulated wiring employed.
- ★ ETCHED GRADE MATERIALS and gauge aluminum panels: resistant to moisture and wear.

**SPECIFICATIONS**

**Series 858 High Sensitivity Multi-Master**

HIGH SPEED, A.C.-D.C. MULTI-RANGE TEST SET

54 Ranges to

6,000 Volts, 60 Microamperes, 12 Amps., 600 Megs. +70DB. 20,000 and 1,000 Ohms per Volt D.C., 1,000 Ohms per Volt A.C.

Series 858 MULTI-MASTER features a "PRECISION" designed, positive action Push-Button Range and Function selection system, affording the ultimate in operational efficiency.

Designed for reliable measurements in modern TV, F.M., A.M. and other critical electronic circuits where only minute current drain of the measuring instrument can be tolerated.

When employed in conjunction with the Series TV-2 super-high voltage safety test probe (described below), direct reading facilities to 30,000 volts are provided. 60,000 volt multiplier is also available.

**Series TV Super High Voltage SAFETY TEST PROBES\***

Voltage Ranges to 60,000 Volts D.C.

With standard V.T.V.M.

or high sensitivity V-O-M

\* U. S. Patent Nos. 2,641,630, Des. 162,813



"PRECISION" engineering solves the high voltage test problem with utmost safety to the operator. Series TV has been custom designed and patent protected for YOUR safety FIRST. Cartridge style high voltage tubular multiplier permits use of a single "TV" probe with many high sensitivity test sets and V.T.V.M.'s. Full details on reverse side of "PRECISION" catalog price sheet.

**IMPORTANT FEATURES**

- ★ Custom Molded Polystyrene Head, heavy duty bakelite handle and triple-ring barrier, specially machined internal lucite components, all spell out "HIGH VOLTAGE ENGINEERED."
- ★ High Dielectric Anti-Leakage Paths and wide, multi-channelled guard-barrier resiterate "HIGH VOLTAGE ENGINEERED."
- ★ Internal and External Protective Grounding — Full handle length grounded internal flash-over-shield. External, grounded arc-back barrier. HIGH VOLTAGE ENGINEERED!
- ★ Heavy Duty, Grounded-Shielded Connecting Cable.
- ★ Ceramic, Helical Film-Type, Cartridge Multiplier manufactured specifically for VERY HIGH VOLTAGE APPLICATION. Removed and changed quickly, conveniently and without tools!
- ★ Positive Grounds and High Voltage Connections through high compression contact springs.

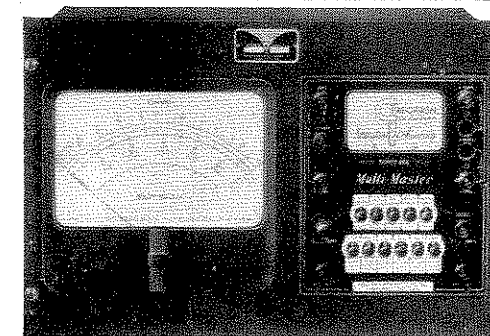
- SERIES TVP—Test Probe less multiplier cartridge, with .080" pin plug terminations. Code: Ebony.
- SERIES TVP-A—Similar to TVP above, except terminates in standard screw-on connector for use with most VTVM's. (Less multiplier cartridge.) Code: Early.
- SERIES TV2—With 30 KV cartridge for "Precision" (or any) 20,000 ohms per volt test set with 6000 V. range.
- SERIES TV-2B—Same as TV-2 above, except terminates in high compression banana plugs for use with PRECISION 120 or any other 20,000 ohms per volt test set with 6000 volt range and banana jacks.
- SERIES TV-4—With cartridge for ranges to 60 KV for use with "Precision" EV-10A and EV-20. Code: Excel.
- SERIES TV-4A—Same as TV4 above, except with special adapter for Model EV-10, not EV-10A. Code: Exact.
- TVM—Cartridge Multipliers only for Series TV. See reverse side of "Precision" catalog price sheet for complete listings.

**Series 866 De Luxe Multi-Master**

Panel-Mounted A.C.-D.C. Test Set,

with 9" Meter and Remote-Control Selector Unit

5000 and 1000 Ohms per V., D.C., 1000 Ohms per V., A.C.



A LABORATORY TYPE HIGH VISIBILITY TEST SET INDISPENSABLE TO THE WELL EQUIPPED, MODERN TEST LABORATORY AND ELECTRONICS CLASSROOM.

The 9" meter and remote-control selector unit afford unparalleled operational efficiency with maximum physical meter protection via panel mounting above the work level.

**RANGES and SPECIFICATIONS**

Except for sensitivity, the ranges, features and functions of the Series 866 are similar to those listed for the Series 858, portable test set, described above.

5000 and 1000 ohms per volt D.C. 1000 ohms per volt A.C.

54 Push-button Selected Ranges to:

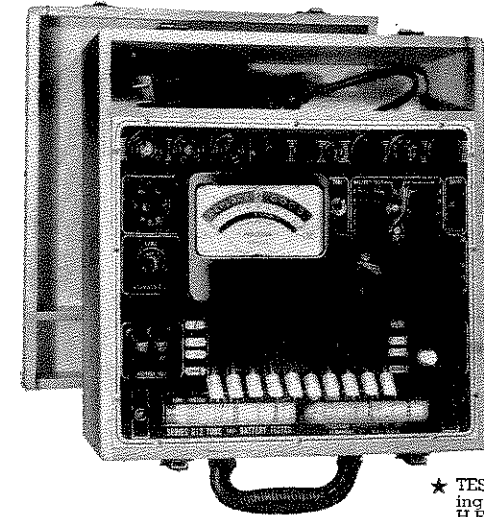
6000V., 300 Microamps, 12 Amps., 200 Megs., + 70 DB.

- ★ 866 (illustrated) In standard panel mount, size 19" x 12 1/4" with dust cover. Complete with high voltage test leads and ohmmeter batteries. Code: Novel.



# PRECISION TEST EQUIPMENT

STANDARD OF ACCURACY



## Series 612 CATHODE CONDUCTANCE TUBE TESTER

A Modern, Free Point, Lever-Operated  
TUBE and BATTERY TESTER

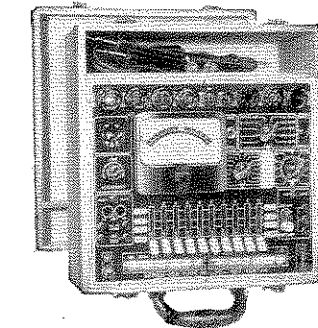
The very popular "600" Series brings to modern electronic tube checking the highest practical order of obsolescence insurance with utmost simplicity of operation, AT MODERATE COST. This has been achieved with full conformity to the well-known "Precision" standards of quality, workmanship, and performance.

The "600" tube testing parameters are based upon the well-established, time-proven emission testing principles as have been recommended by both tube manufacturers and R.T.M.A. The "600" line affords advanced design features and performance which render it incomparable amongst instruments in its category and price range.

### TUBE AND BATTERY TESTING FEATURES

- ★ **612-P** (Illustrated) In hardwood, portable case. Size 12" x 13" x 6". Code: Begin.
- ★ **612-MCP** Open style Metal Case Portable. Size 10 1/2" x 12" x 6". Code: Brine.
- ★ **612-C** In modern, chrome-trimmed, counter cabinet. Black ripple finish. Size 16" x 13 1/2" x 7", sloping to 3" at front. Code: Bison.
- ★ **612-PM** In standard size panel mount 12 1/4" x 19" with dust cover. Code: Blaze.

- ★ TESTS ALL MODERN TUBE TYPES including 7 pin Acorns, Novel 9 pin, dual capped H.F. tubes, sub-miniature types, F.M. and TV amplifiers.
- ★ FILAMENT VOLTAGES 3/4 to 117 volts.
- ★ ABSOLUTE FREE-POINT 10 element lever selection for merit and short tests.
- ★ DUAL SHORT-CHECK SENSITIVITY.
- ★ INDIVIDUAL TESTS OF MULTI-SECTION TUBES including tuning indicators.
- ★ BALLAST UNIT TESTS.
- ★ MICRO-LINE ADJUSTMENT
- ★ 4 1/2" METER, 2% ACCURACY.
- ★ NOISE and CONDENSER TEST pin jacks.
- ★ Pilot Light Test Socket.
- ★ DYNAMIC "UNDER-LOAD" TEST for all popular radio A, B, and C dry batteries.
- ★ Built-in, brass geared hi-speed roll chart.
- ★ Anodized, deep-etched, heavy gauge aluminum panel, resistant to wear.
- ★ Panel-mounted Fuse Extractor Post.
- ★ Test circuits completely transformer-isolated from power line.
- ★ Telephone type cabled, plastic-insulated, moisture resistant hook-up wire.
- ★ Each instrument individually calibrated and sealed.



The Series 654 is available in the same four model types as described for the Series 612 above.

Model	Code
654-P (Illustrated)	Hardy
654-MCP	Hurry
654-C	House
654-PM	Heart

## Series 654 COMBINATION TUBE, BATTERY & SET TESTER

20,000 OHMS PER VOLT D.C. 1,000 OHMS PER VOLT A.C.  
Ranges to 6,000 V., 120 Microamperes, 12 Amps., 60 Megs., +70 DB.

- ★ SERIES 654 is an economical, compact, High Sensitivity Service Laboratory designed to meet the specific needs of modern electronics service, installation and maintenance, A.M., F.M., and T.V.
- Series 654 incorporates the identical tube and battery testing features as described for the Series 612 above, PLUS a complete wide range, high sensitivity, A.C.-D.C. circuit tester.

### CIRCUIT TESTING FEATURES

- ★ 5 D.C. Voltage Ranges: 20,000 ohms per volt.
- ★ 5 A.C. and Output Voltage Ranges: 1000 ohms per volt. 0-12-60-300-1200-6000 volts.
- ★ Ranges to 30,000 Volts D.C. when used with Series TV-2 Super high voltage test probe. Not included with 654. See page 9.
- ★ 6 D.C. Current Ranges: 0-120 microamperes. 0-1.2-12-120 MA. 0-1.2-12 Amperes.
- ★ 3 Wide Resistance Ranges: 0-600-600,000 ohms. 0-60 Megs. Self-contained batteries.
- ★ 5 Decibel Ranges from -12 to +70 DB.
- ★ Fully Rotary Selective Ranges and Functions.
- ★ Only 2 Pin Jacks for all standard ranges.
- ★ Recessed 6,000 V. safety pin jacks.
- ★ 50 microampere, 4 5/8" Wide-Angle meter.
- ★ 1% Wirewound and film-type resistors.
- ★ All circuits isolated from power line.

## MODEL PTA - PICTURE TUBE ADAPTER CABLE

For Use With PRECISION Tube Testers

The Model PTA affords picture tube checking facilities within the limitations inherent in all devices of this type. It is ruggedly constructed from selected components and will provide long-lasting service.

The Model PTA is furnished complete with detailed instructions covering its use with all present PRECISION tube checkers in the 600 and 10-00 series. The Model PTA can also be used with previous PRECISION tube checkers, Models 910, 912, 914, 915, 920, 922 and 954.

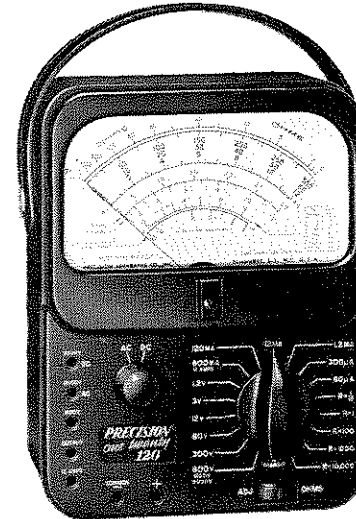
Code: Cable.

This equipment is Approved (and/or Tested) by the CSA Approval Laboratories.



# PRECISION TEST EQUIPMENT

STANDARD OF ACCURACY



## Series 120 High Sensitivity, Multi-Range Test Set

20,000 OHMS PER VOLT DC - 5,000 OHMS PER VOLT AC  
44 Self-Contained Ranges  
from 1.2 volts to 6,000 volts, 60 microamperes to 12 amperes,  
-20 to +77 db, 200 ohms to 20 megohms

The Model 120 provides a combination of features, ranges and functions that have been most wanted in a portable, high sensitivity, multi-range test set.

- MORE RANGES... the '120' has 44... which start lower and go higher than is usually associated with instruments of its size and type.
- AN EXTRA-LOW RESISTANCE RANGE... a 2-ohm center scale range, powered by long-lived, internal 1.5 battery source.
- AN EXTRA-LOW VOLTAGE RANGE... 1.2 volts full scale, AC and DC.
- AN EXTENDED LOW CURRENT RANGE... a 60 microampere first DC current range.
- A LARGER and EASIER READING SCALE FACE... on a new, extra-large 5 1/4" meter.
- SIMPLE, POSITIVE RANGE SELECTION... an 18-position, positive-detenting, master range selector with low resistance, dependable silver-plated contacts.
- RUGGED, POSITIVE CONTACT JACKS and PLUGS... the '120' incorporates specially designed, low resistance, solid brass, banana type plugs and jacks.

### RANGES and SPECIFICATIONS

Model 120: complete with batteries, test leads and manual. Over-all case dimensions: 5 3/8" x 7 x 3 1/8". Code: Wheel

Accessories Available for Model 120 - Model TV-2B: Super-High Voltage Safety Test Probe. Direct reading to 30KV.

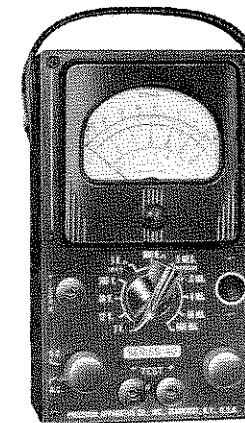
Model LC-3: Leather Instrument Case. Custom-crafted of top-grain cowhide.

Part No. ST-1: Retractable, snap-on stand, permits convenient 45 degree table mount.

- ★ 8 DC Voltage Ranges: 20,000 ohms/volt. 0-1.2-3-12-60-300-600-1200-6000 volts.
- ★ 8 AC Voltage Ranges: 5,000 ohms/volt. 0-1.2-3-12-60-300-600-1200-6000 volts.
- ★ 8 AC Output Ranges: same as AC volt ranges. Built-in 600 V. blocking capacitor.
- ★ 7 DC Current Ranges: 0-60-300 Microamperes. 0-1.2-12-120-600 Ma. 0-12 Amps.
- ★ 5 Resistance Ranges: self-contained. 0-200-2000-200,000 ohms. 0-2-20 megohms.
- ★ 8 Decibel Ranges: from -20 to +77 DB. 0 DB = 1 Milliwatt, 600 ohms.
- ★ Extra Large 5 1/4" Rugged 'Pace' Meter: 40 microamp sensitivity, 2% accuracy.
- ★ 1% Multipliers and Shunts: wire-wound and high stability deposited-film types.
- ★ Only 2 Plug-Jacks Serve All Standard Ranges: separately identified and isolated jacks provide for extra-high ranges.
- ★ "Transit" Safety Position on master range selector, protects meter during transportation and storage.
- ★ Custom-Molded Phenolic Case and Panel set a new standard for compact, efficient, laboratory instrument styling. Deeply engraved panel characters afford maximum legibility throughout the life of the instrument.

## Series 40 Compact AC-DC Test Set

with full size 3" rectangular meter  
31 Self-Contained Ranges  
to 6000 Volts, 600 MA, +70 DB, 5 Megohms



In molded bakelite carrying case, Series 40 meets the need for a compact, yet rugged test set to withstand hard usage as is imposed by the service technician, maintenance engineer, production inspector, troubleshooter, etc.

The Series 40 offers every advanced design feature and full-bodied components as are regularly incorporated in "Precision's" larger multi-range test sets, including: Rotary Range Selection—1% shunts and multipliers—heavy duty insulated pin jacks—Large numeralled, easy reading meter.

All ranges, including 6000 volts and 5 megohms, are self-contained—no external batteries or multipliers are required.

### RANGE SPECIFICATIONS

- ★ 6 A.C.-D.C. and Output Voltage Ranges at 1000 ohms per volt. 0-3-12-60-300-1200-6000 volts.
- ★ 4 D.C. Current Ranges: 0-6-6-60-600 MA.
- ★ 3 Resistance Ranges: 0-5000-500,000 ohms. 0-5 megs.
- ★ 6 Decibel Ranges: -22 to +70 DB.
- ★ Full Size 3" Rectangular 'Pace' Meter: 400 microamperes sensitivity. ±2% accuracy.
- ★ 1% Wire-Wound and Deposited-Film Type Resistors.
- ★ Only 2 Pin Jacks serve all standard ranges and functions.
- ★ Recessed 6000 volt safety jack for operational safety.
- ★ Anodized, etched aluminum panel, moisture and wear resistant.
- Series 40: In molded bakelite case, 3 3/4" x 6 1/4" x 2 1/2". Complete with ohmmeter batteries, test leads, and manual. Code: Visit
- LC-2: Genuine top-grain cowhide carrying case, custom-designed for the Series 40. Code: Young

## Series 80 Wide Range Test Set

1000 Ohms per Volt A.C. and D.C.  
34 Self-Contained Ranges to 6000 Volts,  
12 Amperes, +70DB, 10 Megohms.

The Series 80 is a laboratory type, rotary selective, multi-range, circuit tester.

Combining rugged 1000 ohms per volt sensitivity with small overall size, the Series 80 is specifically intended for use where the ability to withstand greater electrical and physical overload is of more importance than extremely high sensitivity.

Series 80 is "Application-Engineered" for general purpose industrial, telephone and radio service testing.

### SPECIFICATIONS

- ★ 6 A.C.-D.C.-Output Voltage Ranges: 1000 ohms per volt. 0-6-12-60-300-1200-6000 V.
- ★ 6 D.C. Current Ranges: 0-6-6-60-300 MA and 0-1.2-12 amps.
- ★ 4 Resistance Ranges: Self-Contained batteries. 0-1000-100,000 ohms. 0-1-10 megohms.
- ★ 6 Decibel Ranges: from -20 to +70DB.
- ★ 4 5/8" Rectangular 'Pace' Meter: 400 microampere, 2% accuracy.
- ★ 1% Wire-Wound and Deposited-Film Type Resistors.
- ★ Rotary Range Selection: All standard functions available at only 2 polarized tip jacks.
- ★ Recessed 6000 volt safety jack for operational safety.
- ★ Anodized, heavy gauge, etched aluminum panel: resistant to moisture and wear.
- Series 80: In molded bakelite case, 5 1/2" x 7 1/8" x 3". Complete with ohmmeter batteries and test leads. Code: Weave
- LC-1: Genuine top-grain cowhide carrying case, custom-designed for the Series 80. Code: Yearn

