



# RADIO SERVICE EQUIPMENT

## MODELS 17 & 18 UNIVERSAL SIGNAL GENERATORS

### With Five Output Selections

1. Frequency Modulated R.F. Output. (30 KC Sweep)
2. Amplitude Modulated R.F. Output. (400 Cycles)
3. Unmodulated R.F. Output.
4. 100 to 10,000 Cycle Variable Audio Frequency Output.
5. 400 Cycle Fixed Audio Output.

All Ranges Controlled by Output Attenuator.

Self Contained Power Level Meter. Three Ranges. -10 to +6, +6 to +22, +22 to +38. **Model 18 Only.**

6 R.F. Ranges 100 to 250 KC, 250 to 650 KC, 650 to 1600 KC, 1.6 to 4.0 MC, 4.0 to 10 MC, 10 to 30 MC. 100" of Direct Reading Scale. Output voltage from 1 microvolt to over 100,000 microvolts on all ranges. Accuracy better than  $\frac{1}{2}\%$ .

Two Negative Resistance Audio Frequency Oscillators. 0 to 400 cycles, fixed, 100 to 10,000 cycle variable. Accuracy approximately 5%. Output voltage continuously variable from 0 to 1.0 volt.

All coils are air-trimmed for capacity and laboratory adjusted for inductance.

**TUBES:** The tubes used are the type 6J7, type 6C6, type 6K7 and type IV. All these tubes are the latest 6 volt heater type tubes, and are operated sufficiently below their normal rating to insure long life and uniform service.

**POWER:** The Oscillator includes a complete built-in power supply consisting of a transformer, rectifier and filter. It may be operated from any 110 volt A.C. line, 40 to 65 cycles; other voltages and frequencies available at slight additional cost.

**CABLES:** Each oscillator comes completely equipped and supplied with all necessary connecting cables. Complete and 27 page manual furnished with each signal generator. The operator will find these instructions very helpful for practical service work.

Complete Operating Instructions, Containing Much Useful Service Data.

Dealers Net Model 18 with Power Level Meter . . . . . \$54.00  
LIST PRICE . . . . . \$90.00

Dealers Net Model 17 without Power Level Meter . . . . . \$45.00  
LIST PRICE . . . . . \$75.00  
(220 volt or 25 cycle types—\$3.00 net extra)



Model 18. Size 13" x 10" x 7". Shipping weight 21 lbs. Etched aluminum panel. Steel case.



Model 17. Size 13" x 10" x 7". Shipping Weight 20 lbs. Etched aluminum panel. Steel case. Identical to Model 18—Without Meter

## MODEL 4955-S VOLT-OHM-MILLIAMMETER

ACCURACY WITHIN 2%

Hickok 4" square meter. Scale length 3 $\frac{3}{4}$ ".

FOR GENERAL CIRCUIT TESTING: Contains low ohm range—.05-30 ohms.

SCALE RANGES AS FOLLOWS:

A.C. VOLTS, 0-10/50/250/500/2500. D.C. VOLTS, 0/10/50/250/500/2500. OHMS, .05-30, .5-10,000, 50 ohms to 1 megohm, 500 ohms to 10 megohms. 8 ohms in the middle of the scale. D.C. MICROAMPÈRES, 0/500. D.C. MILLIAMPERES, 0/1/5/50/500.

A.C. voltmeter can be used as an output meter. These readings may be readily converted into decibels by means of chart furnished with instructions.

**GUARANTEED ACCURACY:** All ranges including the A.C. volts ranges, are guaranteed to have an accuracy of within 2%, within temperature range of 50 degrees to 90 degrees Fahrenheit. This instrument incorporates a new type rectifier circuit, which will withstand more overloads than any other type. The rectifier is guaranteed for one year. The instrument used in this volt-ohm-milliammeter is especially built by Hickok for this service. The movement is large and rugged, and a very high torque weight ratio gives lively, instantaneous pointer action. Large, open face dial. Four colors are used on the scales to promote legibility. The movement is curve corrected by an exclusive Hickok process which gives a higher accuracy at all points on the scale. Permanently correct calibration. This complete self-contained unit is suited for industrial applications owing to its rugged construction. All parts are of the highest standard of quality and all resistors are moisture proof and accurately adjusted. This is the finest volt-ohm-milliammeter obtainable today. Regular leads supplied are 4' long with special insulated pin prods of proper diameter for insertion in the latest type tube socket.

Size, ModelS 4955 7" x 4 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ ". Metal etched panel. Shipping weight 4 $\frac{3}{4}$  lbs.

DEALER'S NET, MODEL 4955-S, without carrying case . . . . . \$26.40  
LIST PRICE . . . . . \$44.00

DEALER'S NET, MODEL 4955-S, with sturdy carrying case . . . . . \$27.90  
LIST PRICE . . . . . \$46.50

EXTERNAL SHUNT FOR INCREASING RANGE TO 5 AND 50 AMPERES.

DEALERS NET PRICE, \$3.60.

List Price, \$6.00.



THE  
 HICKOK  
 COMPANY  
 NEW  
 YORK  
 CITY

# MODEL T53 DYNAMIC MUTUAL CONDUCTANCE TUBE TESTERS

WITH NEW TRANSLUCENT MULTICOLOR ILLUMINATED METER DIAL

The only dual reading units made indicating Dynamic Mutual Conductance in Micromhos—also Good, Replace, Doubtful.

Simple, easy to understand and operate. New roll type chart—easy to use and replace.

Contains sensitive test for noisy tubes.

Ninety-four unused switch positions for future tubes. Only fifty used. All positions wired.

## TECHNICAL DESCRIPTION OF T53C AND T53P TUBE TESTERS:

Rectified current is used to energize both plate and grid. Superimposed on the rectified voltage in the grid circuit is an alternating signal voltage.

The large square meter responds only to the change in plate current caused by the signal on the grid. The meter is not affected by the steady value of plate current, except in diodes and rectifiers in which plate current is indicated. The T53 type testers are truly Dynamic Mutual Conductance Testers. In twin and multi-element tubes, the components are tested separately, determining the dynamic mutual conductance of each component. In twin grid tubes each grid is energized separately, determining the relative function of each. Diode plates are tested separately.

**EXCLUSIVE FEATURES:** 1. True Dynamic Mutual Conductance in Micromhos. Recognized by tube manufacturers and engineers as the only exact test. 2. Sufficient Plate Current to accurately check both emission and Mutual Conductance simultaneously. 3. Each tube element receives proper voltage. Rectified current is used on both Plate and Grids. 4. Checks gas content on meter. Gassy tubes ruin the operation of even the best radio receivers. 5. Detects both short and open elements. 6. Elements tested separately in multi-element tubes. 7. Short tests made hot or cold. 8. Selector switches take care of all tubes. 9. Mutual Conductance readings not affected by amount of plate current. 10. Ninety-four unused switch positions for future tubes, only 50 used. All positions wired. 11. Only one setting to make. No complications. No customer confusion. 12. Tests Diode plates separately. 13. Tests all Balast Tubes. 14. Tests Magic Eye tubes. 15. Tests New Battery tubes. 16. Tests Gas tubes: 0Z4, 0A4, 874, etc.

The Hickok method of indicating as embraced in this tester, is the result of years of experience in the manufacture of direct reading Dynamic Mutual Conductance Tube Testers, to conform to all manufacturer's standards of practice.

Made in either portable or counter types. Portable model illustrated left at top is furnished in a strong hardwood case having lead compartment. The panel slopes at a convenient angle. Counter model, illustrated left, is furnished in an attractive metal case, having a silver finish base and trim bars. Operating panel made of frosted, etched aluminum

Size, T53C, Counter Type, 14" x 16" x 6". Sloping panel. Shipping weight 22 lbs.

DEALER'S NET PRICE, MODEL T53P, MODEL T53C . . . . . \$49.80

LIST PRICE . . . . . \$83.00

(220 volts, or 25 cycle types—\$3.00 net extra)

Size, T53P: Portable Type 14 3/4" x 13" x 6" Sloping panel. Shipping weight 23 lbs.

# MODEL 51-X DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

WITH

VOLTS, OHMS, MILLIAMPERES, CAPACITY, CONDENSER LEAKAGE, OUTPUT, INDUCTANCE AND DECIBEL READINGS.

Greatest value ever offered in an all purpose tester. It will make all measurements required in portable radio service. Furnished with test leads.

## TUBE TESTER SECTION IDENTICAL TO T53 LISTED ABOVE

**EXCLUSIVE FEATURES:** SET TEST SECTION 1. A.C.-D.C. Volts: 0-20, 200, 500, 1000 in five overlapping ranges. Same uniform scale for A.C. and D.C. 2. D.C. Milliamperes: 0-20-200 direct. 3. Ohms: .1 to 25 megohms in 3 overlapping ranges. NO BATTERIES USED. 4. Capacity: .0001 to 24 mfd. Checks leakage in electrolytic condensers with Polarizing Voltage Applied. 5. A.C. Voltmeter used to read OUTPUT. 6. A.C. Voltmeter accurate on AUDIO FREQUENCIES. 7. Instructions supplied for reading DECIBELS. 8. Checks Inductance of chokes with or without D.C. COMPONENT OF CURRENT. 9. Overall accuracy well within 2%. 10. No copper oxide rectifiers: insures permanency of calibration. Electronic rectifiers used.

(Meter dial not illuminated)

Size, 51X: 14" x 13 3/4" x 6" deep. Sloping panel. Hardwood case, beautiful rubbed walnut finish. Shipping weight, 23 1/2 lbs. Meter scale length 3 3/4", unusually long.

DEALER'S NET PRICE COMPLETE . . . . . 59.40

LIST PRICE . . . . . \$99.00

(220 volts, or 25 cycle types—\$3.00 net extra)

# MODEL AC 47A RADIO TUBE TESTER

MOST ACCURATE MEDIUM PRICED UNIT AVAILABLE Accuracy within 1 1/2%  
Micromhos and Plate Current Indicated Directly in Manufacturer's Values

NO ADAPTERS—SHORTS CHECKED ON METERS

## EXCLUSIVE HICKOK FEATURES—

- Applies DIRECT CURRENT (standard manufacturers ratings) to PLATE and SCREEN GRID. The only precision method of tube testing.
- Indicates MICROMHOS DIRECTLY. Also plate current. Readings can be compared to manufacturers specifications. Scale, 0-3000 micromhos.
- Tests both sections of dual purpose tubes separately, indicating MICROMHOS of each section.
- Tests both plates of rectifier tubes SEPARATELY.
- Tests both plates of diode tubes SEPARATELY.
- Gas content indicated directly on "Good"—"Bad" scale. Also indicates gas in actual microamperes.
- Cathode leakage accurately measured.

Size: 6 3/4" width, 12" length, 4" depth. Shipping weight, 18 lbs.

DEALER'S NET PRICE, 100-130v., 50-60 cycles . . . . . \$90.00

LIST PRICE . . . . . \$150.00

Carrying Case—\$6.00

FIFTEEN YEARS EXPERIENCE MANUFACTURING TUBE TESTERS

# MODEL RFO4 OSCILLOGRAPH

FOR COMPLETE RECEIVER ANALYZING  
Self-Contained Demodulator and Video Amplifiers

Use this oscillograph in both RF and IF stages  
Single or consecutive stage by stage trouble shooting from antenna post to speaker.

## Self-Contained Dual Sweep Electronic Frequency Modulator

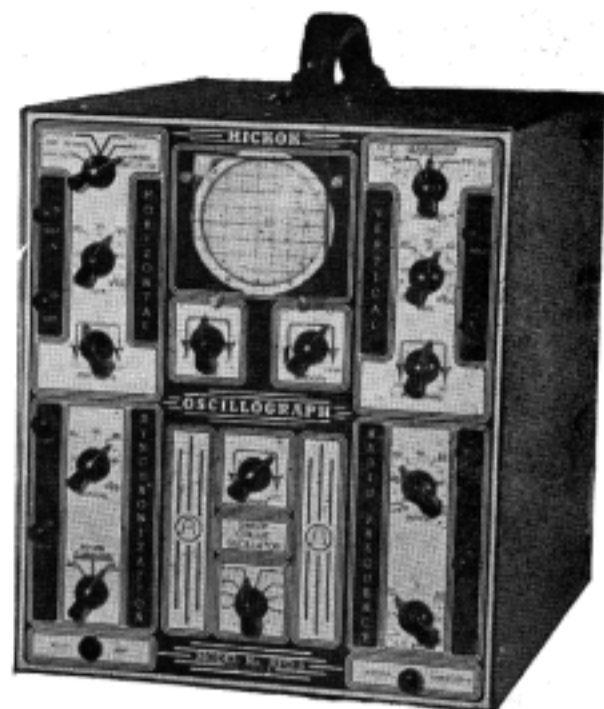
Simplifies connections. Variable width sweep from 0-30 KC. Selectivity measurements. Visual alignment at 665 KC or any harmonic thereof to 5 megacycles without the use of an external oscillator.

In conjunction with an external oscillator, produces an audio frequency output continuously variable from 0 to 15 KC. Also, visual development of audio frequency response curve.

**FEATURES** — 1. Return trace eliminator. (Simplifies alignment of A. F. and R. F. circuits). 2. Horizontal Amplifier for sweep expansion. 3. High Sensitivity amplifiers. (0.2 volts per inch). 4. Trapezoidal patterns for percent modulation measurements. 5. Calibrated screen. 6. Cathode ray tube rotation adjustable by means of flexible mounting. 7. Easy operation due to simplicity of controls. 8 Dual sweep for development of any type single or double response curve. 9. Video Amplifiers

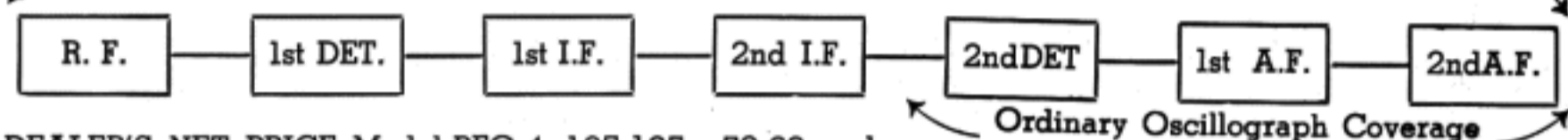
**UNIVERSAL DESIGN** — Every facility for research and laboratory measurements. Model RFO4 is made up of seven different units: Horizontal Panel, Tube Panel, Vertical Panel, Demodulator, Synchronization and Return Eliminator Panel, Sweep Circuit Oscillator Panel and Radio Frequency Modulator Panel. Each section contains the control needed for all oscillographic measurements.

Supplied complete with all necessary cables, and concise, practical operating instructions.



Model RFO4—Size: 11" x 13" x 15 1/4". Weight 35 Lbs. Etched Aluminum Panel. Steel Case.

## HICKOK NEW MODEL RFO-4 WITH COMPLETE COVERAGE



DEALER'S NET PRICE Model RFO-4, 105-125v, 50-60 cycles.....\$93.60  
LIST PRICE.....\$156.00  
(220 volt or 25 cycle types—\$4.50 net extra)

# MODEL PSG-15 MICROVOLTER SIGNAL GENERATOR

## With Calibrated Output in Microvolts on All Ranges

Built in Vacuum Tube Voltmeter and Power Level Meter More Measurements than Any Other Signal Generator

SENSITIVITY, MEASURED MICROVOLTS INPUT, WATTS OUTPUT.

GAIN PER STAGE.

SELECTIVITY — All standardized by self-contained vacuum tube voltmeter.

Calibrated Output Ranges: R.F.—1/2 microvolt to 100,000 on all ranges.

A.F.—0 to 1.0 volt.

DECIBELS, TRIPLE RANGES: — 10 to + 6 + 6 to + 22 + 22 to + 38 db.

100 INCHES OF DIRECT READING FREQUENCY SCALES.

ACCURACY BETTER THAN 1/2%.

Radio Frequency Ranges Calibrated Directly 85 KC to 28 Megacycles.

## TECHNICAL DESCRIPTION AND DETAILS OF PSG-15

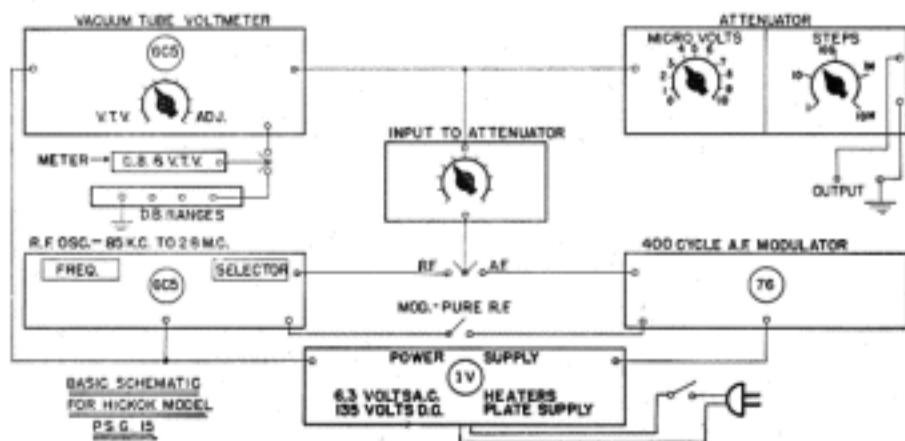
With reference to basic circuit diagram, the radio frequency oscillator covers, in six ranges, from 100 KC to 28 megacycles on fundamentals. The dial is directly calibrated in kilocycles and megacycles and contains over 100" of direct reading scales. A type 6C5 tube is used in an electron coupled oscillator circuit.

The 400 cycle modulator supplies the 400 cycle modulating voltage for the radio frequency section and modulates this to approximately 35% throughout the entire range of the radio frequency oscillator. The output from this modulator may also be switched to the attenuator network so that a 400 cycle calibrated audio output of maximum of 1.0 volt is available at all times.

The input to the attenuator serves the dual purpose of attenuating either the radio frequency or audio frequency output to a predetermined level across the attenuator output. This gives direct calibration of the radio frequency section from 1/2 microvolt to 100,000 microvolts on all ranges and from 0-1.0 volts of audio frequency. The built-in vacuum tube voltmeter is used to standardize the voltage across the attenuator network so that the calibration of this unit holds true. The built-in decibel meter is so arranged that it can be either connected into the vacuum tube voltmeter circuit or switched to an external circuit



Size Model PSG-15. 13" wide x 10" x 7". Shipping weight 23 lbs. Etched aluminum panel case.



which provides three ranges of decibels. The switching of this meter from the vacuum tube voltmeter circuit to the output circuit does not in any way upset the calibration or frequency of the signal generator and thereby provides a means of setting exact input in microvolts to a receiver.

**RADIO FREQUENCY COILS**—All radio frequency coils are wound on ceramic forms and impregnated with special lacquer, making them moisture proof and not subject to inductance change with humidity or temperature. Each coil is individually calibrated for inductance and air trimmed for capacity, thereby giving an accuracy better than 1/2% on all radio frequency ranges.

**SHIELDING**—Each high frequency unit in the signal generator is completely shielded, giving triple shielding on the radio frequency output. Triple filtering is also used in the power supply input.

Supplied complete with dummy antenna, necessary cables, and concise, practical operating instructions.

DEALER'S NET PRICE, MODEL PSG-15.....\$75.00  
LIST PRICE.....\$125.00  
(220 volts. or 25 cycle types—\$3.00 net extra)

This document provided free at  
www.StevenJohnson.com  
NOT FOR RESALE



Model 17 Signal Generator. Dealers Net.....\$45.00

ALL IN LINE—NOT UP, NOT DOWN, EYE LEVEL ACCURACY EVERYTIME  
*Illuminated*

# RADIO SERVICE PANEL

Special Courtesy Offer at Actual Cost



Model PSG-15 Microvoltage Sign Generator. Dealers Net \$75.00



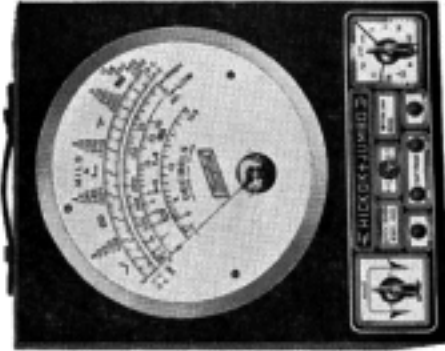
Model 51X Combination D.M.C. Tube Tester Set. Dealers Net.....\$59.40



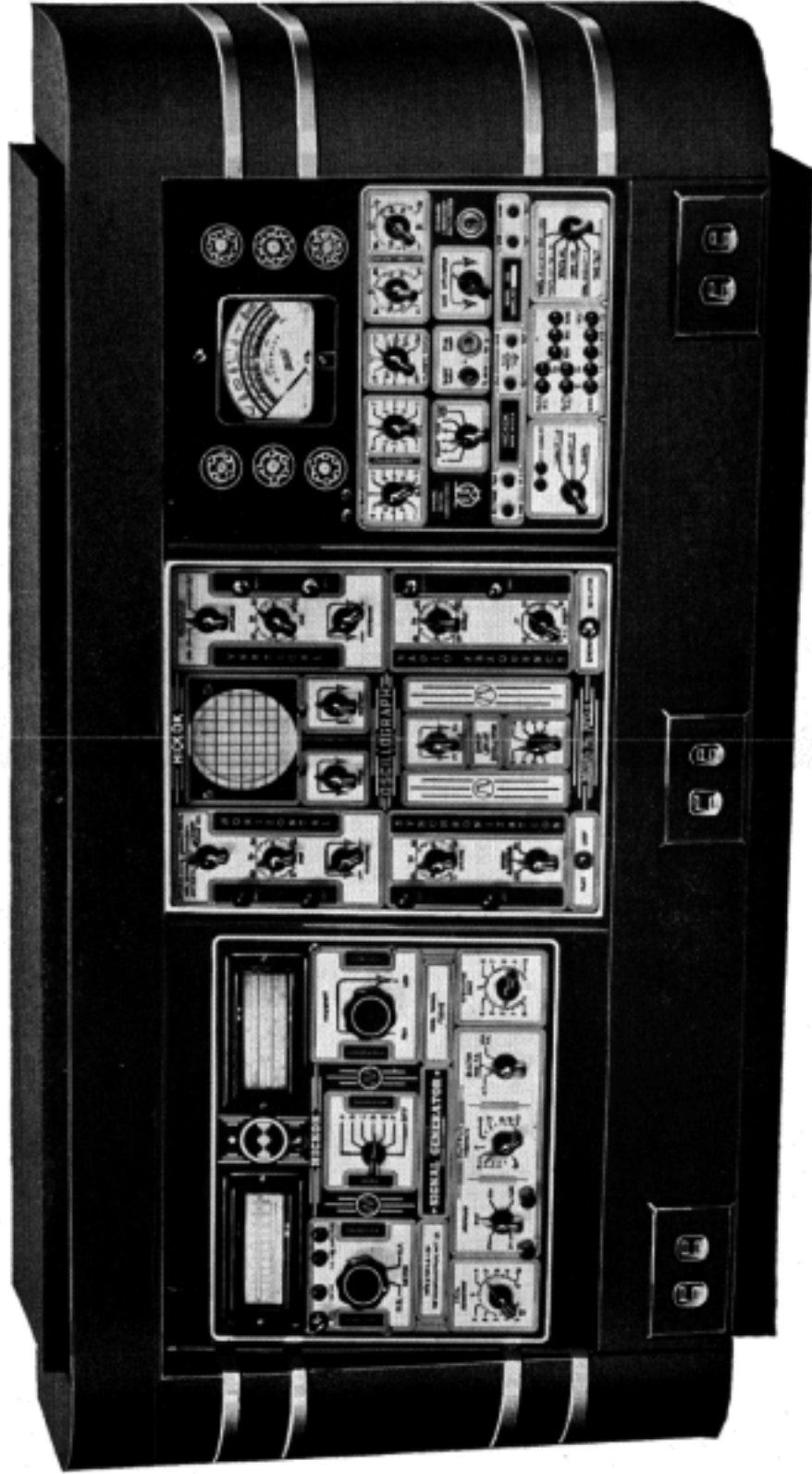
Model 18 Signal Generator, Dealers Net, \$54.00



Model RFO-4 Video Amplifier Oscillograph. Dealers Net \$93.60



Model 4928 Dealers Net Price.....\$34.50



**REMEMBER**—  
There is no circuit or trouble that can not be quickly analyzed and located with Standard Hickok Test Equipment.

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There is no circuit or trouble that can not be quickly analyzed and located with Standard Hickok Test Equipment.

## MODEL SIXTY

Size 44 inches wide — 24 inches high — 12 inches deep. All steel. Dark blue smooth crystal finish. Chrome trim.  
Instruments same finish with satin silver panels to match. Weight 40 pounds, panel only.

**STRIKINGLY ILLUMINATED WITH LONG LUMALINE LAMPS INSET IN TOP.**

Six convenient receptacles, all with fuses, to connect units being tested. Line cord and plug, On and Off switch, etc. Panel shown with PSG-15 Microvoltage, RFO-4 Oscillograph and 51-X Radio Tube and Set Tester. Also supplied with any one, two or three test units illustrated on this page.

*The Most Complete Radio Service Panel Available*

New equipment will be mounted in panel no charge. Add Show Lab price to price of Testers. Dealers instruments will be mounted at factory. Write and tell us what you have.

DEALERS NET PRICE (Panel Only with Lamps) .....\$39.00  
LIST PRICE.....\$65.00



Model TS-50 Dealers Net Price \$48.00



Model 4800 S Zero Current Set Tester, Dealers Net \$59.70



Model 4900-S Zero Current Voltmeter, Dealers Net.....\$49.80



Model 53 D.M.C. Tube Tester. Dealers Net.....\$49.80

# SET ANALYZERS OF ESTABLISHED REPUTATION

## MODEL 4800-S AND 4900-S ZERO CURRENT VOLTMETER TESTERS

### INFINITE OHMS PER VOLT

*Note These Exclusive Features:*



Size 4800S 10" x 12 3/4" x 5".  
Walnut Finished Hardwood Case.  
Shipping weight 14 lbs.



Size: 12" wide, 9" high, 5 1/4" deep.  
Shipping weight 16 lbs.

#### A. ZERO CURRENT VOLTMETER:

1. Infinite ohms per volt on the following ranges 0/10/50/250 volts D.C. No current drain on circuit under test.
2. AVC, AFC and other high resistance circuit voltages accurately measured without disturbing the operating of the set.
3. Special leads supplied for connection to the grid cap of an RF or IF tube to measure bias voltages directly.
4. Above measurements are only possible with an instrument having infinite ohms per volt.
5. Fundamental circuit illustrated Fig. 5. Infinite resistance obtained by use of variable voltage from tester balanced against voltage of circuit under test. This voltage is then read on the regular D.C. volts scales. Balance and voltage indicated on one meter.
6. Balancing voltage  $E_2$  obtained from self contained power supply.
7. Hickok Zero Current Principle permits use of meter movement far more rugged than those used in conventional high resistance voltmeters.

#### B. IMPROVED METER DESIGN:

1. Large open face scale can be read from Wide angle and considerable distance.
2. Extra long scale — 3 3/4" in four colors.
3. Large rugged movement. Very high torque-weight ratio gives lively pointer action.
4. Pointer formed from heavy gauge, hard aluminum to withstand high overloads.
5. Hickok exclusive design gives higher accuracy at all points on the scale.
6. Large, forged magnet with accurately machined pole pieces. Punched laminated magnets are not used in Hickok meters.
7. Movements carefully aged to insure permanently correct calibration.
8. All meters used in Hickok testers are Hickok built in accordance with the best grade instrument manufacturing practice. Highest standard meters for over thirty years.



#### C. WIDE COVERAGE SET ANALYZER SECTION:

1. Simplification of range selection by rotary switches.
2. Improved circuit designed to eliminate errors caused by switch contact resistance.
3. Rectifier guaranteed one year. Exclusive circuit will withstand more overload than any other type.
4. Overall accuracy all ranges within 1 1/2% (including AC volts ranges) within temperature range 50° to 90° F.
5. D.C. Volt ranges: 0/10/50/250 at infinite ohms per volt.  
0/2.5/10/50/250/500/2500 at 1000 ohms per volt.
6. A.C. Volt ranges: 0/2.5/10/50/250/500/2500. 1000 ohms per volt.
7. Ohms ranges: 0/1000/10,000/100,000/1 megohm/10 megohms. Readable as low as .05 ohms. 15 ohms mid-scale, low range.
8. D.C. Microamperes: 0/500. Resistance 500ohms. Can be used with photo-electric cells for measuring relative light intensity.
9. D.C. Milliampers: 0/1/5/50/500.
10. Capacity in Microfarads: 0/.02/.2/20/200. Readable as low as .0001 mfd.
11. Electrolytic condenser leakage. Method of checking all types of condensers complete and accurate: no "Good-Red" scales or other inferior methods used.
12. Output Ranges: 0/2.5/10/50/250/500/2500 Volts.
13. Decibels. Impedance, inductance and A.C. Ripple (Hum) measurements.

#### D. SPECIAL EXTERNAL SHUNTS

1. All 4800-S and 4900-S analyzers calibrated in MILLIVOLTS so external shunts can be used.
2. Specially designed double range shunt, range: 0/5/50 Amperes. (250 M.V.) Net Price \$3.60. (List Price \$6.00 Other shunts on special order.

#### E. BUILT-IN MULTI SELECTOR UNIT: — MODEL 4800-S ONLY:

1. Cables and accessories for all tubes.
2. New improved long life jacks for series or parallel connections.
3. Connections made to any or all tube elements give quick and convenient method for complete socket analysis without disturbing any of the connections in the set under test.

DEALERS NET PRICE, MODEL 4800-S WITH MULTI-SELECTOR, 110 Volts, 50 or 60 Cycles  
(specify frequency).....\$59.70

LIST PRICE.....\$99.50  
(220 volts, or 25 cycle types, \$3.00 net extra)

DEALERS NET PRICE, MODEL 4900-S WITHOUT MULTI-SELECTOR, 110 Volts, 50 or 60 Cycles,  
(Specify Frequency).....\$49.20

LIST PRICE.....\$82.00  
(220 volts, or 25 cycle types, \$3.00 net extra)

## NEW MODEL TS-50 VIBRATOR AND SUBSTITUTE TEST SPEAKER

*The only Meter Equipped Universal Substitute Speaker and Vibrator Tester.*



#### METER RANGES:

.1/1/10 power output in watts. 0/10/100 A.C. volts output. Pin jacks provided for power level measurements on this range. 0/15 amps. for vibrator testing. 0/15 volts, for vibrator testing, etc.  
Meter is connected to a special winding on the output transformer which maintains a ratio of 1000 ohms to the voice coil.

#### FEATURES:

1. Complete "A" battery circuit for automobile radio testing.
2. Complete vibrator testing circuit to test vibrators under actual operating conditions while the vibrator is in the receiver.
3. Test speaker section including a permanent magnet dynamic speaker with universal output transformer for matching a load of 2000 ohms to 30,000 ohms in seven steps. Single tube or push-pull, will match any receiver output.
4. Universal voice coil with matching taps to provide from 1 ohm to 15 ohms in seven steps. Will match any output transformer.
5. Substitute speaker field available having resistance of 300 ohms to 10,000 ohms. Makes it unnecessary to remove speaker from cabinet for servicing either home or auto radios.
6. Polarity reversing switch for sets having either positive or negative ground.
7. Furnished complete, ready to use with heavy No. 8 rubber covered flexible battery leads.
8. Overload protective relay in "A" battery circuit. Limiting current to 20 amperes.
9. Automobile radios cannot be properly serviced without this instrument. It supplies a missing link in radio testing equipment for testing of sets and vibrators.

DEALERS NET PRICE.....\$48.00

LIST PRICE.....\$80.00

ALL METERS HICKOK MADE — THIRTY YEARS EXPERIENCE

# MODEL 5348 DYNAMIC MAGNETIC JERVAL CONDUCTANCE TUBE TESTER AND ZERO CURRENT SET ANALYZER

Embracing in one compact light weight case, the most complete testing device available. Consists of the T53P and 4800-S Testers shown on Pages 2 and 3 of this catalog. NOTE SPECIFICATIONS.

Supplied complete as shown, or in part, to install with either instrument you may have, as follows:



- MODEL 5348 DEALERS NET PRICE COMPLETE AS SHOWN** .....\$109.50  
 LIST PRICE as above.....\$182.50
- MODEL 84 DEALERS NET PRICE WITH 4800-S INSTALLED AND EMPTY SPACE FOR TUBE TESTER**....\$62.40  
 LIST PRICE as above.....\$104.00
- MODEL 15 DEALERS NET PRICE WITH T53P INSTALLED AND EMPTY SPACE FOR ANALYZER**.....\$51.90  
 LIST PRICE as above.....\$85.00

## MODEL 4922 "JUMBO" VOLT OHM MILLIAMMETER

**Nine Inch Meter—X-RAY TYPE—In Production thirty years. Scale over Seven Inches long. Clear, Accurate Readings.**

### TECHNICAL DESCRIPTION MODEL 4922 JUMBO VOLT OHM MILLIAMMETER

A new giant volt-ohm-milliammeter, setting new standards of test methods. The ranges have been extended to cover practically all applications of electrical measurements:

- |                         |  |                                   |
|-------------------------|--|-----------------------------------|
| Service Radio Receivers | Aircraft Installations                 | Telephone and Telegraph Services  |
| Public Address Systems  | Automobile Radios and Ignition Systems | Radio Transmitters and            |
| Household Appliances    | Sensitive Relay Control Circuits       | Their Associated Studio Equipment |
| Industrial Machinery    | Motion Picture Sound Equipment         |                                   |

and many other applications too numerous to mention. The large open-face scale is easily read at any angle and at considerable distance. The torque has been made 55 milligrams per centimeter to obtain the high torque-weight ratio of 60.5. The large moving element and high torque-weight ratio assure a very rugged construction which will withstand many years of rough, portable service while maintaining the high degree of accuracy required.

Extreme accuracy is assured by the Hickok exclusive curve correcting process, which corrects for the mechanical variations present in all D'Arsonval type instruments. By this process, you are assured high accuracy of indication at all points on the scale. Mechanical ruggedness, and ability to withstand severe overloads are built in this tester.

An unusually wide range of coverage is assured by the following ranges:

- AC and DC volts, 0/10/50/250/500/2500.
- DC microamperes, 0/500.
- DC milliamperes, 0/5/50/500.
- Resistance, 0/30 (8 ohms mid-scale), 0/10,000 (150 ohms mid-scale), 0/1 megohm (15,000 ohms mid-scale), and 0/10 megohms (150,000 ohms mid-scale).
- Decibels -10, to +15.

A blocking condenser is provided so that the AC voltmeter may be used as an output meter.

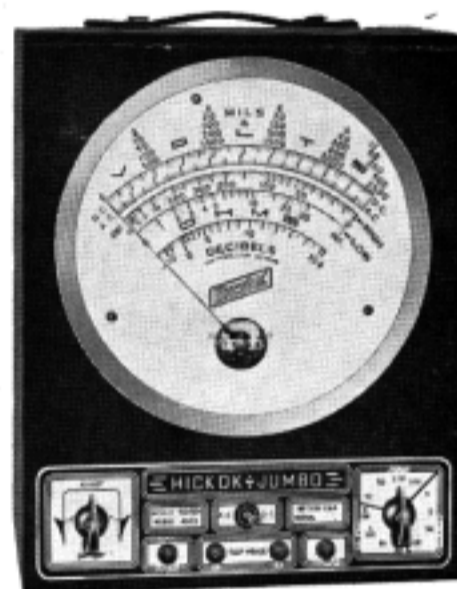
### GUARANTEED ACCURACY

All ranges, including the AC volts ranges, are guaranteed to have an accuracy within 3%, within an ambient temperature ranges of 50° to 90° F. This instrument incorporates a new type rectifier circuit, which will withstand twice the overload possible with any other type of rectifier circuit. If the rectifier fails within a period of one year from date of purchase, it will be replaced without charge.

### EXTERNAL SHUNT FOR 5 AND 50 AMPERES

This two-range shunt is especially designed for use with the Model 4922 to give ranges of 5 and 50 amperes DC. It is particularly useful in the servicing of Automobile Radios, DC Farm Lighting Plants, and many similar applications.

- DEALERS NET PRICE, 4922 Volt Ohm Milliammeter**.....\$34.50  
 LIST PRICE.....\$57.50
- DEALERS NET PRICE, Shunt only for reading 0/5; 0/50 amperes**....\$3.60  
 LIST PRICE.....\$6.00



Size 13" X 10" X 7"  
 Shipping Weight 17 lbs

## HANDY APPLIANCE TESTERS

### DYNAMOMETER TYPE WATTMETERS

Shielded from effect of external magnetic fields

Scale length 2 1/32", diameter of case 2 3/4", depth 3", length of each cable 5 feet.

TO SERVICE Electrical Refrigerators, Washers, Toasters, Waffle Irons, Radio, and all Household Electrical Appliances. A most dependable high grade instrument which will withstand hard portable service. Provides a most thoroughly reliable method of accurately testing to compare actual wattage consumption with rated specifications.

### SPECIFICATIONS AND PRICES

Complete with double end attachment cord and plugs as shown. EQUIPPED WITH RED PUSH BUTTON "PUSH TO READ" TO PREVENT INITIAL STARTING LOAD DAMAGING INSTRUMENT.

Model No.	Range Watts	Volt Limit	Amp. Limit	Dealers Price
4781	0-300	150	2	\$17.10
4783	0-750	150	5	17.10
4785	0-1500	150	10	18.30

List prices Models 4781 and 4873, \$22.50. Model 4785, \$30.50 each. Price of testers with 300 volt limit instead of 150, \$2.50 net extra. With both 150 and 300 volt limits, \$3.50 net extra.



**COMPLETE TECHNICAL DETAILS ON ANY INSTRUMENT LISTED IN THIS CATALOG UPON REQUEST.**

THE HICKOK ELECTRICAL INSTRUMENT CO.

10514 DUPONT AVE.,

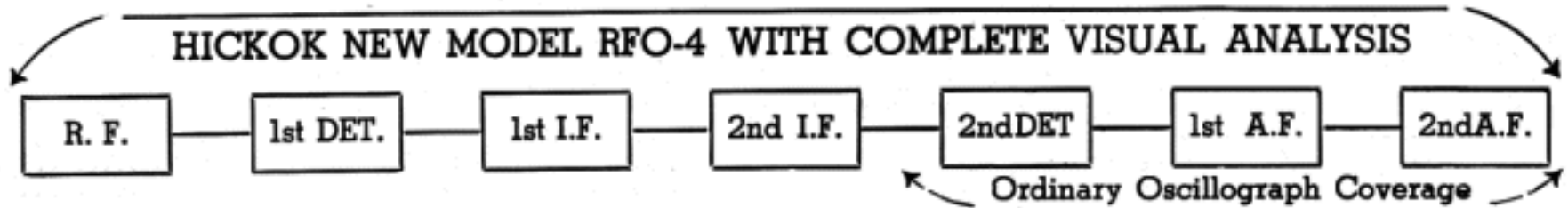
CLEVELAND, OHIO, U. S. A.

# HICKOK

Sets the Pace Again With the One

# OSCILLOGRAPH

FOR COMPLETE VISUAL ANALYSIS



*Made Possible by Incorporating*

**STANDARD and VIDEO (Television) AMPLIFIERS**

## NEW SELF-CONTAINED DEMODULATOR

Extends the usefulness of this oscillograph to both RF and IF stages.

Now single or consecutive stage by stage trouble shooting from antenna post to speaker.

## SELF-CONTAINED ELECTRONIC FREQUENCY MODULATOR

Visual alignment at 665 KC or any harmonic thereof to 5 megacycles without the use of an external oscillator.

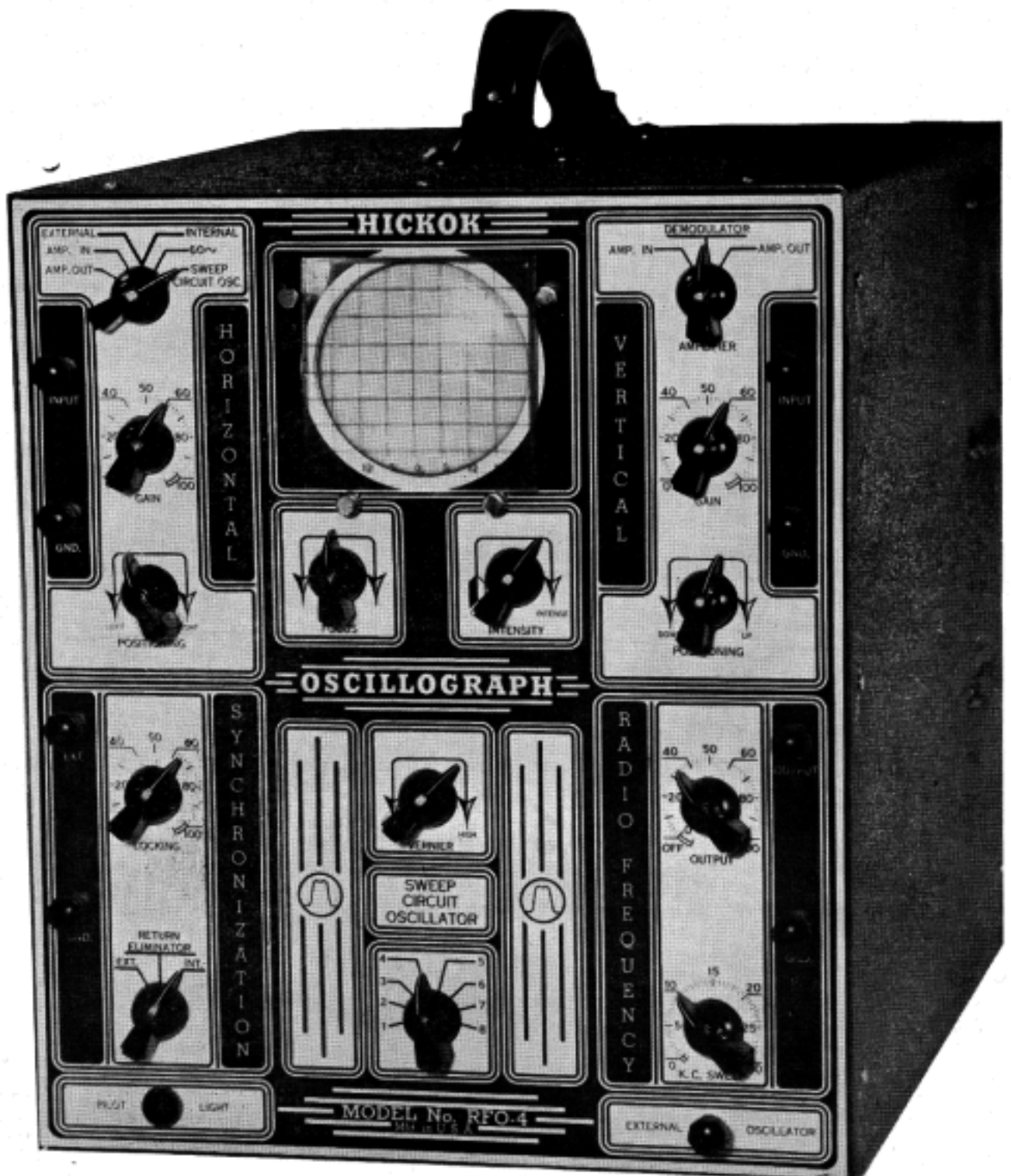
Accurate selectivity measurements.

Variable width sweep from 0-30 KC.

In conjunction with an external oscillator, produces an audio frequency output continuously variable from 0 to 15 KC.

Dynamic visual development of audio frequency response curve.

Simplifies connections.



MODEL RFO-4 Size 11" X 13" X 15" Weight 36 Lbs. Etched aluminum panel, mat finish. Shielded from external fields by rugged steel case.



**OTHER FEATURES INCLUDE:**

1. Return trace eliminator. (Simplifies alignment of A. F. and R. F. circuits).
2. Horizontal Amplifier for sweep expansion.
3. High Sensitivity horizontal and vertical amplifiers. (0.2 volts per inch).
4. Trapezoidal patterns permit percent modulation measurements.
5. Calibrated screen.
6. Cathode ray tube rotation adjustable by means of flexible mounting.
7. Four selection vertical input
8. Wide band (100 to 3,000,000 cycle) video amplifiers.

**FOR THE RESEARCH ENGINEER**—The cathode ray Oscillograph is the most important device for indicating very rapid changes in voltage or current, repetitive transient phenomena, peak voltages and kilovoltages, shape of alternating current waves, etc.

**FOR THE RADIO SERVICE MAN**—The only correct way to align most modern radio receivers is by the visual or cathode ray method. The service man not equipped with an Oscillograph is apt to do an inferior job. Eventually he will have one of three choices: Furnish inferior service and risk losing business, let part of his work out to a more completely equipped shop, or provide himself with proper visual equipment.

**FOR TROUBLE SHOOTING**—The Oscillograph has no equal. It will visually picture the correct or incorrect operation of almost any circuit of a radio receiver. Thereby saving valuable time and increasing business.

With every Hickok Oscillograph you get a 28 page book which describes method of operation and application in detail. The book is completely illustrated with circuit diagrams and charts. The following is a table of contents:

Description.....	Page 3	Radio Frequency Panel.....	9	Lissajous Figures.....	25
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Horizontal Control.....	5	Operating the Oscillograph.....	12	Limitations of Oscillographs.....	26
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**TECHNICAL DESCRIPTION AND DETAILS**

**POWER SUPPLY:** The power supply of the RFO-4 is complete self-contained and operates on 110 volts, 50 to 60 cycles, A. C. Other voltages and frequencies may be supplied at slight additional cost.

**TUBES:** The RFO-4 employs the type 906 3" cathode ray tube. Type 885 saw tooth Oscillator, type 80, high voltage rectifier, type 80 low voltage rectifier. One 6C6 tube, as a horizontal amplifier and one 6J7 as a vertical Low Frequency amplifier. One type 1851 Video amplifier. One type 6C6 Frequency modulated Oscillator, one type 6A7 mixer tube and one 6H6 demodulator tube.

**HORIZONTAL PANEL:** This panel section contains three controls. The top control connects the horizontal 906 plate externally or internally. In the external position, amplifier out, the horizontal plates are connected directly through a blocking condenser to the horizontal input binding posts. When the switch is turned to the "amplifier in" position the 6C6 horizontal amplifier is connected between the horizontal input binding posts and the horizontal plate of the 906. The amplification is controlled by the gain control directly below the switch. When the switch is turned to the 60 cycle internal position, 60 cycle sinusoidal voltage is applied to the horizontal plates and this voltage is adjusted so that it sweeps the horizontal trace exactly 30 kilocycles as indicated on the calibrated screen supplied with the Oscillograph. This 60 cycle sweep is used for a visual alignment of intermediate and radio frequency stages by the Hickok method. When the switch is turned to the internal sweep circuit oscillator position, the 885 thyratron oscillator is connected to the input of the horizontal amplifier and the output of the amplifier applied directly to the horizontal plate. The amplification of which is controlled by the gain control and determines the width of the sweep on the screen. The positioning control in this horizontal panel adjusts the beam horizontally across the face of the cathode ray tube.

**TUBE PANEL:** This panel contains the 906 tube, the focus and intensity controls. The focus control is used to focus the spot on the screen of the tube and the intensity control serves the dual purpose of regulating the intensity of the spot and also of turning off the Oscillograph when it is turned to a complete counter clockwise position.

**VERTICAL PANEL:** This panel has three controls similar to the horizontal panel control. With the switch in the "Standard Amplifier In" position, the low frequency vertical amplifier is connected between the voltage applied to the vertical input binding post and the vertical plates. In the "Video Amplifier In" position the wide band video. In the "Amplifier Out" position this voltage is applied through the audio frequency amplifier to the vertical plate. In the demodulator position, the voltage is applied directly to the demodulator tube, and the demodulator output applied through the audio frequency amplifier to the vertical plate. The vertical positioning control is also on this panel.

**DEMODULATOR:** The demodulator, which is self contained in the model RFO-4 is similar to the second detector in modern radio receivers. Its function is to take out the radio frequency carrier and leave only the demodulated component. Without a demodulator the Radio Fre-

quency found on the R.F. and I.F. Stages cannot be viewed on the screen because of the frequency limitations of amplifiers as found in oscillographs. As a result of the incorporation of this demodulator, the oscillograph can be connected anywhere along the radio frequency or intermediate frequency path in the receiver and the operation at that point viewed on the cathode ray tube screen.

**SYNCHRONIZING PANEL:** This panel includes a locking and a switch control, the external locking binding post and the ground binding post. When the switch on this panel is turned to the external position and a suitable locking voltage is connected to the external binding post, its locking effect on the horizontal saw tooth sweep Oscillator will be increased as the locking control is turned clockwise. When the switch is turned to the "Return Eliminator" position, the return trace is eliminated when a sinusoidal voltage is being used for the horizontal sweep. When the switch is turned to the internal position the locking control may be used to lock the horizontal sweep with any frequency applied to the vertical plates through the vertical amplifier.

**SWEEP CIRCUIT OSCILLATOR PANEL:** This panel contains the step and vernier control of the sweep circuit Oscillator. Position 1 to 8 controls in steps the sweep circuit Oscillator from approximately 15 cycles on position 1 to approximately 25,000 cycles on position 8. There is a considerable overlapping of the frequency between steps and so it is possible to lock in any frequency between these limits.

**RADIO FREQUENCY PANEL:** This section contains two controls, the output control and the kilocycles sweep control. The output control serves to attenuate the output of the radio frequency section to the binding post labeled, "RF OUTPUT". The radio frequency voltage delivered by this section may be varied approximately from 2 microvolts up to about 3 volts of radio frequency. The kilocycle sweep control controls the width of the frequency modulation of the radio frequency Oscillator. When the kilocycle sweep control is turned to 5 the radio frequency output is being frequency modulated 2.5 kilocycles each side of its fundamental, whereas when the kilocycle sweep is turned to 30 it is being frequency modulated 15 kilocycles each side of its fundamental and the calibrated screen supplied with the Oscillograph can be used to read directly as it is calibrated plus or minus 15 kilocycles each side of resonance. If it is desired to use this section as an electronic frequency modulator it is only necessary to connect an external Oscillator into the binding post so labeled and the frequency modulator will modulate the output of the external Oscillator by the heterodyne method and a frequency modulated signal at any frequency within the limits of the external Oscillator will be available at the radio frequency output binding post. The width of the frequency modulation of this type of connection will also remain in accordance with the setting of the kilocycle sweep dial. The mixer circuit in the radio frequency section is so designed that an audio frequency output of any frequency may be obtained by connecting an external oscillator to the binding post so labeled. Frequency modulated A.F. output can also be obtained for dynamic visual response curve.

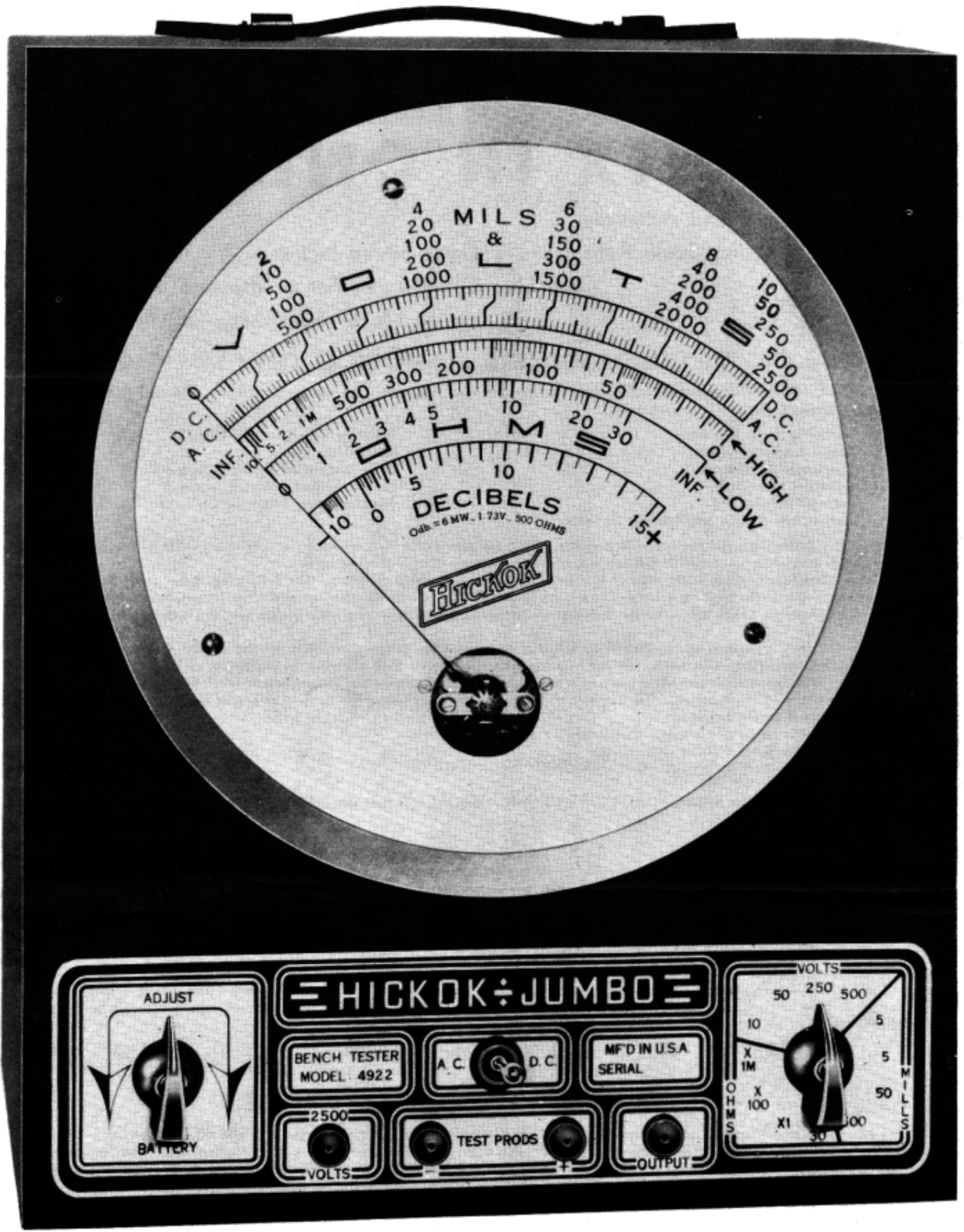
**DEALERS NET PRICE, 105-125v, 50-60 cycles.....\$93.60**  
 LIST PRICE.....\$156.00  
 (25 cycles.....\$4.50 net extra)

**THE HICKOK ELECTRICAL INSTRUMENT CO.**

10514 Dupont Avenue

Cleveland, Ohio, U. S. A.





SIZE 13" HIGH 10 3/8" WIDE 7 1/8" DEEP NINE INCH METER

A CONTRIBUTION TO THE ART OF RADIO SERVICE IN THE CONVERSION OF  
A HICKOK X-RAY METER THAT HAS BEEN IN PRODUCTION OVER 30 YEARS.

# JUMBO

(NINE INCHES DIAMETER)

# SIX IN ONE

Extremely Rugged and Accurate

Long Scale Range . . . Over Seven Inches

Indicates Clearly . . . Far as the eye can see

Meter Sensitivity—350 Micro-Amps

## TECHNICAL DESCRIPTION MODEL 4922 JUMBO VOLT OHM MILLIAMMETER

A new giant volt-ohm-milliammeter, setting new standards of test methods. The ranges have been extended to cover practically all applications of electrical measurements:

Servicing Radio Receivers  
Public Address Systems  
Household Appliances  
Industrial Machinery  
Aircraft Installations  
Automobile Radios and Ignition Systems

Sensitive Relay Control Circuits  
Radio Transmitters and  
Their associated Studio Equipment  
Motion Picture Sound Equipment  
Telephone and Telegraph Services

and many other applications too numerous to mention. Increase your profit by branching out into many fields of trouble-shooting and service in electrical apparatus with this rugged, portable instrument of highest accuracy.

The large open-face scale is easily read at any angle and at considerable distance. The torque has been made 55 milligrams per centimeter to obtain the high torque-weight ratio of 60.5. The large moving element and high torque-weight ratio assure a very rugged construction which will withstand many years of rough, portable service while maintaining the high degree of accuracy required.

Extreme accuracy is assured by the Hickok exclusive curve correcting process, which corrects for the mechanical variations present in all D'Arsonval type instruments. By this process, you are assured high accuracy of indication at all points on the scale. An extra large, solid, forged, chrome steel magnet is magnetized by Hickok's special Surge Type Magnetizer, then aged electrically to assure permanence of the magnet. The instrument pointer is made of heavy gauged, hard-drawn aluminum and is especially designed to withstand severe overload.

An unusually wide range of coverage is assured by the following ranges:

AC and DC volts, 0/10/50/250/500/2500.

DC microamperes, 0/500.

DC milliamperes, 0/5/50/500.

Resistance, 0/30 (8 ohms mid-scale), 0/10,000 (150 ohms mid-scale), 0/1 megohm (15,000 ohms mid-scale), and 0/10 megohms (150,000 ohms mid-scale).

Decibels —10, to + 15.

A blocking condenser is provided so that the AC voltmeter may be used as an output meter.

College and high school laboratories are using many of these instruments for rapid testing in their experiments where instruments are often used by inexperienced students. Sturdy construction and reliable calibration are of the utmost importance. Manufacturers are using them for routine checking in their production lines. Factory maintenance engineers find the Model 4922 indispensable in their maintenance work.

## GUARANTEED ACCURACY

All ranges, including the AC volts ranges, are guaranteed to have an accuracy within 3%, within an ambient temperature range of 50° to 90° F. This instrument incorporates a new type rectifier circuit, which will withstand twice the overload possible with any other type of rectifier circuit. If the rectifier fails within a period of one year from date of purchase, it will be replaced without charge.

DEALERS NET PRICE, 4922 Volt Ohm Milliammeter . . . . . \$34.50

LIST PRICE . . . . . \$57.50

## EXTERNAL SHUNT FOR 5 AND 50 AMPERES

This two-range shunt is especially designed for use with the Model 4922 to give ranges of 5 and 50 amperes DC. It is particularly useful in the servicing of Automobile Radios, DC Farm Lighting Plants, and many similar applications. The terminals are extra heavy duty binding posts having knurled knobs. Two leads, 5 feet long, are supplied with the shunt for connection to the meter. The shunt may be connected directly in the circuit, where it is supported by the connections.

DEALERS NET PRICE, Shunt only for reading 0/5; 0/50 amperes . . . . . \$3.60

List Price, \$6.00

THE HICKOK ELECTRICAL INSTRUMENT COMPANY

Cleveland, Ohio, U. S. A.

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All Hickok Service equipment is available on easy deferred payments as follows:

	Cash Price	S F C	Easy Payments
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<input type="checkbox"/> Model 53 Counter and Portable Type Tube Testers.....	49.80	10.78 down	4.50—10 months
<input type="checkbox"/> Model 4900-S Zero Current Voltmeter.....	49.20	10.10 down	4.50—10 months
<input type="checkbox"/> Model 4955-S Volt. Ohm-Milliammeter.....	26.40	7.56 down	4.40— 5 months
<input type="checkbox"/> Model 4922 Jumbo Volt Ohm Milliammeter.....	34.50	8.64 down	5.00— 6 months
<input type="checkbox"/> Model 4800-S Set Tester.....	59.70	12.86 down	5.40—10 months
<input type="checkbox"/> Model 18 Signal Generator.....	54.00	10.48 down	5.00—10 months
<input type="checkbox"/> Model 17 Signal Generator.....	45.00	10.40 down	4.00—10 months
<input type="checkbox"/> R. F. O. 4-Oscillograph.....	99.00	15.88 down	9.50—10 months
<input type="checkbox"/> Model 15 PSG Signal Generator.....	75.00	14.00 down	7.00—10 months
<input type="checkbox"/> Model 5348 Super Service dynamic mutual conductance tube tester and zero current analyzer.....	109.50	22.64 down	10.00—10 months
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<input type="checkbox"/> Model AC-47-A Radio Tube Tester.....	90.00	10.80 down	9.00—10 months
<input type="checkbox"/> Model AC-47-A Radio Tube Tester with case.....	96.00	12.52 down	9.50—10 months
<input type="checkbox"/> Model 60—Special Display Panel only.....	39.00	8.68down	5.00— 7 months

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