

HICKOK

CATALOG 65D

test equipment

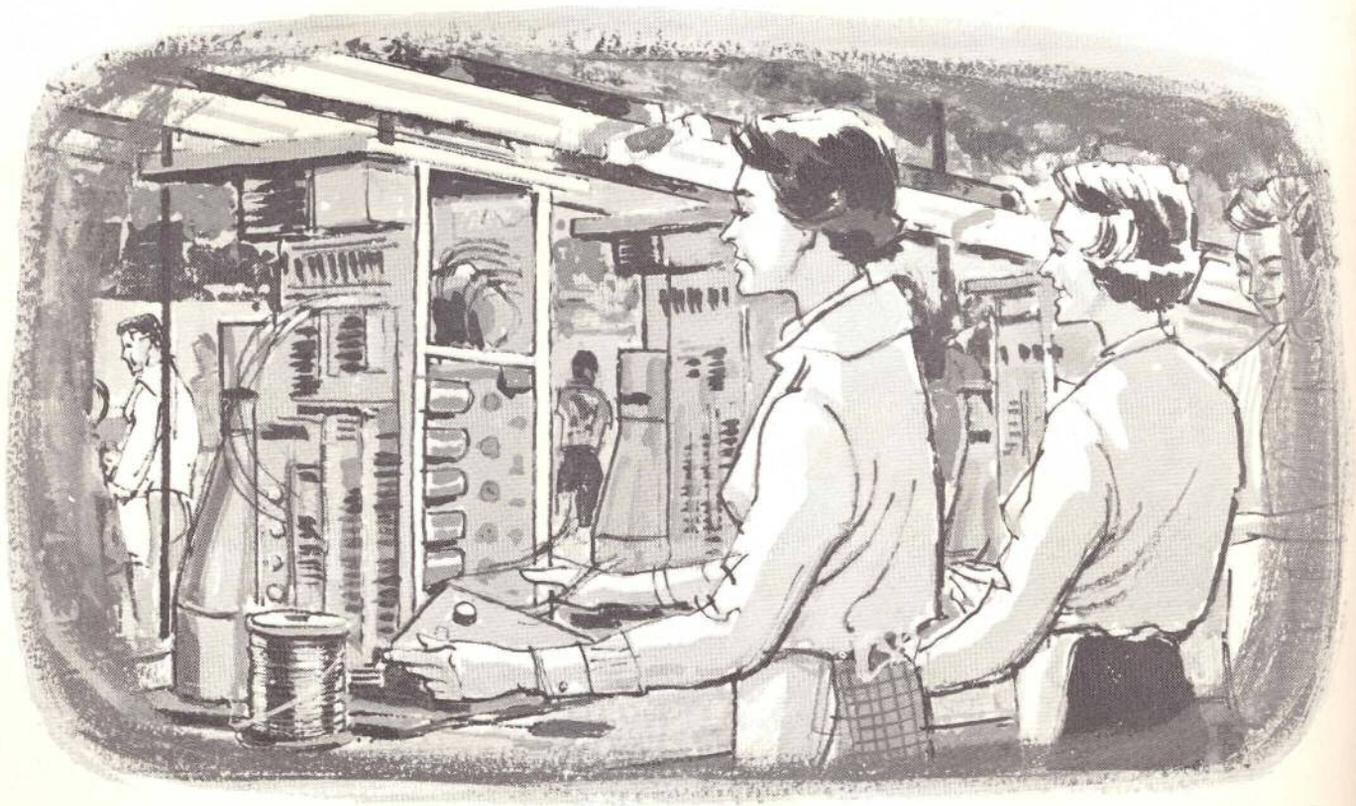
The Hickok Electrical Instrument Co.
10514 Dupont Avenue • Cleveland, Ohio 44108

1910-1964
HICKOK
Recognized For Excellence
For 54 Years

Since 1910, the name "HICKOK" inscribed on electrical and electronic instruments has been the assurance of the finest and most dependable in electronic test equipment. For longer than there has been an "electronics" industry, HICKOK engineering has continually pioneered in the development of highest quality, versatile, reliable test and indicating instruments.

From the days of Marconi's wireless, into the age of semiconductors, HICKOK has led the way in such important development as:

- The first Dynamic Mutual Conductance Tube Tester, universally accepted as providing the standard test of a vacuum tube...HICKOK tube testers have been widely emulated—they have never been surpassed.
- The friction-free, Taut-Band Meter—eliminating friction from pivots, jewels and hairsprings.
- 250° Scale Meters.
- Sub-miniature, ruggedized meters built to military specifications.
- And now, in the Transistor Age—a full line of transistor testing instruments featuring the same ease of operation, unmatched versatility, unexcelled reliability that have characterized HICKOK products for more than half a century.

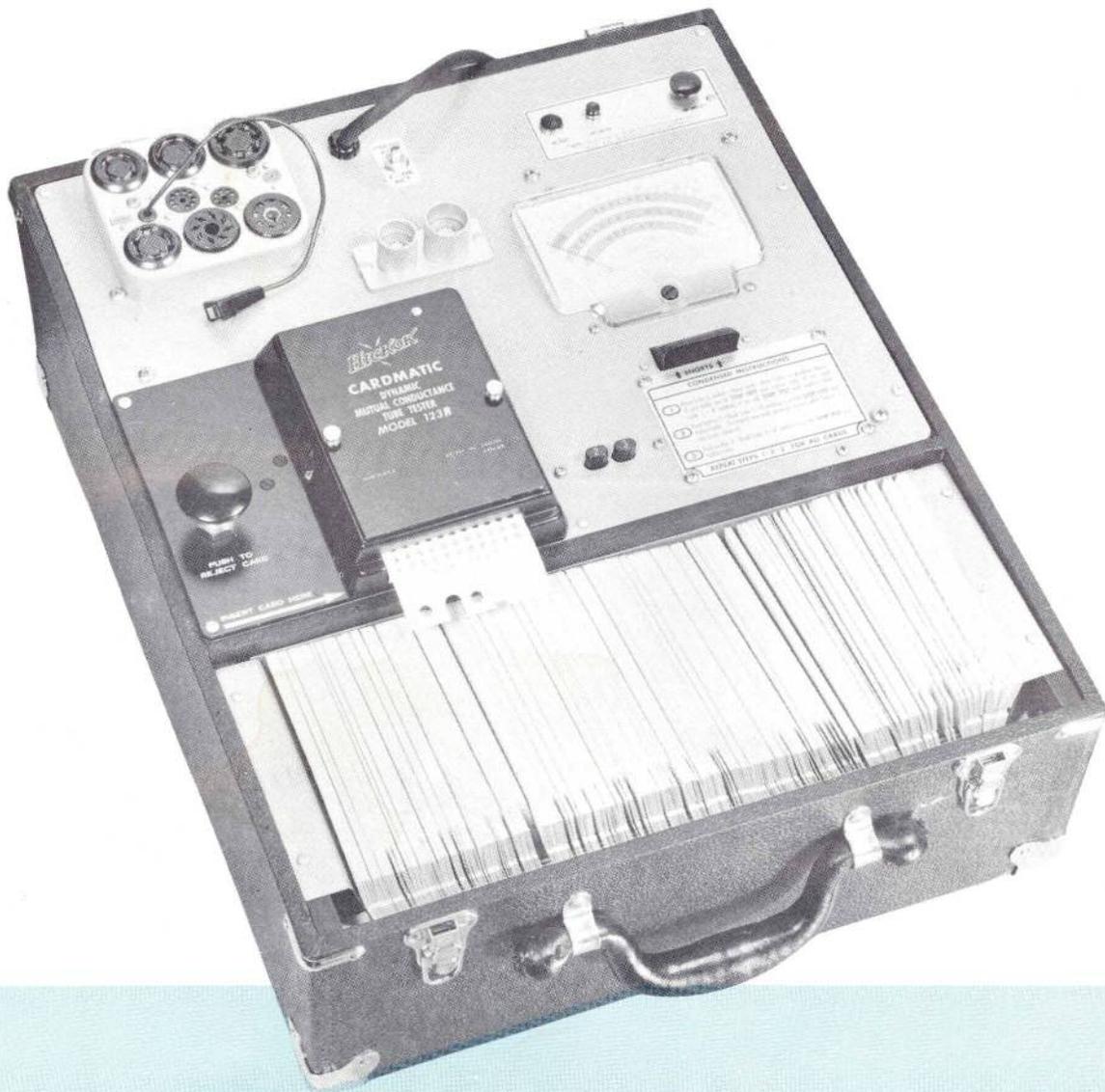


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All Hickok test equipment in this catalog is available for 220/110 volt, 50/60 cycle operation excepting Color Television Generators (Models 660, 661, 662 and 656XC) and the Model 760 Video Scanner.

INDUSTRIAL and LABORATORY MODEL CARDMATIC AUTOMATIC TUBE TESTER



MODEL 123R—The Model 123R is the first tube tester to use card programming to set up tests required for industrial type tubes. Its patented Card Reader Switch permits over 10 trillion switching combinations. Custom tube tests can be programmed at any point on the characteristic curve—to determine tube performance in special purpose circuits.

A truly modern tube tester, the Model 123R performs complete “fringe” tests and saturation and cut-off tests in addition to the basic G_m measurement. Only saturation and cut-off tests can truly evaluate performance in switching, computer and multi-vibrator applications.

The Model 123R has an unusually low signal voltage of 220 millivolts coupled with a unique G_m measuring circuit and fully regulated power supplies, provides 3-5% accuracy in G_m measurements.

MODEL 123R

Technical Specifications

TUBE SOCKETS: 4, 5, 6, 7-pin, octal, loctal, 7 and 9-pin in-line and octal sub-miniature, 5 and 7-pin Nuvistors and Novars. An adapter is available, Model CA4, to permit testing of Compactrons and 10-pin tubes. A Model SA-5 adapter permits testing of European rimlock tubes.

G_m RANGES: From 500 to 26,000 μ mhos

CURRENT RANGES: 100 μ a to 510 ma full scale.

INTER-ELEMENT LEAKAGE: Shown on 5 neon lamps identifying elements involved. Sensitivity to 10 megohms.

TEST VOLTAGES:

Filament: 0.1 to 119.9 volts in 1/10 volt steps.

Signal: 0.222 volt rms.

Plate: 12 to 160 volts, fully regulated, standardized at 50, 100 and 150 volts.

Screen: 12 to 160 volts, fully regulated, standardized at 50, 100 and 150 volts.

Grid Bias: 0 to 124 volts, in 7,110 steps

Self-Bias Resistance: 10 ohms to 71,100 ohms in 10-ohm steps. A 1,000 μ f capacitor shunts the resistance selected.

Rated Loads on Rectifier Tubes: up to 200 ma.

Relay Overload Protection: Protects the G_m bridge circuit, the filament transformer circuit, the power transformer circuit, power supplies and the meter.

Calibration Cards (Furnished): For calibrating the following:

Shorts test sensitivity	Fixed bias voltages
Power supply voltages	G _m measuring circuit
Overload protection	

Cards Furnished: A standard factory pack of 500 selected test cards are furnished with the tester.

A self mailing order form listing more than 3100 additional test cards is packed with each tester. This makes it possible for you to order test cards for latest tubes. Card orders are processed and shipped directly from the factory within 48 hours after receipt. Supplemental lists covering new test cards available for newly released tubes are issued periodically and mailed automatically to all registered owners of Cardmatic tube testers and to those who have previously ordered test cards.

Card Storage: Integral card storage compartment accommodates up to 600 test cards.

TUBE COMPLEMENT:

6AU8
(triode section) regulator for low current supply
(pentode section) Feedback amplifier for high current supply
6DQ6A Series regulator, B + supply
0A2 Negative voltage regulator
6X4 Bias and reference voltage rectifier
5U4 B + rectifier

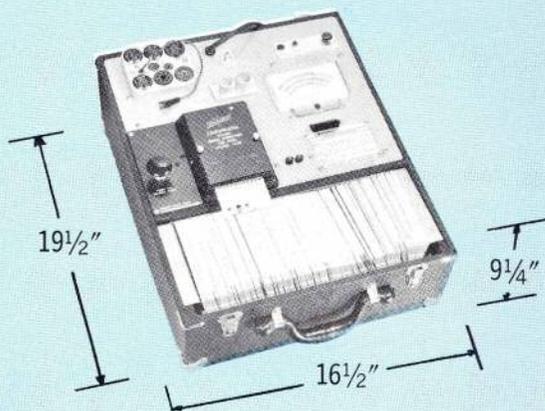
POWER REQUIREMENTS: 105-125V, 50-60 cycles, 55 watts.

Furnished with calibration cards, a selection of most popular cards and instruction book.

MODEL 123R

FEATURES:

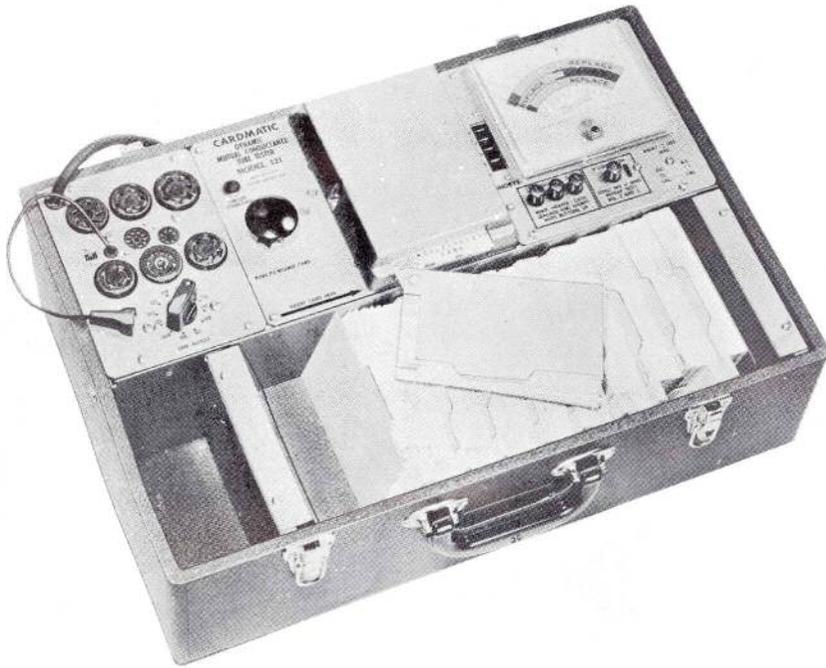
- Card-Programmed Testing to Handbook Standards
- Exclusive Saturation and Cut-off Tests, in Addition to Standard G_m Tests
- Tests Industrial and Computer Type Tubes, Nuvistors, Novars, Low Power Thyratrons, VR Tubes and European Rimlock Tubes.
- Sensitive Instantaneous Shorts and Leakage Test



CASE SPECIFICATIONS: Furnished in strong attractive black-leatherette portable case with detachable lid, 16 $\frac{1}{2}$ " L, 19 $\frac{1}{2}$ " W, 9 $\frac{1}{4}$ " D. 49 lbs. net weight.

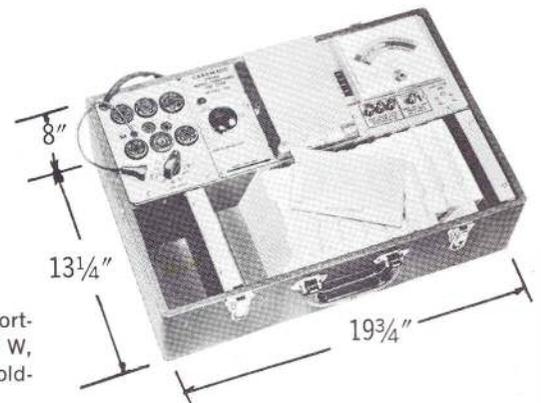
LOW COST, HIGH SPEED, CARDMATIC Automatic Tube Tester, Transistor and Diode Checker

MODEL 121



CASE SPECIFICATIONS:

Furnished in an attractive red-leatherette, portable case with detachable lid, 19 $\frac{3}{4}$ " L, 13 $\frac{1}{4}$ " W, 8" D. 34 lbs. net weight. Control panel is gold-anodized aluminum.



The Model 121 is a new low-cost version of the Model 123R but retains the principal feature of card-programmed G_m , saturation and cut-off tests essential to proper testing of tubes used in pulse, computer and television sweep applications.

Technical Specifications

TUBE SOCKETS: 4, 5, 6, 7-pin, octal, loctal, 7 and 9-pin miniature, 3-pin in-line transistor socket. An adapter, Model CA-4, is available for testing Nuvistors, Novars, Compactrons and 10-pin tubes. Another adapter, Model SA-5, will test European rimlock tubes. SA-1 adapter tests 7-pin in-line and 8-pin round subminiature.

G_m RANGES: Controlled ranges from 500 to 26,000 μ mhos.

INTER-ELEMENT LEAKAGE: Shown by 5 neon lamps identifying elements involved. Sensitivity to 10 megohms.

DUAL SECTION TESTS: Made when indicated by dual-test lamp. Accomplished by depressing a push button on control panel.

ENTERTAINMENT TRANSISTOR TEST: A "good-bad" quality test for emitter-collector conduction. Basic test cards for PNP and NPN transistors are furnished with the tester.

POWER TRANSISTOR TEST: Measures collector-base current leakage.

TEST VOLTAGES:

Filament: 0.1 to 119 volts in 320 steps.

Signal: 0.42 volts RMS.

Plate: 0 to 300 volts in 640 steps.

Screen: 0 to 300 volts in 640 steps.

Grid Bias: 0 to 50 volts in 140 steps.

Self-Bias Resistance Range: 0 to 1000 ohms in 10-ohm steps.

Semiconductor rectifier diodes: Measured in a half-wave circuit under load for conductive efficiency. Load current range: from 100 μ a to $\frac{1}{2}$ ampere.

CARD STORAGE: Integral storage compartment will hold up to 600 test cards. Cards can be re-filed automatically.

CARDS FURNISHED: A standard factory pack of 342 test cards selected to cover the most popular entertainment types is furnished with the tester. A self-mailing order form, listing more than 2300 additional test cards is packed with each tester. This makes it possible for the user to order only those cards he actually needs and will use. Card orders are processed and shipped directly from the factory within 48 hours after receipt. Supplemental lists covering new test cards available for newly released tubes are issued periodically and mailed automatically to all registered owners of Cardmatic Tube Testers and to those who have previously ordered test cards.

POWER REQUIREMENTS: 105-125 volts, 60 cycles, 50 watts.

Furnished complete with a selection of test cards, necessary calibration cards and instruction book.



THE **HICKOK**
CARDMATIC
CARD SUBSCRIPTION
PLAN

Hickok, the originator of a continuing program to keep tube testers up-to-date with current roll chart information, has a companion service for users of Cardmatic automatic tube testers.

Pictured above is a portion of the Hickok inventory of over three and one-half million Cardmatic Test Cards. The large inventory is maintained to assure prompt shipment of card orders within hours after they are received at the factory.

HERE IS HOW THE PLAN WORKS:

A self-mailing Card Order form, listing all test cards currently available for each Cardmatic Model, is enclosed with each tester shipped from the factory. The new owner can review this list and supplement the cards furnished with the tester with the particular cards he needs to test the tubes with which he normally works. Industrial users need not load themselves with entertainment tube test cards; service technicians need not buy computer and other tube test cards they will never encounter in their operations.

As with roll chart testers, the Hickok Tube Library is constantly establishing new test cards for newly

released tubes. To give users information about new tube test cards as they become available, supplementary self-mailing card order lists are published and users can augment their card supply with the particular cards they will need.

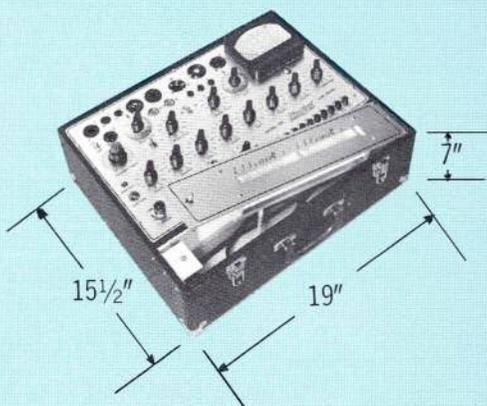
In this way, Cardmatic users are assured that the test cards they need will be available to them—and they need buy only the cards with which they will be working. The effectiveness and efficiency of the Cardmatic Automatic Tube Tester are enhanced because it can be kept up-to-date easily and inexpensively.

MODEL 580

MODEL 580

FEATURES:

- Hickok-developed G_m test circuit
- Four micromho ranges, to 60,000 μ mhos
- Test potentials individually variable, permit set-up to handbook conditions independent of roll chart
- Leakage read on meter, sensitivity to 50 megohms
- Ultra-sensitive gas test circuit detects gas effects to 0.05 microamperes
- Push button test of dual section tubes
- Illuminated meter and roll chart
- Solid state power supplies



CASE SPECIFICATIONS:

Furnished in black leatherette covered wood case, 19" W., 15 1/2" D., 7" H. 30 lbs. net weight. Includes a storage compartment 3" W., 18" L., 4 1/2" D.

Technical Specifications

TUBE SOCKETS: 4, 5, 6, 7-pin, octal, loctal 7, 9 and 10-pin miniature, 7 and 8-pin sub-miniature, compactron, novar, acorn, and 5 and 7-pin nuvistor.

G_m RANGES: 3,000, 10,000, 30,000 and 60,000 micromhos, plus three diode ranges and one VR range.

LEAKAGE TEST: Inter-element leakage indicated directly on meter with maximum sensitivity of 50 megohms.

TEST VOLTAGES:

Filament: 0.6 to 117 volts in 19 steps. (0.6, 1.1, 1.4, 2.0, 2.5, 3.0, 4.3, 5.0, 6.3, 7.5, 10.0, 12.6, 17, 20, 25, 35, 50, 75, and 117 volts).

Signal: 280 millivolts rms.

Plate and Screen: 6.3 to 300 volts DC in 12 steps (6.3, 12.6, 22.5, 45, 80, 100, 120, 150, 180, 200, 250 and 300 volts).

Fixed Bias: Continuously variable in two ranges to 50 volts (0-5 and 0-50). Can be set by means of a calibrated dial or read directly on the meter.

Self Bias Testing Capability: Any desired cathode bias resistor may be inserted in front panel jack for tests under self bias conditions. Bias resistor is bypassed by internal capacitor.

GAS TEST: A new, transistorized gas test circuit makes it possible to measure gas effects in terms of grid current as low as 0.05 microamperes.

DUAL SECTION TUBES: Dual section tubes having electrically equal sections are tested with one setting of selector switches. Test conditions are transferred from one section to the other by a push button.

ROLL CHART: Replaceable, illuminated roll chart covers industrial and entertainment types.

PLATE, GRID AND CATHODE JACKS: Provided on the panel for easy connection to tube caps.

VR TEST: Provides measurement of striking voltage, regulating voltage and current.

CATHODE "LIFE-TEST": Provided by push button reduction of heater voltage for evaluation of cathode reserve.

SELECTOR SWITCHES: Safety-interlocked to prevent tube damage due to improper setting.

POWER REQUIREMENTS: 105 to 125 volts, 60 cycles, 60 watts.

INDUSTRIAL and LABORATORY PORTABLE TUBE TESTER



MODEL 539C — The Model 539C is equally at home in the tube research laboratory or on important maintenance assignments for computers and other industrial electronics equipment. It has the necessary sockets and switching capability to perform handbook tests on the new Compactrons, Novars, 5 and 7-pin Nuvisors and 10-pin types. Because no tube elements are parallel, testing of these new types is complete to handbook specifications.

In addition, it features a VR Tube Test for evaluating voltage regulator tubes under actual operating conditions . . . giving instant readings of striking voltages, regulating voltage and current ranges.

Provision for separate monitoring of plate current (through terminals on panel) makes the Model 539C ideal for matching or balancing tubes. It also features a built-in switch enabling tube measurement under fixed and self-bias condition by merely changing switch position.

Cathode reserve can be determined to indicate the future life of a tube. This is accomplished by a panel switch which reduces heater voltage for evaluation of cathode activity. An extra-low 600 μ mho range is especially suited to testing of subminiature tubes.

Non-standard or "tailored" tests are facilitated by the panel terminals providing access to grid, plate, cathode and heater circuits. Thus, direct measurements of voltages and current in those circuits may be made. The measurement of heater current is important in testing tubes on the series-string group where higher resistance in one tube will prevent the remainder from receiving proper operating voltage.

The 539C also makes forward conduction efficiency tests for selenium rectifiers and germanium diodes.

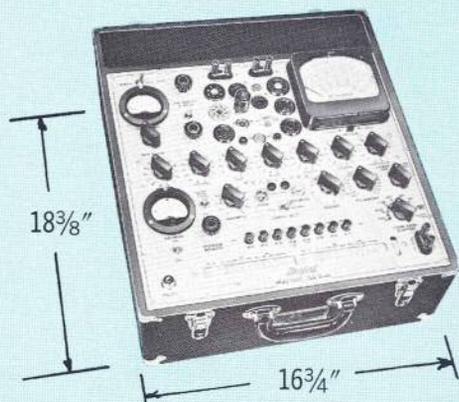
MODEL 539C

Technical Specifications

MODEL 539C

FEATURES:

- *Hickok-Developed G_m Test Circuit*
- *Now tests Novars, Nuvisors Compactrons, 10-pin types*
- *Six Micromho Ranges*
- *Four AC Signal Voltages*
- *Metered Line Voltage*
- *Metered Grid Voltage*
- *Dual Tube Leakage Readings—Directly on Meter or by Neon short indicator*
- *Provides for Plate Current and Heater Current measurement*
- *Tests VR Tubes, low power Thyratrons and "4-digit" types*



CASE SPECIFICATIONS:

Furnished in a black-leatherette, portable case with lead compartment and detachable lid; 16 $\frac{3}{4}$ " L, 18 $\frac{3}{8}$ " W, 7 $\frac{1}{2}$ " D. 28 lbs. net weight.

TUBE SOCKETS:

4, 5, 6, 7-pin, octal, loctal, 7, 9 and 10-pin miniature, 7-pin in-line and 8-pin round subminiature, Compactron, Novar, 5 and 7-pin Nuvisor.

G_m RANGES:

60,000, 30,000, 15,000, 6,000, 600 μ mhos. In addition, rectifier diode and voltage regulator (VR) ranges are provided.

INTER-ELEMENT LEAKAGE:

Indicated directly on meter or on neon lamp; Sensitivity—to 50 megohms.

TEST VOLTAGES:

Filament: 0-117 volts AC (in 18 steps).

Signal: 0.25, 0.5, 1.0 or 2.5 volts rms.

Plate: 66 and 150 volts DC

Screen: 56 and 130 volts DC.

Fixed Bias: 0 to-40 volts DC, continuously variable.

SELF BIAS:

Applied to the tube by a terminal arrangement on the panel.

BUILT-IN ROLL CHART:

Contains test data for latest industrial and entertainment type tubes.

METERS:

Three Hickok Meters (1% accuracy): G_m meter with ranges listed above and scales reading to 200 volts for VR tube testing and to 50 megohms for leakage testing; An AC voltmeter measuring line voltage and a two-range (0-10, 0-50) DC voltmeter to adjust the negative grid bias.

ROLL CHART SUBSCRIPTION PLAN:

New editions of the roll chart, containing test data for recently released tubes, are published semi-annually and mailed automatically to all subscribers to the Hickok Roll Chart Subscription Plan providing a sure way to keep test data up-to-date.

AVAILABLE ADAPTERS:

Hickok Code No.	For
1050-114	Cathode-ray tubes (kinescopes only)
1050-50	2C39A
1050-107	829B
1050-118	991
1050-119	2C36
1050-120	2-01C
1050-121	6263, 6173, 5675 (pencil types)

POWER REQUIREMENTS:

105-125 volts, 50-400 cycles, 40 watts.

INDUSTRIAL and COMMUNICATIONS PORTABLE TUBE TESTER



MODEL 752A — This versatile tube tester, used extensively in maintaining communications and broadcast equipment as well as industrial electronic apparatus is now even more versatile. It can be used to test the latest tubes, Novars, Nuvistors (5 and 7-pin) Compac-trons and 10-pin types. Because no tube elements are paralleled, testing of these new types is complete to handbook specifications.

The 752A incorporates a voltage regulator test circuit which tests VR tubes to manufacturers' specifications including firing point, regulating voltage and current range. The push button test feature for dual section tubes permits rapid selection of tubes for balanced or matched characteristics.

MODEL 752A

Technical Specifications

TUBE SOCKETS: 4, 5, 6, 7-pin, octal, loctal, 7, 9 and 10-pin miniature, 7-pin in-line and 8-pin round subminiature, acorn, Compactron, Novar, 5 and 7-pin Nuvistor.

G_m RANGES: 0-1,500, 3,000, 6,000, 15,000, 30,000 μ mhos.

INTER-ELEMENT LEAKAGE: Quantitatively indicated directly in ohms on the meter. Sensitivity to 10 megohms.

TEST VOLTAGES:

Filament: 0-117 volts AC (in 19 steps)

Signal: 0.25, 0.5, 1.25, 2.5 volts, 60 cycles AC

Plate: 75 and 150 volts DC

Screen: 56 and 130 volts DC

Grid Bias: 0 to -40 volts DC, continuously variable.

Extra Negative Supply: -40 volts DC

Diode Test: 20 volts rms

0Z4 Test: 287 volts rms

VR TUBE TEST: According to handbook specifications on two meter scales; 0-200 volts and 0-100 milliamperes.

CATHODE ACTIVITY/LIFE TEST: Push button switch reduces filament voltage by approximately 10% of its normal value in order to permit evaluation of cathode condition and estimate of future life.

METER: Hickok Model 68. Single G_m scale with multipliers simplifies interpretation of tube condition. Additional scales are provided for leakage and VR tests.

ADDITIONAL FEATURES: Bias and line fusing . . . Safety-interlocked selector switches prevent damage due to improper setting . . . Self bias test jacks on the panel . . . Illuminated meter and roll chart . . . Filament selectors expressed in numbers instead of letters simplifies set-up, minimizes error.

BUILT IN ROLL CHART: Contains test data for more than 1600 tubes.

ROLL CHART SUBSCRIPTION PLAN: New editions of the roll chart, containing test data on recently released tubes, are published semi-annually and automatically mailed to subscribers to the Hickok Roll Chart Subscription Plan, providing a sure way of keeping test data up-to-date.

AVAILABLE ADAPTERS:

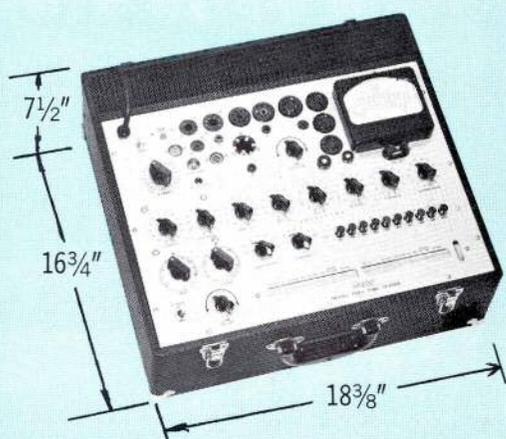
Hickok Code No.	For
1050-28	Cathode-ray tubes (kinescopes only)
1050-50	2C39A
1050-107	829B
1050-109	4X150A/4X150B (leakage test only)
1050-118	991
1050-119	2C36
1050-120	2-01C
1050-121	6263, 6173, 5675 (pencil types)
SA-3	Nuvisitors

POWER REQUIREMENTS: 105-125 volts 50-60 cycles, 40-70 watts. Furnished complete with leads and instruction books.

MODEL 752A

FEATURES:

- *Hickok-Developed G_m Test Circuit*
- *Now Tests Novars, Nuvisitors, Compactrons, 10-pin types.*
- *Dual-section Tubes Tested Without Set-up Change*
- *Speed-engineered Selector Switch Layout*
- *Simplified G_m Scale With Multiplier Ranges*
- *Tests VR Tubes to Handbook Specifications*



CASE SPECIFICATIONS:

Furnished in black leatherette portable case with built-in lead compartment and detachable lid. 18 $\frac{3}{8}$ " L, 16 $\frac{3}{4}$ " W, 7 $\frac{1}{2}$ " D. 25 lbs. net weight.

SERVICE TECHNICIANS' HIGH SPEED DELUXE PORTABLE TUBE TESTER



MODEL 6000A—Now Hickok provides an economical time saving portable tube tester with increased flexibility for both industrial maintenance and service technicians. It will now test compactrons, Novars, 5 and 7-pin Nuvisitors and new 10-pin types . . . more tubes than ever before, faster, without sacrificing accuracy. Sockets, switches and circuitry combined with the replaceable plug—in master socket panel assure effective testing of the latest tubes released. Because no tube elements are paralleled, testing of these new types is *complete* and accurate. The new, instantaneous inter-element shorts and leakage test provides greatly increased leakage sensitivity.

MODEL 6000A

Technical Specifications

TUBE SOCKETS: Furnished complete with type RSP-5, 8-socket removable plate that accommodates octal, loctal, 7, 9 and 10-pin miniature, Compactron, Novar, 5 and 7-pin Nuvistors. Worn tube sockets may be replaced easily. Adapters Available: Type SA-1 accommodating 7-pin in-line and 8-pin round subminiature types. Adapter RSP-4C to accommodate 4, 5, 6, 7-pin, octal, loctal, and 7 and 9-pin miniature tubes.

G_m RANGES: 0-3,000, 6,000, 15,000 μ mhos, read directly on 3-scale meter.

INTER ELEMENT LEAKAGE: Registered instantly on 5 neon lamps, identifying elements involved. Sensitivity: in excess of 3 megohms.

FILAMENT VOLTAGES: 0.6—117 volts in 19 steps.

GRID CURRENT (GAS) TEST: Measured in terms of μ amps of grid current on meter when button is pressed.

FILAMENT CONTINUITY TEST: Open filaments can be discovered immediately after tube is inserted in its socket —by pressing a control button.

TRANSISTOR AND DIODE CHECKS: Provides "Good-Bad" quality test for NPN and PNP transistors and forward conduction efficiency test on semi-conductor diodes.

METER: Hickok 5-inch model with large, easy-to-read, multi-colored scales.

LINE VOLTAGE INDICATION: Continuously shown, permits correction at any time during test.

BUILT-IN ROLL CHART: Contains test data for more than 1600 tubes.

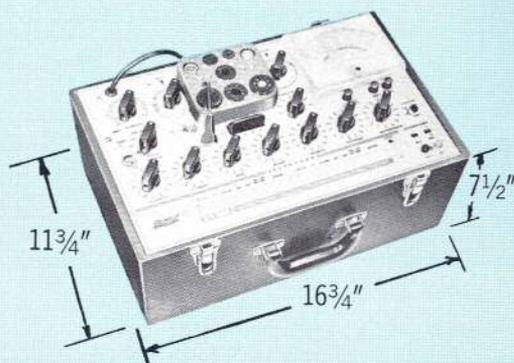
ROLL CHART SUBSCRIPTION PLAN: New editions of the roll chart, containing latest tube additions, are published semi-annually and automatically mailed to subscribers to the Hickok Roll Chart Subscription Plan, providing a sure way to keep test data up-to-date.

POWER REQUIREMENTS: 105-125 volts, 50-60 cycles, 40 watts. Furnished complete with instruction book and test leads.

MODEL 6000A

FEATURES:

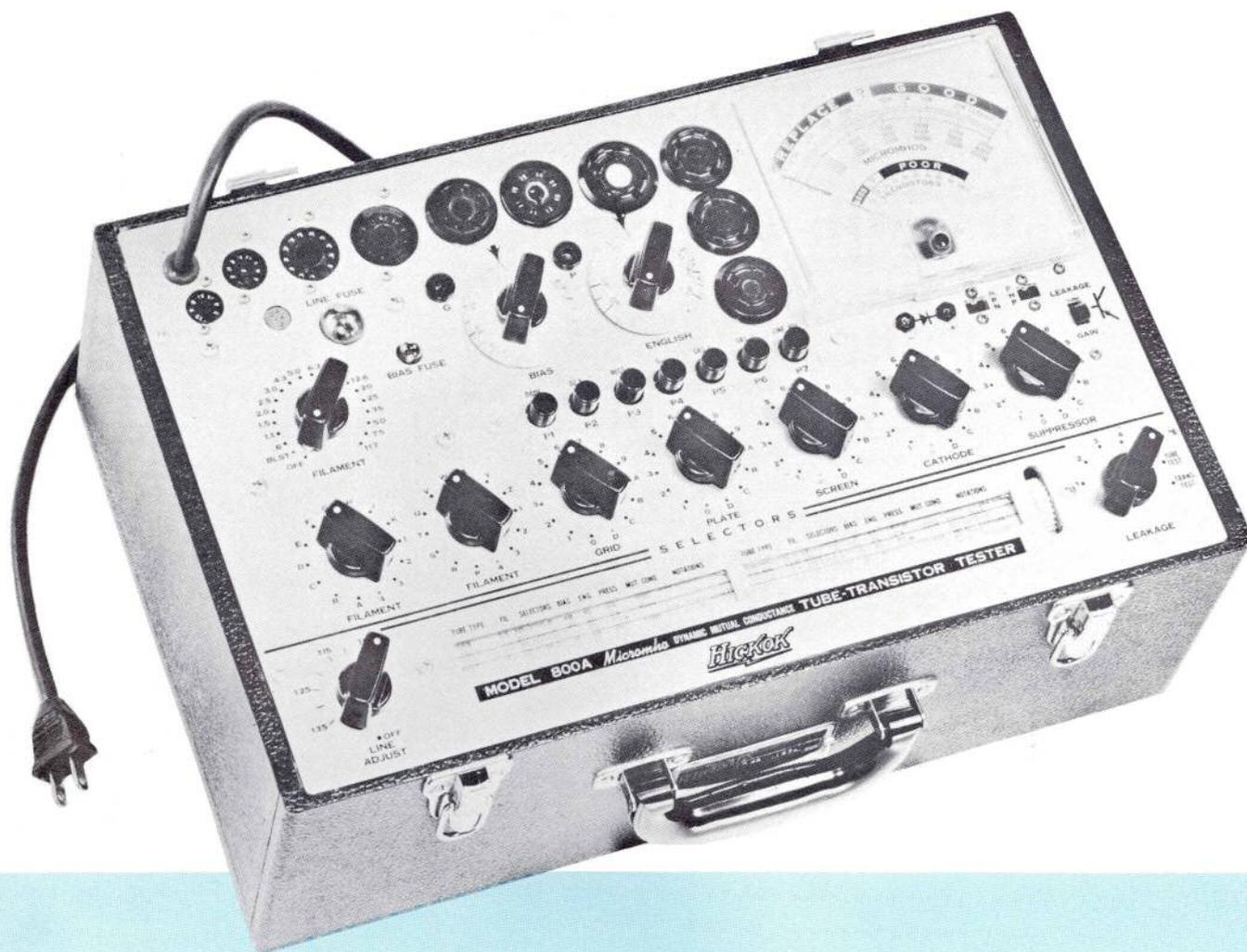
- *Hickok-Developed G_m Test Circuit*
- *Checks Transistors, Diodes, Compactrons, Novars, Nuvistors and new 10-pin types*
- *Replaceable socket plate for obsolescence protection*
- *Sensitive, Instantaneous Inter-element Leakage and Shorts Test*
- *Constant Indication of Line Voltage*
- *Filament Continuity Test*



CASE SPECIFICATIONS:

Furnished in an attractive, red leatherette covered portable case with detachable lid. 16 $\frac{3}{4}$ " L, 11 $\frac{3}{4}$ " W, 7 $\frac{1}{2}$ " D. 16 lbs. net weight.

SERVICE TECHNICIANS' PORTABLE TUBE TESTER, TRANSISTOR and DIODE CHECKER



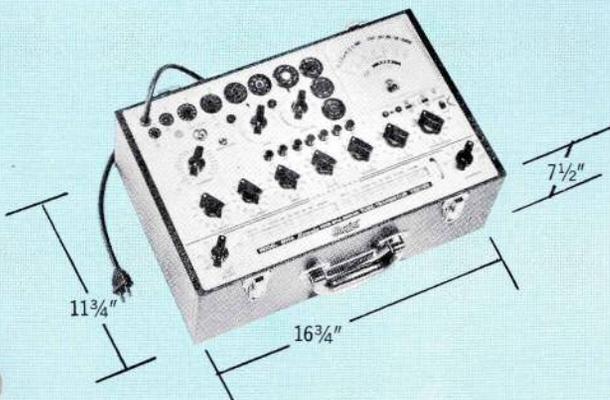
MODEL 800A—The Model 800A, incorporating the Hickok-developed G_m test circuit, up-dated to include tests on all new tube types, brings the advantages of quality Hickok tube testers to the smallest service shop. Results of the new inter-element leakage and shorts test are read directly on the meter. Manual control of heater voltage permits measurement of cathode reserve by reduction of heater voltage.

MODEL 800A

MODEL 800A

FEATURES:

- *Hickok-Developed G_m Test Circuit.*
- *Now Tests Novars, Nuvisitors (5 and 7-pin), Compactrons, 10-pin types.*
- *Tests Transistors and Diodes.*
- *Direct Meter Reading of Inter-element Leakage and Shorts.*
- *New Filament-Continuity Test—Speeds Tests of Series-string Tubes.*



CASE SPECIFICATIONS:

Furnished in attractive red-leatherette covered portable case with detachable lid. The aluminum panel is gold-anodized with red and black lettering. 16 $\frac{3}{4}$ " W, 11 $\frac{3}{4}$ " L, 7 $\frac{1}{2}$ " D. 16 lbs. net weight.

Technical Specifications

TUBE SOCKETS: 4, 5, 6, 7-pin, octal, loctal, 7 and 9-pin miniature, novar, 5 and 7-pin Nuvisitor, Compactron, and 10-pin type. Adapters available: Type SA-2 for 7-pin in-line and 8-pin round sub-miniature types, and No. 1050-9, which accommodates acorn-type tubes. In addition, the Model 800A will accommodate the Hickok CRT adapter.

Gm RANGES: 0-3,000, 6,000, 15,000 μ mhos indicated directly upon the meter dial.

INTER-ELEMENT LEAKAGE: Read on meter. Maximum sensitivity, 10 megohms.

TRANSISTOR AND DIODE CHECK: Provides "Good-Bad" quality test for NPN and PNP transistors and forward conduction efficiency test on semiconductor diodes.

SPECIAL METER REVERSE: Push button control reverses the meter for testing special tubes such as the 117N7 types.

BUILT-IN ROLL CHART: A time-saving tube test data reference chart is provided on the control panel.

ROLL CHART SUBSCRIPTION SERVICE: New editions of roll charts are published semi-annually and automatically mailed to subscribers to the Hickok Roll Chart Subscription Plan, providing a sure method of keeping test data up-to-date.

POWER REQUIREMENTS: 105-125 volts, 50-60 cycles, AC, 40 watts. Furnished complete with instruction manual and grid and plate lead.

TUBE TESTER ACCESSORIES

TUBE TESTER SOCKET SAVERS

- *Permits easy-to-make permanent installation*
- *Add years of life to your tester*
- *Eliminate wear on tube sockets in your HICKOK tube testers*

SW-1 (7-pin), SW-2 (8-pin), SW-3 (9-pin) — For Models 121, 123, 123A, 539B, 539C, 752, 752A, 6000, 6000A, 800, and 800A.

SR-1 (7-pin), SR-2 (8-pin), SR-3 (9-pin)—Designed specifically for use with older HICKOK Tube Testers. Assures freedom from errors due to parasitic effects.



SOCKET ADAPTERS



SA-1—Subminiature socket adapter, 7-pin inline and 8-pin round for use with late models 6000, 6005, 6000A and 121.

SA-2—Subminiature socket adapter, 7-pin inline and 8-pin round for use with Models 800 and 800A.

SA-3 NUVISTOR Adapter for all older HICKOK Tube Testers. Use with any HICKOK Tube Tester covered by currently supplied roll charts.

SA-4—NOVAR Adapter for all HICKOK Tube Testers. Used for testing all RCA Novar tubes.

SA-5 Rimlock Adapter for all HICKOK Tube Testers. Used for testing European rimlock tubes.

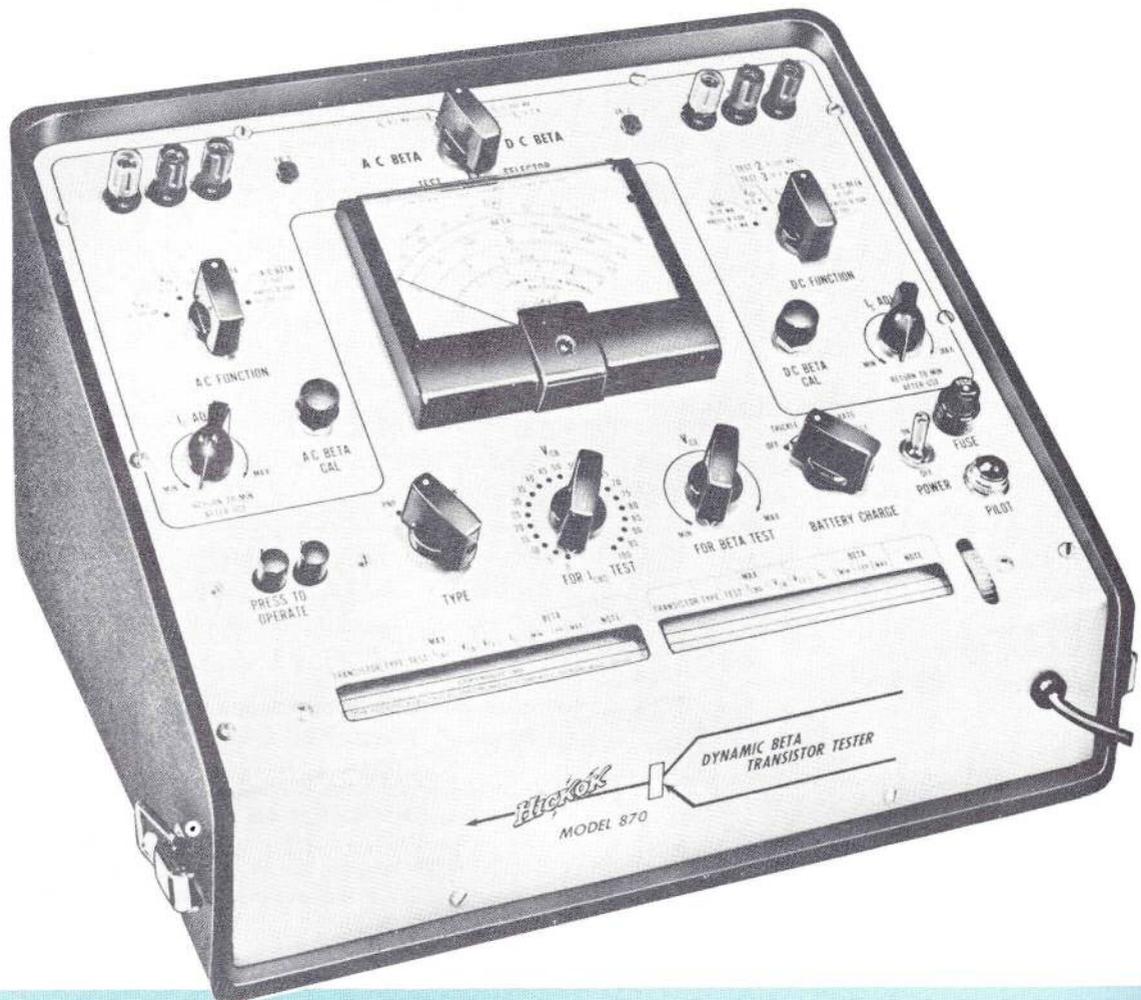
CA-4—Adapter for 10-pin tubes, Nuvistors, 9-pin Novars and Compactrons. For older Hickok tube testers, except 532, 533, 534, 536, 539A and 600.

RSP-4C—Accessory Socket Plate Assembly for Model 6000A to test older 4, 5, 6, and 7-pin tubes as well as octal, loctal, 7, 9 and 10-pin miniature types.

CRT—Picture Tube Adapter Accessory—Tests all picture tubes, including 110° types. For use with all current HICKOK Manual Tube Testers.



DYNAMIC BETA TRANSISTOR TESTER



MODEL 870—This new instrument fills a recognized need for a transistor test instrument that can provide meaningful measurements of both AC and DC beta. It is ideal for quality control, incoming inspection and sorting and other assignments requiring precise measurement of transistor performance.

To provide fast, accurate set-ups, vital to efficient volume testing, the instrument has a speed-engineered control layout. All AC beta test controls are on the left side of the panel; DC beta test controls on the right. Common controls are placed under the meter, above the handy roll chart containing set-up information for more than 2500 transistors. The Model 870 can also be set up by using handbook information—making it indispensable for custom tests to individual performance requirements in specific applications.

MODEL 870

Technical Specifications

I_{cbo} MEASUREMENTS—Measures I_{cbo} in the following ranges: 0-100 μ a, 0-1 ma and 0-10 ma—with a variable V_{cb} of 0-100 volts.

BETA RANGES—0-100 and 0-300, extendable to 600 by reducing AC test signal to $2\frac{1}{2}$ μ a.

BETA TEST COLLECTOR CURRENT—Continuously variable, 0-2 amps—permitting satisfactory beta measurement on power transistors rated 5 amps or more.

BETA TEST COLLECTOR VOLTAGE—Continuously variable, 0-5 volts.

SMALL SIGNAL AC BETA TEST—1000 cps signal provides 5 μ a current flow in the base of the transistor, can be adjusted to provide $2\frac{1}{2}$ μ a current flow if desired to extend Beta range to 600.

V_{ce} —0-5 volts, I_c —0-5 ma

LARGE SIGNAL DC BETA TEST— I_c variable, 5 ma up to 2 amps. V_{ce} variable, 0-5 volts.

I_{ceo} TEST—Accomplished with reversal of Base and Emitter externally.

AC BRIDGE CIRCUIT—AC Bridge Circuit consists mainly of two high-gain amplifier stages and crystal diode bridge detector. Circuit is highly degenerative—providing stability. Input sensitivity of bridge amplifier is 50 millivolts peak-to-peak or 17.6 millivolts rms for full deflection of meter.

METER SPECIFICATION—Hickok Model 66K—type meter has sensitivity of 100 μ amps with internal resistance of 1000 ohms.

METER PROTECTION—Silicon diode type SD91 connected across meter terminals by-passes excess current that could cause damage to the meter.

BETA TEST ACCURACY—Both AC beta and DC beta are within 5%.

TRANSISTOR INPUT RESISTANCE MEASUREMENT—Accomplished with the aid of an external potentiometer and capacitor.

BUILT-IN ROLL CHART—Contains test data for over 2500 transistors.

ROLL CHART SUBSCRIPTION PLAN—New editions of the roll chart, containing test data on recently released transistors, are published semi-annually and automatically mailed to subscribers to the HICKOK Roll Chart Subscription Plan, providing a sure way of keeping test data up-to-date.

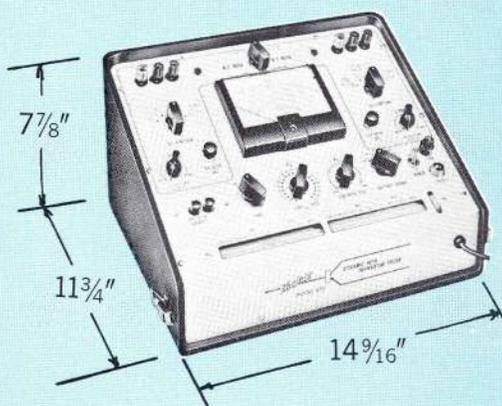
BATTERY POWER SUPPLY—Two rechargeable nickel cadmium batteries are kept in fully charged state with either high rate or trickle charge. Charging network is independent of the power on-off switch. Set on trickle, the batteries will be kept at full charge without damage.

POWER REQUIREMENTS—115 volts, 60 cycles AC, 40 watts
Furnished complete with instruction book.

MODEL 870

FEATURES:

- Tests transistors as recommended by manufacturers at specified I_c , V_{ce} , and I_b
- Checks Collector Saturation Voltage (V_{ce-SAT})
- Provides low voltage, high current tests—excellent for switching transistors
- Controls provide maximum set-up flexibility combined with speed-engineered layout for volume testing of transistors
- Complete with roll chart giving test data for over 2500 transistors, including imported types



CASE SPECIFICATIONS

Furnished in black leatherette portable case with detachable cover. 7 $\frac{7}{8}$ " H, 14 $\frac{9}{16}$ " W, 11 $\frac{3}{4}$ " D. 15 lbs. net weight.

Dynamic Beta[®] IN-CIRCUIT TRANSISTOR TESTER

Now, for the first time, Hickok's Model 890 Dynamic Beta In-Circuit Transistor Tester enables industrial maintenance specialists, service technicians and production personnel to make *in-circuit* measurements on transistors—and at an accuracy of $\pm 5\%$! No other in-circuit transistor tester can measure Beta to such accuracy.

The key to this new standard of accuracy is the unique, Hickok-developed (and patent-applied-for) method of neutralizing circuit impedance before tests are made. This neutralization effectively nullifies the loading effects of external circuit impedances and thereby eliminates the inaccuracies inherent with other methods, such as the "swamping" method. When required, the amount of external circuit impedance ("Z Ohms"), can be measured directly.

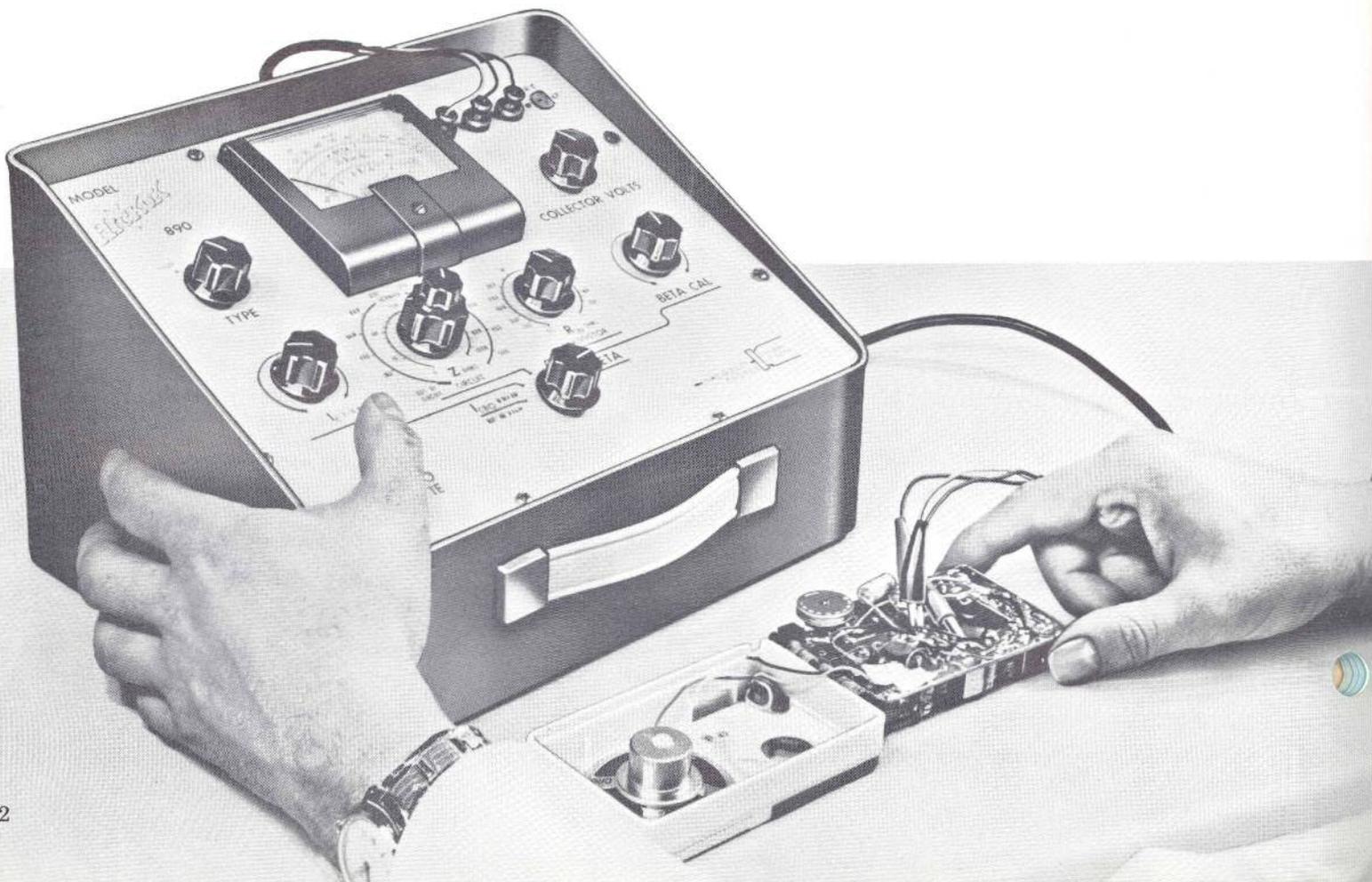
Utilizing an AC bridge principle, with the transistor input circuit elements as one arm of the bridge, the total impedance is nulled. With circuit impedances as low as 150 ohms, this effectively removes these

elements from the circuit as a factor in the Beta measurement.

The versatile Model 890 will also measure I_{cbo} ; for this measurement, of course, the transistor must be removed from the circuit.

Because of its new standard of accuracy, the Model 890 is an ideal maintenance, service and production line instrument. It can be used for incoming inspection of transistorized products and sub-assemblies as well as at various points during assembly to insure quality control as production advances. Its portability and easy operation make the 890 particularly suited to quick trouble shooting in maintenance and service work.

The instrument is simple to operate: Merely clip the color-keyed test leads to the appropriate transistor leads, neutralize the "Z Ohms" and proceed with the Beta measurement. External Input impedance ("Z Ohms") and Dynamic Input Resistance (" R_{in} "), are read from individual, carefully calibrated potentiometers.



MODEL 890

Technical Specifications

MODEL 890

FEATURES:

- Unique circuit (patent applied for) measures AC Beta with equal accuracy in or out of circuit
- Measures the following in-circuit parameters:
 - I_c
 - AC Beta
 - R_{in} (transistor input resistance)
 - Z Ohms (base-emitter circuit impedance)
- Measures AC Beta, I_c and I_{cbo} out-of-circuit
- In-circuit AC Beta measurement accuracy $\pm 5\%$ (150 ohms minimum circuit impedance)
- Portable and completely self-contained

I_{cbo} Measurement Range: 0-50 μa

Beta Ranges: 0-50, 0-100, 0-200.

Collector Test Current: Variable from 0-10 ma

Collector Test Voltages: Variable—1.5v, 3.0v, 4.5v

Beta Test Accuracy: $\pm 5\%$ for circuit impedance above 150 ohms

I_c Range: 0-10 ma

AC Test Signal: Variable 1000 cps sine wave—Calibration setting at 5 μa base current

Transistor Input Resistance ("R_{in}, Transistor") Range: 50-10,000 ohms

Circuit Input Impedance Range: ("Z Ohms") 100—100,000 ohms

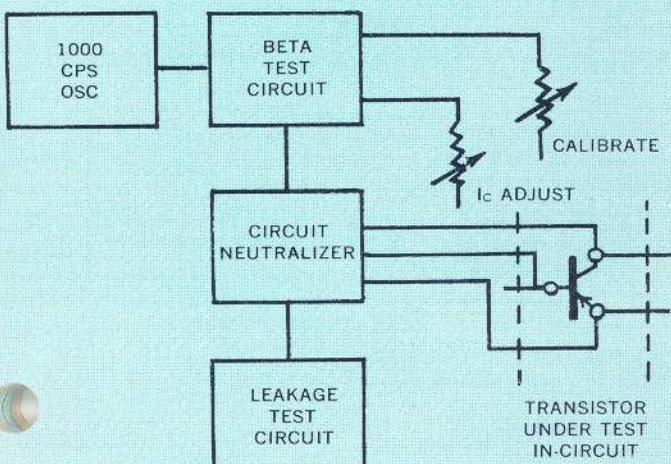
Meter Specifications: Hickok Type 64, Sensitivity: 50 μa , 100 mv, protected against overload.

Battery Power Supply:

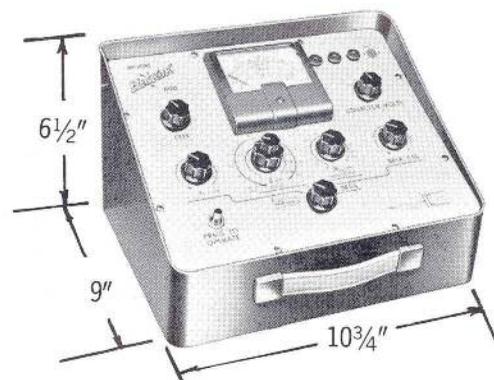
One 22.5 volt battery

Four 1.5 volt batteries

Furnished complete with test cable and instruction book.



BLOCK DIAGRAM

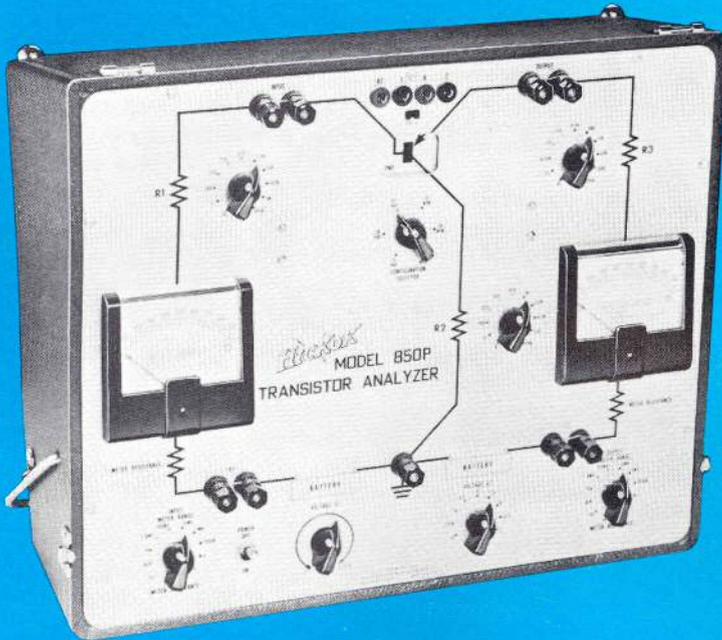


CASE SPECIFICATIONS:

Furnished in steel portable carrying case. 6 1/2" H, 9" D, 10 3/4" W. 7 3/4 lbs. net weight.

PORTABLE TRANSISTOR ANALYZER

MODEL 850P



FEATURES:

- Ideal for use as a "breadboard" in transistor circuit design and development
- Checks parameters in any of three configurations—common base, common emitter and common collector
- Tests transistors under actual circuit conditions
- Six Circuit Configurations—Switch-selected choice of common emitter, common collector and common base—either NPN or PNP

The Model 850P has been developed as an economical, accurate, easy-to-use transistor analyzer designed to check transistors and determine their ability to function under specific circuit conditions. Featuring a wide range of applied voltages, this instrument will never become obsolete, regardless of new transistor designs. It is ideal as a teaching aid in conveying a full understanding of how a transistor functions.

Technical Specifications

PARAMETERS MEASURED: Measures the following parameters under specific use conditions: Alpha, Beta, R_{in} , R_{out} , I_{co} , I_{ceo} , I_{cbo} , Power gain.

VARIABLE INPUT RESISTANCE: Choice of 27, 100, 150, 220, 470 ohms, 2.2 K, 10 K, 100 K, and 1 meg, plus "short" and "open". Other selected resistance can be added externally through panel terminals.

VARIABLE OUTPUT RESISTANCE: Choice of 100, 470 ohms, 1K, 1.5K, 2.2K, 10K, 15K, 47K, 100K, plus "short" and "open". Other selected resistances may be added externally through panel terminals.

EMITTER BIAS RESISTANCE: Choice of 47, 100, 220, 330, 470 ohms, 1K, 2.2K, 4.7K, 15K, plus "short" and "open". Other selected resistances may be applied externally through panel jacks.

METER RANGES: Input and output meters are identical, have five ranges 0-100 μa , 1 ma, 10 ma, 100 ma, 1 amp.

INPUT CIRCUIT VOLTAGE: Variable 0-2.75 volts with a source resistance of 0.5 ohms. Additional voltage may be applied externally through panel jacks.

OUTPUT CIRCUIT VOLTAGE: 0-12 volts in 1.5 volt steps with a source resistance of 0.5 ohms. Additional voltage may be applied externally through panel jacks.

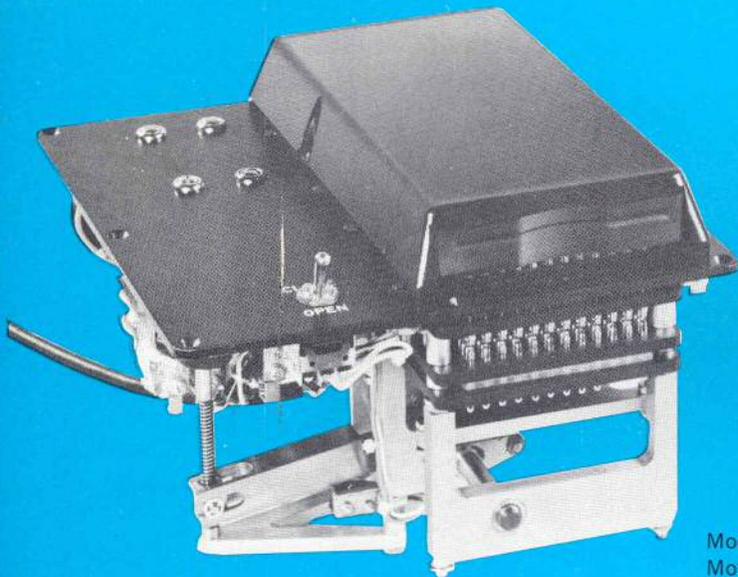
ACCURACY: Transistor measurements are registered on accurate indicating meters of $\pm 2\%$ full scale accuracy.

CONTROLS: Panel selector permits operator choice of circuit-use conditions to determine transistor suitability.

CASE SPECIFICATIONS:
8" D, 16½" W, 13½" H. 20 lbs. net weight.
Furnished in black leatherette case.

POWER REQUIREMENTS: Battery operated. Furnished with test leads and instruction book.

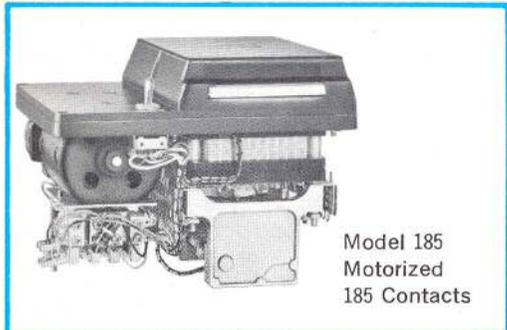
NEW CARDMATIC CARD SWITCH



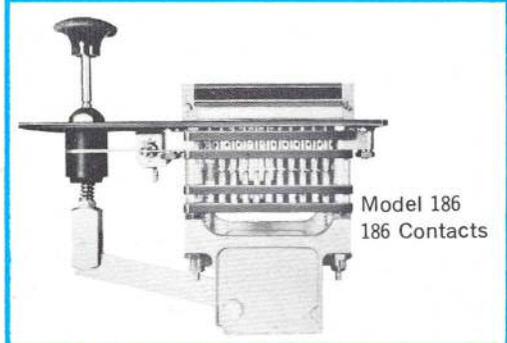
Model 540
Motorized
540 Contacts

WITH THE CARD YOU CAN:

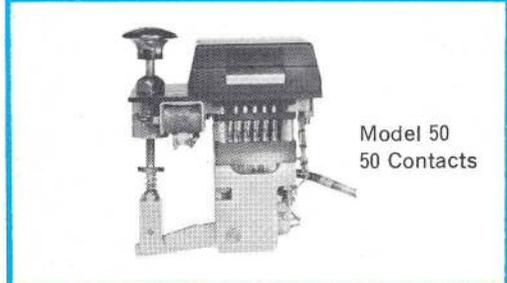
- *Reduce Costs*—Do away with expensive relays and other costly components. Do away with push buttons and complicated patch boards.
- *Reduce Space*—Even this largest model switch measures no bigger than 8 $\frac{3}{8}$ " x 9 $\frac{1}{4}$ ". Add to this significant saving the space needed for relays and other components and you have reduced the size of your package considerably.
- *Reduce Operator Error*—What could be simpler than picking a card from a group and inserting it in the switch? Cards are available in various colors for faster, surer identification.



Model 185
Motorized
185 Contacts



Model 186
186 Contacts



Model 50
50 Contacts

The Hickok Card Actuated Multiple Contact Switch reads and works simultaneously. This Cardmatic Card Switch is actually 50 to 540 separate working switches, card actuated, each with a current carrying capacity of 10 amps. It can be used to directly operate solenoids, drive motors, switch power.

With the Card Switch, you eliminate the need to refer to instructions or a complicated wiring diagram to change set-ups. Just pick the proper card, insert it in the switch and you're in operation. The card is heavy duty, rubberized vinyl, your permanent record of every operation.

Technical Specifications

CONTACT RESISTANCE:

.005 ohms nominal (contact-to-pin-to-contact)
.0025 ohms nominal (contact-to-pin only)

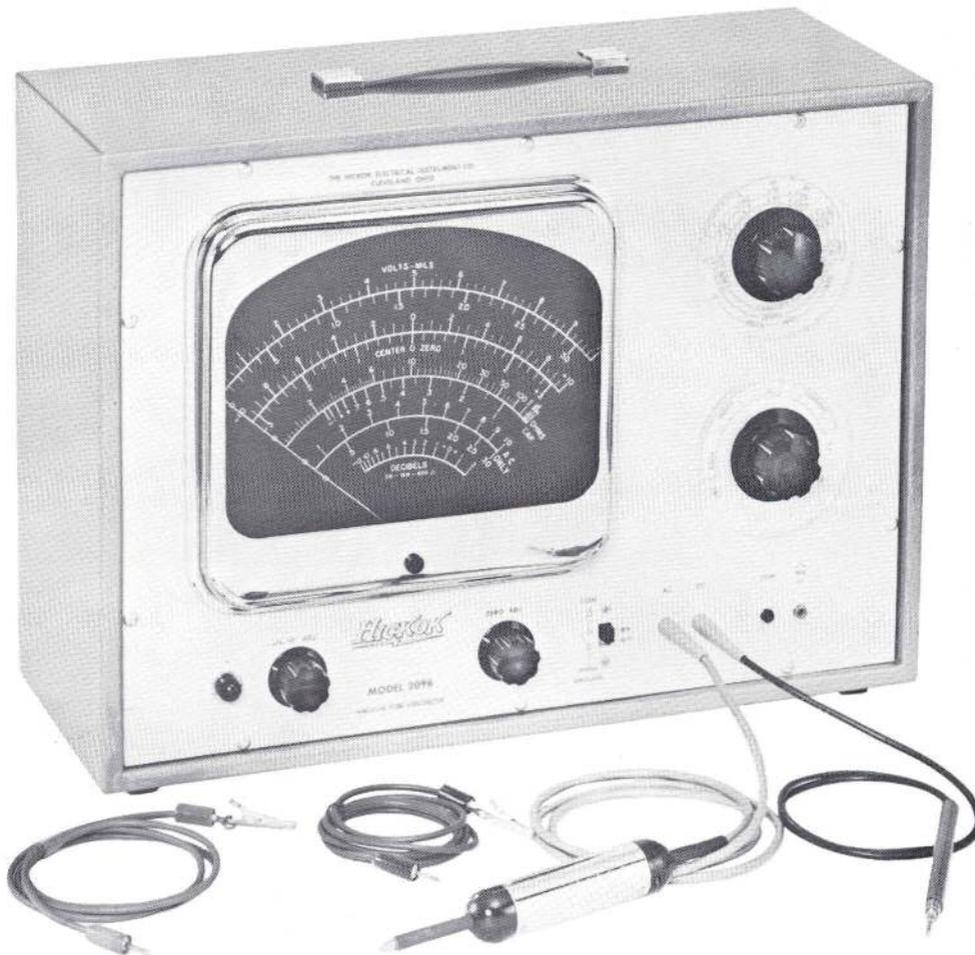
CURRENT RATING: 10 amperes

PHYSICAL:

Baked enamel finish
Black phenolic sandwich separators

Insulation: Tailored to specifications

VTVM TRUE VACUUM TUBE VOLT-OHM- MILLIAMMETER AND CAPACITANCE METER



Model 209B — Greater operating ranges and higher sensitivity characterize this new multi-purpose instrument designed to fill multiple requirements of industrial maintenance and research applications. Eight separate functions can be measured by the 209B which features crisp, functional design, inside and out.

The large, nine-inch, multi-range scale is easy to read — facilitating use of the instrument from almost any position. The meter is completely protected against damage from accidental overload.

The capacitance range of the 209B permits measurement as low as 100 $\mu\mu\text{f}$ and as high as 2000 μf . Positive or negative DC voltage, with respect to ground may be measured by using a selector switch to change polarity. A DC volt—zero center position is included for measuring potential in null balance circuits.

In capacitance measurements, the unknown is placed in series with an internal source of AC voltage and a portion of the divider across the unknown is applied to an amplifier, the output of which is rectified electronically, and then impressed on the grid of the vacuum tube bridge.

A built-in power supply provides all DC plate voltages and AC heater voltages. All supply voltages, including heater, are fully regulated assuring stability of all measurements.

The input capacitance of the Model 209B is approximately 5 $\mu\mu\text{f}$, compared to 100 $\mu\mu\text{f}$ in similar electronic voltmeters.

MODEL 209B



TECHNICAL SPECIFICATIONS:

Functions: DC volts, zero center (for null adjust), \pm DC volts, \pm DC Milliamps, AC volts, Ohms, Capacitance.

Ranges:

DC Volts, 0-0.1, 0.3, 1, 3, 10, 30, 100, 300, 1000 volts

AC Volts, 0-1, 3, 10, 30, 100, 300 volts

DC current, 0-0.1, 0.3, 1, 3, 10, 30, 100, 300, 1000 ma.

Ohms (Center scale—10 ohms), x1, x10, x100, x1K, x10K, x100K, x1M

Capacitance (Center scale—50), x10, x1, x0.1, x0.01, 0.001 μ fd, x10 and x100 μ fd

Frequency Response: 20 cycles to 1 mc, \pm 3%, full scale, 20 cycles to 100 mc \pm 1 db, full scale. Useful response to 200 mc.

Useful response to 200 mc.

Accuracy: AC-DC volts and DC current, \pm 3%, full scale ohms and capacitance, \pm 3° of arc

Stability: All power supply voltages are regulated; Electronically regulated B+ supplies and transistor regulated heater supply provide stable operation even on power lines with large, long duration line transients. Drift is negligible after 20 minutes warm-up.

Ohmmeter Power Supply: Self contained, regulated 0.1 volt source for resistance measurements, safe for all transistor and diode usage.

Input Impedance: DC volts, 11 megohms; DC Null, 22 megohms; AC volts, 10 megohms shunted by approximately 5 μ f.

Grounding: The case of the instrument is grounded through a 3-wire line cord and maintained at ground potential for maximum operator safety. The common test lead is normally connected to ground at the case, but the unit may be used "floating" for current measurements up to 1000 volts above or below ground. A front panel switch is provided to connect common to ground.

Power Requirements: 117 volts \pm 10%, 50-60 cycles, 30 watts, approx.

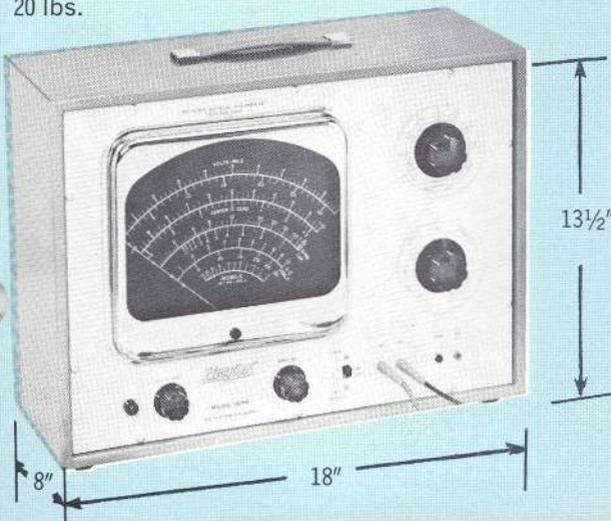
Furnished complete with AC and DC probe assemblies, test leads and instruction book.

MODEL 209B

FEATURES:

- 100 Millivolt Sensitivity
- Large 9-Inch Meter
- Low Current Ohmmeter Circuit
- All Power Supplies Regulated within 1%

Case Specifications: Furnished in an attractive, enameled steel portable case with non-glare black meter scale and chrome meter case, 13½" H, 18" W, 8" D, 20 lbs.



ELECTRONIC VOLT-OHMMETER

MODEL 470A



FEATURES:

- *Advanced Uni-Scale Design*
- *AC-DC-ohms Single Unit Probe*
- *Increased Ranges in all Functions*

The first major advance in VTVM design in 20 years, the 470A provides increased ranges in all functions—while simplifying readability by reducing basic scales to TWO. This makes the instrument especially easy to use, since AC and DC values are read from the same scales; AC errors due to crowding on low ranges are eliminated.

The 470A features an AC-DC-ohms single unit probe which eliminates the need for multiple leads, simplifies operation and makes the instrument adaptable to both field service and laboratory applications.

Technical Specifications

2 basic UNI-SCALE Arcs:

0-1.5 and 0-5 for AC rms and DC
0-1.4 and 0-4 for peak-to-peak

8 AC-DC Voltage Ranges: 0-0.5, 1.5, 5, 15, 50, 150, 500, 1500

8 Peak-to-Peak AC Ranges: 0-1.4, 4, 14, 40, 140, 400, 1400, 4000

8 Resistance Ranges: x1, x10, x100, x1K, x10K, x100K, x1M, x10M

DC Zero Center

Frequency Range: 15 cps to 2.5 mc

Input Impedance: DC Volts—17.7 megohms
AC Volts—15 megohms paralleled with approximately 150 $\mu\mu\text{fd}$.

Meter: Large, 7", easy-to-read; 100 μa movement, clear plastic window

Case Specifications: Furnished in an attractive metal case, 6 $\frac{3}{8}$ " x 7 $\frac{1}{2}$ " x 4 $\frac{1}{2}$ ", 6 pounds net.

Power Requirements: 115 volts, 50-60 cycles, AC, 8 watts. Ohmmeter powered by 1.5 volt "C" cell. Furnished complete with single-unit probe, test leads and instruction book.

**BURNOUT-PROOF
VOLT-OHMMETER****MODEL 455A**

This attractive, versatile, compact portable volt-ohm-milliammeter provides automatic overload protection. **YOU CAN'T BURN IT OUT!** Any high voltage or current may be applied across any function, including ohms, without endangering the meter or any other component.

A unique, patented protection circuit incorporates an interlocked combination of relay, fuse and neon lamp to protect against any conceivable overload situation.

FEATURES:

- *Exclusive Burnout-Proof Protection for Meter and all Components*
- *Single Function Range Selector Switch*
- *Batteries Instantly Accessible—Snapped In or Out*
- *Attractive, Streamlined, High-Impact Phenolic Case*



MODEL 457

The new, streamlined, high-impact phenolic case has a curved face. The meter is also slanted, permitting the instrument to lie flat while in use. The wide-visibility, non-breakable lucite face admits more light for easier reading.

The Model 457 incorporates the features of the Model 455A—except for the automatic overload protection feature and AC sensitivity. An accuracy of $\pm 3\%$ DC, $\pm 5\%$ AC, and $\pm 3^\circ$ of arc on resistance scale is provided in both models.

Technical Specifications**MODEL 455A**

Sensitivity: 20,000 ohms per volt DC
20,000 ohms per volt AC

Volts: 3, 15, 60, 150, 600, 1200 volts AC
3, 15, 60, 150, 600, 1200 volts DC

Resistance: 0 to 100 megohms in 4 ranges

Center Scale Ranges: 5, 500, 5000, 500,000 ohms

Current Ranges: 50 μ a, 1, 10, 100, 1000 ma,
10 amperes

Size: 8½" L, 5⅞" W, 3⅜" H, tapering to 2" H. 3¼ lbs.

MODEL 457

Sensitivity: 20,000 ohms per volt DC
1,000 ohms per volt AC

Volts: 3, 15, 60, 150, 600, 1200 volts AC
3, 15, 60, 150, 600, 1200 volts DC

Resistance: 0 to 100 megohms in 4 ranges

Center Scale Ranges: 5, 500, 5000, 500,000 ohms

Current Ranges: 50 μ a, 1, 10, 100, 1000 ma,
10 amperes

DB Ranges: -18 to +57 db in 5 ranges, frequency
compensated over the audio range

Size: 8½" L, 5⅞" W, 3⅜" H, tapering to 2" H. 3¼ lbs.

5" LABORATORY OSCILLOSCOPE



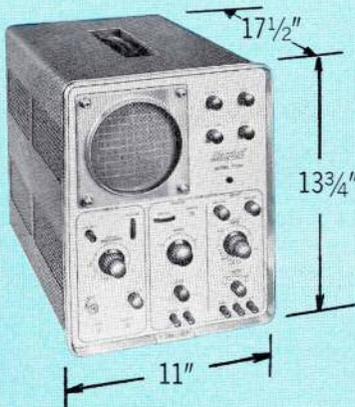
MODEL 770A — This new 5" wide-band utility oscilloscope was developed for usage in a wide range of general industrial and laboratory applications. It features a moderate bandwidth, high-gain, calibrated vertical amplifier (optimized for best transient response), 18 calibrated direct-reading-sweep rates with 5X horizontal magnification, choice of recurrent, driven and automatic modes of operation of the sweep generator and flat-faced, post-accelerated CRT.

MODEL 770A

MODEL 770A

FEATURES

- DC to 4MC Vertical Amplifier, 75 nsec rise time
- Calibrated Horizontal Sweep
- Illuminated Graticule
- Flat-face Tube



CASE SPECIFICATIONS:

Furnished in an attractive steel case, with non-glare crinkle finish, 13 $\frac{3}{4}$ " H., 11" W., 17 $\frac{1}{2}$ " D. 45 lbs. net weight.

Technical Specifications

VERTICAL DEFLECTION SYSTEM

Provides choice of two band-width/sensitivities; 3 cycles to 3.5MC at 0.01v/div. (equivalent to 26mv p-p/inch) and DC to 4.0mc at 0.1v/div.

Eight step attenuator with steps of 0.01, 0.05, 0.1, 0.5, 1.0, 5.0, 10 and 50v/div. accurate to within 5%, plus vernier attenuator with 5:1 range for range overlap and extension of last range.

Input impedance is equivalent to 1 megohm shunted by 40 pf. Maximum input voltage is 600v p-p. Input connector is standard SO-239 Coaxial type.

Input selector switch provides choice of DC input, AC input (0.1 μ fd series Capacitor into 1 megohm) and input shunted to chassis ground.

Vertical positioning control permits shift to 2 $\frac{1}{2}$ times full screen and is symmetrical about graticule center-line to within ± 1 division.

Direct access to deflection plates is also provided.

HORIZONTAL DEFLECTION SYSTEM

The horizontal sweep generator incorporates a miller run-up circuit. The circuit makes possible a wide choice of writing speeds from 0.2 μ sec/div. to 1.5 sec/div.

An 18 position sweep rate selector provides steps of 1, 2, 5, 10, 20, 50 μ sec/div., 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50 msec/div. and 0.1, 0.2 and 0.5 sec./div. accurate to within $\pm 3\%$. Sweep vernier provides 3:1 changes and extends lowest range to 1.5 sec./div.

Horizontal magnifier expands sweep rate 5 times and extends highest range to 0.2 μ sec/div. Accuracy is within $\pm 3\%$.

Three operational modes of the internal sweep generator are provided: free-running, driven and automatic. In the free-running mode, the sweep is recurrent. In the driven mode the sweep is initiated by a triggering pulse. In the automatic mode, the sweep is supplied constant rate trigger pulses by a free-running multivibrator until a sync signal is applied which overrides the multivibrator rate. Synchronization is achieved by adjusting the sync control between its free-running and automatic positions.

The horizontal selector provides sweep magnification and a choice of three operating modes: direct input to the horizontal amplifier, 60 cycle line input, and input from the sweep generator. The sweep sync selector has six positions: internal + and -, external + and -, and line + and -. The 60 cycle line sweep is provided with a variable phase control adjustable over approximately 180°.

The internal horizontal amplifier has a pass band to 600 KC (within 3db). A two step (X1 and X10) attenuator and vernier gain control with 10:1 range are provided.

GENERAL

The instrument incorporates sweep magnification registration on internal sweep functions. Registration is held within $\pm \frac{1}{2}$ major division.

Internal calibrating signal available at front panel provides 60 cycle square wave at 1 volt p-p $\pm 3\%$.

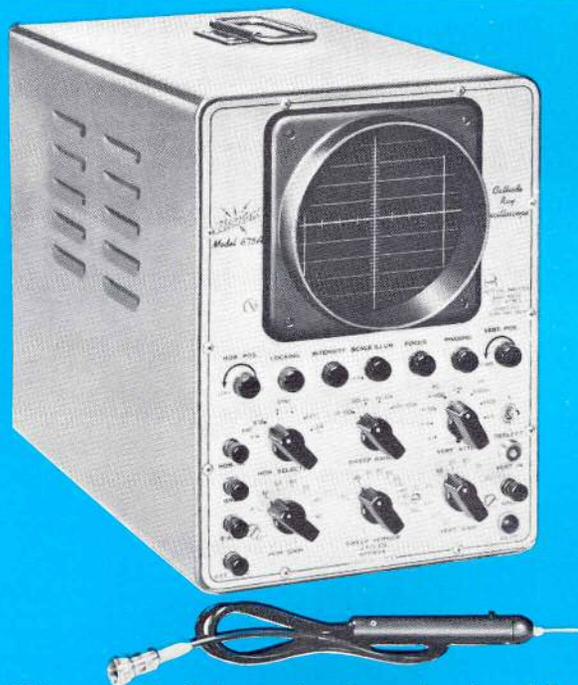
Access to the Z axis is provided, requiring 14V p-p for beam cut-off.

POWER REQUIREMENTS:

105-125 volts, 50/60 cycles, 130 watts furnished complete with operating manual and leads.

WIDE BAND, HIGH SENSITIVITY OSCILLOSCOPE

MODEL 675A



FEATURES:

- *Illuminated, Calibrated Screen*
- *Wide Band Response*
- *Ideal for Servicing Color TV Equipment*
- *Complete with Low-Capacity Probe*

This new 5-inch 'scope has been developed for servicing latest model industrial and entertainment type equipment, including color television receivers. It contains design features formerly found only in much higher priced equipment.

The illuminated, calibrated screen, with astigmatism and focus controls, provides clear, undistorted trace detail. Stable operation, and latest circuit refinements, make this an ideal general purpose oscilloscope.

Technical Specifications

VERTICAL AMPLIFIER: Frequency Response: DC to 4.5 mc (within 3 db). Flat through the Color Burst Frequency (3.58 mc). Pulse Response: rise time, 0.08 μ sec. Sensitivity: 20 mv rms per inch. Amplifiers are shock-mounted. A 60 cycle, 100 mv square wave calibrating signal is provided.

VERTICAL ATTENUATOR: Fully Frequency-compensated. 10 to 1 vernier gain control plus decade step attenuator providing decade steps of 1, 10, 100 and 1000 to 1.

HORIZONTAL AMPLIFIER: Frequency Response: 1 cps to 450 kc (within 3 db). Sensitivity: 250 mv rms per inch. Horizontal Attenuator: 10 to 1 vernier gain control and frequency compensated, decade steps of 1 to 1 and 10 to 1.

TRACE REVERSAL: A switch is provided to reverse the polarity of the vertical trace. Amplifiers are shock-mounted.

LINE SWEEP: Variable phase (through approximately 180°) line frequency signal is available.

TIME BASE GENERATOR: Coverage from 10 to 100,000 cycles per second in four calibrated decade ranges with 10 to 1 vernier control: 10 cps—100 cps, 100 cps—1 kc, 1 kc—10 kc, 10 kc—100 kc.

TIME BASE EXPANSION: Time base expansion of ten times full screen around center line (40 inches) with complete positioning of expanded trace.

ILLUMINATED, CALIBRATED SCREEN: The illuminated, calibrated screen is backed with a green filter to reduce reflections. This permits accurate qualitative and quantitative measurements to be made. Astigmatism and focus controls provide a new standard in trace sharpness.

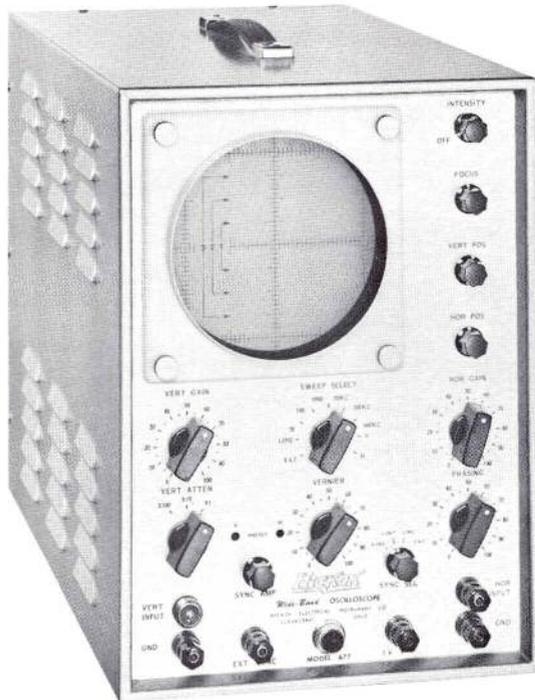
DISPLAY INFORMATION: The trace is displayed on a type 5UP1 Cathode-Ray tube with 1500 volts accelerating potential, providing sharp trace detail.

INTENSITY MODULATION: Input provided for Intensity (Z-Axis) Modulation.

SPECIAL TUBES: For photographic purposes, Model 675HA is available with the type 5UP11 high actinic CRT. The Model 675LP is available with the type 5UP7 long persistence CRT for observation of non-recurrent phenomena.

DIMENSIONS: 13" H, 10" W, 16" D, 35 pounds net weight.

POWER REQUIREMENTS: 105-125 volts, 50-60 cycles, 125 watts. Furnished complete with low capacitance probe, ground lead and instruction book.

**WIDE BAND SERVICE
TECHNICIAN'S OSCILLOSCOPE****MODEL 677**

This new 5" wide-band 'scope has been specifically developed to provide television service technicians with a high quality instrument at an economical cost. *Color-Approved*, it is especially suited for color TV servicing, FM Multiplex alignment and similar service assignments. The calibrated screen and sharp, bright trace with full astigmatic correction facilitate its use in both waveform observation and peak-to-peak measurements.

FEATURES:

- AC Response—5 cps to 4.5 mc within 3 db
- Pre-set Horizontal and Vertical Sweep Positions
- Sharp, Bright Trace with Full Astigmatic Correction
- Built-in Peak-to-peak Calibrator

Technical Specifications

VERTICAL AMPLIFIER: Frequency response flat to within 3 db from 5 cycles to 4.5 mc. Sensitivity, 40 mv rms per inch. Rise time, 0.08 μ sec or better. Three step decade attenuator plus vernier gain control, Cathode follower input. Input impedance, 3 megohms shunted with 10 mmfd; approximately 33 megohms shunted with 6 mmfd through accessory lo-capacity probe.

HORIZONTAL AMPLIFIER: Response within 3 db, 5 cycles to 350 kc. High gain provides minimum 5-times sweep expansion, facilitates detailed observation of TV sync waveforms, including color burst. Vernier gain control. Input impedance, 5 megohms shunted with 30 mmfd.

SWEEP GENERATOR: Covers 10 cycles to 500 kc with step and vernier frequency control, plus two fixed frequencies of 30 cycles and 7,875 cycles to speed

checking of vertical and horizontal TV sweep waveforms. Choice of \pm internal, external and line sync. High stability provided by 6DT6 tube (commonly used in TV circuits as gated sync separator). Retrace blanking built in.

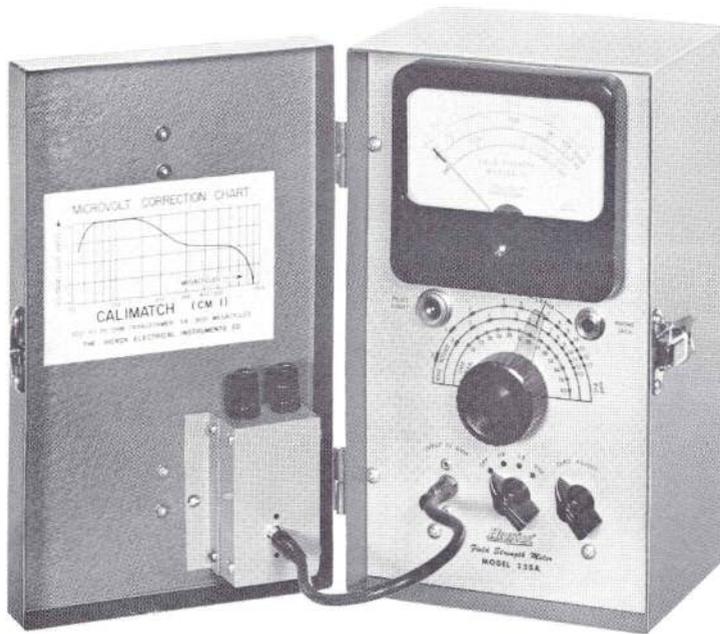
DISPLAY: 5" CRT with 1,600 volts accelerating potential. Separate astigmatism control. DC coupling to deflection plates to eliminate spot drift. Filtered green graticule calibrated in decades and with multiplier factors of 1, 2 and 3. Used with built-in 1 volt p-p calibrator, greatly facilitates measurement of peak-to-peak voltages.

POWER SUPPLY: 117 volts, 50/60 cycles, 90 watts, fused. All critical voltages are electronically regulated.

DIMENSIONS: 14" H, 9 $\frac{1}{2}$ " W, 18 $\frac{1}{2}$ " D, 26 pounds, net weight. Furnished complete with detailed application and instruction book, test leads and warranty.

VHF/UHF FIELD STRENGTH METER

MODEL 235A



FEATURES:

- Covers TV channels 2-6, 7-13 and 14-83
- Reads absolute field strength, 10-100,000 microvolts VHF, 30-50,000 microvolts UHF
- 75 or 300 ohm input
- Battery operated and completely portable
- Headphone output jack for audio monitoring

A rugged and completely portable instrument, the Model 235A is designed for installation and maintenance of both VHF and UHF antennas and antenna distribution systems. It provides direct reading of absolute field strength on all television channels from 2 through 83.

Technical Specifications

SUPERHETERODYNE CIRCUIT: Stable superhet circuit results in sensitivity of 10 microvolts on VHF, 30 microvolts of UHF at an accuracy of ± 3 db (VHF). UHF accuracy is ± 4 db rising to $+6$ db at high end of UHF band. Range in absolute field strength is 10 to 100,000 microvolts VHF and 30 to 50,000 microvolts UHF.

INPUT: Provision made for accommodating 75 ohm line such as more commonly used in distribution systems. Also accepts 300 ohm line using CM-1 matching transformer (included). Matched input filter assures low VSWR. Self-calibrating simplified, "zero-set" calibration method (using the meter) permits quick and easy calibration each time instrument is used.

INDICATOR-REGULATOR: A neon panel lamp serves both as an On-Off indicator and as a regulator to assure correct battery voltage for proper operation.

AUDIO OUTPUT: An output jack is provided for a high impedance headphone so that the audio carrier may be monitored (any standard crystal headphone may be used). This allows positive identification of the channel being measured and also gives an indication of the presence of ghosts for positioning and orienting the antenna for minimum audio distortion.

DIMENSIONS: 10½" high, 6¼" wide, 6" deep. 8¾ lbs. net weight.

POWER REQUIREMENTS: Two 1½" "A" batteries (Burgess 8R or equal), one 90 volt "B" battery (Burgess N60 or equal). Shipped less batteries.

MODEL 288AX

CRYSTAL CONTROLLED, HIGH OUTPUT
AM-FM SWEEP and MARKER GENERATOR**FEATURES:**

- *A Complete Alignment Instrument*
- *Built-in Decibel Meter*
- *Crystal-controlled Frequency Standard*
- *8 Bands From 35 kc - 160 mc*
- *New Ultrasonic Range - 35 kc to 110 kc*

The Model 288AX provides the necessary signal voltages for servicing AM and FM receivers as well as television receivers. In addition, a crystal-controlled 100 kc and 1000 kc oscillator provides an accurate frequency standard. The wide choice of frequency ranges, including **new ultrasonic range** of 35 kc to 110 kc, the variety of sweep widths and methods of modulation makes this a uniquely versatile generator.

The high output voltage of the Model 288AX permits visual stage-by-stage alignment of IF, limiter and discriminator stages of FM and TV receivers and complete alignment of AM receivers. Power and voltage measurements, as well as determination of resonance in alignment work are materially aided by a self-contained decibel meter with a range of -10 to $+38$ db.

Technical Specifications

Amplitude Modulated Ranges: 35 kc—110 mc in 8 bands. Choice of unmodulated, 400 \sim modulation, or external modulation.

Frequency Modulated Ranges:
 100 kc—160 mc in 8 bands (0-30 kc sweep)
 1 mc—160 mc (0-150 & 0-450 kc sweep)
 1 mc—Fixed (0-30 kc sweep)
 50 mc—Fixed (0-150 kc & 0-450 kc sweep)

Modulation: Choice of external or internal modulation on both AM and FM ranges. Internal sweep width continuously variable to maximum of 450 kc. Choice of 60 \sim or 400 \sim sweep rate. Sweep synchronizing voltage brought out to front panel.

Audio Frequency Output: 20-15,000 \sim variable or 400 \sim fixed

Crystal Output: Choice of 100 kc or 1000 kc, unmodulated or modulated at 400 \sim . 100 kc output provides useful harmonics to 15 mc; 1000 kc output useful to 125 mc.

Output Control: Vernier control with decade steps of 1, 10, and 100.

Db Meter: Ranges of -10 to $+6$, $+6$ to $+22$, $+22$ to $+38$ decibels.

Dimensions: 16" W x 13" H x 7" D—33 pounds net weight.

Power Requirements: AC —110 volt 50-60 cycles. Complete with crystals, cable assembly meter lead and instruction book.

FM, STEREO, MULTIPLEX GENERATOR

MODEL 727



FEATURES:

- Separation of 35 db or better.
- Composite audio output includes main channel (L+R) and sub-channel (L-R). Basic audio source is 1000-cycle oscillator switchable to left or right channel. Crystal-controlled 19 kc pilot carrier included.
- RF output at 100 mc, adjustable to ± 200 kc. Level fixed at 500 microvolts.
- Separate 38 kc signal available for filter and band-pass alignment.
- 67 kc signal for adjusting SCA trap and filter.
- Fully transistorized, choice of portable battery operation or optional AC power supply.

This new stereo generator represents a major design breakthrough resulting for the first time, in a popularly-priced test instrument that meets the needs of in-home stereo FM service without the expense and complexity of a standard generator.

Using a double side band suppressed carrier signal, the generator provides a correct signal for adjusting all types of FM stereo systems for maximum separation.

Technical Specifications

COMPOSITE SIGNAL: Generated by 1000-cycle sine wave oscillator which modulates 38 kc sub-carrier in the double sideband suppressed carrier mode. 1000-cycle source is switchable to left (L) or right (R) providing equivalent of L+R and L-R composite signals. Crystal-controlled 19 kc pilot carrier (accurate to within ± 2 cps.) included at standard 10% level, switchable to 5% level for making receiver checks. Level of total composite signal is continuously variable from 0-4 volts, peak-to-peak from 250 ohms source impedance.

RF OUTPUT: The composite signal frequency modulates a 100 mc carrier which is tunable over a ± 200 kc range. Fixed output level of 500 microvolts assures receiver operation above limiter saturation level.

AUXILIARY SIGNALS: 38 kc signal supplied direct at approximately 3 volts peak-to-peak for alignment of filter and band-pass circuits. 67 kc signal supplied direct at 3 volts peak-to-peak or via RF carrier for adjustment of SCA trap in FM stereo receivers and adapters.

SEPARATION: Channel separation is 35 db or better.

POWER SUPPLY: Fully transistorized, operates from 22½-volt battery or optional AC power supply, 105-125 volts AC, 50-60 cycles, 7 watts.

Furnished with leads and instruction book, less battery, in steel case 11" x 8½" x 5". Shipping weight, 7 lbs.

STEREO STANDARD FM MULTIPLEX GENERATOR

MODEL 725



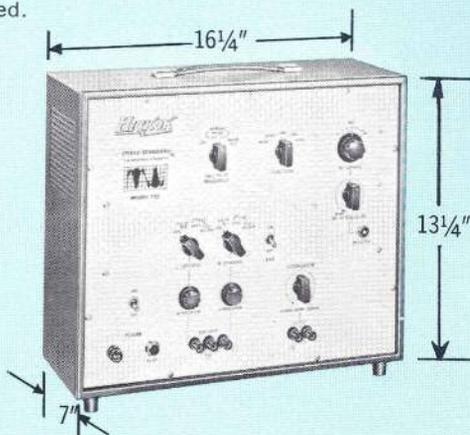
MODEL 725 A unique, but straightforward design approach in this new generator has resulted in a low-cost instrument that meets all requirements for maintenance of FM Stereo Multiplex receiving equipment, while combining the flexibility of complete Stereo signal generation.

Technical Specifications

Composite Output

The direct composite output consists of:

- (1) L+R, generated by two stable self contained oscillators 400 cps and 1200 cps.
- (2) L-R produced by a double balanced modulator. The output of the balanced modulator contains the sidebands of the L-R suppressed 38 kc sub-carrier.
- (3) A 19 kc pilot carrier. The pilot is used to synchronize the demodulator of the stereo receiver or adapter being tested or aligned.



Dimensions: 13 1/4" H, 16 1/4" W, 7" D. Weight 23 lbs.

Power Requirements: 105-125 volts, 50-60 cycles, 75 watts. Variable output of 0-4 volts, with an output impedance of 250 ohms.

RF Output: Tuneable from 92 to 104 mc. Modulated with any of the signals selected by the function selector. Output variable 50 to 1000 microvolts. RF input into Ant. terminals of FM receiver enables the technician to determine whether the FM receiver band-pass is adequate for FM Multiplex Stereo reception.

External Modulation: Accommodates any external signal source such as stereo mike, tape player or record player (1 volt p-p min.). Fully compensated to provide correct L-R vs. L+R delay. This feature permits on-the-floor demonstration of FM stereo sets without any need to depend on local broadcast program schedules.

Self Checking: The Model 725 features a pilot phase check. This self checking feature assures the operator that the generator is producing an accurate composite signal for maximum separation.

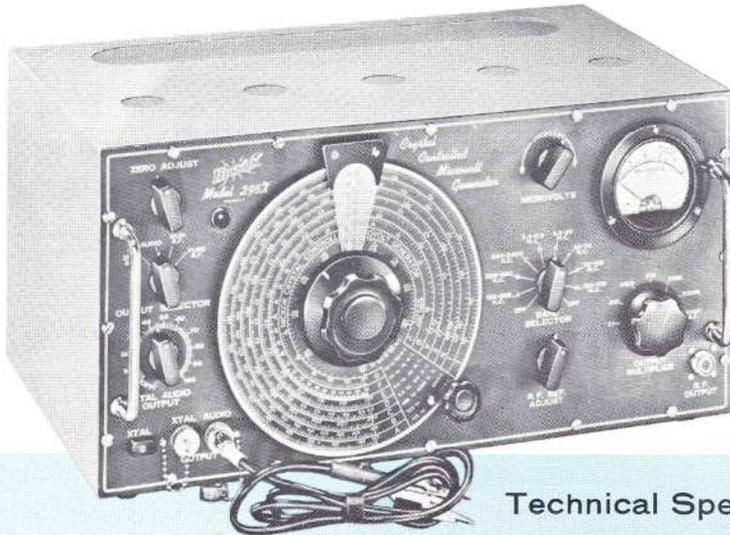
Separation: 35 db or better—distortion of composite signal less than 2%.

SCA Coverage: Generates 67 kc signal for adjustment of SCA trap in FM multiplex receivers and adapters. Assures minimum interference levels from Subsidiary Communication Authorization signals.

Correct for all Detection Systems: Because the instrument generates a standard stereo signal, it is fully compatible and correct for use with any detection system; beam-switching, matrixing, or envelope detection.

MICROVOLT and CRYSTAL CONTROLLED GENERATOR

MODEL 295X



MODEL 295X

FEATURES:

- Continuous Frequency Coverage from 125 kc to 175 mc
- Metered Output from 0.1 to 100,000 Microvolts
- 1% Dial Calibration Accuracy
- Precision Step Attenuator
- Direct Reading—Vernier Tuning

Technical Specifications

FUNCTIONS:

Unmodulated RF: Continuous from 125 kc to 175 mc in 8 calibrated bands with monitored output from 0.1 to 100,000 microvolts.

Amplitude Modulated RF: Modulated at 400 cycles, from 125 kc to 175 mc in 8 calibrated bands with monitored output from 0.1 to 100,000 microvolts.

Crystal-Controlled RF: At any frequency from 400 kc to 20 mc on fundamentals (by choice of accessory crystal). High harmonic output—up to 250 mc through selection of crystals. 1000 kc crystal is supplied. Output is continuously variable and may be unmodulated or amplitude modulated at 400 cycles.

Audio at 400 cycles: Continuously variable to a maximum of one volt, rms.

PRECISION STEP-ATTENUATOR

Has low VSWR characteristics throughout all frequencies. Six positions in decade steps with multiplying factors from 1 to 100,000. The step-attenuator and microvolt meter are calibrated for proper indication when the generator is terminated with a 50 ohm load. This attenuator, used in conjunction with the "microvolt meter," provides an accurate measurement of the RF output. RF connector is approved A/N-type SO-239.

VARIABLE OSCILLATOR

Eight Bands from 125 kc to 175 mc.

- | | |
|-----------------------------------|---------------------------------|
| A Band: 125 kc to 325 kc | E Band: 6.9 mc to 20 mc |
| B Band: 325 kc to 890 kc | F Band: 20 mc to 70 mc |
| C Band: 890 kc to 2,400 kc | G Band: 70 mc to 120 mc |
| D Band: 2.4 mc to 6.9 mc | H Band: 120 mc to 175 mc |

Accuracy of Frequency Calibration: 1%.

Output Impedance: 50 ohms.

Modulation: 400 cycles, 30%.

CRYSTAL-CONTROLLED RF OSCILLATOR

Frequency Determined by Choice of External Crystal: 1,000 kc crystal, accuracy 0.05%, supplied with instrument. Possible crystal frequency range, 400 kc to 20 mc on fundamentals. Crystals can also be supplied to generate any desired harmonic frequency from 20 mc up through 250 mc, accuracy 0.05%.

AUDIO OSCILLATOR

Frequency 400 cycles, accuracy 10%
Output level variable to a maximum of approximately 1 volt
Output impedance variable, 0 to 50,000 ohms

METER:

Hickok-built Model 46, 3½" ruggedized and sealed, with an accuracy of 1% of full scale. 50 µa sensitivity.

TUBE COMPLEMENT:

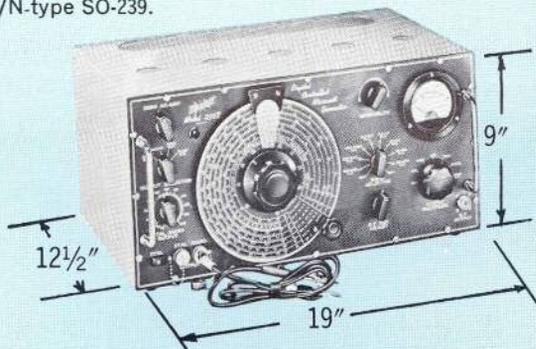
- | | |
|---|---------------------------------|
| 6J6 Variable RF oscillator, H band | 6SN7 Audio oscillator-amplifier |
| 6J6 Variable RF oscillator, A through G bands | 12AU7 VT voltmeter |
| 12AU7 Xtal oscillator-amplifier | 5Y3 Rectifier |
| 12AT7 RF amplifier | OB2 Voltage regulator |
| 12AT7 RF cathode follower | OB2 Voltage regulator |
| | 7H-10 Ballast |

ACCESSORIES FURNISHED:

- 1,000 kc crystal
- 48-inch output cable with two connectors
- Instruction book

POWER REQUIREMENTS:

105 to 125 volts, 50 to 400 cycles, 90 watts at 115 volts, 60 cycles.



CASE SPECIFICATIONS:

Portable, steel, gray finish enamel case. 19" W., 12½" D., 9" H. 40 lbs. net weight.

VIDEO SCANNER

MODEL 760



FEATURES:

- *Generates and scans at the 525-line, 60-field, 30-frame system*
- *Produces slide pictures for closed-circuit television systems*
- *Uses high definition flying spot scanning method, 450-line resolution*
- *Crystal-controlled sync generator*
- *Choice of video or RF output*

An instrument with a multitude of uses in industrial and service applications, the Model 760 can be used to produce slide pictures and announcements in closed circuit TV systems in schools, rail, bus and air terminals, industrial plants or retail stores.

In service applications, this complete, cable-connected transmitting station can be used to trouble-shoot the synchronizing section or to analyze the frequency response or definition capabilities of any TV receiver. By inserting a slide to produce a white dot pattern on the raster, it is possible to make a quick, accurate convergence adjustment of color TV receivers. A test pattern slide, furnished, can be inserted to check all the properties of picture production. The ratio of video information to sync is adjustable and, thus, can be varied to evaluate the sync performance of a television receiver.

Technical Specifications

Patterns Furnished: Bar, Dot, Standard Test Pattern and transparent blanks for use with a grease pencil.

Crystal Controlled: 315 kc Crystal provides stable sync standard.

Horizontal Sync: Contains both front and back porch.

Vertical Pulse: Serrated to maintain horizontal sync.

Video Output: 2 volts peak-to-peak with an impedance of 100 ohms. Output is either positive or negative.

Resolution: Minimum 450 lines, band-width in excess of 5 mc.

Variable Sync Level: Permitting any combination of sync to video information, preset at factory to EIA Standards.

RF Channel Selector: Covers channels 2 through 6 (fixed).

RF Output: Variable to 100,000 μ volts.

Tube Complement: 17 tubes including type 5HIX CRT, photo-multiplier and rectifier.

Case Specifications: Furnished in an attractive black-leatherette portable case with detachable cover: 17" W., 18 $\frac{3}{4}$ " L., 8 $\frac{1}{2}$ " D., 43 lbs. net weight.

Power Requirements: 105-125 volts AC 60 cycles, 120 watts approximately.

Furnished complete with output cable, pattern slides listed above, and instruction book.

COLOR BAR WHITE DOT-BAR TV GENERATOR

MODEL 656XC



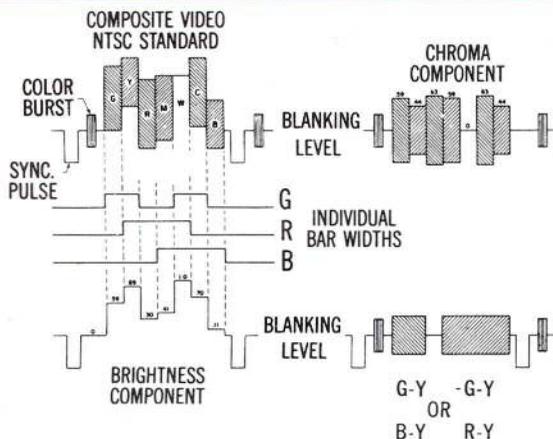
FEATURES:

- 100% Fully-saturated NTSC Approved Standard
- Provides Complete Range of Signals for Chroma Alignment
- Combines Color Bar Generator with White Dot-Bar Generator

This versatile generator produces the standard fully-saturated NTSC color bar pattern. Because its design is based on NTSC standards, obsolescence protection is assured. The Model 656XC provides signals for complete chroma alignment including R-Y, B-Y, and G-Y demodulator systems. Color phase is accurately set with precision delay lines and referenced to a crystal oscillator; the amplitude of the sub-carrier and of the brightness component is accurately set with precision resistive networks, assuring the high stability required for correct alignment. Proper colors are generated within 30 seconds after warm-up.

In addition to color bar patterns, this versatile instrument produces a choice of: crosshatch (20 vertical and 15 horizontal), vertical lines only, horizontal lines only, and small size white dots, locked to assure stability. This "locking" is obtained through the self-generated 60 cycle and 15,750 cycle sync pulses referenced to a 315 KC crystal oscillator. The white dots are of optimum size (approximately 2 lines thick) to permit accurate convergence adjustments. Approximately 300 dots are present in each frame.

The Model 656XC was designed in cooperation with leading color TV manufacturers and is specified by them for their field service groups because of its accuracy, stability and long, troublefree operating life.



This NTSC standard waveform is to precise scale and is accurately produced in detail by the 656XC when viewed on a high quality wide-band scope (At least 4.5 MC).

NTSC Standard Color and Brightness: Designed for use with NTSC-standard color television systems

Color Generation: 3 primaries, 3 complementaries, plus black and white; I, Q, R-Y, B-Y, G-Y, and -G-Y

Dot/Crosshatch Generation: Crystal-controlled by 315 kc crystal oscillator. 300 dots per frame less those in blanking region. Minimum size—2 lines.

Crosshatch: Choice of vertical or horizontal bars or both; 20 vertical bars, 15 horizontal bars—less those in blanking region

Crystal-Controlled Sub-Carrier and Horizontal Framing: Produces stable, clearly defined waveforms to permit easy alignment and reduce possibility of error

Video Output: 0-2 volts peak-to-peak, open circuit, across 100 ohms with positive or negative output

Technical Specifications

RF Output: Channels 2 through 6, modulated with choice of color signals. Equivalent vestigial sideband modulator avoids overloading of chroma channel. Separate output provided from 3.58 mc burst oscillator

Sound Carrier: Provided to permit correct setting of local oscillator in TV receivers

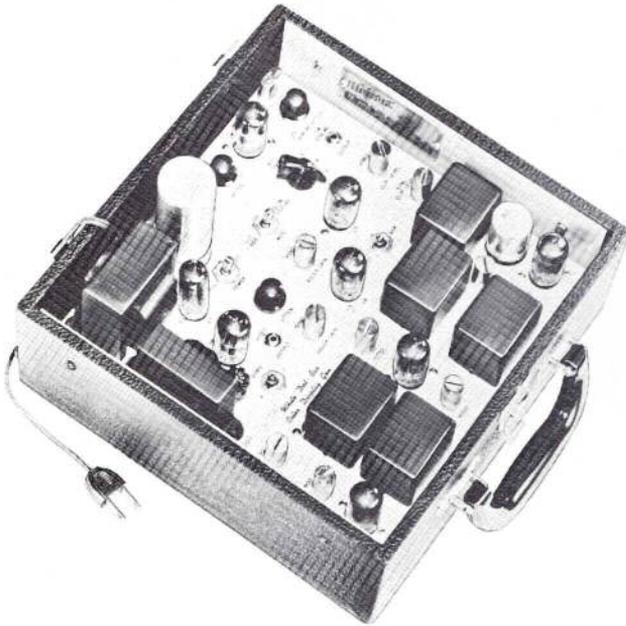
Advanced Integrated Design: Generator is self-contained, requiring no external synchronization connections. All generated voltages are stable and independent of line voltage changes

Case Specifications: Furnished in an attractive black leatherette case with detachable cover, 16 $\frac{3}{4}$ " W, 18 $\frac{3}{8}$ " L, 7 $\frac{1}{2}$ " D. 34 lbs. net weight

Power Requirements: 105-125 volts, 60 cycle, 40 watts. Furnished complete with cable and instruction book

WHITE DOT COLOR DISPLAY TELEVISION GENERATOR

MODEL 660

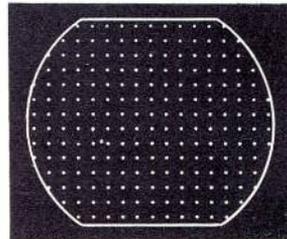


This generator was designed for use in fast, in-the-home servicing of color TV receivers or on-site servicing of industrial color TV closed circuit installations. In the Model 660, all frequencies generated are crystal-controlled and locked together for maximum stability. In addition, the frequency of the chrominance (color) signal is crystal-controlled to insure reliable evaluation of chroma circuit performance. This feature assures an accurate standard of reference not found in color display generators employing a free-running oscillator.

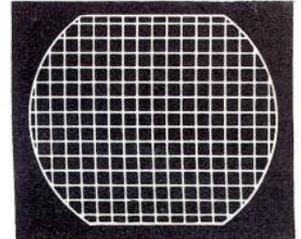
RF output frequency is pre-set for channels 2 through 6, permitting easy selection by means of a built-in switching arrangement. The circuit of the Model 660 has been developed to be completely compatible with future color TV receiver designs. The precise timer circuit will hold synchronization over the wide range of line voltages that may be encountered in "on-location" servicing.

FEATURES:

- *All Frequencies Crystal-Controlled and Locked Together*
- *Circuitry Completely Compatible with New Design Receivers*
- *Lightweight, Portable for In-The-Home Servicing*



Small size white dot pattern. 300 white dots, less those in blanking.



White line cross-hatch pattern. 20 vertical and 15 horizontal, less those in blanking.

Technical Specifications

COLOR DISPLAY PATTERN: In the following sequence; orange, red, magenta, blue, cyan and green—all crystal controlled.

SIDELOCK COLOR FREQUENCY CRYSTAL: 3.563795 MC output, 1 volt peak-to-peak

DOT AND CROSSHATCH SIZE: As small as 2 lines in both horizontal and vertical planes. Approximately 300 dots total.

CROSSHATCH WHITE LINES: 20 vertical and 15 horizontal, less those in blanking

RATIO OF SYNC TO VIDEO: Variable from 10 to 90%

VIDEO OUTPUT: 0-4 volts, peak-to-peak; across 300 ohms, black positive or negative

RF OUTPUT VOLTAGE: 0.05 volts maximum, 0.001 volts minimum RF modulated by all video outputs (60% modulation)

CASE SPECIFICATIONS: Furnished in sturdy black leatherette portable case with detachable cover, 10½" W, 10½" H, 5¼" D. 15 pounds net weight

POWER SPECIFICATIONS: 105-125 volts, 50-60 cycles, 40 watts. Furnished complete with instruction book, with color channel alignment waveforms, 2 crystals and output cable.

CHROM-ALIGNER NTSC STANDARD Color Bar and White Dot Generator



FEATURES:

- *Generated Color Signals to NTSC Standards*
- *Provides all standard alignment signals*
- *White Dot—Crosshatch Generator*
- *A Complete Color Servicing Instrument*

MODEL 661 The new Hickok Model 661 CHROM-ALIGNER is a versatile White Dot-Crosshatch Generator, which generates individual 100% saturated color bars to NTSC standards to permit critical adjustments in the home. Light weight, compact, it is an ideal instrument for all types of field servicing, converging and installation of color television receivers.

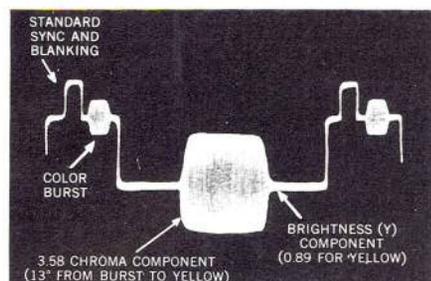
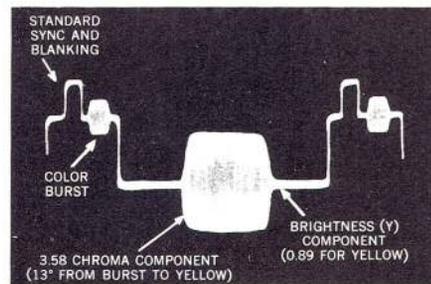
YOUR SCOPE CAN SHOW YOU THE IMPORTANCE OF NTSC SIGNALS

Check a color signal as received off the air by a color receiver. The diagram at right shows that it consists of a brightness component, the chroma, or color, component and a color burst signal. It is an NTSC Standard broadcast signal.

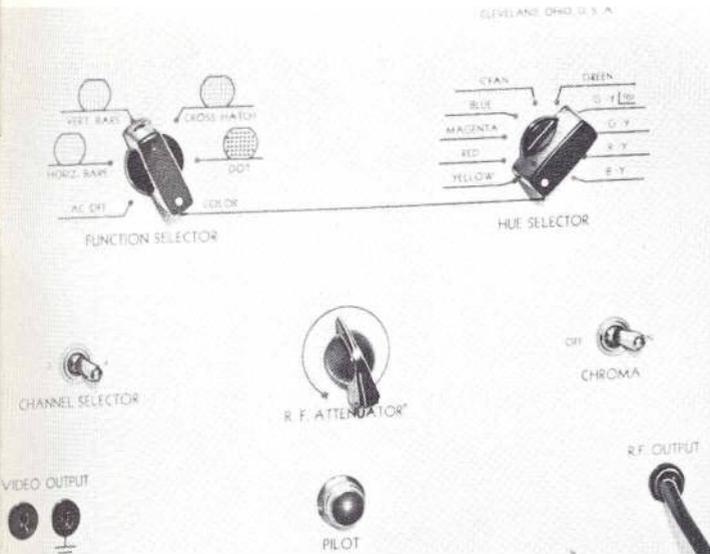
Now, look at the signal produced by the new Hickok Model 661, shown at the right, also. It duplicates the broadcast signal. It contains the brightness, chroma and color burst signals. **The result: a true NTSC Standard Signal, NTSC Standard Colors.**

Check the signal produced by non-NTSC generators. They do not have the important brightness component. Consequently, they only do half the job, turn on the chroma elements in the set by brute force.

They cannot guarantee the set is operating properly.



MODEL 661



TECHNICAL SPECIFICATIONS

The instrument provides the following NTSC color Signals:

1. Yellow	Chroma 13°	Luminance 0.89
2. Red	Chroma 76°	Luminance 0.30
3. Magenta	Chroma 120°	Luminance 0.41
4. Blue	Chroma 193°	Luminance 0.11
5. Cyan	Chroma 256°	Luminance 0.70
6. Green	Chroma 300°	Luminance 0.59

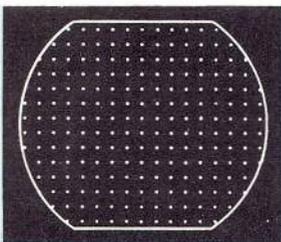
It will also provide the following demodulator alignment signals: R-Y, B-Y, -G-Y, G-Y at 90°.

RF output on channels 3 or 4 is provided.

Video Output: 1.5 v p-p across 75 ohms.

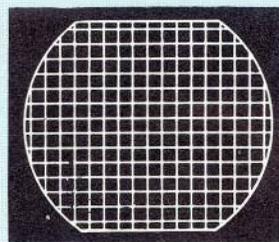
Operates on 110 v 60 cycle, 20 watts. Net weight, 20 lbs.

There is no confusion in operating the new Model 661. All controls are on the front panel. The left selector switch is the function selector and all functions are illustrated for speedy selection. The right selector switch selects the color or demodulator signal desired. A toggle switch allows selection of either Channel 3 or 4.



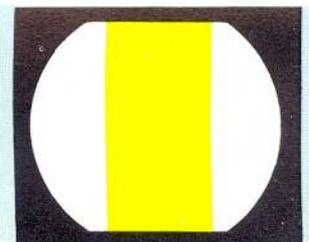
WHITE DOT PATTERN

For fast, accurate convergence, dots must be steady. You can't afford to waste time working with an unstable generator whose dots are constantly "on the move". Crystal control and tested, industrial grade components assure rock steady stability in the 661. Dots are small—about 2 lines thick, providing a stable pattern with accurate convergence of the red, green and blue dots that produce the white dot and give a good, accurate convergence job.



CROSSHATCH PATTERN

Stability is important here, too. Only a crystal controlled generator, like the Model 661, can give you the stable pattern you need.



NTSC STANDARD COLORS

NTSC Yellow is defined as being a signal that is phased 13° from burst and contains 89% brightness. Take away the brightness or Y signal and you can't be sure of your color. And, yellow is most critical. Misadjusted yellow results in poor flesh tones and customer complaints. Your eye can't tell the difference but your customers will be able to during the next color program. Guessing about color can cost you money. Work with an NTSC standard generator and be sure.

INSTALLER'S COLOR TV GENERATOR

MODEL 662



FEATURES:

- Complete convergence signals—vertical bars, horizontal bars, crosshatch and dots
- Exclusive 500 dot circuit results in extremely fine dots, lines and crosshatch—less than two lines wide and one line thick
- Gun-killer speeds convergence, facilitates purity adjustments
- New, ultra-stable, simplified timer circuit assures rock-steady signals
- And a Hickok exclusive—single-bar, crystal-controlled color-burst signal

Hickok has designed and priced this instrument to get the service technician started in color TV with reliable equipment at a minimum investment. The 662 Model not only generates stable convergence signals, but an entirely new circuit approach provides correct color alignment signals as well.

Technical Specifications

VIDEO OUTPUT: All video signals, including dots, bars, crosshatch, and color burst, are fed directly to the color picture tube. Sync and timing signals are generated in the instrument and locked to the receiver's sweep system. Dot, bar, and crosshatch signals based on a 500 dot system with 5:4 ratio, assure complete dot coverage, including the critical and hard-to-converge areas in the corners and edges.

Dot size is stabilized at a single line in thickness. Dot width is limited only by receiver's bandwidth—generally less than two lines in width.

RF OUTPUT: A single connection to receiver's antenna terminals injects gated color-burst bar (at 3.57945 mc \pm 10 cycles) into RF-IF system. No tuning or adjustments required.

GUN KILLER: A "quick-connect" assembly unit connects to the picture tube, injects all convergence signals directly

to the receiver and permits gun-killer action. All purity checks can then be made with the instrument alone. This feature also provides "remote" gray-scale ("black-and-white tracking") control during convergence so receiver controls don't have to be disturbed.

COLOR ALIGNMENT SIGNAL: An exclusive and new Hickok-developed circuit provides a single horizontal bar at the exact color burst frequency (crystal-controlled at 3.57945 mc), allowing instant checking of hue control range, chroma and demodulator alignment. All types of demodulators, including R-Y/B-Y, G-Y and X/Z systems can be accurately set in by use of the gun-killer feature. Supplied with leads, "quick-connect" cable assembly, and instruction book.

Available with accessory carrying case.

Furnished in steel case, 11" x 8½" x 5⅜", 8 lbs. net weight, 105-125 volts ac 60 cycle, 25 watts.

SWEEP AND MARKER ALIGNMENT GENERATOR

MODEL 615



FEATURES:

- Provides Complete TV IF and RF Alignment
- Also Provides Harmonic Output on UHF
- All-Electronic Sweep With No Moving Parts

The Model 615 is a complete, single-unit TV sweep and marker generator providing all the necessary features and ranges for visual alignment of television receivers. It permits complete television IF and RF alignment as well as harmonic output on UHF. Both the marker and the sweep have the required attenuation range for accurate results in servicing modern, sensitive TV receivers. Designed around HICKOK's unique *barium titanate* sweep capacitor, the all-electronic sweep has no moving parts to wear out or become inoperative. Amplitude modulation in the Model 615 is less than 0.1 db/mc. Since amplitude modulation distorts the final curve, as viewed on a 'scope, its elimination is mandatory in any sweep generator. Marker frequency is 0.5% or better at any dial setting. Non-parallax, knife-edge pointers simplify readings, reduce chance of error.

Technical Specifications

MARKER FREQUENCY: 2.5-5.5 mc, 19-50 mc, 54-108 mc and 108-216 mc harmonic

MARKER AMPLITUDE: 0.25 rms, attenuation to 0.3 microvolts

INTERNAL MARKER MIXING: Built-in switching arrangement and panel connector permit either internal marker mixing or external mixing with heterodyne marker-adder such as the HICKOK Model 691.

SWEEP FREQUENCY: 0-50 mc, 50-100 mc, 175-225 mc

SWEEP WIDTH: Step variable to 15 mc, linear within 0.1 db/mc. Two narrow band positions for FM and sound alignment.

RETRACE BLANKING: Built-in and controllable from front panel to provide zero-reference base line.

EXTERNAL SWEEP PHASING CONTROL: External sweep vari-

able phasing (170°) is controllable from the front panel for use with 'scopes that do not have variable sweep phasing control.

BUILT-IN CRYSTAL: 4.5 mc crystal provides dual markers for IF or RF alignment and accurate 4.5 mc signal for inter-carrier sound alignment.

AMPLITUDE MODULATION: Both marker and crystal oscillators may be amplitude modulated approximately 30% by self-contained 900 cycle internal modulator.

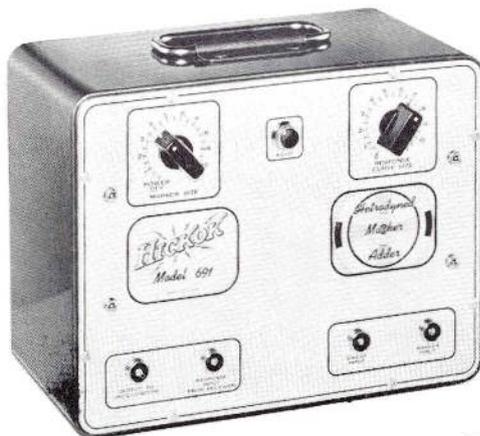
CIRCUIT PROTECTION: Dual-fused to protect power transformer and other components

CASE SPECIFICATIONS: Furnished in an attractive portable steel case, 13¼" H, 16¼" W, 8" D. 31 lbs. net weight

POWER REQUIREMENTS: 110-120 volts, 60 cycles, 40 watts
Furnished complete with leads and instruction book

HETERODYNE MARKER ADDER

MODEL 691



This instrument, when used with the Model 695 sweep-alignment generator and Model 690 marker, provides the ultimate in TV alignment technique, takes the guesswork out of alignment jobs and eliminates errors otherwise encountered because of marker overload. The Model 691 provides a continuously visible marker (including trap points) that will not alter or distort the receiver's response curve and materially simplifies and speeds up any alignment job. The outputs of the sweep and marker generators are heterodyned and applied to a 'scope in such a manner that the marker signal does not pass through the receiver itself and therefore cannot cause overloading. This unit will function with any associated marker and sweep equipment that has an output capability of 0.05 volts or more.

Technical Features

- Input RF voltage required; 50,000 microvolts
- Output marker voltage; maximum 3 volts
- Attenuation of marker; variable 0 to 60 db.
- Attenuation of response curve; variable 0 to 20.
- Input impedance' 90 ohms.
- Attractive steel portable case. 11¼" W, 8¼" H, 7" D. 10 lbs. net weight
- Power supply required: 105-125 volts AC, 50-60 cycles, 25 watts

PROBES AND ACCESSORIES

HICKOK PROBES AND ACCESSORIES INCREASE THE RANGE AND USEFULNESS OF YOUR TEST EQUIPMENT

TVP-1 TELEVISION PROBE—Reduces capacitive loading effects. Provides net input capacity of 25 μm f. Made of black phenolic with chrome probe tip and four-foot heavy duty cord with spade connectors.

PR 30—HIGH VOLTAGE DC PROBE—Extends the range of your VTVM to 30,000 volts DC. Doubles the use of any voltmeter. Designed for use with the Hickok Model 203 or 209. Made of heavy duty black phenolic, with a 4-foot cord and cable type connector.

PR 30A—HIGH VOLTAGE DC PROBE—Same technical advantages and specs as the PR-30 described above but specifically designed for use with the Hickok Model 209A.

PR 25—HIGH VOLTAGE DC PROBE—Specifically designed to extend the range of the Hickok Models 450 and 435A to 25,000 volts DC. This probe is also ideal for use with any 20,000 ohm per volt DC multimeter with a 250 volt scale. Same weight and specifications as the PR-30.

PR 4-6KV—HIGH VOLTAGE DC PROBE—Specifically designed to extend the range of the Model 455A to 6000 volts.

PR 4-30KV—HIGH VOLTAGE DC PROBE—Specifically designed to extend the range of the Model 455A to 30,000 volts.

PR 50-KV—HIGH VOLTAGE DC PROBE—Specifically designed to extend the range of the Model 470 to 30,000 volts.

TYPE 34—CRYSTAL DEMODULATOR PROBE—Ideal for use with any scope to trace a modulated RF signal through a radio or TV receiver from the antenna post to the detector or discriminator. Phenolic probe and heavy four foot cord with spade-type connectors. Provides a quick and accurate aid to trouble-shooting with your scope.

TYPE 35—CRYSTAL DEMODULATOR PROBE—Same technical advantages and specifications as the type 34 described above but it is specifically designed for use with the Hickok Model 675 Oscilloscope and has Microphone-type connector.

TYPE 75—TERMINATION PAD—Available for use with any TV-FM alignment generator having unbalanced output of 75-90 ohms. Provides match to 300 ohms, balanced and eliminates standing waves on the output cable to insure accurate match between generator and TV receiver.

CRYSTALS

For Model 295X:

100 kc to 20 mc, Specify accuracy

For Models 615 or 695:

IF Crystals, 4.5 mc through 50 mc

RF Crystals, specify channel, 2 through 6.



TVP-1



PR-30



TYPE 34



TYPE 75

HICKOK POLICIES

DISTRIBUTOR SALES POLICY

Hickok instruments are sold by selected electronics distributors throughout the country. We are proud of our relationship with these local businessmen. They stand ready to demonstrate Hickok equipment, answer your questions, recommend the best instrument for your needs. You can depend on your experienced Hickok Distributor.

TERMS

Since Hickok instruments are sold to the ultimate user by distributors, terms and payment arrangements are established by them.

WARRANTY

Hickok instruments are warranted to be free from defects in materials and workmanship. Any parts that fail within a period of 90 days from date of purchase by the user will be replaced without charge, provided the instrument has been used in accordance with operating instructions and within its specifications limit and provided the instrument has been registered with us. A defective instrument should be returned, whenever possible, to the designated repair station or to the factory or Branch office from which it was originally shipped.

PARTS

The company maintains an inventory of parts for instruments currently offered for sale, and for

most older models at its Cleveland Service and Parts Department, 10626 Leuer Avenue, Cleveland 8, Ohio. Every effort is made to ship parts promptly upon receipt of order. When ordering parts, please describe completely the parts desired. Give the model number and serial number of the instrument for which the parts are ordered.

SPECIFICATIONS

Hickok is constantly engaged in research and development of new test instruments and the improvement of present instruments to keep pace with the dynamic progress of the electronics industry. Therefore, specifications in this catalog are subject to change without notice. The company is not liable for incorporating specification changes into completed instruments. We also reserve the right to discontinue manufacture of any instrument without notice.

EXPORT REPRESENTATIVES

Export sales are handled by Hughes International, Bldg. 322, M/S 100 5804 So. Centinela Avenue, Culver City, California, with established export distribution points throughout the world. All quotations and other sales agreements are made by that office for export sales. Canadian distribution is represented by our Canadian subsidiary, Stark Electronic Sales, Ltd., P. O. 670, Ajax, Ontario. All Canadian sales and service questions are handled by that company.

SERVICE

Factory Service and repair facilities are maintained in Cleveland, Ohio; Paramus, New Jersey, and Greenwood, Mississippi. In addition, authorized repair stations are located at convenient points throughout the United States and Canada. To expedite repairs, contact your local Hickok

distributor for the location of the nearest repair facility. All returns to factory repair facilities must be preceded by written authorization (Contact C. E. Lenke, Service Mgr., 10626 Leuer Ave., Cleveland 8, Ohio.) Returns should be accompanied by a detailed description of the fault or defect.

Instruments returned to Cleveland for servicing should be addressed to:

The Hickok Electrical Instrument Company
Service and Parts Department
10626 Leuer Avenue
Cleveland 8, Ohio

Instruments returned to Paramus for servicing should be addressed to:

The Hickok Electrical Instrument Company
Service Department
117 Route 17, South
Paramus, New Jersey

Instruments returned to Greenwood for servicing should be addressed to:

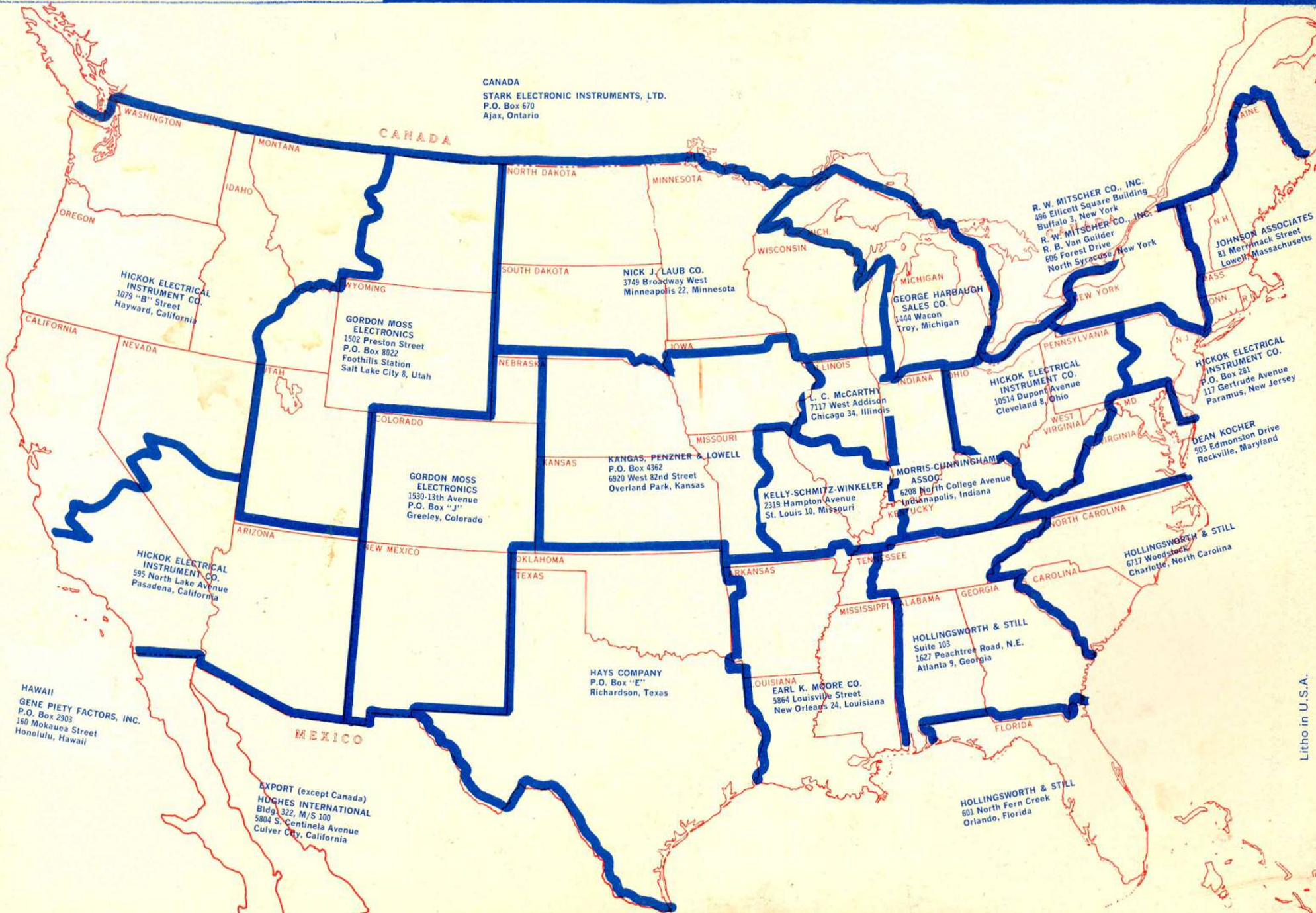
The Hickok Electrical Instrument Company
Supreme Electronics Division
Service Department
Greenwood, Mississippi

In areas not conveniently located to these points, contact the local Hickok distributor for the name of the nearest authorized repair station.



SALES REPRESENTATIVES

CANADA
 STARK ELECTRONIC INSTRUMENTS, LTD.
 P.O. Box 670
 Ajax, Ontario



EXPORT (except Canada)
 HUGHES INTERNATIONAL
 Bldg. 322, M/S 101
 5804 S. Centinela Avenue
 Culver City, California

HAWAII
 GENE PIETY FACTORS, INC.
 P.O. Box 2903
 160 Mokuauia Street
 Honolulu, Hawaii