

Apparatus & Equipment
CH 8/16/56

TEST EQUIPMENT FOR ELECTRONIC MEASUREMENTS AND INDUSTRIAL MAINTENANCE

Clamp Volt—Ammeters
Industrial Circuit Tester
A-C Industrial Analyzer
Electron Tube Analyzer
Oscilloscope
Tubechecker
Volt—Ohm—Milliammeters
Vacuum Tube Voltmeter
Sweep Generator
Calibrator
Volt-Ohmmeter
Ohmmeter
Accessories



CATALOG
R-36-A

WESTON ELECTRICAL INSTRUMENT CORPORATION, NEWARK 5, NEW JERSEY, U.S.A.

A Subsidiary of Daystrom, Incorporated

DISTRIBUTED BY
CAMERADIO CO.
1121 PENN AVE.
PITTSBURGH 22, PA.

A-C CLAMP AMMETERS AND VOLT-AMMETER

Accurate within 3%

Scale Length 2.36"

Size 13⁵/₈" x 4³/₈" x 2¹/₂"

Approx. Wt. 3³/₄ lbs.

The ideal maintenance tool for on-the-job testing. Rapidly measures a-c voltage and current without breaking the circuit. Combines in one instrument three a-c voltage ranges and five a-c current ranges, completely covering voltages and currents most frequently encountered in industrial and utility service work.

Clamp Ammeter is similar to the Clamp Volt-Ammeter except that it is not provided with the voltage features or regularly equipped with an adjustable pointer stop.

FEATURES

- Dependable Magnetic Circuit
- Rugged Bakelite Case
- Non-Shatterable Glass
- Easily Read, Double Scale
- Pear-shaped Pointer for Maximum Visibility
- Adjustable Pointer Stop for Measuring Motor-Starting Currents
- Successive Voltage and Current Readings at the Flick of a Switch
- Positive, Convenient 6-Position Range and Selector Switch
- Safety Type Trigger—Designed for Glove or Bare Hand Use
- Slot for Carrying Strap
- Solid Bakelite Handle—Man-Size Grip
- 5 A-C Current Ranges—(1000/250/100/25/10 amperes full scale)
- Flexible Potential Leads Supplied
- 3 A-C Voltage Ranges—(700/350/175 volts full scale)
- Fast, well damped movement
- Complete Instrument Insulated for 750 Volt Service
- Clamping Jaw Insulation—Long Service, Replaceable Rubber
- Can be Hung on a Conductor, Leaving Operator's Hands Free
- Conductors up to 2" in Diameter

Ranges

Model 633 Type VA-1 (Incl. Potential Leads)

1000/250/100/25/10 amperes a-c

700/350/175 volts a-c

Model 633 Type A-1—500/250/100/50/25/10 amperes a-c

Model 633 Type A-2—1000/500/250/100/25/10 amperes a-c

Model 633 Type A-3—2000/1000/500/250/100/50 amperes a-c

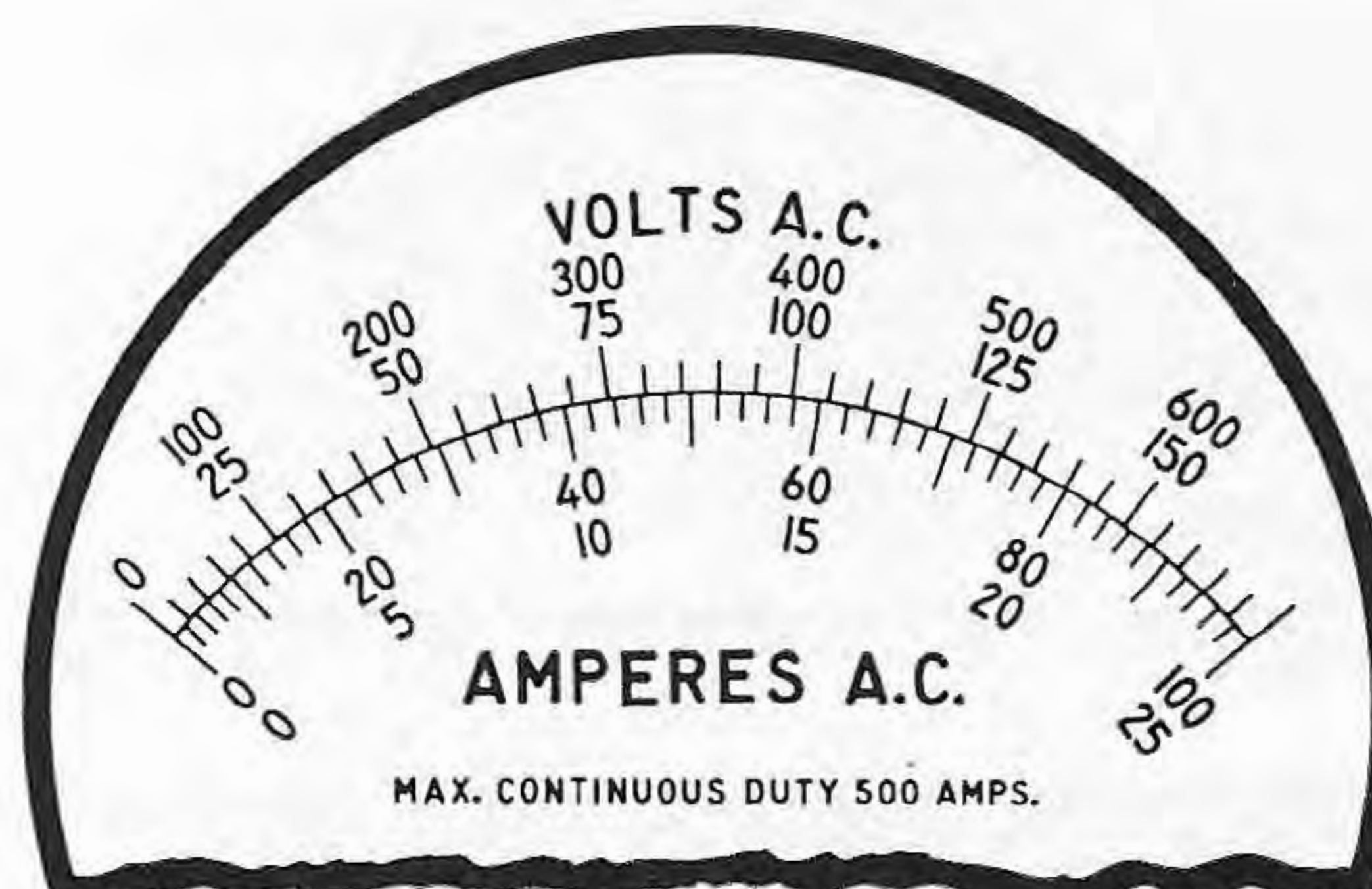
Model 9958, 50 Foot Extension Cable, Plug and Receptacle for Model 633 Types A-1, A-2, A-3

Leather Carrying Case (Model 633 Types VA-1, A-1, A-2, A-3)

Leather Carrying Case (Model 9958—Cable, Plug and Receptacle)



Model 633—Clamp Volt-Ammeter, Type VA-1



Actual Size Scale
Model 633

A-C POCKET SIZE CLAMP VOLT-AMMETER

Accurate within 3%

Scale Length 2.36"

Size 7½" x 3" x 1¼"

Approx. Wt. 14 oz.

An easy to handle, lightweight clamp volt-ammeter designed particularly for the electrician, service man, engineer and motor repair shop. Contains six current ranges and three voltage ranges quickly readable from any angle on one large size scale. Supplied complete with carrying case, voltage test leads with insulated battery clips and three accessory probes.

FEATURES

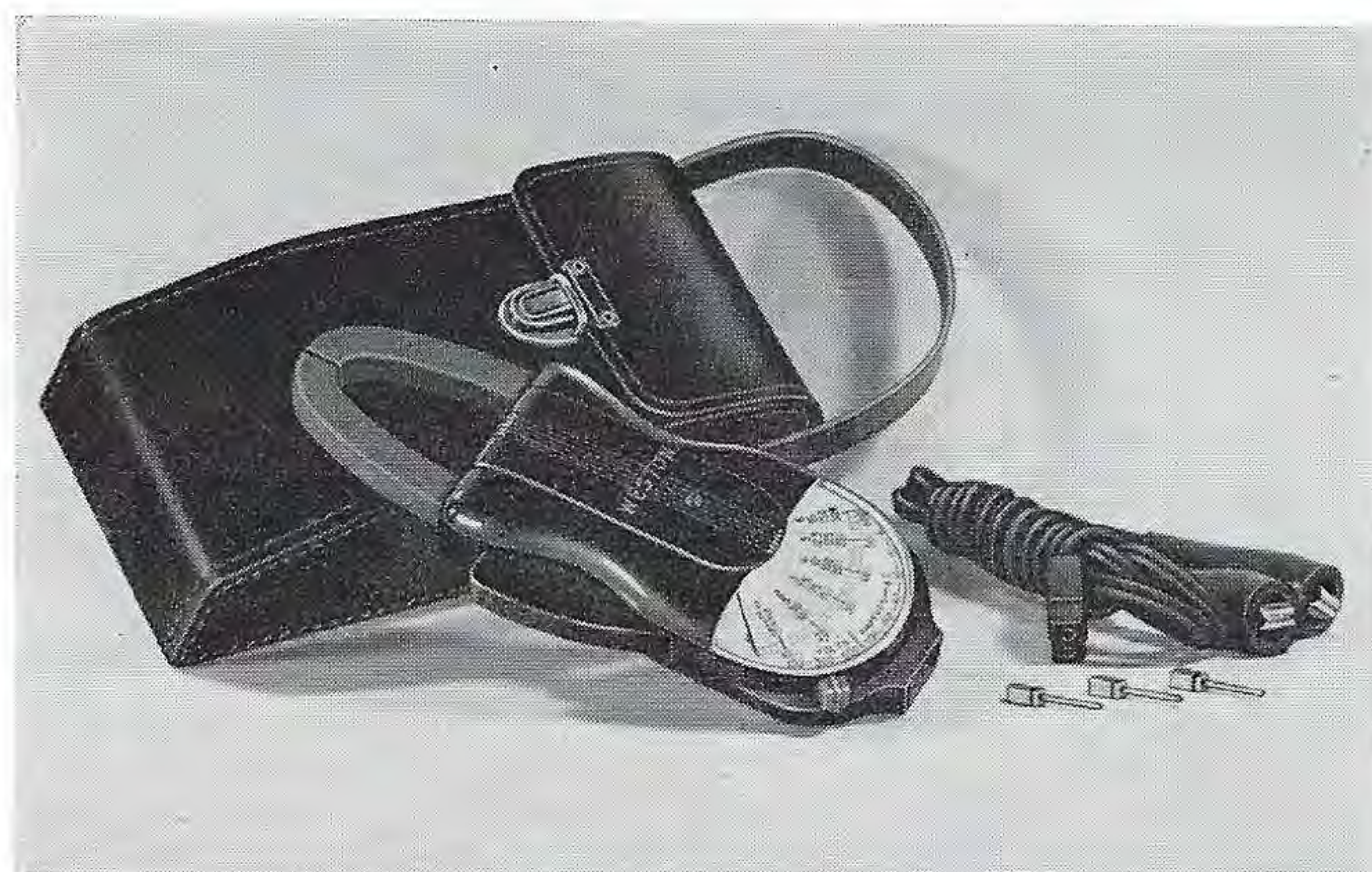
- Light Weight, Compact, Hand-Fitting Design
- Easily Slipped into Pocket
- Precision Ground Faces Provide Positive Jaw Contact
- Accommodates Conductors up to 1" Round or 1¼" Rectangular
- Large, Smooth Action Trigger
- Satin Finish Black Bakelite Case
- Positive Action Range Selector Switch
- Shatterproof Wrap-around Plastic Window
- Only One Scale for all Ranges
- Bright Red Pointer for Easy Reading
- Uses New Shock-Mounted Core Magnet Mechanism
- Fully Insulated for 750 Volt Service
- Sturdy Carrying Case with Convenient Lead Compartment

Ranges

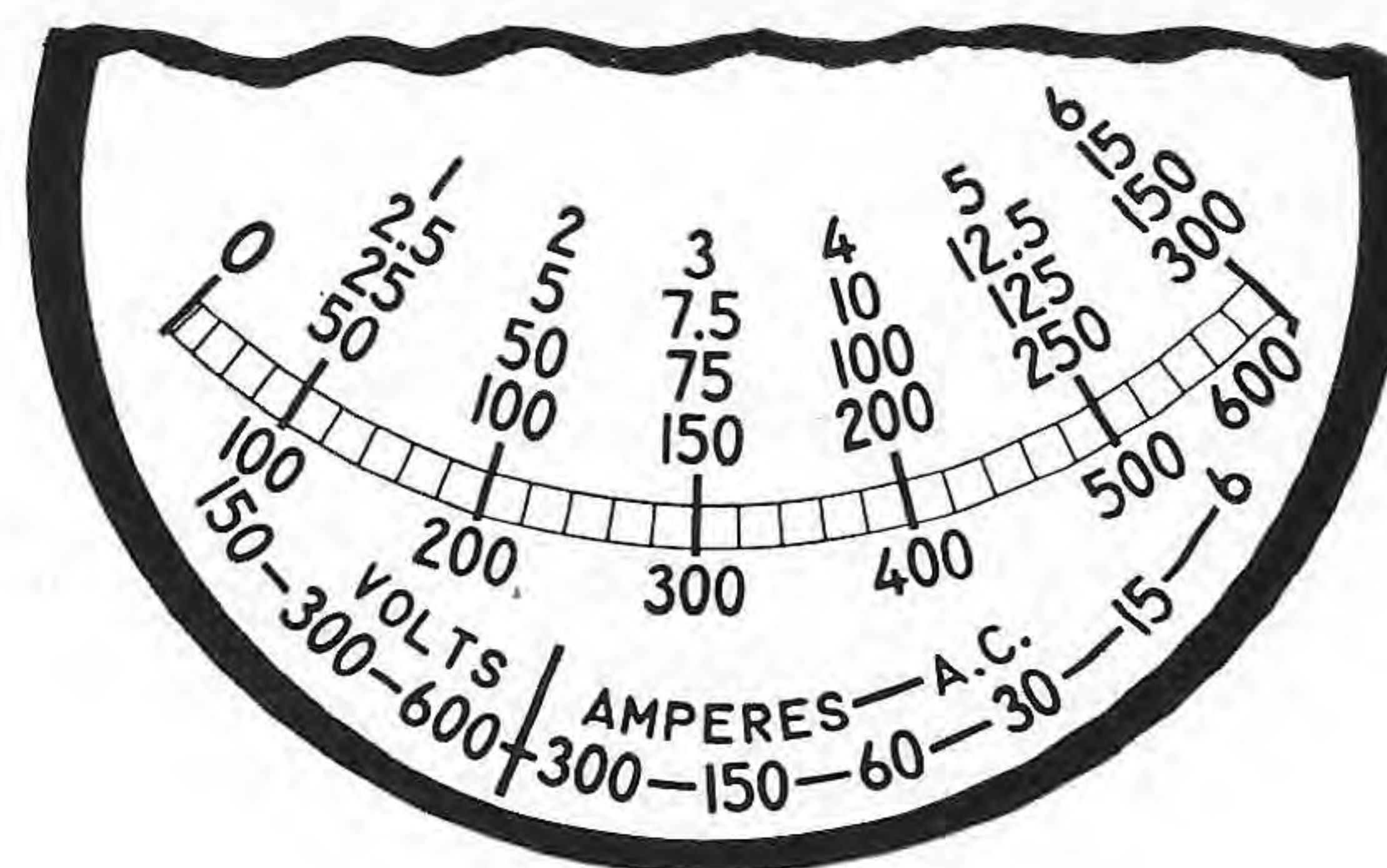
300/150/60/30/15/6 amperes a-c; 600/300/150 volts a-c



Model 749
Clamp Volt-Ammeter



Clamp Volt-Ammeter, Divided Carrying Case, Voltage Test Leads And Three Probes



Actual Size Scale
Model 749

INDUSTRIAL CIRCUIT TESTER

Size: 13" x 12½" x 5½" (330 x 318 x 140 mm)
Weight: with batteries, oak case, etc.: 13½ lbs. (6.13 kgs.)

Multi-Purpose—28 Range Tester for:

- Communications Systems—Telephone—Radio, etc.
- Electronic Circuits and Equipment
- Lighting and Power Circuits
- Resistance—in all types of circuits
- Signal Systems—Police, Fire and Burglar Alarms
- Transformers, Loads and Wiring

Weston Model 785 is well established throughout Industry as the most complete single unit for general maintenance and ultra-sensitive test purposes, particularly on electronic equipment.

The widespread use of electronic devices and sensitive relays in circuits has created a definite need for this instrument, although its usefulness is by no means confined to sensitive circuit applications. General maintenance work such as checking motors, lighting circuits, etc., can be accomplished with a minimum expenditure of time.

One outstanding feature of its design is the arrangement permitting current and potential leads to be connected to the instrument at the same time for instantaneous current and voltage readings. All ranges required are instantly available and the wide selection of well overlapped ranges facilitates measurements in the best portion of the scale.

Whenever a control circuit fails to function it is often necessary to suspend operations until all the required instruments are assembled. This loss of time, with its consequent disruption of production schedules, can be eliminated by using an ultra-sensitive, multi-range Model 785.

A distinctive advantage of the Model 785 is that current and voltage ranges can be extended and insulation tested by the use of accessories described on page 14.

APPLICATION MEASUREMENTS

Capacitor Leakage Measurements: The sensitive ohm ranges on Model 785 makes these tests easy. Testing of paper capacitors should always be made using the top range. Leakages lower than 50 megohms can signify moisture presence which may result in unit breakdown.

Electrolytic capacitors utilized in power supplies can be rejected if the leakage resistance is below 600,000 ohms.

Insulation Resistance: Model 792 Insulation Tester when used in conjunction with Model 785 makes possible resistance measurements up to 900 megohms. With this arrangement a d-c potential of approximately 500 volts appears across the test prods for all values of circuit resistance above 50 megohms. For resistance below 50 megohms this voltage decreases gradually until at short circuit it is reduced to zero due to the internal protective resistance. The potential of 500 volts d-c was selected to conform with the recommendations of the A.I.E.E. The voltage



Model 785—Industrial Circuit Tester

is low enough to permit the measurement of leakage of all mica condensers and of all paper capacitors having a voltage rating of 150 volts or higher.

Combination Measurements: To check relay circuits for both voltage and current, it is possible to make both the current and voltage connections to the test set and by simple rotation of the functional switch, readings can be taken.

High Current Ranges: Higher current ranges can be obtained by the utilization of an external current transformer such as Model 604. For complete details on this transformer refer to page 14.

SPECIFICATIONS

Standard Weston 4¼" instrument. D-c sensitivity 50 microamperes. New temperature compensated rectifier circuit gives greater a-c accuracy. Can be supplied in oak carrying case or steel case for bench use.

Ranges*

D-C VOLTS.....Seven Full Scale Ranges Of:
1/10/50/200/500/1000 volts (20,000 Ohms per volt), and 100 millivolts direct or for use with external shunts. Accurate within 2% to 500 volts—3% at 1000 volts.

A-C VOLTS.....Six Full Scale Ranges Of:
5/15/30/150/300/750 volts (1,000 Ohms per volt). Accurate within 3%.

D-C CURRENT.....Six Full Scale Ranges Of:
50 Microamps.....1/10/100 Milliamps.....1/10 Amps.
Accurate within 2%. Higher ranges, at full scale reading, with 100 mv. external shunts.

A-C CURRENT.....Four Full Scale Ranges Of:
.5/1/5/10 Amperes. Accurate within 3% on 60 cycles. Slightly less on 25 and 133 cycles. Higher ranges with external current Transformers.

RESISTANCE.....Five Full Scale Ranges Of:
3,000/30,000/300,000 Ohms.....3/30 Megohms
25/250/2,500/25,000/250,000 Ohms.....Center Scale
(Self-contained Batteries). Accurate within 2% of linear arc length on any ohmmeter range.

*For higher a-c and d-c ranges, see current transformer and shunt listings on page 14.

A-C INDUSTRIAL ANALYZER



Model 639, Type 2 A-C Industrial Analyzer

Size..... $\left\{ \begin{array}{l} 18\frac{7}{8}'' \times 10\frac{7}{8}'' \times 6\frac{7}{8}'' \\ 479 \times 276 \times 175 \text{ mm} \end{array} \right.$ Approx. Wt. 32 lbs. (14.5 kgs.)

Accurate within:

Voltmeter and Ammeter..... 1%
Power Factor Meter..... 1%
Wattmeter 2%

Frequency 25-125 Cycles Scale Lengths 3.5" (89 mm)

The Weston Model 639 Type 2, a complete power analyzer, has wide acceptance in industry, among plant maintenance men . . . utility service engineers . . . electrical contractors . . . marine service men . . . and those engaged in general testing or installation work.

Model 639 is designed to analyze industrial loads by measuring a-c current, voltage and power, in single and polyphase circuits; as well as power factor in 3 phase, 3 wire, balanced circuits. It is convenient, safe, compact, light-weight, rugged and portable.

The standard specified instrument accuracy for 25-125 cycles operation is cited in the tabulation under the appropriate column for the various functions. The second and third columns indicate the relative accessories that can be expected for 200 and 400 cycle frequency measurements.

Compensations can be made for 200 cycle and 400 cycle operation for any specified range and instrument.

FEATURES

Instruments: Four Model 610 instruments ($4'' \times 4\frac{1}{2}''$), a Voltmeter, Ammeter, Wattmeter, and Power Factor Meter are included in its sturdy oak carrying case. These instruments contain the large, rugged mechanisms as used in the Weston 6" Line.

The Ammeter is equipped with an adjustable pointer stop to facilitate the rapid determination of the maximum value of starting currents. The Wattmeter has a single scale with the multiplying factors conveniently located on the instrument panel.

Safe: Internal connections eliminate possibility of "outage" due to improper connections; or damage to individual meters.

Heavy insulated binding posts are located at top away from operator. Instruments are placed along a horizontal centerline with all switches below.

The danger of interference with other equipment is minimized, due to less external wiring.

Model 639 is insulated for 1000 volt service.

Convenient . . . Saves Time: Model 639 is self-contained and all interconnections are made within the unit, thereby saving considerable time when power studies are being made . . . Only a few simple connections are necessary to place this instrument in circuit, eliminating the maze of interconnecting wires necessary when individual meters and transformers are used . . . Internal switches facilitate rapid measurement of all line currents and voltages . . . Complication of applying multiplying factors to scale readings, when using individual meters and transformers is avoided . . . Fine line scales with knife-edge pointers, and "straight-line" grouping of identical instruments, provides easy readability.

Low Burdens: Potential circuit per phase, 7 volt-amperes. Current circuit per phase, 6 volt-amperes.

High Overload Capacity: Current Circuits are designed to be used continuously at 25% above their rated values and may be subject to greater overloads for shorter periods of time.

Built In Accuracy: Current transformers are hand wound on nickel alloy ring type cores, making it possible to maintain the phase angle and ratio errors at a minimum which is well below transformers having joints and cores of ordinary material. The overall accuracy of the Wattmeter and Power Factor Meter is maintained even at low power factors as a result of the low phase angle of the transformers.

Series resistors are well spaced throughout Model 639 to provide maximum cooling for sustained operation and accuracy.

Ranges

Model 639 has self-contained potential ranges of 150/300/600 volts . . . current ranges of 5/25/125 amperes . . . and corresponding Wattmeter ranges . . . current and potential transformers may be used for extending these ranges.

Power factor indications are for 3-phase, 3-wire, balanced systems only30 lag through unity to .80 lead.

On 220 volt 3-phase circuits, the 5 ampere range will take care of loads to 1 hp on the 2 kw scale . . . on the 25 ampere range, up to $7\frac{1}{2}$ hp on the 10 kw scale . . . on the 125 ampere range up to 40 hp on the 50 kw scale. At 440 or 550 volts the hp and kw ranges are doubled.

Accuracy Tabulation On Various Instruments At Different Frequencies

INST.	RANGE	Accuracy % of Full Scale			INST.	RANGE	Accuracy % of Full Scale		
		25-125 cycles	200 cycles	400 cycles			25-125 cycles	200 cycles	400 cycles
AM.	All	± 1	± 1	± 0.5 to -15	Vm	600	± 1	± 1	0 to -2
WATT.	All	± 2	± 1 to -3	0 to -4	Vm	300	± 1	0 to -2	-2.5 to -4.5
P.F.	All	$\pm .02$ P.F.	$\pm .02$ P.F.	$\pm .03$ P.F.	Vm	150	± 1	-2.5 to -4.5	-13.5 to -15.5

Mr. Newingham

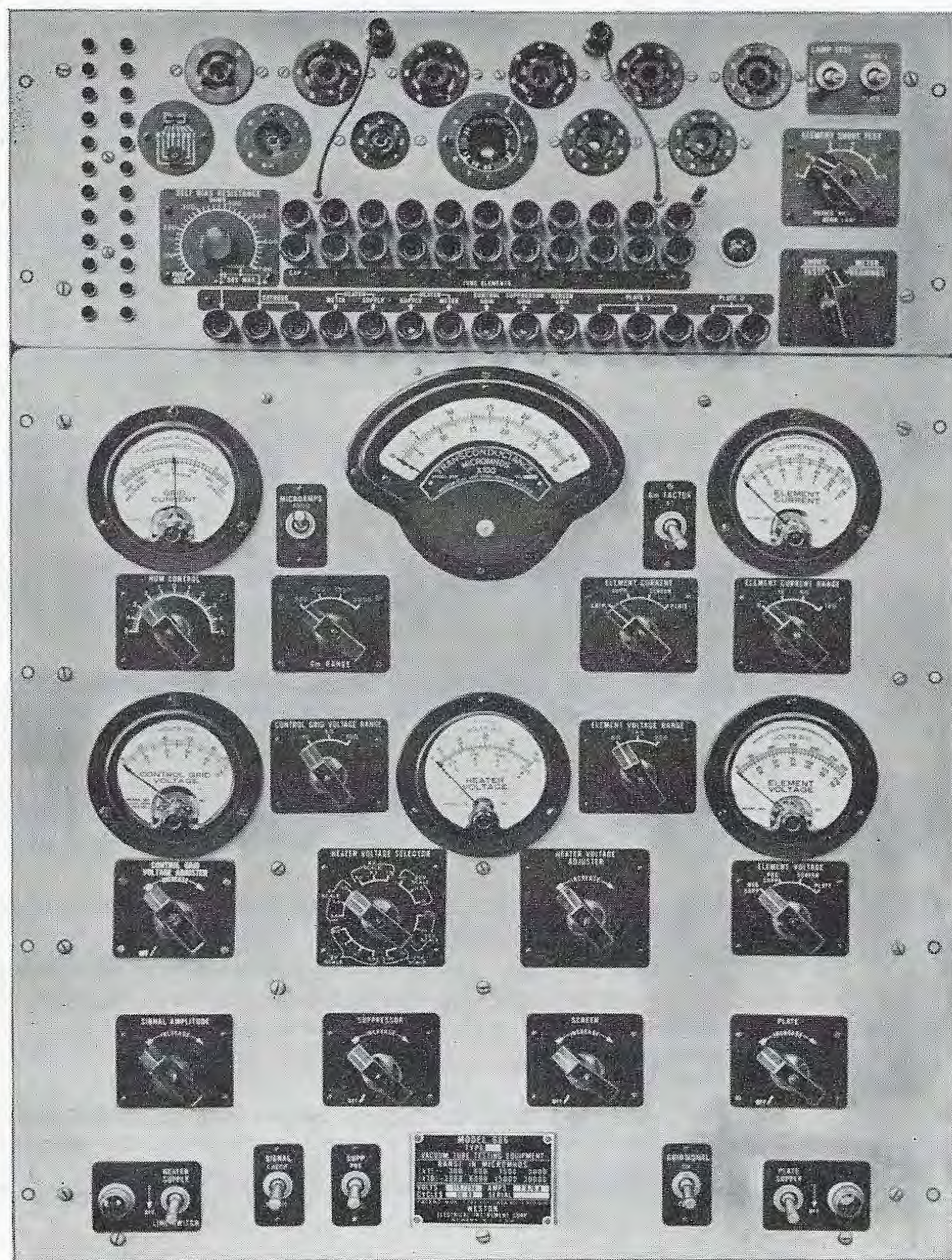
AT. 1-8089

TRUE MUTUAL CONDUCTANCE ELECTRON TUBE ANALYZER

\$975.00

Delivery from Stock 4-6 weeks

A Complete Electron Tube Analyzer



Model 686, Type 10A True Mutual Conductance Electron Tube Analyzer

TESTS TUBES UNDER EXACT OPERATING POTENTIALS!

Model 686 Type 10A is more than just another tube tester . . . it is a complete "all purpose" electron tube analyzer. It offers for the first time in one instrument, two primary advantages:

1. Accurate testing of *true mutual conductance* of all tubes in accordance with the manufacturer's rated operating conditions, and—
2. Determination of *true mutual conductance* of all tubes at other values not in conformance with standard ratings and operating conditions.

This latter feature facilitates the study of tube performance for non-standard applications, and quickly indicates the suitability of the tube for the circuit under consideration.

The Type 10A provides far greater accuracy than any previous model since the exact amplification factor of the tube under test need not be known. This also eliminates the former slight error due to scale distribution on tubes having an Amp Factor below 20.

Readings in True Mutual Conductance

The application of an a-c signal to the grid of a properly operating tube will cause an a-c component to appear in the plate circuit. An a-c meter in the plate circuit will read in terms of true mutual conductance and may be so calibrated only if the plate circuit resistance and the power supply impedance are known and properly compensated, as in Model 686.

Note that the added sensitivity is especially useful for the measurement of subminiature tubes having low transconductances. The new circuit for measurement of transconductance makes the test independent of all other parameters so that the true G_m is obtained on all triodes and pentodes, even low μ control tubes, without use of correction factors or charts. The scale of the G_m meter has a single arc

TRUE MUTUAL CONDUCTANCE ELECTRON TUBE ANALYZER (Con't)

thus eliminating the chance of error in choice of scale arcs.

No manual adjustment of variable shunts or other networks to correct the final mutual conductance is needed. As a result, no special test data are required other than a knowledge of tube basing and electrode potentials.

In addition to providing for the basic measurement of mutual conductance, tubes may be analyzed for grid-plate and screen current. External components such as resistors, relays, inductors, photo-cells, etc., may be introduced in series or across the various tube elements for study of an experimental or operating electronic circuit.

Unit Description

The unit is divided into two sections. The lower section contains a well filtered d-c power source, with separate controls for each tube element potential. This enables the user to apply any desired d-c potential from 0 to +300 volts to the anode, screen or plate elements, and 0 to -100 volts regulated on the control grid. Adjustable a-c potentials are available in 18 steps from 0.6 to 117 volts covering all normal filament ratings.

The maximum rating of plate supply is 100 Ma at 300 volts and 120 milliamperes at 250 volts.

The lower section also has a complete set of meters and metering switches for the standardization of each tube for plate-screen-suppressor-control grid current and voltage, and heater voltage over the ranges indicated below. All power supply potentials terminate in a row of individual pin jacks.

A new ring shunt in the element milliammeter eliminates the effects of switch contact resistance

and a special selector switch limits the voltage drop to a maximum of 75 millivolts.

In the upper section, a separate panel houses a hot leakage and short testing circuit, using a neon indicating lamp; and appropriate sockets for all receiving type tubes. A 500 ohm self-bias control in the upper section can be introduced into the cathode or filament return circuit. This control is suitably by-passed and may be used for any tube measurements under self-bias conditions. Each tube socket pin is brought out to an individual pin jack, permitting each element to be connected to the power source with flexible leads.

The basic design of this analyzer permits tube analysis under any operating condition within the range of the power supply and element measuring instruments. The flexibility of the element terminating arrangement provides maximum protection against obsolescence due to the introduction of new tube types.

SPECIFICATIONS

Power Requirements

115/230 Volts, 175 Watts, 50-60 Cycles A-C

Gm Ranges

	Signal Voltages			
	1.0	0.5	0.2	0.1
Micromhos (x1).....	300	600	1500	3000
Micromhos (x10).....	3000	6000	15000	30000

Power Supply Ranges

Filament Potentials.....(18 selected steps) 0.6 to 117 Volts AC
 Plate Potentials0 to 300 Volts DC
 Screen Potentials0 to 300 Volts DC
 Suppressor Potentials
 0 to 15 Volts Negative, 0 to 300 Volts Positive DC
 Control Grid Potentials.....0-10/0-50/0-100 Volts DC
 Signal Voltage0.1/0.2/0.5/1.0 Volts AC
 Power Supply Current100 Ma DC Maximum
 Self Bias.....0 to 750 ohms by-passed by 1,000 μ f capacitor

Meter Ranges

Filament Voltage Ranges.....2/4/8/20/50/125 Volts AC
 Plate Voltage Ranges.....60/150/300 Volts DC
 Screen Voltage Ranges.....60/150/300 Volts DC
 Suppressor Voltage Ranges.....60/150/300 Volts DC
 Plate Current Ranges.....3/12/60/120 Ma DC
 Screen Current Ranges.....3/12/60/120 Ma DC
 Suppressor Current Ranges.....3/12/60/120 Ma DC
 Cathode Current Ranges.....3/12/60/120 Ma DC
 Control Grid Current.....15-0-15/1500-0-1500 Microamperes DC
 Grid Voltage Ranges.....10/50/100 Volts DC

980 Line — ALL PURPOSE OSCILLOSCOPE



Model 983 — Oscilloscope

Size: 10" x 14" x 19.5"

Approx. Weight: 40 lbs.

The Model 983 is a high gain, wideband Oscilloscope designed to accurately reproduce waveforms comprising a wide band of frequencies. High sensitivity of 15 millivolts per inch RMS makes this Oscilloscope ideal for—setting resonant traps . . . signal tracing in low level stages . . . as a general null indicator . . . for phase characteristic measurement in Industrial Applications . . . and for sweep frequency visual alignment of TV receivers.

The scope contains identical vertical and horizontal push-pull amplifiers with a choice of a-c or d-c coupling without affecting either sensitivity or bandwidth. Both amplifiers have compensated step attenuators and cathode follower input.

It has excellent square wave reproduction with overshoot of only 2 to 5% with a rise time of 0.1 microsecond. The scope response is essentially flat throughout the specified range of 4.5 mc and is usable to 6 mc.

The unit has provisions for internal calibration, internal phased sine wave, and Z-axis intensity modulation. Reversal of polarity of both horizontal and vertical signals is easily accomplished by means of toggle switching. Tube replacements are non critical, and etched circuitry facilitates quick and rapid maintenance.

SPECIFICATIONS

Wide Band Frequency Response: Flat within 1.5 db from 0-3.58 mc and within -3 db to 4.5 mc on both vertical and horizontal amplifiers. Transient response: overshoot 2 to 5%. Rise time: 0.1 microsecond.

High Deflection Sensitivity: 15.0 millivolts per inch, RMS, on both vertical and horizontal amplifiers.

Phase Shift: Between horizontal-vertical amplifiers, 0-500 kc—0°, to 1 mc within 2°; by internal adjustment with gain controls at max 0° phase shift possible on any specific frequency to 6 mc.

Calibrating Voltages: 500 millivolts, 5 volts, 50 volts, 500 volts, peak to peak. Readily available and adjustable by front panel controls.

Z-Axis Modulation: Input terminal mounted on front panel.

Sweep Frequencies: 10-500,000 cps, variable. Preset TV/V position—30 cps. Preset TV/H Position—7875 cps. Retrace Time—better than 2% to 100 kc; at 500 kc less than 10%.

Internally Phased Sine Wave: Adjustable through 170°.

Vertical and Horizontal Polarity: Reversible.

Input Impedance: Vertical Amplifier (without Shielded Cable), 1 meg shunted by 60 mmf. Vertical Amplifier (with Shielded Cable), 1 meg shunted by 120 mmf. Vertical Amplifier (with Low Capacitance Probe), 10 meg shunted by 12 mmf. Horizontal amplifier (without Shielded Cable), 1 meg shunted by 60 mmf.

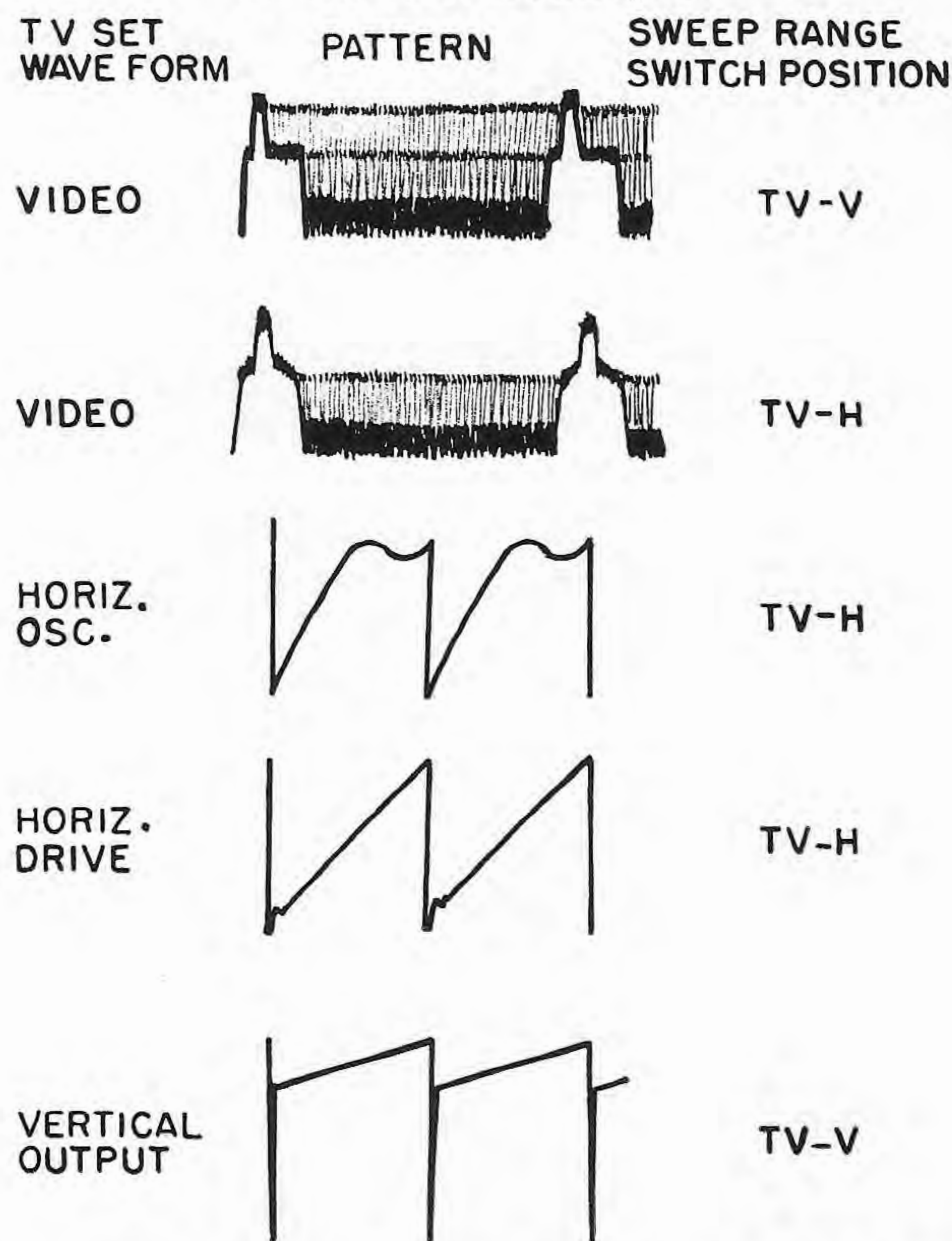
Power Supply: 105/125 volts, 50/60 cycles.

Tube Complement: (1)-1V2, (1)-5U4-GA, (6)-6BQ7A, (4)-12BY7A, (4)-6AH6V, (1)-6U8, (1)-5UP1, (1)-0D3, and (1)-5NO60T.

Case: Grey Hammertone finished steel.

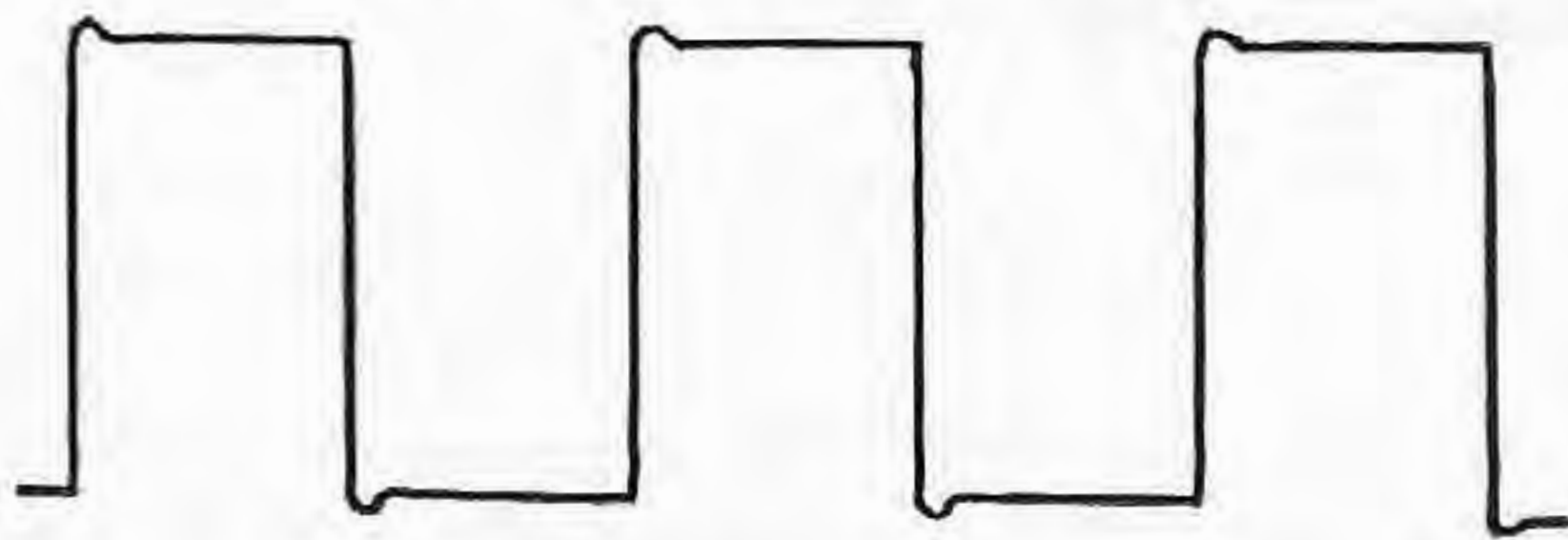
Panel: Aluminum finish with etched, black markings.

TV Waveform Analysis



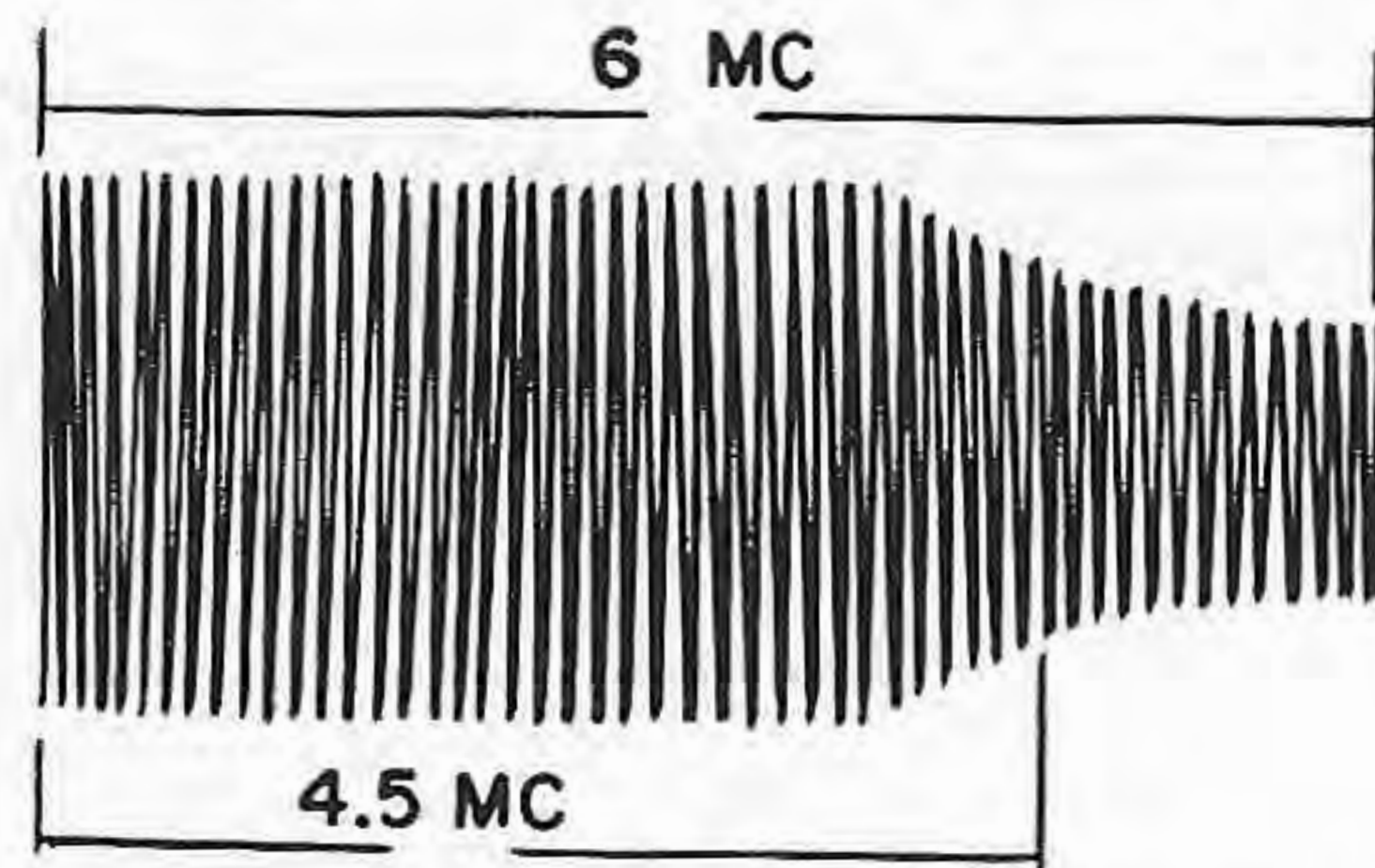
Sweep frequencies of 30 cycles per second are available by simply turning the sweep range switch to the desired range. A Z-axis terminal input on the front panel facilitates instrument test-hook-up when employing the Weston quick and accurate method of visual alignment.

Square Wave Response



Overshoot is only 2 to 5% Rise Time is 0.1 Microsecond. Square wave depicted 800 kc. A fast, retrace sweep circuit with cathode follower output prevents pattern distortion.

Response Characteristics



Note flatness throughout specified range; usable to 6 mc.

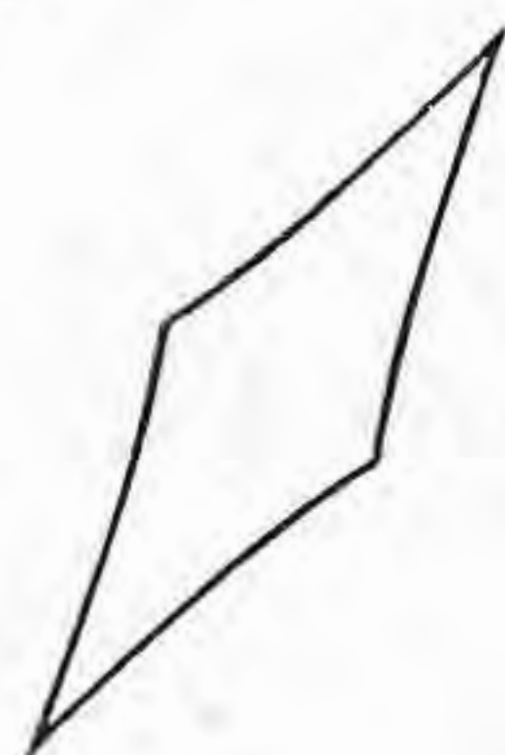
Audio Measurements



Cross-Over
Badly Matched Tubes



Clipping Due To
Grid Current



Transformer
Magnetizing Distortion

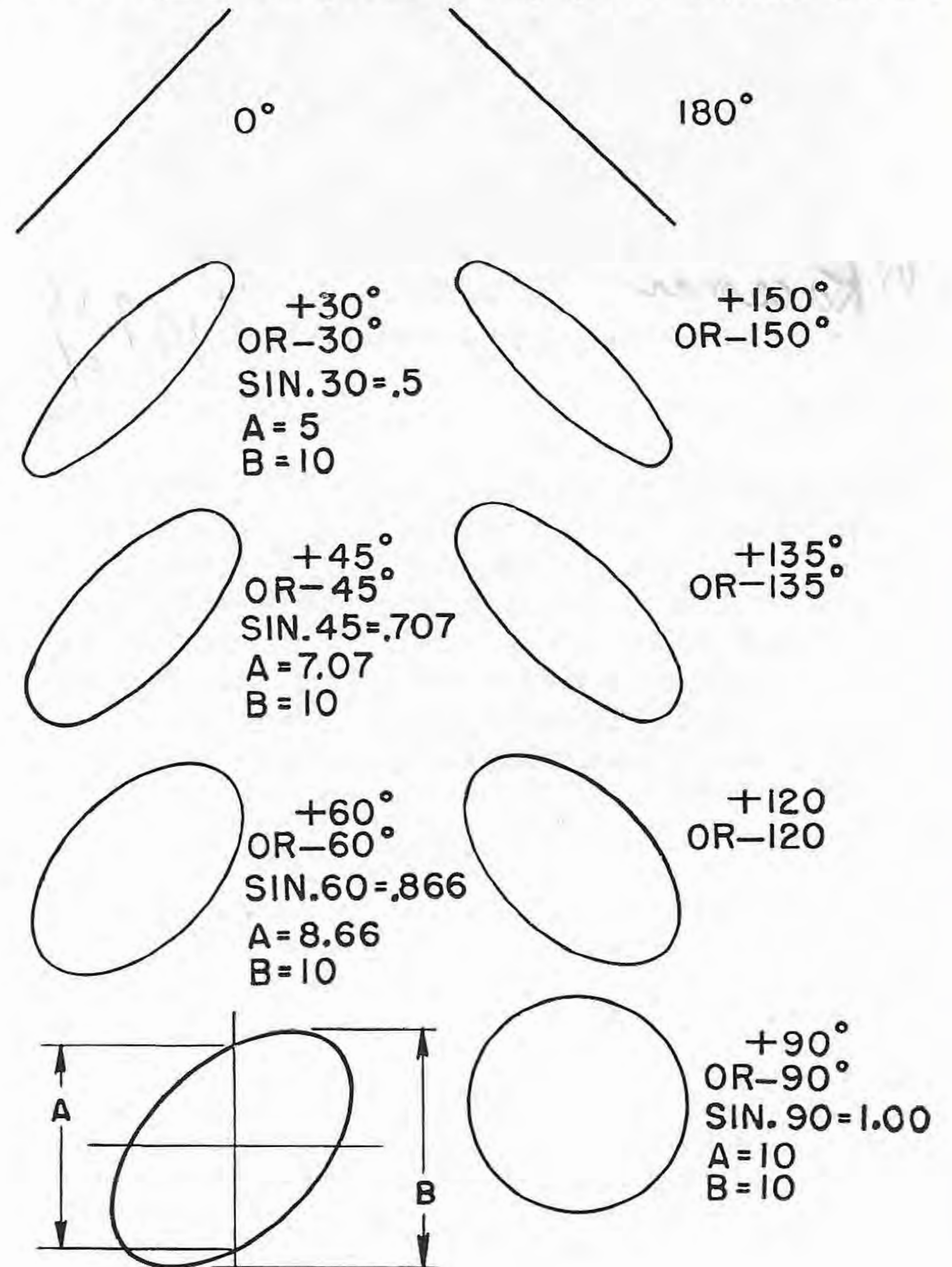
Oscilloscopes with identical amplifiers make audio amplifier analysis a relatively simple problem. The technique comprises connecting the amplifier input to the vertical input or Y terminal of the scope and taking the audio amplifier output across the voice coils and feeding the signal to the horizontal input. In this manner it becomes possible to determine the degree of phase shift or distortion present in the amplifier circuitry.

Phase Measurements

Vertical Signal In Phase
With Horizontal Signal

Zero Phase Shift

Phase shift between horizontal-vertical amplifiers, 0-500 kc-0°, to 1 mc within 2°; by internal adjustment with gain controls at max 0° phase shift possible on any specific frequency to 6 mc.

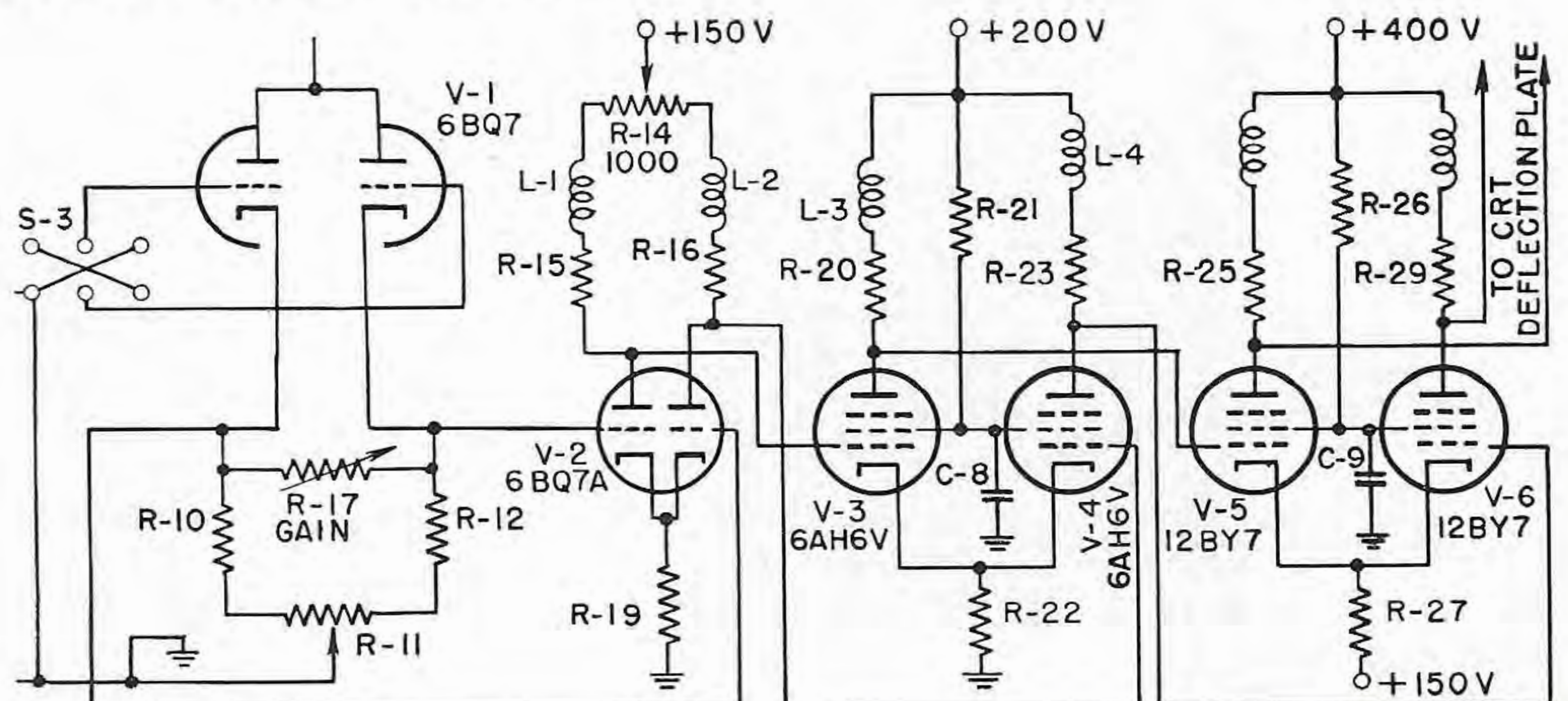


$$\text{Phase Shift Angle} = \text{Arcsine } \frac{A}{B}$$

By virtue of identical amplifiers Model 983 Oscilloscope is excellent for phase shift measurements. The phase shift angle is related to ratio of the distance A divided by the distance B. The A distance is the intercept on the vertical line and the B distance is the total height of the pattern.

Vertical-Horizontal Amplifiers

A 6BQ7A tube is employed as a wideband cathode follower. A gain control connected at the two cathodes serves as a variable resistance which effectively changes the output impedance. The low voltage level output available from the cathode follower is then amplified by three stages of direct coupled push-pull amplification.



980 Line – TUBE CHECKER



Model 981, Type 3—Tube checker

Size: 17.50" x 13.25" x 6.00".

Weight: 23½ lbs. (10.7 kgs.)

The Weston Tube checker Model 981 Type 3 is a new functional tubetester of the Proportional Mutual Conductance type. This model has been especially designed to bring together in one instrument the best features in a portable tubetester. The instrument consists of a vacuum tube and voltage regulator tester and is mounted in one complete assembly within an attractive grey hammertone finished steel case. Constructed of high quality components to assure accuracy and dependability of performance, Model 981 provides for the accurate and rapid measurement of proportional mutual conductances, emission characteristics of rectifiers and diodes, and the firing potential limits of voltage regulators and low power thyratrons.

FEATURES

Gm Measurements—Gm measurements are made more accurately by using filtered d-c plate, screen grid and control grid potentials. A precision voltage divider network and selector switch allows a proportionate value of signal voltage to be chosen for testing tubes having transconductances up to 30,000 micromhos. Signal voltages of 5.2, 2.6, 1.3, and 0.65 volts peak-to-peak having a frequency of 5000 cycles are provided.

Meter Measurement of High Leakage Resistance—The outstanding feature is the provision for accurate leakage measurement between tube elements. Since tube leakage as high as several megohms can cause poor performance in TV receivers, this tube checker is designed to provide an accurate meter measurement of leakage resistance as high as 5 megohms between tube elements, thus being particularly useful for TV servicing and TV line production assembly.

Multiple Switching Facilities—Protection against obsolescence over the conventional tube checker is assured through the use of nine single circuit, twelve position, selector switches. These multiple switching facilities make possible many more combinations of tube connections.

Twin Section Tubes—Three toggle switches make it possible to rapidly check and compare the respective sections of twin section tubes at only one setting of the selector switches.

Roll Index Chart—A complete listing of tube test data is available at the flick of a finger by means of an easy-to-read, built-in roll chart. This conveniently located roll chart provides comprehensive, up-to-date test data on commonly encountered tubes, as well as those infrequently used. The chart mechanism is constructed to insure perfect alignment for fast, smooth operation.

Grid Bias, Screen Grid and Plate Voltage—Filtered d-c potentials of 90, 130, and 220 volts are available for plate and screen potentials. A variable filtered d-c voltage in two ranges of 0.5 and 0-20 volts are used to obtain better resolution of Grid Bias settings. Far greater accuracy is obtainable with filtered d-c potentials than previously possible in portable tube checkers.

Subminiature Type Tubes—A 45 volt potential source facilitates testing of subminiature tubes.

Voltage Regulator Tubes—A selenium rectifier supply furnishes 200 volts d-c for testing of voltage regulator tubes.

Single Socket for Each Tube Base Regardless of Tube Connection—Only one socket for each type tube base regardless of tube base connection eliminates the possibility of plugging a tube into the wrong socket. Sockets are provided for conventional type tube bases as well as acorn, and 7 and 8 pin subminiatures.

SPECIFICATIONS

Filament Voltage:	.65, 1.1, 1.5, 2, 2.5, 0.6a, 3.3, 5, 6.3, 7.5, 10, 13, 20, 27.5, 35, 47, 70, 115.
Plate Voltage:	90, 130, 220 volts d-c. 22, 44, 160 volts a-c.
Grid Bias:	0-5V, 0-20 volts d-c.
Signal Voltages:	5.2, 2.6, 1.3, 0.65 volts peak-to-peak.
Gm Range:	Up to 30,000 micromhos.
Power Requirements:	100 to 125 volts, 60 cycles single-phase a-c, 30 watts.
Case:	Grey hammertone finished steel.

980 Line – VOLT-OHM-MILLIAMMETER



Model 980—Volt-Ohm-Milliammeter

Accuracy: 2%, d-c; 3%, a-c

Scale Length: 4.63"

Size: 6.25" x 7.50" x 3.25" Approx. Weight: 2 lbs., 11 ozs. (1.25 kgs.)
(158.8 x 190.5 x 82.6mm)

The Weston Model 980 Volt-Ohm-Milliammeter is a highly sensitive, accurate and rugged instrument with an etched circuit and a combination of functional ranges which provide a wide range of test measurement applications in the electronic field. The instrument has a d-c sensitivity of 20,000 ohms/volt, and an a-c sensitivity of 1000 ohms/volt. Accuracy is 2% d-c, 3% a-c.

Range and functional switching is greatly simplified by use of a single dial for all ranges and functions.

980 Line – VACUUM TUBE VOLTMETER

Size: 10" x 7.38" x 3.63" (254 x 187.3 x 92.1mm)

Weight: 6 lbs. (complete with batteries and accessories) (2.72 kgs.)

Accuracy: $\pm 3\%$ d-c, $\pm 5\%$ a-c RMS; sinusoidal wave form.

Impedance: 10 megohms d-c; 2.8 megs a-c RMS; 1 meg a-c, peak to peak.

Scale Length: 4.63"

The Weston Model 982 is a self-contained, battery operated Vacuum Tube Voltmeter. It is adaptable to the Radio-TV servicing industry where the requirements of peak to peak measurements of a-c voltages exclude the use of conventional meters. It makes possible quantitative measurement of all complex wave form voltages utilized in video, sync and deflection circuits with no a-c line interference in critical measurements.



Model 982 — Vacuum Tube Voltmeter

FEATURES

Unit is Battery Operated—Unit affords complete isolation from spurious response due to stray a-c fields and circulating ground currents. Extremely low drain for long battery life. *Power Consumption: Less than 25 milliwatts.*

No Switching of Leads is Required—One shielded lead is used for all measurements, a-c, d-c, ohms and peak to peak.

Range Function Switch—Makes negative and positive d-c potentials measurable DIRECTLY.

High Input Impedance—10 megohms on d-c for accurate measurements—2.8 megohms a-c RMS—1 megohm a-c, peak to peak.

No Zero Scale Drift—Instrument can be used immediately without waiting for warm up . . . resetting of zero corrector when switching from range to range is entirely eliminated.

D-C Isolation Adaptor—Makes d-c measurements possible in the presence of a-c voltages. (Supplied with instrument).

Frequency Response—Suitable for measurement of TV wave forms, such as sync pulses, saw tooth, drive voltages, and other complex wave form voltages.

Discriminator Alignment—Zero corrector knob has sufficient latitude to center scale.

RF Probe—Is available as an accessory.

Low Capacitance Adaptor—Makes peak-to-peak measurements possible with an input impedance of 10 megohms and a shunt capacitance of only 15 mmf. This circuit makes it easy to service TV horizontal and vertical sections with minimum circuit loading. (Supplied with instrument).

Reset Button: Facilitates rapid readings on peak-to-peak or AC measurements.

SPECIFICATIONS

Ranges:

D-C Volts	1.6	8	40	160	400	800	1600
A-C Volts	1.6	8	40	160	400	800	1200
P-P Volts	1.6	8	40	160	400	800	1600
Low-C Probe							
P-P Volts	16	80	400	1600			
Ohms	X1Meg	X100K	X10K	X1K	X100	X10	X1 (10 ohms center)

Battery Life: Battery A*—Approx. 90 days—is easily replaceable (Standard 1.5 Volt, Size D Cell). Battery B*—Shelf Life Approx. 1 year.

*Based on maximum use—8 hours per day.

Case: Grey hammertone finished steel.

Panel: Aluminum finish with markings etched in black.

VOLT-OHM-MILLIAMMETER (Con't)

SPECIFICATIONS

Ranges: D-C Volts: 1.6, 8, 40, 160, 400, 1600.....at 20,000 Ohms/Volt

A-C Volts: 1.6, 8, 40, 160, 400, 1600.....at 1,000 Ohms/Volt

DB Range: — 15 db to + 54 db (in six ranges)

D-C Milliamperes: 8, 80, 800

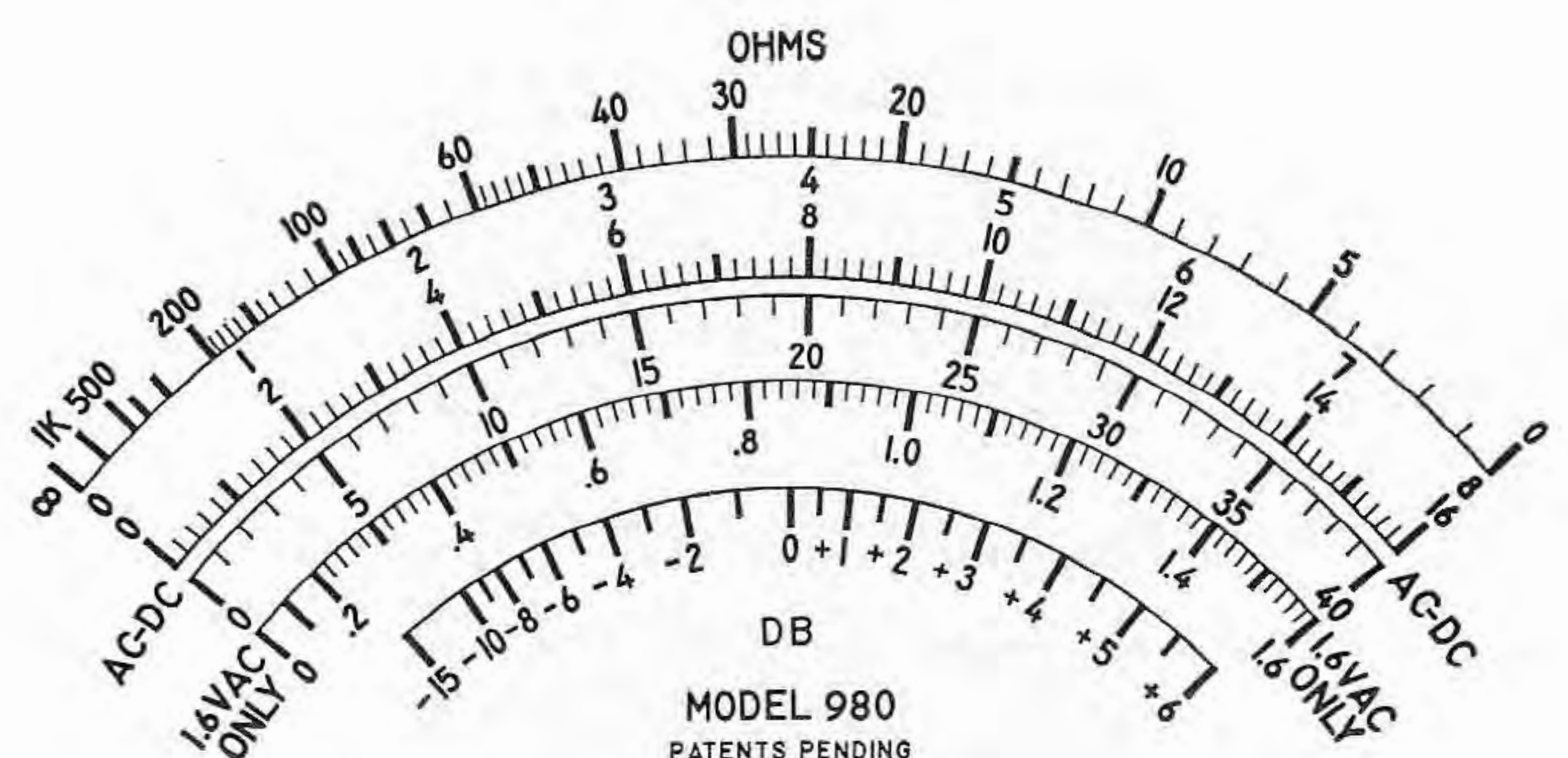
D-C Microamperes: 80

D-C Amperes: 8

Ohms Range	Center Scale	Full Scale
R x 1	25	1,000
R x 10	250	10,000
R x 100	2,500	100,000
R x 1,000	25,000	1 megohm
R x 10,000	250,000	10 megohms

Case: Black molded bakelite.

Panel: Black molded bakelite with engraved white markings.



980 Line – SWEEP GENERATOR



Model 984 — Sweep Generator

Size: 13.50" x 10" x 6.75"

(342.9 x 254 x 171.4 mm)

Approx. Weight: 14 lbs., 4 ozs.

(6.47 kgs.)

The Weston Model 984 is a top performance instrument precision built for effective trouble shooting of sound and video IF circuits, associated trap circuits, TV tuners, video amplifiers and all-purpose visual alignment. It has a high flat output voltage.

FEATURES

Blanking: Special circuitry produces a zero output reference base which is essential for relative gain measurements.

RF Output: Frequency modulated signal, TV channels 2 to 13 inclusive, complete FM coverage available by means of two preset selector positions. *FREQUENCIES ARE FUNDAMENTALS OF THE OSCILLATOR FREQUENCY.*

IF/Video Output: Frequency modulated signals ranging to 50 megacycles, continuous tuning, signals free from harmonics.

Sweep Width: Full 10 megacycles on all channels.

Z-Axis Terminal: For use with the Model 985 Calibrator.

Circuit Description: A 6T6 tube is used as a pushpull RF sweep oscillator. This oscillator is frequency modulated at 60 cycles by the mechanical motion of capacitor plates. A 60 cycle a-c voltage impressed across the voice coil actuates the plates of these capacitors and the relative motion of the coil is determined by the setting of the sweep width control. By means of the channel selector switch the appropriate channel center frequency is obtained. Coils utilized are the permeability type and are adjusted at the factory. The amplitude level of the RF output signal is controlled by the attenuator.

SPECIFICATIONS

Sweep Width: 0-10 Megacycles (continuously variable for both IF and RF).

Output Voltage (RMS): 0.1 Volt . . . sweep is linear.

RF Output: TV channels 2 to 13 preset. Complete FM coverage available by means of two additional preset selector positions.

IF/Video Output: 50 Megacycles (continuous tuning).

Horizontal Sweep for Oscilloscope: Phase adjustment range: 165°
Frequency: Power Line 60 cycles per second.

Cable Termination: RF output 300 ohms balanced. IF output 100 ohms.

Power: 105/125 volts, 60 cycles.

Tube Component: 6J6, 6U8, 12AT7, 6X4.

Case: Grey hammertone finished steel.

Panel: Etched aluminum satin finish.

ACCESSORIES FOR THE 980 LINE OF INSTRUMENTS

HIGH VOLTAGE PROBES—For Models 980-982

For measuring high voltages up to 20 kv at 50 microamperes or less. Probes consist of multiplier resistor encased in an insulated probe handle. Multipliers are rated with a flash voltage of 30 kv.

RF PROBE—For Model 982

Used in conjunction with a VTVM makes it possible to read RF voltages as high as 250 megacycles present in TV and radio receivers. Voltage is indicated in terms of rms on a sine wave.

LOW CAPACITANCE PROBE—For Model 982

For reducing the capacitive and resistive loading effects on the circuit under test. Makes possible peak to peak measurements with an input impedance of 10 megohms and a shunt capacitance of only 15 mmf.

ISOLATION PROBE—For Model 982

Used in conjunction with VTVM, the electronic function of the unit is performed by a 270 K resistor placed in series with the hot test lead. The resistor prevents interaction between the circuit under test and the voltmeter.

LOW CAPACITANCE PROBE—For Model 983

Used in trouble-shooting high impedance circuits to prevent loading.

DEMODULATOR PROBE—For Model 983

For use in separating the modulation from the RF signal, and especially useful in signal tracing.

SHIELDED INPUT LEAD—For Model 983

Necessary in providing complete shielding from stray fields which may possibly distort the input signal.

980 Line — CALIBRATOR

Size: 13.5" x 10" x 6.75"

(342.9 x 254 x 171.4 mm)

Approx. Weight: 18 lbs., 12 ozs.

(8.51 kgs.)

The Weston Model 985 Calibrator is a highly functional instrument for TV shop, engineering, laboratory, and industrial alignment applications. Markers are provided for wave-form patterns, local tuner oscillator frequencies, and trap circuit alignment. The instrument is extremely useful for making linearity adjustments, calibrating signal generators, and determining signals of unknown frequencies.



Model 985 — Calibrator

FEATURES

Scale Calibration: The frequency calibration of each frequency setting can be checked and adjusted with crystal accuracy. Crystal calibrating points are available at 1.5 and 4.5 megacycles throughout the entire scale. A scale shift knob is provided to align properly the scale with the crystal calibrating dots. A neon bulb indicates visibly the crystal frequency points.

Scale Presentation: Slide rule type in which one scale is visible at a time. Ten scale range bands available . . . total scale length of 8 1/4 ft.

Dual Markers: 4.5 mc side band markers permit simultaneous observation of video and sound carrier.

Internal Markers: Special circuitry provides an internal marker of either a positive or negative pulse suitable for Z-axis intensity modulation of the scope pattern. This eliminates the necessity of feeding an RF calibrator signal directly into the TV receiver which can cause overload and oscillation in the TV set. The marker is visible even at the sound trap frequencies.

Heterodyne Detection: With an input sensitivity of 500 microvolts, the local TV receiver-tuner channel oscillator frequency can be determined without tuner disassembly.

Bar Pattern Generator: Amplitude modulated signals of the band oscillator at 400 cycles for the horizontal linearity check and 300 KC for the vertical linearity check can be readily fed to TV antenna terminals to produce horizontal and vertical bars.

Z-axis Circuit: Consists of a 6T4 variable oscillator from which a signal is injected into the 6BA7 mixer stage with an accompanying signal from the crystal oscillator. The input sweep signal is also applied to the mixer stage. A tuned plate load impedance selects the correct components which are then amplified by 12AT7 and 6CL6 amplifier stages and connected to the Z-axis output terminal.

Since the plate load of the mixer is tuned to 75 kilocycles, there will be two points at which the mixer will generate an output; one at 75 kc below the setting of the variable oscillator and the other 75 kc above the setting of the oscillator. The center between these two points is the correct frequency. A 6AL5 diode is used to clamp the rectified 75 kc amplified signal.

Zero Beat Indication Circuit: In the heterodyne detection circuit, the unknown signal frequency is injected in the mixer stage along with the variable oscillator frequency. The variable oscillator frequency is manually adjusted until zero beat is obtained as indicated by the neon bulb. When the frequency difference between the unknown signal and the variable oscillator becomes about 1 kilocycle, the neon bulb will light. The exact zero beat is indicated when the light is sharply extinguished. Calibration is achieved in the same manner except that in place of the unknown signal, the harmonic of the crystal oscillator is used.

SPECIFICATIONS

Frequency Range (with Variable Frequency Oscillator): 4-110 megacycles in 7 bands. 170-260 megacycles in 3 bands. Use of second harmonic is suitable for UHF—340-520 megacycles in 3 bands.

Output Attenuator Range: 100% to 1%.

Crystal Marker Accuracy: 1.5 mc position $\pm 0.01\%$; 4.5 mc position $\pm 0.01\%$.

Internal Modulation Frequencies: 400 cps, 300 KC, 4.5 mc.

Heterodyne Input Sensitivity: 500 microvolts (VFO).

Linearity Adjustment: Horizontal—400 cycles, Vertical—300 KC.

Dual Markers: Video and sound . . . available for either Z-axis intensity modulation of scope or conventional marker pip display.

Tube Complement: 6BA7, 12AT7, 6CL6, 6AL5, 6X4, 6T4.

Power Supply: 105/125 volts, 50/60 cps.

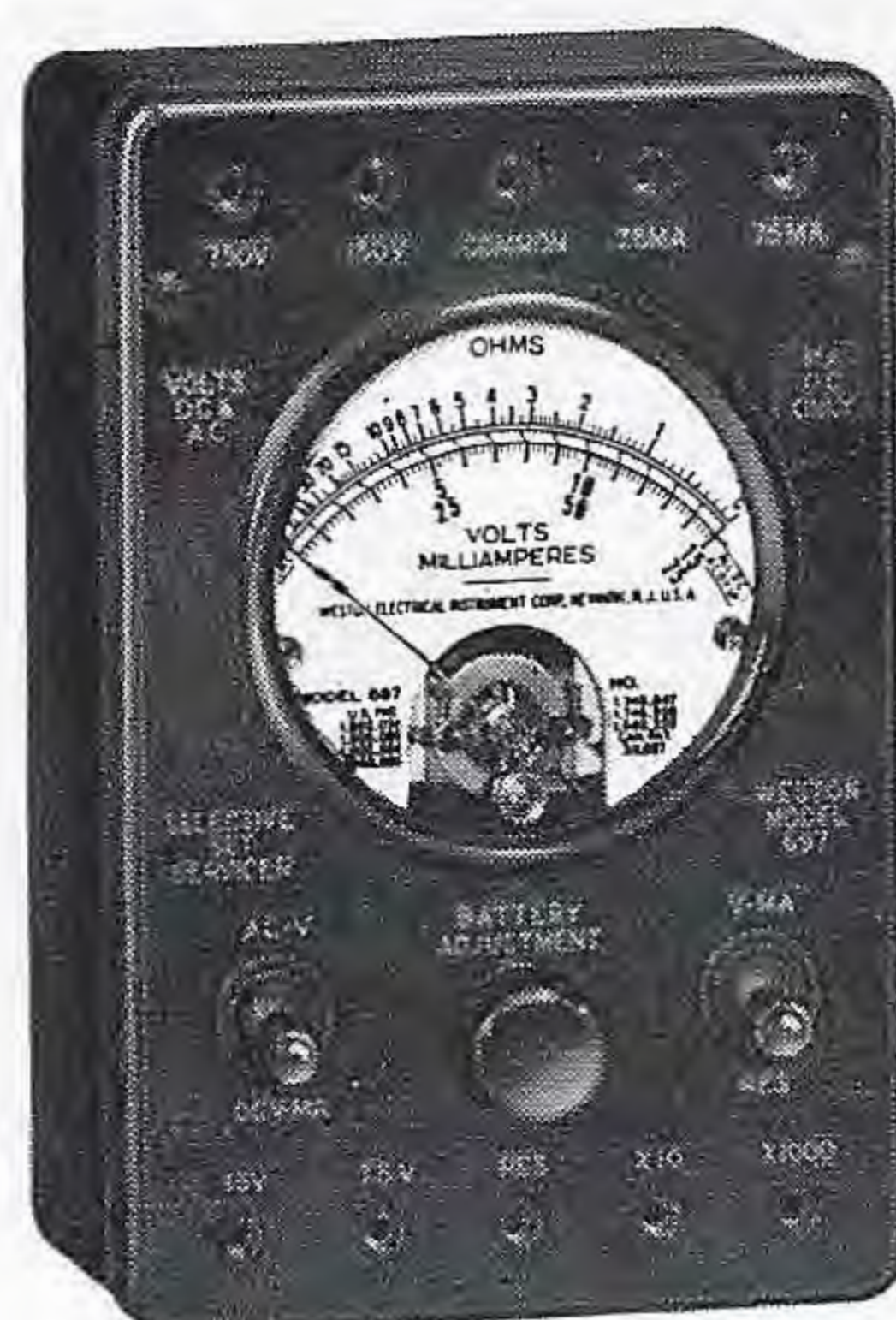
Scale Length: 8 1/4 ft.

Case: Grey hammertone finished steel.

Panel: Aluminum finish with etched black markings.

POCKET SIZE TESTERS

MODEL 697 VOLT-OHM-MILLIAMMETER



Model 697

ACCURACY: 2% D-C — 5% A-C

SCALE: 2.36" (60 mm)

Size: 5³/₁₆" x 3³/₄" x 3³/₁₆" (141 x 95 x 65 mm)

Approx. Wt.: 1³/₄ lbs. (.794 kgs.)

Low cost, light weight instrument with a well selected group of ranges to cover the majority of measurements required in electrical and electronic equipment. Ideal for portable use and small enough to be included in a kit of general maintenance tools. Test leads are supplied.

RANGES: 0-7.5/15/150/750 a-c and d-c (1000 ohms per volt)

CURRENT: 0-7.5/75 milliamperes d-c

RESISTANCE: Full scale 5,000/500,000 ohms — Center scale 35/3500 ohms

MODEL 564 VOLT-OHMMETER



Model 564

ACCURACY: 2%

SCALE: 2.36" (60 mm)

Size: 5³/₁₆" x 3⁴/₁₆" x 2¹/₁₆" (140 x 94 x 65 mm)

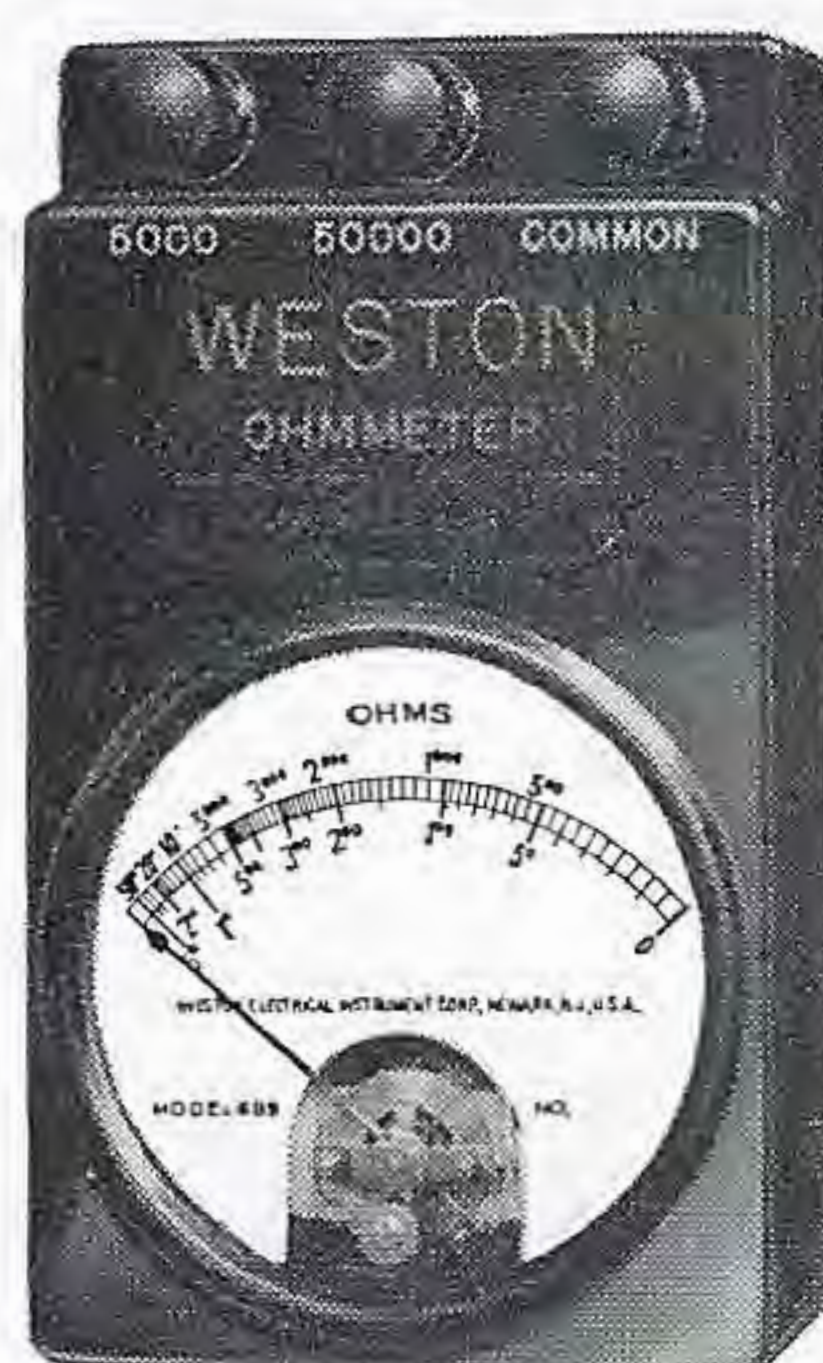
Approx. Wt.: 1³/₄ lbs. (.79 kgs.)

For all general maintenance measurements on D-C equipment. Pocket size, convenient and easy to use. Test leads are supplied.

RANGES: 3/30/300/600 volts d-c (1,000 ohms per volt)

RESISTANCE: Full scale — 1,000/10,000/100,000/1,000,000 ohms

MODEL 689 OHMMETERS



Model 689
Type 1-E

ACCURACY: 2%

SCALE: 2.36" (60 mm)

Size: 5" x 2⁷/₈" x 1⁷/₈" (125 x 73 x 47.6 mm)

Approx. Wt.: 1 lb. (.45 kgs.)

Checks circuits by the resistance and continuity method. For production testing of armature and field resistance of small motors, relay and coil testing and other electrical components. Test leads are supplied.

RANGES: Type 1-E—double range 0-5,000 and 50,000 ohms-full scale
Type 1-F—double range 0-10 and 0-1,000 ohms-full scale

ACCESSORIES

MODEL 604 CURRENT TRANSFORMER

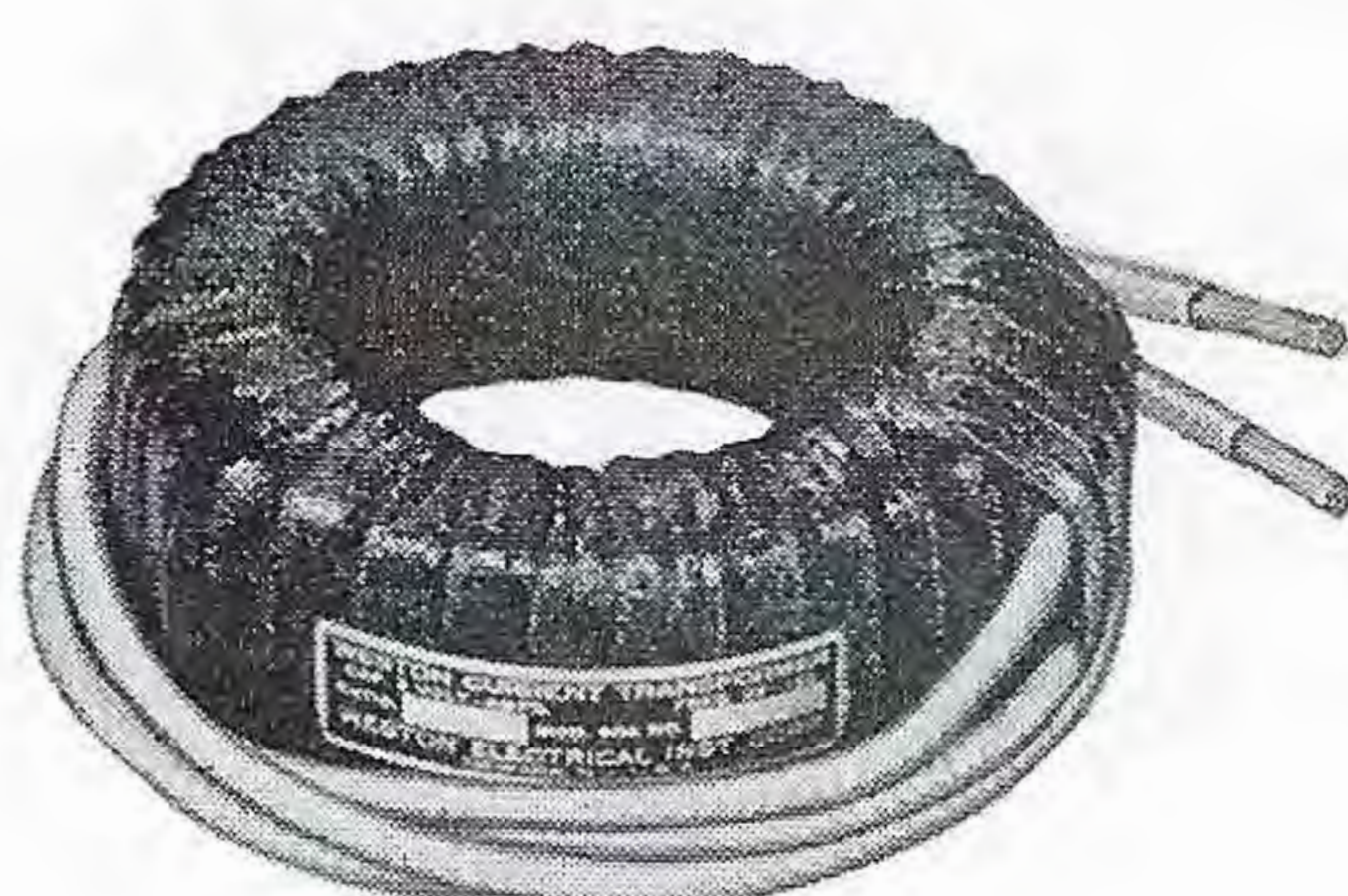
Inserted primary type used to increase a-c current range of Model 785. Type 1, accuracy 1% on frequencies from 25 to 125 cycles, capacity 2 volt-amperes. Type 2, accuracy 1% on frequencies from 50-125 cycles, capacity 5 volt-amperes. Ratios include 200:5, 300:5, 400:5, 500:5.

100 MV EXTERNAL SHUNT

Used for extending d-c current ranges of Model 785 beyond 10 amperes. Available in 50, 100, 250 and 500 amperes.

CARRYING CASES

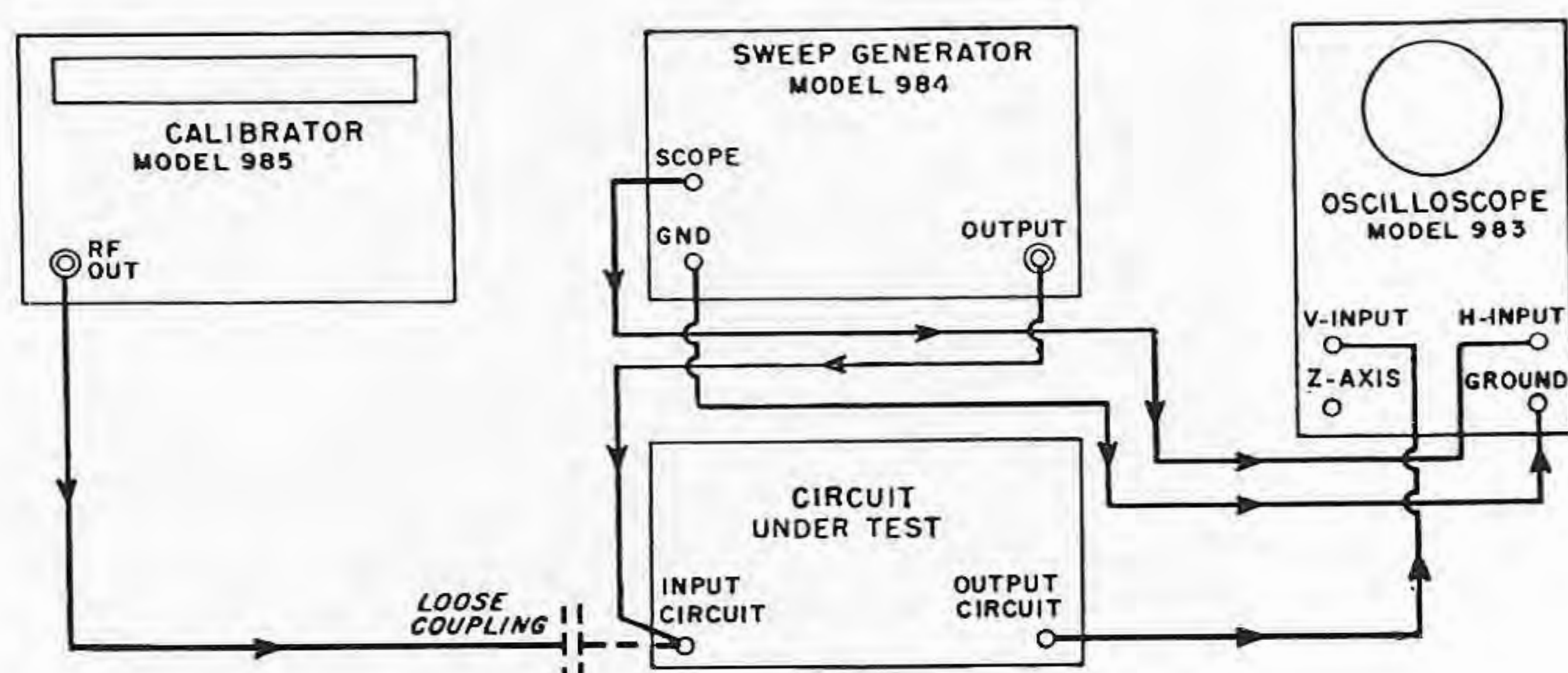
For greater protection, pocket-size instruments should be housed in carrying cases when stored, or when being transported on the job. When ordering please specify model number of instruments with which they are to be used. Cases available for Models 564, 689, 697, 980 and 982.



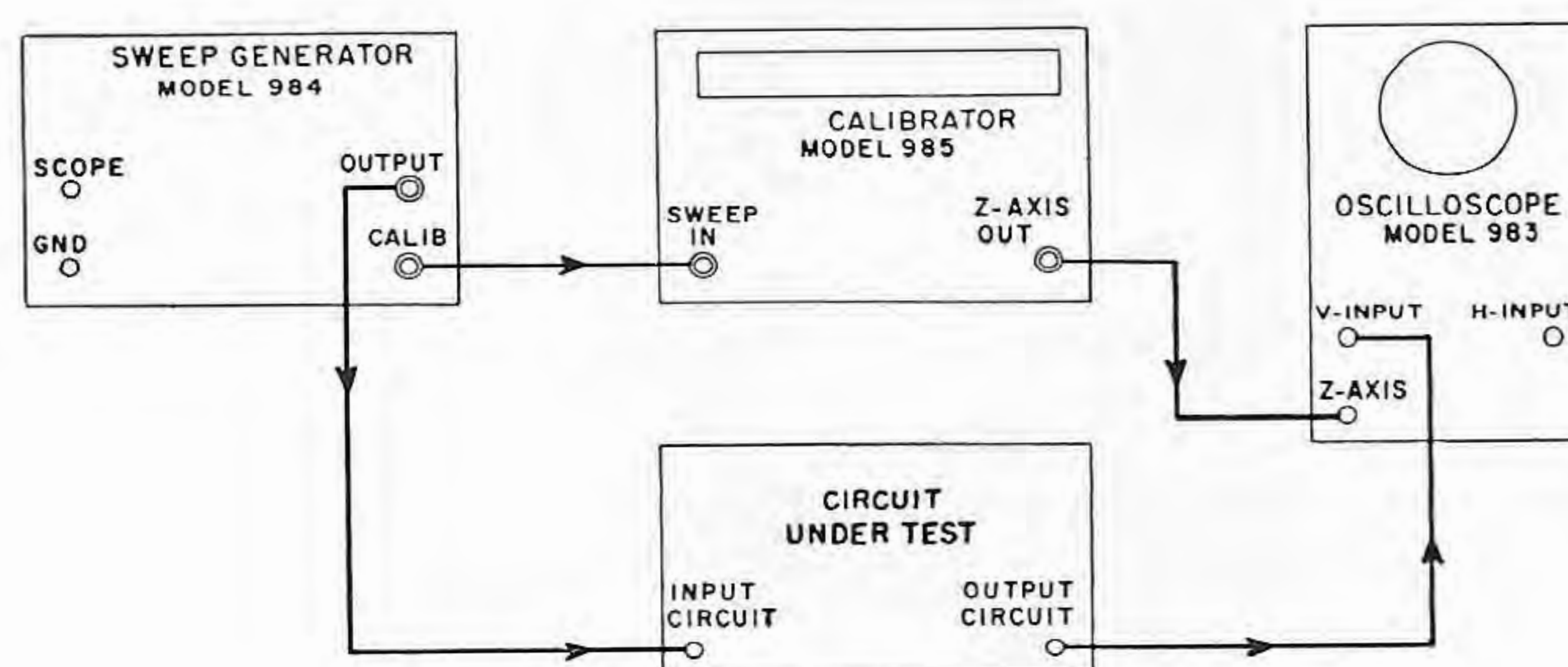
Model 604

WESTON SIMPLIFIED METHOD OF VISUAL ALIGNMENT

ACCURATE—TIME SAVING—MONEY SAVING



Conventional Method of Visual Alignment



Weston Simplified Method of Visual Alignment

In the 980 Line, Weston offers the most simple, accurate, and rapid method of visual alignment. If you have been annoyed with the disappearance of markers at trap resonant frequencies, disturbed with trimmer touch-up on trap circuits after a completed alignment procedure, troubled with receiver oscillations in your test hook-up or critical coupling in your test alignment hook-up, then this new approach to visual alignment is just what you've been looking for.

In the Weston method, it is unnecessary to connect the calibrator to the circuit under test, thus eliminating spurious markers which can be generated by intermodulation of the calibrator signal with that of the circuit signals. Use of only two connections to the unit prevents receiver oscillations encountered

with the conventional method of multiple lead test hook-up. Note block diagrams shown above.

Further, there is no disappearance of markers at trap resonant frequencies. Z-axis modulation of the scope provides accurate intensity markers on the response curve under conditions where beat note markers would disappear. Response curves are not disturbed. Annoying trimmer touch-up on trap circuits is minimized. This simplified and rapid method of alignment is only possible when the companion instruments — Weston Calibrator Model 985 and Sweep Generator Model 984—are used with a scope having provisions for Z-axis intensity modulation. However, individual instruments in the Model 980 Line can be used with available test equipment in the conventional method of alignment.

WARRANTY

These products are warranted to be of good workmanship and quality and free from defects in manufacture. Our liability is limited to repairing such defects, providing return is made prepaid to the Service Division, Weston Electrical Instrument Corporation, Newark 5, N. J. within one (1) year after delivery to the original purchaser, except for electron tubes and batteries utilized in this equipment for which the warranty period is ninety (90) days. We shall not be liable for consequential damages. This warranty is in lieu of all other warranties, guaranties, liabilities or obligations, statutory or implied, to the original purchaser or to any other person.



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IN THE
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ATLANTA—E. A. Thornwell, Inc.
BALTIMORE—Thomas H. Closs
BOSTON—Cowperthwait and Brodhead
BUFFALO—Cooper-Morgan, Inc., Hamburg, N. Y.
CHARLOTTE, N. C.—Ranson, Wallace & Company
CHICAGO—Weston Electrical Instrument Corp.
CINCINNATI—Beedle Equipment Co.
CLEVELAND—Ambos-Jones Company
DALLAS—Butler and Land
DAYTON—Beedle Equipment Co.
DENVER—Peterson Company
DETROIT—T. S. Cawthorne Company
HOUSTON—Lynn Elliott Company
JACKSONVILLE—Ward Engineering Co., Inc.
KANSAS CITY, MO.—C. B. Fall Co., Hickman Mills
KNOXVILLE—A. R. Hough
LITTLE ROCK, ARK.—Curtis H. Stout
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NEW ORLEANS—W. J. Keller
NEW YORK—Weston Electrical Instrument Corp.
ORLANDO, FLA.—Ward Engineering Co., Inc.
PHILADELPHIA—Joralemon, Craig and Co.
PHOENIX—J. E. Redmond Supply Co.
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SEATTLE—Eicher & Company
ST. LOUIS—C. B. Fall Company
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CANADA

Powerlite Devices, Ltd.
Northern Electric, Ltd.