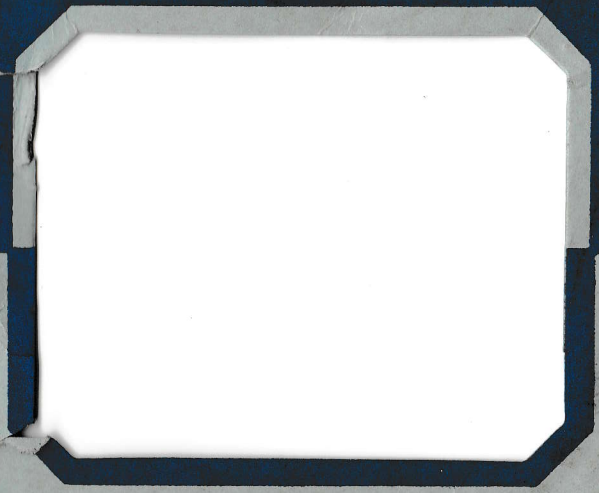
INSTRUCTION MANUAL FOR



EICO

ELECTRONIC INSTRUMENT CO., Inc.

84 WITMERS STREET, BROOKLYN 11, N. Y.

MULTI-SIGNAL TRACER

The Eico Model 145

DESCRIPTION

The Eico Model 145 Multi-Signal Tracer features a crystal diode probe with a frequency response to well over 200 megacycles. It is an extremely versatile instrument used for the tracing of RF, AF, IF and television video frequencies. Besides audible signal tracing with the internal speaker or earphones, provisions are included for visual signal tracing with a Vacuum Tube Voltmeter, such as the Eico Model 221, or an oscilloscope, such as the Eico Model 400. The unit may also be used as a small public address system or an inter-communication system unit. The serviceman will find it an indispensable instrument for his service bench.

GENERAL OPERATING INSTRUCTIONS

Before using the Eico Model 145 Multi-Signal Tracer, read the instructions carefully. The Eico Model 145 Multi-Signal Tracer is designed to operate on 105 to 120 volts, 50-60 cycles alternating current. The A.C. power switch is located on the gain control. Controls and jacks are clearly identified by the markings on the panel and serve the following purposes:

1. INPUT pin jacks: The diode probe pin tips are inserted into the INPUT jacks and feed the audio modulation component of the signal to the internal audio amplifier. In using the Multi-Signal Tracer as an audio amplifier or P.A. system, the output of the microphone or phonograph is fed DIRECTLY into the INPUT pin jacks without using the diode probe.

2. GAIN CONTROL: This varies the gain of the internal amplifier. When turned to the extreme counter-clockwise position, the A.C. power is turned off.

3. OUTPUT SWITCH: When the OUTPUT SWITCH is turned to the "SIGNAL TRACE" position, the Multi-Signal Tracer is in its normal operating position. When the OUTPUT SWITCH is turned to "TEST AMPLIFIER", the speaker becomes disconnected and the secondary of the output transformer is connected to the OUTPUT pin jacks below the switch. This allows an external speaker to be tested by connecting

GUARANTEE

This instrument is guaranteed to be free from defects in material and workmanship in accordance with the terms of the Standard RMA Warranty.

IF tube grid (Pin 4 -- 12SG7), IF tube plate (Pin 8 —12SG7) and the diode plate of the second detector tube (Pin 5 -- 12SQ7). In succession at each of these points the broadcast station or the signal generator modulation should be heard. When the signal stops, the stage immediately preceding is defective.

The audio section can be traced in a similar manner, working from the audio amplifier following the second detector to the loudspeaker. With the probe, touch the audio amplifier grid (Pin 2 -- 12SQ7), the power amplifier grid (Pin 5 -- 50L6), and the power amplifier plate (Pin 3 -- 50L6).

The speaker connection should also be contacted in order to ascertain whether the speaker is open, the output transformer secondary is open, or the circuit is open. The receiver speaker may be tested by connecting the voice coil to the OUTPUT pin jacks of the Signal Tracer and OUTPUT SWITCH turned to "TEST AMPLIFIER". A signal is then obtained on the Signal Tracer from a previous stage. The signal should be heard on the receiver speaker unless the receiver speaker is defective.

The secondary of the output transformer in the receiver may be tested by connecting it to the OUTPUT pin jacks of the Signal Tracer and switching the OUTPUT SWITCH to "TEST SPEAKER". The signal should be heard over the Signal Tracer unless the output transformer of the receiver is defective.

VISUAL SIGNAL TRACING

An Eico Model 221 Vacuum Tube Voltmeter or an Eico Model 400 oscilloscope, or similar units, may be connected to the Vacuum Tube Voltmeter pin jacks for visual signal tracing. If a measurement of the gain in a stage of the receiver is desired, connected a constant modulated RF signal into the receiver input, and, touching the plate and grid of the stage under test, determine the voltage developed at each point. The ratio of voltage output to voltage input is the stage gain.

With an oscilloscope, such as the Eico Model 400, connected to the Vacuum Tube Voltmeter pin jacks, the distortion in a receiver can be localized by finding the point in the receiver at which it appears. The oscilloscope sweep frequency is set to the frequency of the signal generator audio modulation, and the waveform of the audio modulation observed.

its voice coil into the OUTPUT pin jacks, and using the internal amplifier of the Multi-Signal Tracer. When the OUTPUT SWITCH is turned to "TEST SPEAKER", the internal amplifier is disconnected and the Multi-Signal Tracer speaker is connected directly to the OUTPUT pin jacks. This allows an external audio amplifier or radio to be tested by hooking the amplifier output transformer secondary to the OUTPUT pin jacks, and using the Multi-Signal Tracer speaker.

4. OUTPUT pin jacks: When the OUTPUT SWITCH is turned to "TEST AMPLIFIER", the OUTPUT pin jacks are connected to the secondary of the output transformer in the Tracer. When the OUTPUT SWITCH is turned to "TEST SPEAKER" position, the internal test speaker is connected to the OUTPUT pin jacks.

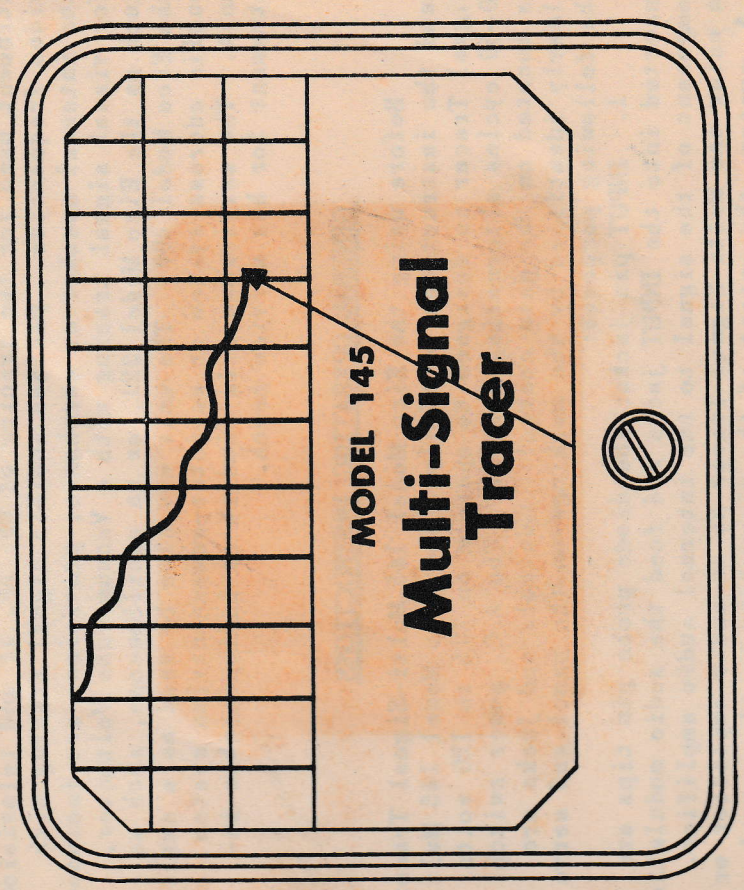
5. VACUUM TUBE VOLTMETER pin jacks: These jacks allow measurement of the signal voltage at the plate circuit of the 6K6 amplifier tube, using an Eico Model 221 Vacuum Tube Voltmeter, an Eico Model 400 oscilloscope, or both. Comparative gain measurements in an audio amplifier or RF stage can be made by placing the probe at the input and output of the stage being measured and noting the ratio of the voltages developed at the plate circuit of the 6K6 amplifier tube.

For operation of the Multi-Signal Tracer with earphones, the earphone pin tips are inserted directly into the Vacuum Tube Voltmeter pin jacks, and speaker silenced by turning the OUTPUT SWITCH to "TEST AMPLIFIER" or "TEST SPEAKER" position.

USING THE MULTI-SIGNAL TRACER AS A SMALL PUBLIC ADDRESS SYSTEM

Connect either a phonograph pick-up or high impedance crystal microphone DIRECTLY to the INPUT pin jacks (the probe is not needed and its use here causes some distortion). Use either the internal speaker or a remote speaker connected to the OUTPUT pin jacks (OUTPUT SWITCH to "TEST AMPLIFIER" in the latter case).

INSTRUCTION MANUAL FOR



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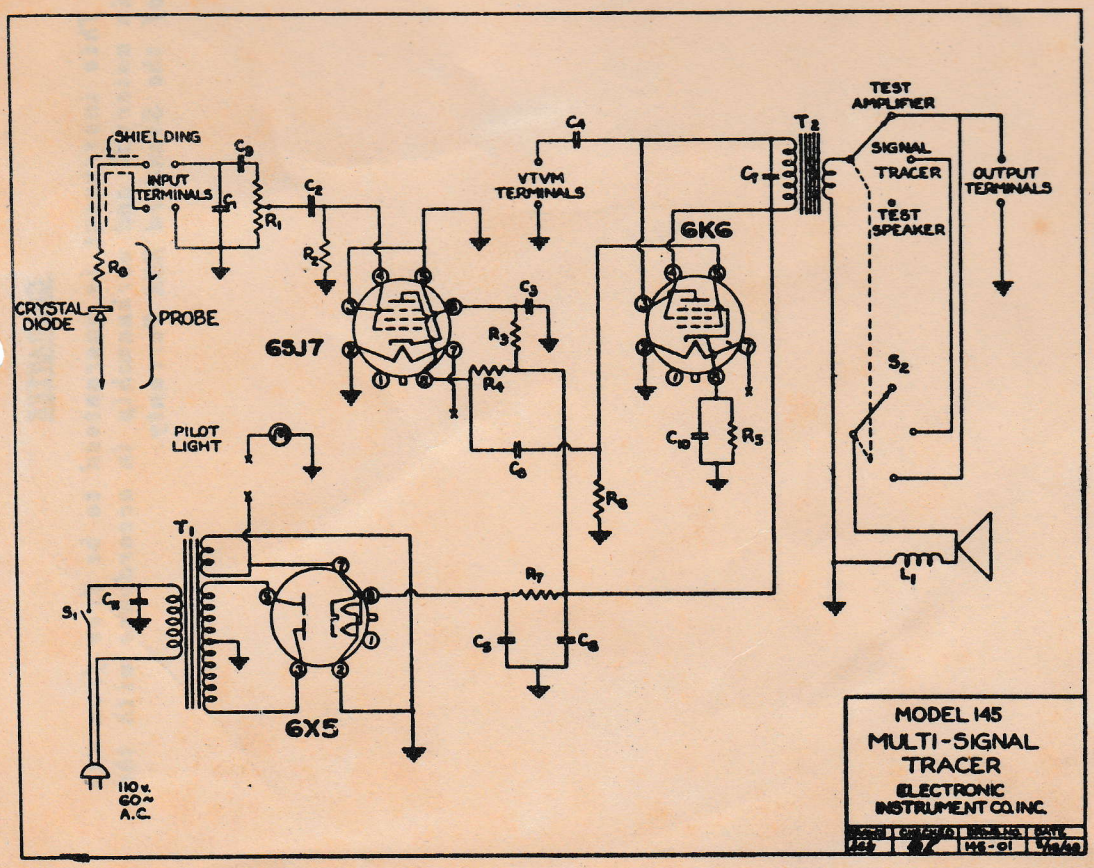

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ITEM	PART #	SPECIFICATION
R1	9	500K POT. WITH SWITCH
R2	10	10 MEG. RESISTOR
R3	11	2 MEG. RESISTOR
R4	12	510K RESISTOR
R5	13	470 OHM RESISTOR
R6	12	510 K RESISTOR
R7	14	1000 OHM RESISTOR
R8	15	51000 OHM RESISTOR
C1	16	50 MMF MICA CONDENSER
C2	17	.01 MFD. CONDENSER
C3	18	.05 MFD. CONDENSER
C4	19	.002 MFD. CONDENSER
C5	20	DUAL 8 MFD. CONDENSER
C6	20	" " " "
C7	19	.002 MFD. CONDENSER
C8	17	.01 MFD. CONDENSER
C9	17	.01 MFD. CONDENSER
C10	21	10 MFD. CR OVEN CONDENSER
C11	17	.01 MFD. CONDENSER
T1	6	POWER TRANSFORMER
T2	7	OUTPUT TRANSFORMER
S1		PART OF R1
S2	22	OUTPUT SWITCH

THE SIGNAL PATH IN A TYPICAL AC-DC RECEIVER

The diagram of a typical AC-DC receiver follows. The antenna secondary loop is used as the RF tuning coil and is tuned by the RF tuning condenser which is ganged to the oscillator condenser. The 12SA7 tube is a combined mixer and oscillator, and is usually called the converter tube. The oscillator signal is heterodyned with the incoming RF signal to produce the intermediate frequency. The 12SG7 tube is the IF amplifier, usually operating at a frequency of 455 kc. The sensitivity and selectivity of the receiver is obtained in the IF amplifier stage. The output of the IF amplifier is fed to a combined second detector and audio amplifier tube. The second detector separates the RF signal from its audio modulation component, feeding the latter into the triode audio amplifier. The output of the amplifier is fed to the 50L6-GT power output tube. The power output tube is coupled to the speaker by means of the power output transformer.

SIGNAL TRACING THROUGH THE RECEIVER

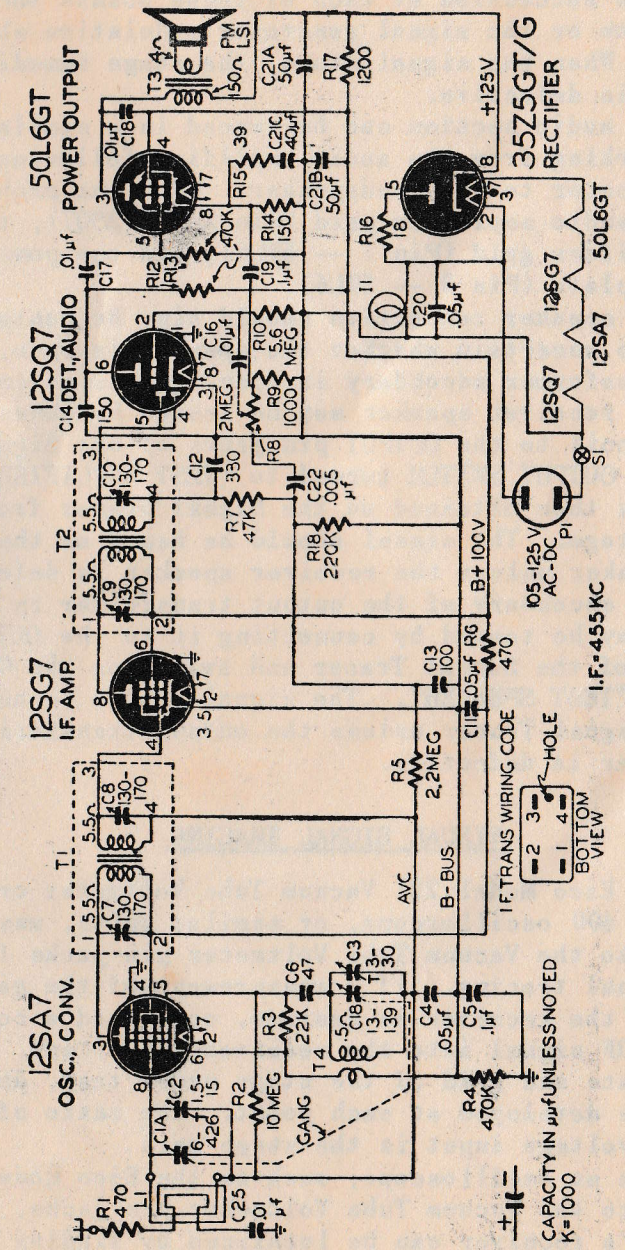
Set the receiver dial to a known broadcast station, or connect a signal generator, such as the Eico Model 320, to the receiver, setting both to the same frequency.

Connect the ground lead from the Multi-Signal Tracer to the B- of the receiver (usually the low side of the volume control). On transformer-operated A.C. sets, the chassis is usually B-. If hum results in the Tracer speaker, reverse the receiver line plug. With the probe cable pin tips plugged in (shield to ground), touch the probe tip to the primary, and then to the secondary, of the RF tuning coil. The signal level is lowest at this point in the receiver, and an antenna may be required to hear a broadcast station signal in the Tracer speaker.

In the receiver illustrated, the antenna loop is the RF tuning coil, as has been pointed out, and it is connected to the tuning condenser stator terminal, which is readily accessible.

Continue tracing back from the receiver front end, touching the converter tube plate (Pin 3 -- 12SA7),

A TYPICAL AC-DC RECEIVER



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THE EXCLUSIVE EICO MAKE GOOD GUARANTEE

Each EICO kit and instrument is doubly guaranteed by Eico and your jobber to contain only selected quality components. EICO guarantees to replace any component which might become defective in normal use if returned to the factory, transportation charges prepaid, within 90 days of original purchase. EICO guarantees all kits assembled according to Eico's simplified instructions will operate as specified therein. EICO guarantees to service and calibrate every Eico kit and instrument at nominal charge.

This guarantee is valid only when the enclosed card is properly filled in and returned for registration.

ELECTRONIC INSTRUMENT CO., Inc., 84 Withers St., B'klyn 11

IMPORTANT NOTICE

In accordance with EICO'S modernization policy we endeavor to keep owners of EICO equipment advised as to latest engineering developments and changes. We ask that you please fill in the attached card and mail it to us immediately. This will register your instrument and allow us to extend to you the full scope of our services.

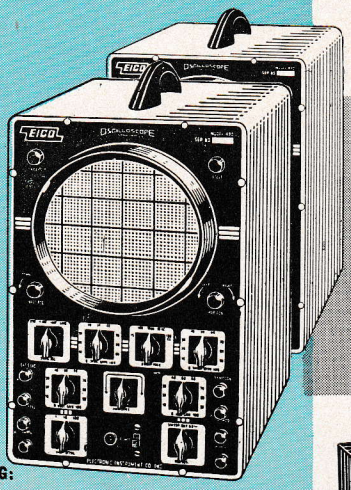
This instrument or kit was shipped from our factory in perfect condition, carefully inspected to prevent shortages and defects. However, should any shortage or defect occur, notify factory, specifying date and inspector's number as indicated on the guarantee.

If instrument or kit parts are received in damaged condition, notify the CARRIER at once. We are not responsible for any damage caused in transportation. Our responsibility (other than our standard guarantee) ceases to exist upon our delivery to the carrier.

New! 7 INCH PUSH-PULL OSCILLOSCOPE

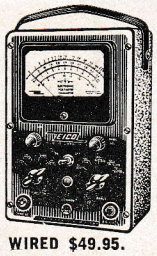
Only EICO Has All These Features:

- **VERTICAL FREQ. RESPONSE:** flat ± 2 db 10 cps — 1 mc
- **VERTICAL SENS.:** .01 volts rms/inch
- **HOR. FREQ. RESP.:** flat ± 0 db 10 cps — 200 kc, —4 db at 500 kc
- **HOR. SENS.:** .3 volts rms/inch
- **SWEEP RANGE:** 15 cps-100 kc
- **3-STEP FREQ.-COMPENSATED ATTENUATOR** eliminates freq. distortion, overloading.
- **CATHODE FOLLOWER** inputs to both amplifiers
- **PUSH-PULL** outputs in both amplifiers
- **RETURN TRACE BLANKING**
- **INT. VOLTAGE CALIBRATOR**
- **V & H TRACE EXPANSION & CENTERING:** 1.5X full screen without distortion.
- **DIRECT CONNECTION** to vert. CRT plates.
- **PHASING CONTROL** of internal 60 cps sine wave sweep.
- **AT FRONT PANEL:** intensity mod. input; 60 cps, sawtooth outputs.



MODEL 470K KIT $79.95. WIRED $129.50.

Also Available:
425K 5" PUSH-PULL SCOPE KIT $44.95. WIRED $79.95.



- AC & DC volts: 0-5, 10, 100, 500, 1000 V (30 KV with HVP-1 probe).
- 5 ohm ranges from .2 ohm to 1000 megs.
- DC input Z 26 megs.
- 4½" meter movement in can't-burn-out circuit.
- 1% mult. resistors.

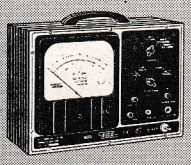
221K VTVM KIT $25.95. WIRED $49.95.

- Covers all TV & FM freqs. between 500 kc & 228 mc in continuous sweep.
- Sweep width variable 0-30 mc.
- Crystal marker oscillator, variable amplitude.

360K SWEEP GEN. KIT $34.95. WIRED $49.95.

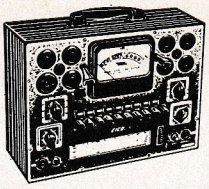
HIGH VOLTAGE PROBE $6.95
- Extends range of VTVMs & voltmeters to 30 KV.

PIX TUBE ADAPTER for Tube Testers $4.50. Checks TV picture tubes while in set.



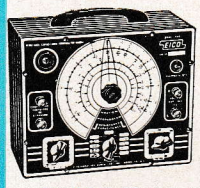
- Large 7½" meter, can't-burn-out circuit.
- AC/DC volts: 0-5, 10, 100, 500, 1000 (30 KV with HV Probe).
- 5 ohms ranges from .2 ohm to 1000 megs.
- DC input Z 26 megs.
- 1% mult. resistors.

214K VTVM KIT $34.95. WIRED $54.95.



- Illum. gear-driven "Speed Rollchart."
- New lever-action switches for individual testing of every element.
- Tests all conventional & TV tubes.

625K TUBE TESTER KIT $34.95. WIRED $49.95.



- Measures & tests all resistors; .5 ohm to 500 megohms.
- Every type condenser, 10 mmf to 5000 mfd.
- 0-500 DC voltage source for capacitor leakage testing.

950A-K R-C BRIDGE & R-C-L COMP. KIT $19.95. WIRED $29.95.

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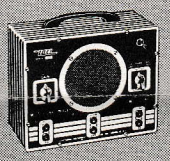
LIFETIME SERVICE & CALIBRATION GUARANTEE*

...the Industry's greatest protection for your test equipment investment!



- Audibly signal traces all IF, RF, Video & Audio circuits from ANT to SPKR or CRT in all TV, FM, AM, etc. without switching.
- Germanium crystal diode probe responsive to over 200 mc.
- Integral test speaker.

145K SIG. TRACER KIT $19.95. WIRED $28.95.

* at less than our cost of handling (see the EICO Guarantee Card enclosed with each Kit and Instrument).

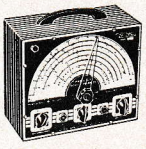
NEW!

SCOPE VOLTAGE CALIBRATOR KIT 495K KIT $12.95. WIRED $17.95.

- Sq. wave output at power-line freq. with full-scale readings of .1, 1, 10 or 100 V. peak-to-peak.
- Accuracy ± 5% of full-scale on each range.

- 1000 Ω/V; 31 ranges
- DC/AC volts: **Zero to 1**, 5, 10, 50, 100, 500, 5000.
- DC/AC Current: 0-1, 10 ma; 0.1, 1 A.
- Ohms: 0-500, 100 K, 1 meg.

536K MULTIMETER KIT $12.90. WIRED $14.90.



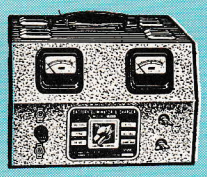
- Fundamentals 150 kc to 34 mc, harmonics to 102 mc.
- 5-step band switching.
- Colpitts audio oscillator generates 400 cps pure sine wave voltage.
- Permits pure RF, modulated RF, or pure AF.

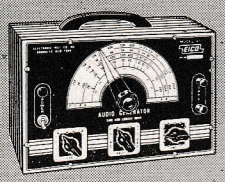
320K SIG. GEN. KIT $19.95. WIRED $29.95.

NEW!

6V & 12V BATTERY ELIMINATOR KIT 1050K KIT $29.95. WIRED $38.95.

- DC output: 0-8 V or 0-16 V.
- Continuous current rating: 10 A at 6 V, 6 A at 12 V.
- Intermittent current rating: 20 A at 6 V, 12 A at 12 V.
- Separate Voltmeter & Ammeter.





- Complete sine wave coverage, 20-200,000 cps in 4 direct-reading ranges.
- Complete square wave coverage, 60-50,000 cps.
- Cathode follower output circuit.

377K SINE & SQUARE WAVE AUDIO GEN. KIT $31.95. WIRED $49.95.

- Resistance values from 0 to 99,999 ohms with 0.5% precision.
- All resistors have 0.5% accuracy.

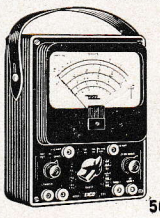
1171K RES. DECADE BOX KIT $19.95. WIRED $24.95.

NEW!

DECADE CONDENSER BOX KIT 1180K KIT $14.95. WIRED $19.95.

- All capacitors precision silver mica, accuracy ± 1%.
- Range from 100 mmf — 0.111 mfd in steps of 100 mmf.
- Smooth-action positive detent ceramic switches.

Prices 5% higher on West Coast. Specifications and prices subject to change without notice.



- 20,000 Ω/V; 31 ranges.
- DC/AC/Output volts: 0-2.5, 10, 50, 250, 1000, 5000.
- DC Current: 0-100 ua; 10, 100, 500 ma; 10 A.
- Ohms: 0-2K, 200K, 20 meg.

565K MULTIMETER KIT $24.95 WIRED $29.95.

- Covers range of 75 kc to 150 mc.
- 7 calibrated scales: accuracy better than 1%.
- Bandspread vernier tuning.
- 4-step RF shielded output multiplier: constant output Z.

315K DELUXE SIG. GEN. KIT $39.95. WIRED $59.95.

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