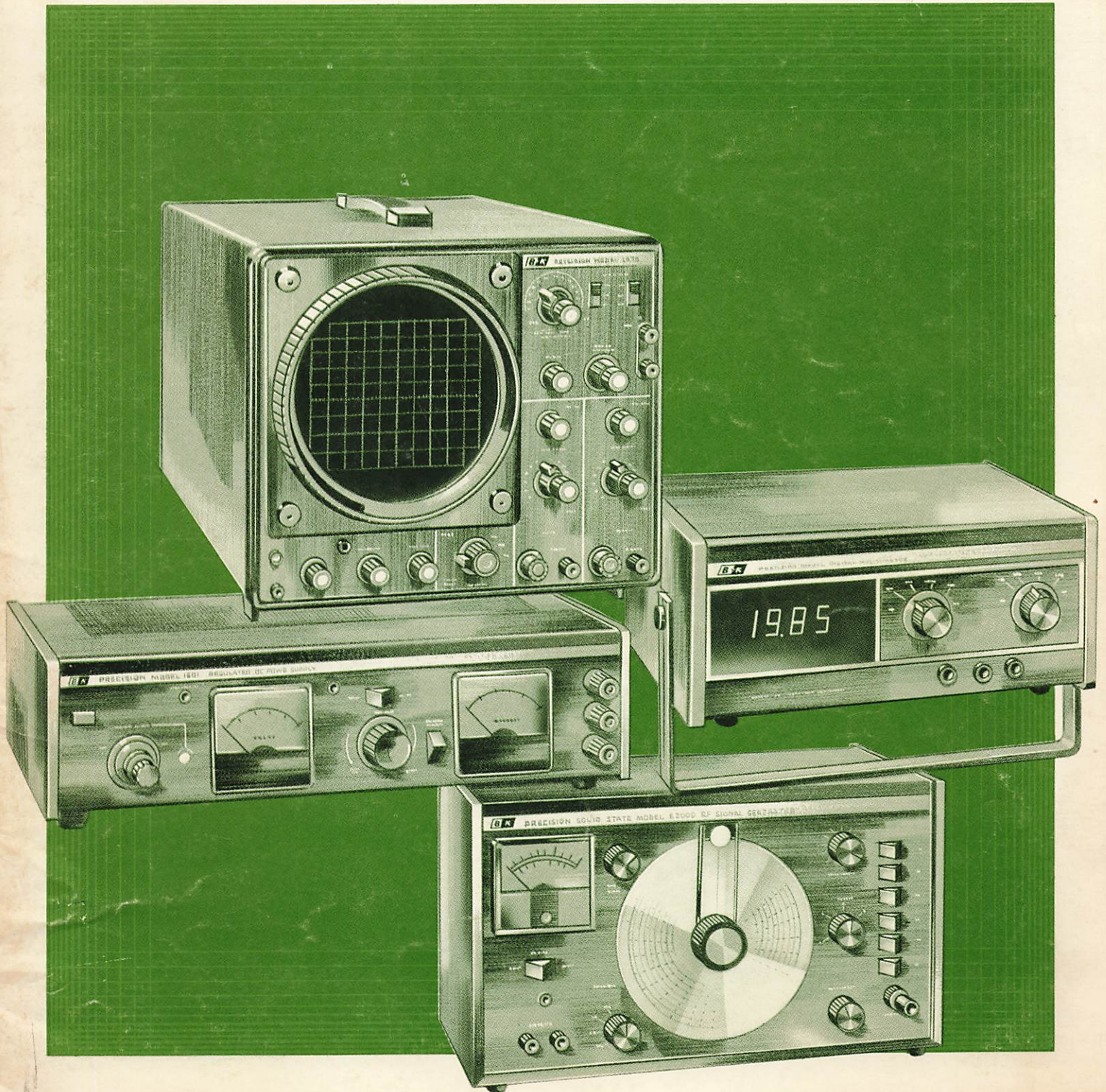


# **B&K** precision test equipment

PRODUCTS OF **DYNASCAN** CORP.





# Solid-State Digital Multimeter

**B&K**-Precision Model 281



- **DC accuracy, 1%.**
- **Large 2½-digit numerical display.**
- **High sensitivity—measures 100 mV full-scale, AC and DC.**
- **Positive out-of-range indication.**
- **Clearly indicates wrong polarity.**

**industrial quality . . . laboratory stability . . .**

In this age of automation, why settle for anything less than a digital readout multimeter? The 281 is designed to meet the requirements of better than 99% of all measurements in industry, labs, schools and servicing. The speed, accuracy and stability of the 281 will save many valuable hours of measuring time. Reading errors are virtually eliminated, whether at the bench or on the production line. Low test current on resistance ranges eliminates danger of harming components on low-resistance ranges!

While the 281 has fully 100% overrange capability, it also has fool-proof out-of-range indication: the first digit (1) remains OFF and the second and third digits flash ON/OFF together. In addition, the 281 indicates wrong polarity as follows: The first digit remains ON, while the second and third digits remain OFF. You couldn't make a reading error if you tried. And there's a polarity-reversal position right on the FUNCTION switch—no need to switch leads when the polarity is wrong.

Fully portable, the 281 Digital Multimeter has a 3-position handle that doubles as a handy stand, for eye-level viewing.

## OTHER FEATURES

- Non-blinking, razor-sharp display.
- Automatically positioned decimal point.
- Large, easy-to-read numerical readout.
- PR-21 probe with switchable 100K ohm resistor.

## SPECIFICATIONS

### DC VOLTAGE ±

**Ranges:** 5 ranges—0-100 mV, 1.00 V, 10.0 V, 100 V, 1.00 KV.

**Maximum DC Input:** 1500 VDC or DC plus AC peak.

**Accuracy:** ±1% of reading, ±1 digit.

**Polarity Switching:** Function switch has polarity reversal position.

### AC VOLTAGE

**Note:** Peak-reading circuitry calibrated to read RMS value of pure sinusoidal wave.

**Ranges:** 5 ranges—0-100 mV, 1.00 V, 10.0 V, 100 V, 1.00 KV RMS.

**Maximum AC Input:** 1000 V RMS or 1500 V peak.

**Accuracy:** ±1.5% of reading, ±1 digit.

**Frequency Response:** 20 Hz to 1000 Hz.

### DC CURRENT

**Ranges:** 5 ranges—0-100 μA, 1.00 mA, 10 mA, 100 mA, 1.00 A.

**Voltage Drop** (Measured at terminals): 100 mV at full range.

**Accuracy:** ±1.5% of reading, ±1 digit.

### AC CURRENT

**Ranges:** 5 ranges—0-100 μA, 1.00 mA, 10.0 mA, 100 mA, 1.00 A.

**Voltage Drop** (Measured at terminals): 100 mV RMS at full range.

**Accuracy:** 1.5% of reading, ±1 digit.

**Frequency Response:** 20 Hz to 1000 Hz.

### RESISTANCE

**Ranges:** 7 ranges—0-10.0 ohms, 100 ohms, 1.00K ohms, 10.0K ohms, 100 K ohms, 1.00 M ohm, 10.0 M ohms.

**Accuracy:** 2% of range, 10.0 ohms to 1.00 M ohms; 3% of range, 10.0 M ohm range.

**Test Voltage:** 0-10 ohm range, 0.1 V at full range.

100 ohms to 10 M ohms, 1.0 V at full range.

### GENERAL

**Overrange:** 100% on all ranges.

**Input Impedance:** 10 megohms, all ranges.

**Overload Protection:** DC/AC volts: diode and series current-limiting resistance. Ohms ranges: fuse.

**Size:** 3½ x 7 x 9".

**Net Wt.:** 3 lbs.

**Power Requirements:** 105-125 VAC, 50-60 Hz. 3-wire cord. With test leads and PR-21 probe. Also available for 117/234 VAC.

**Model 281 Digital Multimeter.**



# 3½-Digit Digital Multimeter

**B&K**-Precision Model 282



- *Large, bright, non-blinking, 7-segment, flat 3½ digit display.*
- *DC accuracy, 0.5% . . . 6 to 13 times the accuracy of a typical analog meter*
- *Automatic polarity.*
- *Positive out-of-range indication.*
- *100% solid-state circuitry.*
- *1 mV resolution.*

*an outstanding "high-value buy" for all VOM applications . . .*

The industry's most popular bench-type VOM has 3% full scale DC accuracy, or  $\pm 1.5V$  on the 50V scale. At about 20V, the accuracy of reading is 7.5%. Model 282's accuracy of reading is 0.5%  $\pm 1$  least significant digit, or  $\pm 0.11V$  at 20V. Dividing 1.5 by 0.11, you find that the 282 has 13.6 times the accuracy of the analog VOM at that reading. And even at readings close to 50V, where the analog meter is most accurate, the 282 remains more than six times as accurate. 100% overrange capability means you can read to 1999 on nominal 1000 scales. Clear out-of-range indication—when input exceeds range selected plus 100% overrange, the first digit shows "1" and the rest blank out. The 282 also has automatic polarity indication, automatic decimal point positioning, an advanced analog-to-digital converter, complete overload protection, 10-megohm input impedance and a three-position handle that doubles as a tilt-up stand for viewing. Plus a Model PR-21 probe with switchable 100K isolation resistor to prevent capacitive loading while measuring DC in RF circuits.

## OTHER FEATURES

- Automatically positioned decimal point.
- 10 megohms input impedance on AC and DC volts.
- 3-position handle that doubles as a stand for eye-level viewing.
- With PR-21 probe with switchable 100K ohm resistor.
- Full overload protection on all ranges.

## SPECIFICATIONS

### DC VOLTAGE (Auto Polarity)

**Ranges:**  $\pm 0-1.000$ , 10.00, 100.0, 1000V.

**Maximum DC Input:** 1500 VDC or DC + AC peak.

**Accuracy:** 1, 10 and 100V ranges,  $\pm 0.5\%$  of reading,  $\pm 1$  L.S.D. 1000V range,  $\pm 1\%$  of reading,  $\pm 1$  L.S.D.

**Polarity:** Automatic.

### AC VOLTAGE

**Note:** Average-reading circuitry calibrated to read RMS value of pure sinusoidal wave.

**Ranges:** 0-1.000, 10.00, 100.0, 1000V RMS.

**Maximum AC Input:** 1500V peak or 1500V DC + AC peak.

**Accuracy and Response:** 1V range,  $\pm 1\%$  of reading,  $\pm 1$  L.S.D., 50-1000 Hz; 10, 110V ranges, 50-200 Hz. 1000V range,  $\pm 1.5\%$  of reading,  $\pm 1$  L.S.D., 50-200 Hz.

### DC CURRENT

**Ranges:**  $\pm 0-1.000$  mA, 10.00 mA, 100.0 mA, 1000 mA.

**Voltage Drop:** Nominal F.S. drop across shunts, 100 mV.

**Accuracy:** 1, 10 and 100 mA ranges,  $\pm 1\%$  of reading,  $\pm 1$  L.S.D. 1000 mA range,  $\pm 1.5\%$  of reading,  $\pm 1$  L.S.D.

### AC CURRENT

**Ranges:** 0-1.000 mA, 10.00 mA, 100.0 mA, 1000 mA.

**Voltage Drop:** Nominal F.S. drop across shunts, 100mV.

**Accuracy:** 1, 10 and 100 mA ranges,  $\pm 1.5\%$  of reading,  $\pm 1$  L.S.D. 1000 mA range,  $\pm 2\%$  of reading,  $\pm 1$  L.S.D.

**Frequency Response:** 50 to 200 Hz.

### RESISTANCE

**Ranges:** 0-100.0, 1.000K, 10.00K, 100.0K ohms; 1.000, 10.00 megohms.

**Accuracy:** 100, 1000, 10,000, 100,000 ohm and 1 megohm ranges,  $\pm 1\%$  of reading,  $\pm 1$  L.S.D. 10 megohm range,  $\pm 2\%$  of reading,  $\pm 1$  L.S.D.

### GENERAL:

**Number of Digits:** 3½, plus automatic polarity.

**Accuracy Temperature Coefficient (15° to 35° C.):**  $\pm .025\%$  of reading per degree C. on DCV ranges;  $\pm .05\%$  per degree C., all other ranges.

**Input Impedance:** 10 megohms, all voltage ranges.

**Overrange:** 100% on all ranges.

**Overload Protection:** Unconditionally protected up to 250 V on ohms ranges; to 3 amps on current shunts, to 1500 V on voltage ranges.

**Size:** 3½ x 7 x 9". **Net Wt.:** 3 lbs.

**Power Requirements:** 105-125 VAC, 50-60 Hz; 3-wire grounded AC line cord. With PR-21 probe.

**Model 282 Digital Multimeter.**

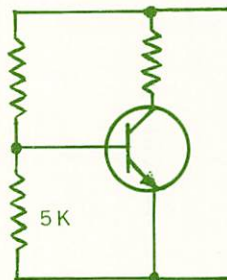


# Solid-State Electronic Multimeter

## B&K - Precision Model 277



*high-and low-power ohms ranges for critical semiconductor circuit testing . . .*



### Why High-Low-Power Ohms

Low-power resistance ranges on the 277 are indispensable when checking resistances in semiconductor or IC circuits. For example, in the circuit at left, suppose we want to check the value of the 5K ohm resistor. Note that the emitter base junction is in parallel with this resistor. A conventional ohmmeter with 1.5 V supply could cause this junction to conduct, shunting the 5K resistor and giving a false resistance reading. The 277's low-power .068 test voltage will never cause this junction to conduct. Thus, you always will read the true value of the 5K resistor without concern for either the transistor or lead polarity. On the other hand, high-power ohms ranges are necessary when you're trying to determine if the transistor in our circuit is working.

With the high-power ohms ranges, you can cause the transistor to conduct and then reverse the leads to determine the front-to-back ratio. This will give you a very good indication as to whether the transistor is good or bad. With 7 low-power and 7 high-power ohms ranges, the 277 is indeed an extremely versatile meter, with special value in semiconductor circuits.

The 277 is 100% solid state; has a DC current range of only 1  $\mu$ A full-scale for sensitive semiconductor leakage testing; has .1 VAC and .1 VDC scales—important for measuring transistor bias.

### SPECIFICATIONS

#### GENERAL

**Multipliers:** 1% precision-type, frequency-compensated.  
**Meter:** 4½"; 50-microampere movement; mirrored scale.  
**Protection:** Meter and F.E.T. input fully protected from overloads; current and resistance circuit overload protection by fuse.

#### DC VOLTS

**9 Ranges:** 0-.1, .3, 1, 3, 10, 30, 100, 300, 1000V. DC zero center capability on all ranges. **Accuracy:**  $\pm 2\%$  of full scale.  
**Input Resistance:** 15 megohms.

#### AC VOLTS

**9 RMS Ranges:** 0-.1, .3, 1, 3, 10, 30, 100, 300, 1000V.  
**9 Peak-to-Peak Ranges:** 0-.28, .88, 2.8, 8.8, 28, 88, 280, 880, 2800V. **Accuracy:**  $\pm 3\%$  of full scale.  
**Input Impedance:** 10 megohms shunted by approximately 100 pF.  
**Frequency Response:** Flat, 50 Hz to 150 kHz.

#### DC CURRENT

**9 Ranges:** 0-1  $\mu$ A, 10  $\mu$ A, 100  $\mu$ A, 1 mA, 10 mA, 30 mA, 100 mA, 300 mA, 1 A. **Accuracy:**  $\pm 3\%$  of full scale.

#### RESISTANCE

**7 Low-Power Ranges:** Rx1, x10, x100, x1K, x10K, x100K, x1 megohm (.068 test volts).  
**7 High-Power Ranges:** As above, but 1.5 test volts.  
**Mid-Scale Reading:** 10 ohms (on Rx1 range).

#### DECIBELS

**9 Ranges:** From -20 dB to +60 dB. **Accuracy:**  $\pm 3\%$  of full scale.  
**Reference:** dB = 1 mW into 600 ohms.

Size, 5 $\frac{1}{16}$  x 7 $\frac{1}{4}$  x 3 $\frac{3}{8}$ " deep. Net Wt., 2 lbs. Complete with PR-21 probe (described below); less batteries. Requires one 1.5V "D" cell and one 9V NEDA 1604 cell.

#### Model 277 F.E.T. Electronic Multimeter.

#### PR-21 PROBE

Supplied with the 277 above and the 290 on facing page. Prevents capacitive loading when measuring DC in RF circuits. Has switchable 100K ohm isolation resistor. Molded double banana plug.



### With PR-43 DC/AC/Ohms Probe

The 177 is supplied complete with the B & K PR-43 DC/AC/Ohms test probe with switch and ground lead. Speeds signal-tracing and circuit-checking.

## Model 177 Vacuum Tube Voltmeter

*with DC supply for resistance ranges—no ohms battery needed . . .*

This highly popular VTVM has a total of 37 ranges with a special 0.5 volt DC scale for transistors. 100-microamp meter.

**OTHER FEATURES:** Separate peak-to-peak and RMS scales • Special calibration on low AC ranges • Special dB scale for amplifier gain measurements • Zero center scale for FM alignments • Large 7" mirrored meter for easy reading • 1% precision resistors in all critical circuits • DC polarity reversal switch.

**SPECIFICATIONS:** **DC Volts:**  $\pm 0.5, 1.5, 5, 15, 50, 150, 500, 1500$ . **AC Volts, RMS:** 0-1.5, 5, 15, 50, 150, 500, 1500. **AC Volts, Peak-to-Peak:** 4, 14, 40, 140, 400, 1400, 4000. **AC Response:**  $\pm 1$ dB, 40 Hz to 3 MHz (600 ohm source, 5 volt range). **Resistance, Full-Scale:** 1K, 10K, 100K ohms; 1, 10, 100, 1000 megohms; **Resistance, Mid-Scale:** 10, 100, 1K, 10K, 100K ohms; 1, 10 megohms. **Input Resistance:** 11 megohms (1 megohm in probe). **Accuracy:** DC,  $\pm 3\%$  of full scale; AC, 5%. **Power:** 105-125 VAC, 50-60 Hz. **Size:** 7 $\frac{1}{8}$  x 7 $\frac{1}{4}$  x 3 $\frac{3}{8}$ ". **Net wt.:** 6 lbs.

#### Model 177 VTVM.

See back cover for carrying case for model 277.



# Solid-State Electronic Multimeter

**B&K**-Precision Model 290



- *Hi-Lo power ohms ranges.*
- *15 megohms input impedance for minimum circuit loading.*
- *7" meter with 100° scale arc*
- *50 mV full-scale sensitivity on both AC and DC.*
- *50 microamp current range.*
- *Rx0.1 ohm range with 1 ohm center scale.*

**latest 'state-of-the-art' F.E.T. multimeter—75 ranges for every need . . .**

If there were an "Academy Award" for meter design of the year, the new B & K 290 would most certainly take home the Oscar. It literally has everything you've ever wanted in an electronic multimeter—and then some. Just check the specs and features and compare them with anything else on the market, regardless of price. It meets the measurement requirements of the industrial user, engineers, radio-TV-audio technicians, and hobbyists. Its 75 ranges not only include high- and low-power ohms ranges for checking resistors or testing IC's, transistors, SCR's, etc., in- or out-of-circuit; they include a special Rx0.1 low ohms range with 1 ohm center scale and 50-microamp DC and AC current scales. Zero center scale for FM alignment. The 290 is supplied with the B & K Model PR-21 probe, which has a switchable 100K ohm isolating resistor. Prevents capacitive loading when measuring DC in RF circuits.

## OTHER FEATURES

- Full protection for meter, FET input, circuits.
- All solid-state electronic circuitry.
- 0.5% precision multipliers.
- Full AC operation with zener-regulated power supplies.

## SPECIFICATIONS

### DC VOLTS (±)

**10 Ranges:** 0-50, 150, 500 mV; 1.5, 5, 15, 50, 150, 500, 1500 V. **Accuracy:** ± 1.5% full scale.

**Input Resistance:** 15 megohms, including 100K ohm isolating resistor in PR-21 probe.

**AC Rejection:** 46 dB minimum @ 60 Hz.

### AC VOLTS

**10 RMS Ranges:** 0-50, 150, 500 mV; 1.5, 5, 15, 50, 150, 500, 1500 V.

**10 Peak-to-Peak Ranges:** 0-140, 440 mV; 1.4, 4.4, 14, 44, 140, 440, 1400 and 4400 V.

**Accuracy:** ± 3% full scale @ 60 Hz; ± 5%, 500 V and 1500 V ranges.

**Input Impedance:** 15 megohms/41 pF, at input jacks.

**Frequency Response:** 50 mV to 150 V ranges, ±0.5 dB, 20 Hz to 500 kHz; ± 3 dB, 5 Hz to 750 kHz.

### DC CURRENT

**10 Ranges:** 0-50, 150, 500  $\mu$ A; 1.5, 5, 15, 50, 150, 500 mA; 1.5 A.

**Accuracy:** ± 3% full scale, except ± 4% on 1.5 A range.

**Internal V. Drop:** (At input term.) 50 mV, to 50 mA range.

### AC CURRENT

**10 Ranges:** 0-50, 150, 500  $\mu$ A; 1.5, 5, 15, 50, 150, 500 mA; 1.5 A.

**Accuracy:** ± 4% full scale @ 60 Hz; ± 5% on 50  $\mu$ A and 1.5 A ranges.

**Frequency Response:** ± 0.5 dB, 20 Hz to 5 kHz; ± 3 dB, 7 Hz to 16 kHz.

**Internal V. Drop:** (At input term.) 50 mV, to 50 mA range.

### RESISTANCE

**8 Low-Power Ranges (33 mV source):** Rx0.1, Rx1, Rx10, Rx100, Rx1K, Rx10K, Rx100K, Rx1M.

**7 High-Power Ranges (1.25 V source):** Rx1, Rx10, Rx100, Rx1K, Rx10K, Rx100K, Rx1M.

**Mid-Scale Reading:** 1 ohm, Rx0.1; 10 ohms, Rx1 range.

**Accuracy:** ± 3° of arc.

### DECIBELS

**10 Ranges:** -40 to + 66dB. **Accuracy:** ± 3% full scale.

**Reference:** 0 dB = 1 mW (600 ohms).

### OTHER SPECIFICATIONS

**Meter:** 7", with 6 $\frac{5}{8}$ " scale arc length; 100  $\mu$ A movement, ± 2%, 100°. Mirrored scale.

**Protection:** Meter and F.E.T. input protected against overloads. Circuit overload protection by fuse. High voltage protection by spark gaps.

**Power Requirements:** 105-125 VAC, 50/60 Hz. 3.9 watts.

**Size:** 7 $\frac{1}{4}$  x 8 x 3 $\frac{3}{8}$ " deep.

**Net Wt.:** 4 $\frac{1}{4}$  lbs.

Complete with PR-21 probe and instruction manual.

**Model 290 F.E.T. Electronic Multimeter.**



# Volt-Ohm-Milliammeter

**B&K** - Precision Model 120P



## How true overload protection saves you money . . .

All of the 120P's ranges are fully protected from overloads that normally would damage the VOM, by a positive electronic overload system—except the 10-ampere bus bar range. No single overload or combination of overloads can in any way cause damage to the instrument, meter or components.

This 100% overload protection guarantees that you will save money by avoiding repairs, and that you will not be deprived of the instrument's use because of repairs. No matter what happens, the 120P will be available to do its job 24 hours a day. This kind of "insurance" cannot be bought at any price—but you get it automatically when you buy a B & K Model 120P VOM . . .

## Resettable electronic overload protection . . . plus:

- 20,000 ohms/volt sensitivity on DC, with 2% accuracy
- .25 volt and 50 $\mu$ A DC ranges
- "TRANSIT" position on range switch
- Rugged, taut-band meter movement

One of the most accurate, rugged, versatile test units ever designed. It reads DC volts and current with 0.25 volt and 50  $\mu$ A low-range scales; AC RMS volts, output volts, and decibels; and ohms. In addition, it features a resettable, electronic overload protection circuit that prevents accidental destruction of instrument, shunts, multipliers, meter, pointer and sensitive rectifier. Especially useful feature for schools, or inexperienced personnel. When overload occurs, a RESET BUTTON pops up, and cannot be reset until the overload is removed! Protects all ranges except the 10-ampere and 1000 VDC ranges. Meter movement is a precision, taut-band, self-shielding annular type, to withstand damage from shock or vibration. Has easy-access battery and fuse compartment, with extra fuse.

### SPECIFICATIONS

**DC Volts:** 0-.25, 1, 2.5, 10, 50, 250, 500, 1000V. **Accuracy,**  $\pm 2\%$ , F. S.

**DC Current:** 0-50  $\mu$ A ( $\pm 1.5\%$  F. S.); 0-1, 10, 100, 500 mA and 0-10A ( $\pm 2\%$  F. S.).

**AC Volts:** 0-2.5, 10, 50, 250, 500, 1000 V RMS. (Calibrated to indicate RMS value of pure sine wave.) **Accuracy:**  $\pm 3\%$ , F. S.

**Frequency Response:** 0-50 VAC,  $\pm 1$  dB to 100 kHz; 250 VAC,  $\pm 1$ dB to 20 kHz.

**AC Output Volts:** 0-2.5, 10, 50, 250 VAC.

**Resistance:** Rx1, Rx100, Rx10,000; center scale, 12 ohms.

**Accuracy:** 2° of arc.

**Decibels:** -20 to +10 dB, -8 to +22 dB, +6 to +36 dB, +20 to +50 dB. (Zero dB = 1 mW across 600-ohm line.)

**Size:** 5 $\frac{1}{8}$  x 7 x 3 $\frac{1}{8}$ " deep. **Net Wt:** 2 $\frac{3}{4}$  lbs.

Complete with test leads, batteries and instruction manual.  
**Model 120P Volt-Ohm-Milliammeter.**



## Model HV-40 Probe/Meter measures up to 40,000 volts with 2% accuracy

For fast, accurate, safe high-voltage measurements up to 40,000 volts. Extremely lightweight for ease in handling, yet very rugged. Built-in overload capability. Tracking accuracy,  $\pm 2\%$  of full scale. Reading accuracy, 2% at 25 KV. Meter movement includes self-shielded bar magnet. Housing is anti-static treated. Knife-edge pointer and large numbers for ease of reading. 1.75" probe tip for reaching under corona cap.



# Miniature and Compact V-O-M's

## **B&K** Model 101 Miniature V-O-M



This quality, mirrored scale, 20,000 ohm/volt instrument provides an unusual combination of accuracy, readability and dependability at its reasonable price. Meter scales are simplified for fast, accurate reading; there are no diagonally shifted calibration marks or odd scale locations. The mirror eliminates parallax reading errors. Full size banana jacks insure good probe connections. You can even measure .25VDC full scale in the 50-microamp position for semiconductor junction differential measurements.

- *Industry Standard 20,000 ohms/volts, DC*
- *Easy-to-read simplified scales for 16 ranges*
- *Mirror for parallax correction*
- *Rugged, impact-resistant case*
- *Dependable test leads*

### SPECIFICATIONS

**DC Volts:** 0-2.5, 10, 50, 250, 1000V. Accuracy,  $\pm 3\%$ , F.S.

**DC Current:** 0-50  $\mu$ A, 0-25, 250 mA ( $\pm 3\%$  F.S.)

**AC Volts:** 0-10, 50, 250, 500, 1000V RMS. (Calibrated to indicate RMS value of pure sine wave.) Accuracy:  $\pm 3\%$ , F.S.

**Frequency Response:** 0-50 VAC,  $\pm 3$  dB to 10 kHz; 250 VAC,  $\pm 1$  dB to 60 kHz.

**Resistance:** Rx1, Rx10, Rx100; center scale, 100 ohms.

**Accuracy:**  $3^\circ$  of arc.

**Decibels:** -20 to +22 dB, +20 to +36 dB, (Zero dB = 1 mW across 600-ohm line.)

**Size:**  $3\frac{1}{2} \times 5 \times 2$ " deep. Net Wt.: 11 ounces.

Complete with test leads, batteries and instruction manual.

**Model 101 Volt-Ohm-Milliammeter.**

## **B&K** Model 102 Compact V-O-M



With 22 ranges measuring .25 to 5,000 VDC, the Model 102 V-O-M has the versatility for almost every use and the small size and light weight to rate a place in every tool kit. The 20,000 ohms per volt standard DC loading matches the notations on most service schematics, providing compatible readings. Simplified meter scales and mirror combine to give you fast, accurate readings without parallax error. Full size, rugged banana jacks assure dependable probe connections. 0.25 VDC range is convenient for measuring semiconductor junction differentials and other critical voltages such as ground path voltage drops.

- *Industry Standard 20,000 ohms/volt DC*
- *22 Scales cover 0.25 to 5,000 volts*
- *Simplified, mirrored scales for fast accurate readings*
- *Banana jacks for dependability*
- *Sturdy metal case*

### SPECIFICATIONS

**DC Volts:** 0-.25, 1, 2.5, 10, 50, 250, 1000, 5000V.  
Accuracy:  $\pm 3\%$ , F.S.

**DC Current:** 0-50  $\mu$ A; 0-1, 50, 500 mA and 0-10A ( $\pm 3\%$  F.S.).

**AC Volts:** 0-10, 50, 250, 1000 V RMS. (Calibrated to indicate RMS value of pure sine wave.) Accuracy:  $\pm 3\%$ , F.S.

**Frequency Response:** 0-50 VAC,  $\pm 1$  dB to 100 kHz; 250 VAC,  $\pm 1$  dB to 20 kHz.

**Resistance:** Rx1, Rx100, Rx1,000, Rx10,000; center scale 40 ohms.

**Accuracy:**  $3^\circ$  of arc.

**Decibels:** -20 to +22 dB, +20 to +36 dB, (Zero dB = 1 mW across 600-ohm line.)

**Size:**  $4\frac{1}{8} \times 5\frac{7}{8} \times 2$ " deep. Net Wt.: 1 lb. 5 oz.

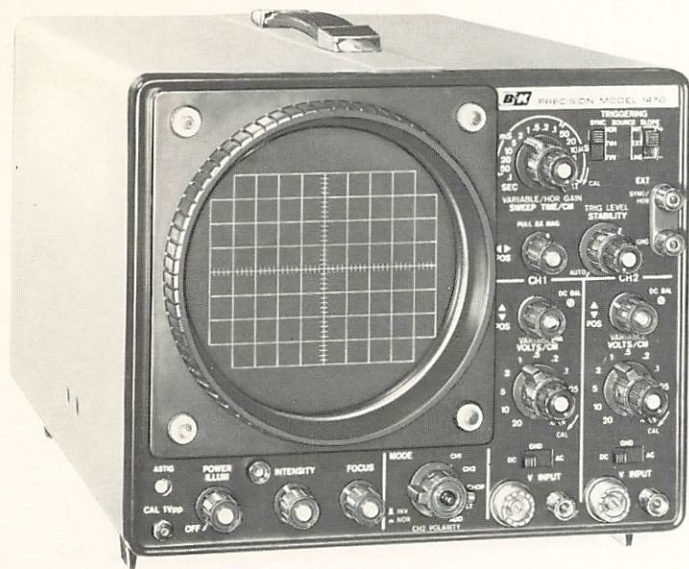
Complete with test leads, batteries and instruction manual.

**Model 102 Volt-Ohm-Milliammeter.**



# Dual-Trace Triggered Sweep Scope

**B&K** - Precision Model 1470



Bezel accepts standard camera mounting bracket.

- *For industry, labs, schools and service benches.*
- *Compare inputs, outputs.*
- *Compare outputs of stages triggered by same pulse, such as sync, logic or switching circuits.*
- *Six operating modes, including alternate and chopped displays.*

## *dual display of all waveforms for fast, easy comparison . . .*

The Model 1470 meets the ever-increasing demand for a dual-trace scope in industry, labs, schools and the service field. For those applications where inputs and outputs are to be compared, or outputs of multiple stages triggered by the same pulse are to be compared, the 1470 is the answer. It permits dual display of waveforms in 6 modes, allowing you to compare the waveforms for shape and time duration. Used in industry and labs for years, the dual-trace scope is showing up on service benches with increasing frequency. Its speed in checking inputs and outputs of video amplifiers, e.g., is unsurpassed. The same is true for checking the burst into and out of gate amplifiers; or the many stages keyed off the horizontal pulse in a TV set. With the 1470, you can determine in a matter of seconds, whether these stages are functioning normally. But the 1470, of course, gives you much more than this advantage; it's an extremely versatile scope, with 10 MHz bandwidth, 10mV sensitivity and automatic, triggered sweep. It replaces all single-trace scopes and gives you the invaluable dual-trace feature in addition.

### APPLICATIONS OF DUAL-TRACE DISPLAY

- Industry, labs, schools, TV-stereo servicing.
- Design and trouble-shooting.
- Viewing simultaneously two waveforms that are frequency- or phase-related—or that have a common sync voltage, such as in digital circuitry.
- Comparison of inputs and outputs.
- Comparison of outputs of multiple stages triggered by the same pulse.
- Checking frequency dividers.
- Evaluation of transmission- and ultrasonic-type delay lines.
- Checking differential amplifiers for balance.
- Relay testing and sequencing.
- Measuring amplifier phase shift.

### THE MODEL 1470 MODE STORY

The 1470 offers 6 operating modes: Channel 1, Channel 2, Chopped, Alternate, Add, and Channel 2 Invert. In Ch. 1

position, only Ch. 1 input signal will be displayed. In Ch. 2 position, only Ch. 2 input will appear. The ALTERNATE mode is used to observe waveforms of higher frequency, at higher sweep speeds. In this position, Ch. 1 and Ch. 2 inputs are displayed on alternate sweeps, the two traces appearing as simultaneous waveforms. The CHOPPED mode is used to observe low-frequency waveforms, with low sweep speeds, to eliminate flickering that would occur in the ALTERNATE mode. In this mode, the amplifiers are switched at a 140 KHz rate by an internally generated signal. At low sweep rates, this switching frequency provides two individual traces on the screen. In the ADD mode, any two waveforms can be added algebraically. Also, the Ch. 2 INV switch *inverts* the polarity of the Ch. 2 waveform; therefore, in the ADD mode, it is possible to obtain the *difference* between 2 waveforms under study, by inverting Ch. 2. The capability of inverting Ch. 2 is a great advantage when comparing certain amplifier inputs and outputs. For example, two waveforms can be nulled by reversing the polarity of Ch. 2, and any resultant remaining pattern represents *distortion* developed in the amplifier.

**Model 1470. Less probes .**

### PROBES



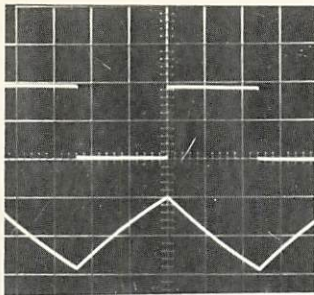
PR-20

**MODEL PR-20 PROBE.** Combination 10:1/DIRECT probe, with spring-loaded clip-on tip. Input impedance: Low-capacity, 10:1, 10 megohms/18 pF; DIRECT, 1 megohm, 120 pF. **2 Probes Required for the 1470.**

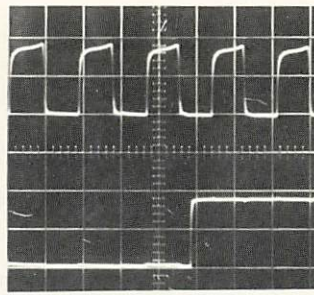
**MODEL PR-16 PROBE.** As above, less spring-loaded tip. **2 Probes Required for the 1470.**



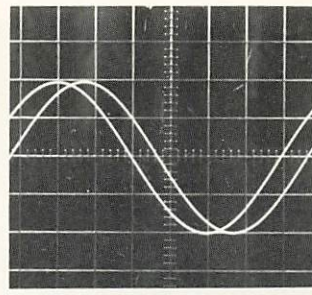
## TYPICAL MODEL 1470 WAVEFORM DISPLAYS



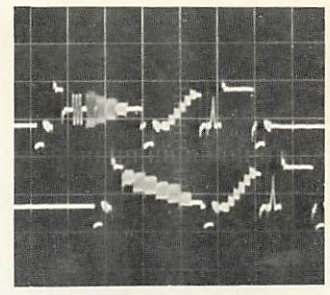
Operational amplifier integrator input and output waveforms.



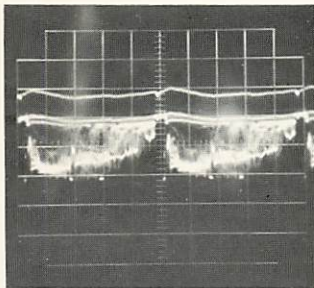
Digital countdown circuit waveforms.



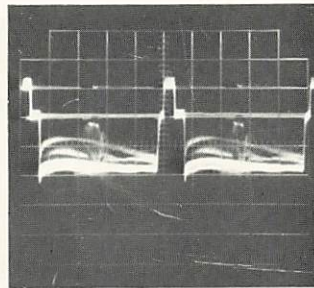
Amplifier phase shift measurements.



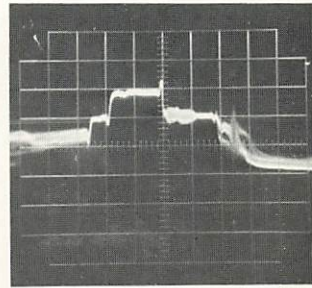
Simultaneous display of field #1 and field #2, VITS (Vertical Interval Test Signal).



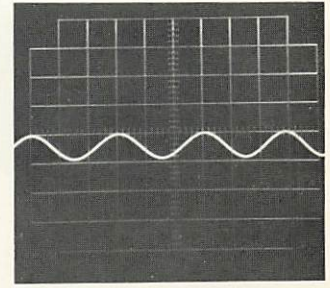
2 fields of vertical TV signal.



2 lines of horizontal TV signal.



Expanded horizontal TV signal with "Back Porch" Note color burst info.



Only 1 cm of synchronized 3.58 MHz color signal, expanded 5x.

### OTHER FEATURES

- CHOP mode for low-frequency waveforms eliminates flickering.
- ADD mode: Ch. 1 plus 2; with Ch. 2 invert, Ch. 1 minus 2.
- Automatic and triggered sweep.
- DC to 10 MHz bandwidth.
- 10 mV/cm sensitivity; minimum circuit loading.
- Maximum sweep speed of  $.2 \mu\text{SEC}/\text{cm}$  (magnified 5 times).
- Calibrated voltage and time base scales for accurate measurements.
- Large, 5" (130 mm) screen, with illuminated scale.
- TV sync separator circuit for TV-H and TV-V.

### SPECIFICATIONS

#### VERTICAL AMPLIFIERS (Ch. 1 and Ch. 2)

**Sensitivity:** 10 mV/cm to 20 V/cm,  $\pm 5\%$ , divided into 11 calibrated ranges. Concentric variable control between ranges.

**Response:** DC, DC to 10 MHz; AC, 2 Hz to 10 MHz ( $-3$  dB).

**Risetime:** 35 nanoseconds.

**Maximum Input:** 300 volts DC + AC peak; or 600 volts p-p.

**Input Impedance:** 1 megohm shunted by 35 pF.

**Operating Modes:** CH. 1 only; CH. 2 only; ALTERNATE; CHOPPED; ADD; CH. 2 invert (push-push switch).

**Chopping Frequency:** 140 KHz.

**Tilt:** 5% or less.

**Overshoot:** 3% or less.

### SWEEP SYSTEM

**Type:** Automatic and triggered.

**Sweep Time:**  $1 \mu\text{SEC}/\text{cm}$  to  $.1 \text{ SEC}/\text{cm}$  ( $\pm 5\%$ ), in 16 steps (1-2-5 sequence). Concentric variable control between ranges.

**Magnification:** 5X at all speeds, for maximum sweep speed of  $.2 \mu\text{SEC}/\text{cm}$ .

### TRIGGERING

**Sync:** Normal; TV-H (100 Hz to 1 MHz); TV-V (100 Hz to 3 KHz).

**Source:** Internal, Ch. 1 or external.

**Slope:** Positive or negative.

**Range:** 20 Hz to 10 MHz (min. 1 cm deflection on CRT).

**TV Sync:** Sync separator circuit generates sweep sync pulses from TV composite video waveforms.

### HORIZONTAL AMPLIFIER

**Sensitivity:** 300 mV/cm.

**Response:** DC to 800 KHz ( $-3$  dB).

**Input Impedance:** 100 K ohms, shunted by 40 pF.

### OTHER SPECIFICATIONS

**Calibration Source:** Line frequency square wave, 1 volt p-p.

**Intensity (Z-Axis) Modulation:** 30 volts, p-p, minimum.

**CRT:** Flat-faced, 5", high sensitivity, medium persistence.

**Graticule:**  $8 \times 10$  cm, variable illumination.

**Size:**  $9 \times 10 \times 17$ " deep. Compact, low-profile design.

**Net Wt.,** 23½ lbs. With handy tilt-stand.

**Vector Overlay:** Supplied.

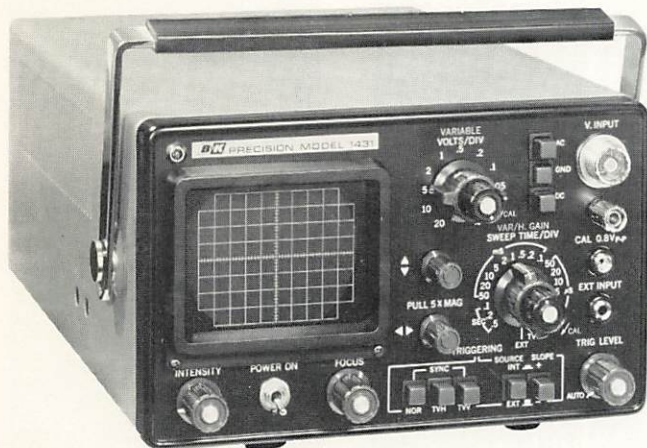
**Probes:** Two required; not supplied (see page 8).

**Power Requirements:** 105-125 VAC, 50-60 Hz; 3-wire cord. Also available for 117/234 VAC.



# 3" Triggered Sweep Oscilloscope

**B&K**-Precision Model 1431



- 1/3 the size of comparably performing scopes.
- The ultimate in triggered sweeps: 19 sweep positions.
- DC to 10 MHz Bandwidth with 10 mv/div sensitivity.
- Weighs only 13 pounds.

**solid-state, triggered sweep, automatic sync . . . in a 3" scope**

The 1431 combines all the advantages of triggered sweep, with automatic sync; 1, 2 and 5 steps on the calibrated vertical attenuator; very high sensitivity of 10 mV/div.; TV-H and TV-V sweep selector positions which enable you to see two horizontal lines or two vertical fields, automatically synchronized; front-panel Vectorscope capability; super-bright patterns on a 3" screen; optimized high accelerating anode voltage for sharp, high-intensity patterns at ultra-fast writing speeds of up to 0.1  $\mu$ /SEC/div. (with x5 magnification).

## FEATURES

- Displays entire complex TV signal or any portion thereof—including "back porch" of horizontal sync pulse with color burst information—all automatically synchronized. Exclusive sync separator locks sweep for jitter-free waveform display. Even Vertical Interval Test Signals (VITS) can be locked in and expanded for viewing.
- High sensitivity—displays smallest signal levels in transistor and IC circuits with positive sync. Will sync waveform displays with amplitudes as low as one div peak-to-peak.
- DC amplifier permits measurement of AC and DC signal components.
- Accurate reproduction of high frequency signals (3.58 MHz color burst) with wide bandwidth amplifier (10 MHz).
- Exclusive B & K circuit optimizes high voltage on accelerating anode for sharp, ultra-bright patterns even at super-fast writing speeds of up to 0.1 microsecond/div.
- 100% solid state.
- Front-panel Vectorscope capability for ease of use.

## SPECIFICATIONS

### VERTICAL AMPLIFIER

**Sensitivity:** 10 millivolts/div. to 20 volts/div.  $\pm$  5%, divided into 11 calibrated ranges, each with fine adjustment.  
**Frequency Response:** DC, DC to 10 MHz ( $-3$  db); AC, 2 Hz to 10 MHz ( $-3$  db).  
**Risetime:** 35 nanoseconds.  
**Overshoot:** 3% or less.  
**Input Impedance:** 1 megohm, shunted by 35 pf.  
**Maximum Input Voltage:** 600 V p-p 300 V (DC + AC peak).

### SWEEP CIRCUIT

**Sweep System:** Automatic and triggered.  
**Sweep Time:** 0.5 microsecond/div. to 0.5 second/div. ( $\pm$  5%), divided into 19 calibrated ranges (1, 2, 5 steps), each with fine adjustment. Special TV-H position displays two horizontal lines and TV-V position displays two vertical fields.

**Magnification:** 5 times, at all speeds; increases maximum sweep to 0.1 microsecond/div.

**Linearity:** 0.5 sec/div. to 2 microsec/div. ranges: 3% or less.  
1.0 microsec/div. to 0.5 microsec/div.: 5% or less.

### TRIGGERING

**Type:** Internal and external. (0.5 V p-p) triggering. **Slope:** Positive or negative.  
**Range:** 20 Hz to 10 MHz (minimum 1.0 div deflection on CRT).

**TV Sync:** Exclusive sync separator for viewing even the most complex TV waveform. Optimum sync separation for vertical and horizontal sync pulses; any portion of TV waveform can be synchronized and expanded for viewing, even at deflection amplitudes as low as one division.

### HORIZONTAL AMPLIFIER

**Sensitivity:** 300 millivolts/div. **Response:** DC-1 MHz ( $-3$  db).  
**Input Impedance:** 1 Megohm; approx., shunted by 40 pf.

### OTHER SPECIFICATIONS:

**Calibration Voltage:** line frequency square wave, 0.8 volts p-p ( $\pm$  5%)

**Intensity Modulation:** 30 volts p-p, minimum.

**Dimensions:** 4 $\frac{3}{4}$ "Hx7 $\frac{7}{8}$ "Hx12 $\frac{7}{8}$ "L. Net Wt.: 13 lbs.

**Power Requirements:** 105-125 VAC, 50-60 Hz; 30 watts.

3-wire line cord.

With handle tilt stand and Mylar Vector overlay; less probe—see listings below.

**Model 1431 Less probe.**

### PROBES

**MODEL PR-20 PROBE.** Combination 10:1/DIRECT probe with spring-loaded clip-on tip. Input impedance: Low-capacity, 10:1, 10 megohms/18 pf; DIRECT, 1-megohm/120 pf. For B & K 1440, 1460, 1465, 1470 scopes.

**MODEL PR-16 PROBE.** Combination probe as above, but less the spring-loaded tip.



# Triggered Sweep Oscilloscope

**B&K** - Precision Model 1460



Bezel accepts standard camera mounting bracket.

- *The ultimate in triggered sweeps: 19 positions, PLUS special TV-H and TV-V positions for one-knob selection of horizontal or vertical TV signals—automatically synchronized!*
- *DC to 10 MHz Bandwidth with 10 mv/cm sensitivity.*

## *the pace-setter: solid-state, triggered sweep, automatic sync . . .*

The 1460 combines all the advantages of triggered sweep, with automatic sync; 1, 2 and 5 steps on the calibrated vertical attenuator; very high sensitivity of 10 mV/cm; TV-H and TV-V sweep selector positions which enable you to see two horizontal lines or two vertical fields, automatically synchronized; front-panel Vectorscope capability; super-bright patterns on a 5" screen; optimized high accelerating anode voltage for sharp, high-intensity patterns at ultra-fast writing speeds of up to 0.1  $\mu$ /SEC/cm (with x5 magnification).

### FEATURES

- Displays entire complex TV signal or any portion thereof—including "back porch" of horizontal sync pulse with color burst information—all automatically synchronized. Exclusive sync separator locks sweep for jitter-free waveform display. Even Vertical Interval Test Signals (VITS) can be locked in and expanded for viewing.
- High sensitivity—displays smallest signal levels in transistor and IC circuits with positive sync. Will sync waveform displays with amplitudes as low as one cm peak-to-peak.
- DC amplifier permits measurement of AC and DC signal components.
- Accurate reproduction of high frequency signals (3.58 MHz color burst) with wide bandwidth amplifier (10 MHz).
- Exclusive B & K circuit optimizes high voltage on accelerating anode for sharp, ultra-bright patterns even at super-fast writing speeds of up to 0.1 microsecond/cm.
- 100% solid state.
- Front-panel Vectorscope capability for ease of use.

### SPECIFICATIONS

#### VERTICAL AMPLIFIER

**Sensitivity:** 10 millivolts/cm to 20 volts/cm,  $\pm 5\%$ , divided into 11 calibrated ranges, each with fine adjustment.  
**Frequency Response:** DC, DC to 10 MHz ( $-3$  db); AC, 2 Hz to 10 MHz ( $-3$  db).  
**Risetime:** 35 nanoseconds.  
**Overshoot:** 3% or less.  
**Input Impedance:** 1 megohm, shunted by 35 pf.  
**Maximum Input Voltage:** 600 volts p-p.

#### SWEEP CIRCUIT

**Sweep System:** Automatic and triggered.  
**Sweep Time:** 0.5 microsecond/cm to 0.5 second/cm ( $\pm 5\%$ ), divided into 19 calibrated ranges (1, 2, 5 steps), each with fine adjustment. Special TV-H position displays two horizontal lines and TV-V position displays two vertical fields.

**Magnification:** 5 times, at all speeds; increases maximum sweep to 0.1 microsecond/cm.

**Linearity:** 0.5 sec/cm to 2 microsec/cm ranges: 3% or less.  
 1.0 microsec/cm to 0.5 microsec/cm: 5% or less.

#### TRIGGERING

**Type:** Internal, line and external. **Slope:** Positive or negative.  
**Range:** 20 Hz to 10 MHz (minimum 1.0 cm deflection on CRT).  
**TV Sync:** Exclusive sync separator for viewing even the most complex TV waveform. Optimum sync separation for vertical and horizontal sync pulses; any portion of TV waveform can be synchronized and expanded for viewing, even at deflection amplitudes as low as one centimeter.

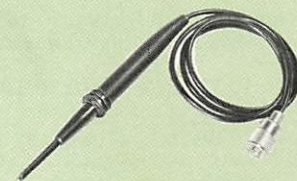
#### HORIZONTAL AMPLIFIER

**Sensitivity:** 300 millivolts/cm. **Response:** DC-800 KHz ( $-3$  db).  
**Input Impedance:** 100,000 ohms, shunted by 40 pf.

#### OTHER SPECIFICATIONS:

**Calibration Voltage:** 1 KHz square wave, 5 volts p-p ( $\pm 5\%$ )  
**Intensity Modulation:** 30 volts p-p, minimum.  
**Dimensions:** 9 x 10 x 17" deep. **Net Wt.:** 23½ lbs.  
**Power Requirements:** 105-125/234 VAC, 50-60 Hz; 20 watts.  
 3-wire line cord.  
 With handy tilt stand and Mylar Vector overlay; less probe—see listings below.  
**Model 1460. Less probe .**

### PROBES



PR-20

**MODEL PR-20 PROBE.** Combination 10:1/DIRECT probe with spring-loaded clip-on tip. Input impedance: Low-capacity, 10:1, 10 megohms/18 pF; DIRECT, 1 megohm/120 pF. For B & K 1440, 1460, 1465, 1470 scopes.

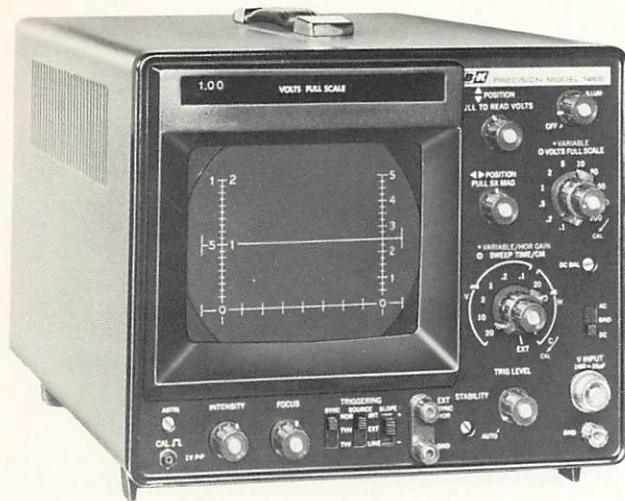
**MODEL PR-16 PROBE.** Combination probe as above, but less the spring-loaded tip.

See back cover for LC-70 carrying case.



# Triggered Scope with "Cali-Brain"<sup>®</sup>

**B&K** - Precision Model 1465



- Triggered sweep and automatic sync
- 5X sweep magnification
- Front panel Vectorscope
- Sync separator in all sweep positions
- DC-10 MHz bandwidth
- Exclusive "Cali-Brain"<sup>®</sup> scale readout

CALI-BRAIN is another B&K exclusive—and this is the only scope anywhere that has it! The scope also features DC to 10MHz bandwidth, front-panel Vectorscope capability and a modern low-profile case with tilt-stand for eye-level viewing. Plus B&K's traditional rugged construction and 100% solid state circuitry for reliable use in production, lab, shop and classroom applications.

## MODEL 1465 SPECIFICATIONS

### Vertical Amplifier

**Sensitivity:** .1 volt full scale (16.6 mV/cm) to 200 volts full scale. Concentric control provides continuous variation between calibrated ranges.

**Response:** DC, DC to 10 MHz; AC, 2 Hz to 10 MHz (both -3dB).

**Risetime:** 35 nanoseconds.

**Overshoot:** 3% or less. **Tilt:** 5% or less.

**Maximum Input:** 600 volts, peak-to-peak.

**Input Impedance:** 1 megohm, shunted by 35 pF.

### Sweep System

**Type:** Automatic and triggered.

**Sweep Time:** 1  $\mu$ SEC/cm to 20 mSEC/cm ( $\pm 5\%$ ) in 10 steps (1-2 sequence), each with fine adjustment. **Magnification:** 5X, at all speeds; increases maximum sweep speed to .2  $\mu$ SEC/cm.

### Triggering

**Type:** Internal, line and external.

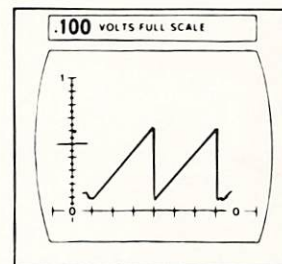
**Slope:** Positive and negative.

## How the CALI-BRAIN<sup>®</sup> Measures Amplitude Faster, More Accurately

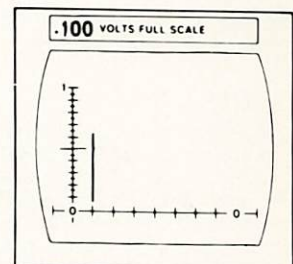
Measuring peak-to-peak volts on a standard scope graticule can prove to be very difficult—especially if the waveform is something other than a simple sine wave. Which scale do you read? What are the full scale volts? Where is the peak in a complex wave? How long does it take you to get the answers? We at B & K always have felt there should be an easier way to perform this very important operation with a scope. And now there is—with CALI-BRAIN, a B & K exclusive (patent applied for) featured on the 1465. Here's how it works:

The CRT screen has a special graticule with two scales, one at each side of the screen. Each is individually lighted. As you select the vertical attenuator range, you automatically light up the correct scale and get a digital readout in the display panel directly above the scale selected, giving you the exact value of full-scale volts for that scale. To read peak-to-peak volts with the 1465, therefore, this is all you do: (1) Get your desired pattern on the screen. (2) Pull out the CALI-BRAIN knob (vertical position control). This (a) collapses the horizontal sweep, compressing your waveform into a single vertical line; (b) shifts the line to the correct scale on the graticule, and (c) gives you a readout of the exact full scale volts above the scale.

(3) Position the compressed waveform on the base line (easy to do because it's a single bright line). (4) Read the peak-to-peak volts directly off the screen from the vertical scale—just like reading volts on a voltmeter!



Normal pattern before pulling out the "CALI-BRAIN" knob.



CALI-BRAIN collapses sweep and shifts vertical line to correct scale; full scale volts appear above scale.

**Range:** 20 Hz to 10 MHz (minimum 1 cm deflection on CRT).

**TV Sync:** Sync separator circuit generates sweep synchronizing pulses corresponding to vertical and horizontal sync pulses of complex waveforms, including TV signals, and VITS (Vertical Interval Test Signal).

### Horizontal Amplifier

**Sensitivity:** 300 mV/cm. **Response:** DC to 800 KHz.

**Input Impedance:** 100K ohms, shunted by 40 pF.

### Other Specifications

**Calibration Source:** Line frequency sq. wave, 1 volt p-p ( $\pm 5\%$ ). **Intensity (Z-Axis) Modulation:** 30 volts p-p minimum; input jack on rear panel.

**CRT:** Flat-faced, 5"; optimized anode accelerating voltage.

**Size:** 9x10x17" deep.

**Net Wt.:** 23 1/2 lbs.

**Power Requirements:** 105-125 VAC, 50-60 Hz; 20 watts. Also available for 117/234 VAC, 50-60 Hz. With 3-wire line cord.

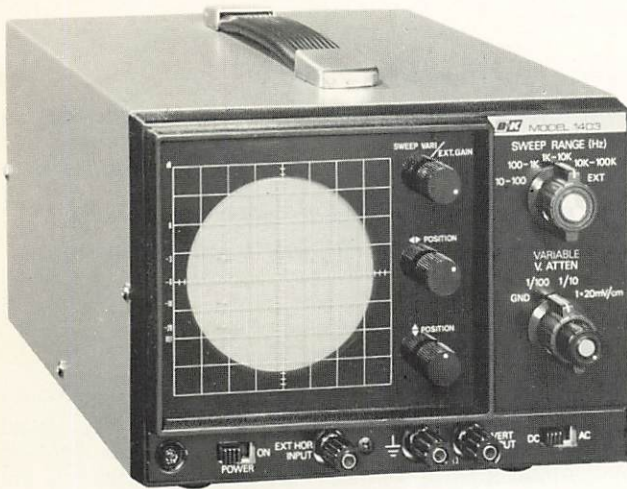
With handy tilt stand for eye-level viewing; less probe.

See back cover for LC-70 carrying case.



# 3" Solid-State Oscilloscope

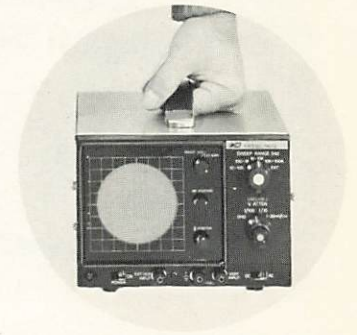
**B&K** Model 1403



ACTUAL SIZE: 5¼ x 7¾ x 11¼"

Rugged "mini-scope" features DC to 2MHz bandwidth, sharp, bright trace, DC amplifiers on both vertical and horizontal axes and direct-deflection terminals for waveforms up to 150MHz. Completely solid state scope (except CRT) weighs just 8½ pounds and has a three-wire grounded AC line cord. Ideal for many monitoring applications, freeing more expensive scopes from "menial" monitoring tasks—even use two 1403's to replace costly dual-trace scopes for monitoring. Just set the responsive controls for the waveform being monitored at a particular checkpoint—and leave the rest to your checker. She'll appreciate the 1403's sharp trace and stability. Takes up very little space on the bench, line or classroom lab table. The 1403's sturdy construction, bright display, portability and smoked acrylic graticule make it perfect for teachers and students in science and electronic labs and classrooms.

You CAN  
take it  
with you !



- For field service work, production lines, schools
- Ultra-compact and lightweight
- Use the 1403 to release more expensive scopes from monitoring applications

## SPECIFICATIONS

### VERTICAL AMPLIFIER

**Sensitivity:** 20 mV/cm or better.

**Response:** DC, DC to 2 MHz, (-3 dB)  
AC, 2 Hz to 2 MHz (-3 dB)

**Overshoot:** 5% or less.

**Maximum Input:** 600 volts, peak-to-peak.

**Input Impedance:** 1 megohm, shunted by 30 pF.

**Attenuator:** 1, 1/10, 1/100 multiplier, ±5%.

**Gain Control Range:** Continuously variable range greater than 22 dB.

### HORIZONTAL AMPLIFIER

**Sensitivity:** 500mV/cm or better.

**Response:** DC to 250 KHz.

**Input Impedance:** 1 megohm, shunted by 40 pF.

### SWEEP SYSTEM

**Type:** Recurrent.

**Time Base Ranges:** 10-100 Hz, 100-1kHz, 1 kHz-10 kHz, 10 kHz-100 kHz; continuously variable between ranges.

**Sweep Linearity:** ± 5%.

**Synchronization:** Internal, negative.

**Signal Required for Sync:** Minimum of 10 mm deflection on screen of CRT.

### OTHER SPECIFICATIONS

**Intensity Modulation:** 25 volts, peak-to-peak.

**Size:** 5¼" high, 7¾" wide, 11¼" deep.

**Net Wt.:** 8½ lbs.

**Power Requirements:** 117/234 VAC, 50-60 Hz; 15 watts.  
3-wire grounded AC line cord.

**Accessories Included:** Leads, spare fuse, instructions.

**Model 1403 Oscilloscope.**

## PROBES FOR 1465 & 1403



**MODEL PR-20 PROBE.** Combination 10:1/DIRECT probe with spring-loaded clip-on tip. Input impedance: Low-capacity, 10:1, 10 megohms/18 pF; DIRECT, 1 megohm/120 pF. For B & K 1440, 1460, 1465, 1470 scopes.

**MODEL PR-16 PROBE.** Combination 10:1/DIRECT probe as above, but less spring-loaded tip.

**MODEL PR-21 PROBE.** Combination isolation/direct probe. Has switchable 100K resistor to prevent capacitive loading when measuring DC in RF circuits. For Model 1403 Oscilloscope.

See back cover for LC-14 carrying case.



# Solid-State RF Signal Generators

## **B&K** -Precision Model E200D



100% Silicon Transistors

Features 100% silicon transistor circuitry and zener-regulated power supply for accuracy, stability and long life. Six individually shielded step attenuators plus variable fine output level control with calibrated meter provide widest range of outputs with known signal levels. Full shielding eliminates spurious radiation even at outputs of  $1\mu\text{V}$ . Internal crystal calibrator for accuracy of better than 0.1%. Has  $200\mu\text{A}$  d'Arsonval meter for accurate monitoring and setting of RF carrier and modulation levels. Crystal calibrator provides audible zero-beat through built-in speaker. Can be used as crystal-calibrated marker. 100kHz to 54MHz on fundamentals and 54 to 216MHz on harmonics.

### SPECIFICATIONS

**Frequency Range:** 100kHz-54MHz in 5 bands; 54-216MHz on harmonics.  
**Accuracy:**  $\pm 1.5\%$  of highest frequency on any range used; better than

- 100kHz to 216MHz in 5 bands
- Completely shielded RF output with percent modulation metering and variable monitored attenuation calibrated to less than 1 microvolt
- Built-in crystal calibration system
- Easy-setting, 2-color, 5" anti-backlash vernier dial

0.1% obtainable with crystal calibrator. **Output** (calibrated into 50-ohm load): 100,000 microvolts maximum. Open circuit uncalibrated output, 0.3V minimum. **Output Level Calibration Accuracy:**  $\pm 1\text{dB}$  of nominal to 54MHz. **Attenuation:** 6 individually shielded step attenuators with total capability of  $-96\text{dB}$ . Outputs as low as  $106\text{dB}$  below  $100,000\mu\text{V}$  can be obtained with fine output level control and calibrated meter, which provides additional  $-10\text{dB}$  to  $+2\text{dB}$  output level indication ( $0\text{dB} = 100,000\mu\text{V}$  into 50 ohms). **Modulation:** 400Hz, nominal. External modulation sensitivity, approximately 1 volt RMS for 50% modulation. **Crystal Calibrator:** 1MHz and 100kHz; 100kHz output is calibrated against the 1MHz crystal oscillator. Accuracy,  $\pm 0.05\%$ . Built-in detector, amplifier and speaker provided for calibration function. **Power Requirements:** 110-130VAC, 50-60Hz; 6 watts. Also available for 117/234VAC, 50-60Hz. Three-wire grounded line cord. **Size:**  $12\frac{3}{4} \times 7\frac{1}{4} \times 8$ " deep. **Net Weight:** 10 pounds.

Model E200D

## **B&K** Model 2050



Rugged, versatile, accurate RF signal generator is built to withstand the rigors of continuous use, such as in industry—yet it's compact and lightweight—weighs only 5 pounds. All solid-state silicon circuitry uses FET's in RF and audio oscillator stages for greater stability and maximum linearity of modulated signals. A single PC board holds 90% of components, assuring highest frequency stability. Zener-regulated power supply is internally fuse-protected. Isolated RF output for maximum protection against external voltage sources.

- 100kHz to 30MHz in 6 bands, with 1.5% accuracy
- 3 outputs: RF, modulated RF (400Hz) and externally modulated RF
- Positive anti-backlash dial drive
- Zener-regulated power supply
- 100% solid-state • FET's for stability

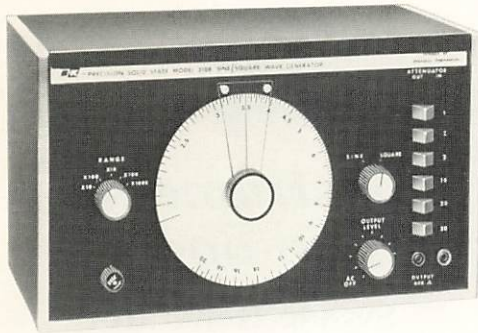
### SPECIFICATIONS

**Frequency Ranges:** 100kHz to 30MHz on 6 fundamental bands. **Accuracy:** 1.5% of dial setting. **Output:** 0.1V RMS or better ( $20^\circ\text{C}$ ). **Attenuator:** Combination HIGH-LOW switch, plus continuously variable RF OUTPUT control for approximately 20dB change. **Modulation, Internal:** 400Hz; 40%,  $\pm 5\%$ . **Modulation, External:** 40Hz to 10kHz; modulating voltage, 1.5V RMS for 40% or better modulation. **Operating Temperature Range:**  $0-50^\circ\text{C}$ . **Size:**  $7\frac{1}{2}$ " wide x  $6\frac{1}{8}$ " high x  $9\frac{3}{4}$ " deep overall. **Net Weight:** 5 pounds. **Power Requirements:** 117/234V AC, 50-60Hz; 2.8 watts. 3-wire grounded line cord. **Accessories:** Supplied with shielded leads with insulated clip and banana plug; detailed instruction manual.



# Sine/Square Wave Generators

## **B&K** -Precision Model E310B



### 100% Silicon Transistors

The industry standard for years! All solid-state circuitry uses FET's in oscillator, silicon transistors and zener-regulated power supply. Fully shielded—no spill-over to other equipment. Large, easy-to-read 5" vernier dial scale for accurate repeatability. Handsome case and panel for professional appearance. Rugged enough to withstand continuous use in schools and labs as well as service shops.

### SPECIFICATIONS

**Sine Wave Frequency Range:** 20Hz to 2.0MHz in five decade ranges. **Output:** 0-8 volts RMS into hi-Z loads; 0-7VRMS into 600 ohms;  $\pm 2$ dB. **Distortion:** 0.25% typical; 0.5% maximum (100Hz to 2 MHz); 1% maximum below 100Hz.



This versatile audio frequency generator, based on the Wien bridge oscillator circuit, provides sine wave output voltage of 10V RMS over its entire frequency range of 20Hz to 200kHz. WAVE FORM switch allows easy selection of either sine or square waves. Continuous output level control plus three-position attenuator allow precise output adjustment. An ideal signal source for phase and time measurements and for characteristic measurements using square waves, as well as a low-distortion signal source for audio frequency measurements. Factory set for 117VAC, 50-60Hz, but easily converted to 100V or 230V operation.

### SPECIFICATIONS

**Frequency Range** (sine and square wave): 20Hz-200kHz in four decades. **Accuracy:**  $\pm(3\%+2\text{Hz})$

**Sine Wave Output Voltage:** 10V RMS,  $\pm 10\%$  at 1kHz. **Output vs. Frequency Characteristics** (referred to 1kHz level):  $\pm 1$ dB or better from 20Hz to 200kHz. **Distortion:** 0.5% or less, 50Hz-100kHz; 1% or less, 20Hz-200kHz.

- **Extended frequency range:**  
*Sine:* 20Hz to 2MHz  
*Square:* 20Hz to 300kHz
- **Constant-voltage output over each band and band-to-band**
- **56dB step attenuation**

**Square Wave Frequency Range:** 20Hz to 200kHz in four decade ranges. **Rise Time:** Less than 100 nanoseconds at 20kHz. **Symmetry:** Balanced within 5% or less.

**Frequency Calibration Accuracy:**  $\pm 3\%$ , 20Hz to 2MHz.

**Attenuators** (both sine and square wave): Six switches for a total of 56dB; accuracy,  $\pm 5\%$  when terminated in a 600-ohm load. Continuously variable control adjusts output from maximum set by switches down to less than 0.25 millivolt.

**Power Requirements:** 100-130VAC, 50-60Hz; 15 watts. Also available for 117/234VAC, 50-60Hz. **Size:** 12 $\frac{3}{4}$  x 7 $\frac{1}{4}$  x 8" deep. **Net Weight:** 9 $\frac{1}{2}$  pounds.

Model E310B

## New **B&K** Model 3050

- **Sine/square waves, 20Hz-200kHz**
- **Tests ultrasonic controls**
- **High stability, even with line voltage changes**
- **10V RMS output, 0-40dB attenuation**
- **Each selector position uses entire scale**

**Square Wave Output Voltage:** 10V peak-to-peak or more. **Tilt:** 10% or less at 20Hz. **Rise and Fall Times:** 500 nanoseconds or less. **Overshoot:** 3% or less. **Symmetry:** Within  $\pm 5\%$ , measured at 1kHz with maximum output.

**Output** (sine and square wave): 0/20/40dB step attenuator plus continuously variable OUTPUT vernier control that adjusts output from zero to maximum selected by step attenuator. Approx. 600 ohms output impedance.

**External Synchronization:** Range, typically 1 $\frac{1}{2}$ %/V; 3V RMS maximum input. Input impedance approximately 20,000 ohms.

**Stability with  $\pm 10\%$  Line Voltage Variation:** Less than  $\pm 0.5\%$  frequency drift; less than  $\pm 0.5$ dB output level variation.

**Operating Temperature:** 0-50°C at 90% or less relative humidity.

**Power Requirements:** 117V AC, 50-60Hz; 30 watts. Convertible to 100V and 230V, 50-60Hz operation. **Size:** 7 $\frac{3}{4}$ " wide, 9 $\frac{1}{8}$ " deep, 6" high. **Net Weight:** 6 $\frac{1}{4}$  pounds.

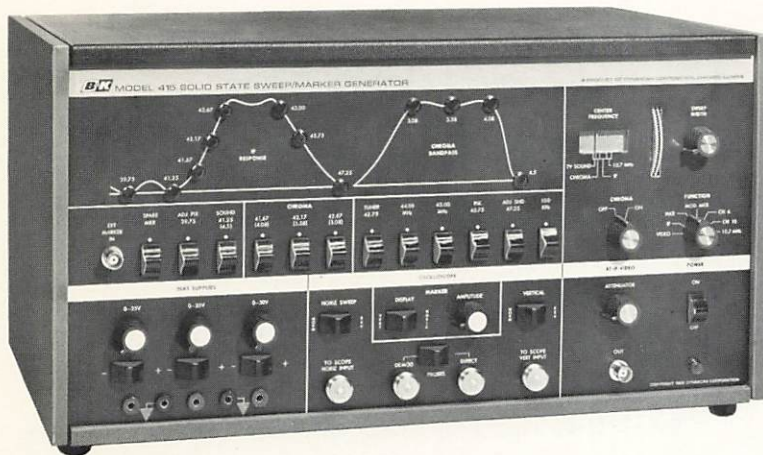
**Accessories:** Complete with one red and one black test lead, each terminated in insulated alligator clip and banana plug; spare fuse.

Model 3050



# Solid-State Sweep/Marker Generator

**B&K** Model 415



# 4

*instruments  
in one*

Sweep Generator  
Marker Generator  
Marker Adder  
Bias Supply

*the most useful test instrument ever devised for TV alignment . . .*

The highly popular Model 415 Sweep/Marker Generator concentrates all the alignment tools you ever will need (except for oscilloscope and VTVM), into a single, versatile, easy-to-use instrument. Functional grouping of all controls and features adds greatly to the efficiency of the instrument.

The 415 actually is 4 instruments in one: A sweep generator, a marker generator, a marker adder, and bias supply (3 provided)—plus the demodulator probe.

By using and mastering the 415 alignment procedures, you develop a feeling of confidence in the unit and in the alignment methods. You achieve unparalleled speed in alignment and verification of alignment. And when you have finished alignment, you will feel certain that the set is properly aligned—because the response curves obtained were not influenced by the position of, or contacts with, a mass of inter-connecting cables between a series of test units.

All IF marker outputs are crystal-controlled, assuring their absolute accuracy. 100 kHz markers which can be superimposed on the crystal-controlled markers, permit alignment of the critical automatic fine tuning circuits of color TV receivers.

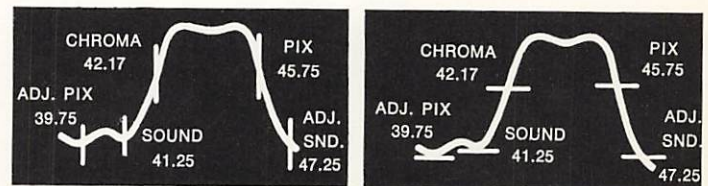
Markers can be viewed horizontally or vertically (see Marker Tilt Feature at right). And their positions on the bandpass curves are shown on the front panel, utilizing idealized curves and lights.

The 415 eliminates the problems normally encountered in sweep alignment. It provides IF sweep, RF sweep on TV channels 4 and 10, video sweep, 10.7 MHz sweep for FM receivers and 10 crystal-controlled post-injection markers for accurate frequency identification on all sweep ranges.

Not the least important feature of the 415 package is the Instruction Manual, which in its 100 pages not only covers all aspects of alignment procedures, but also reviews, in clear language enhanced by numerous large drawings, the transmitted television signal, the television receiver, typical receiver block diagrams, and the various tuned circuits which require alignment.

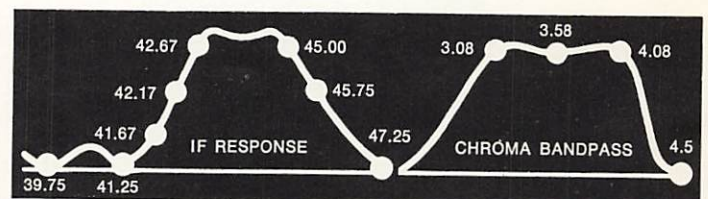
## B&K EXCLUSIVE MARKER TILT FEATURE

Permits marker to be viewed in either the vertical or horizontal position, with the flip of a switch. Ensures precision accuracy in setting markers at the exact locations on the bandpass curve. Extremely useful when aligning traps; permits you to locate trap frequencies that occur close to the base line of the IF curve.



Vertical Markers

Markers Tilted Horizontally



Marker Frequency Guide on Front Panel

## COMPLETE ACCESSORY PACKAGE

The 415 is supplied complete with the following accessories: RF cable with built-in DC blocking and switch-selectable 75 or 300 ohm termination; PR-151 Demodulator Probe for all video, chroma, IF and RF demodulation needs; DIRECT cable with mike connector and 10K ohm isolating resistor; 3 shielded cables—one with mike connectors at both ends, 2 with mike connector one end, banana plugs at other end; 3 bias leads; one ground cable; 2 IF loading blocks.

**Model 415 Sweep/Marker Generator.**



## The 415 gives you all these features:

### GENERAL

- Unity gain through signal-processing circuits of the 415 permits continuous monitoring of peak-to-peak amplitudes of response curves on the oscilloscope.
- Exclusive marker tilt and amplitude control for easy pinpointing of marker positions, regardless of sweep curvature.
- Pattern polarity and sweep reversal enable you to match waveform displays shown in manufacturers' alignment procedures.
- Built-in low-frequency compensation eliminates pattern errors caused by a scope with poor low-frequency response.
- To make simple overall alignment checks, connect the 415's RF sweep output (Ch. 4 or 10), to receiver antenna terminals, and without making any additional signal input re-connections, evaluate the alignment condition of all tuned, signal-processing circuits of the TV receiver.
- Visual reproduction on front panel of idealized alignment curves, with lights indicating marker positions, provides a constant reference—minimizing errors.
- Three built-in bias supplies are provided, with reversible polarity—more than adequate for all alignment tasks.
- Signal cable is properly terminated to minimize alignment errors and "hot" leads caused by standing waves.

### OUTPUTS

- Completely self-contained, solid-state sweep and marker generators provide stable, linear sweeps and crystal-controlled markers (see SPECIFICATIONS).
- True post-injection of 10 crystal-controlled IF markers, plus an 11th oscillator circuit less crystal, as a user option for marker function in the 30-50 MHz range.
- A continuous chain of 100 kHz markers can be superimposed on any of the crystal-controlled markers. Simpli-

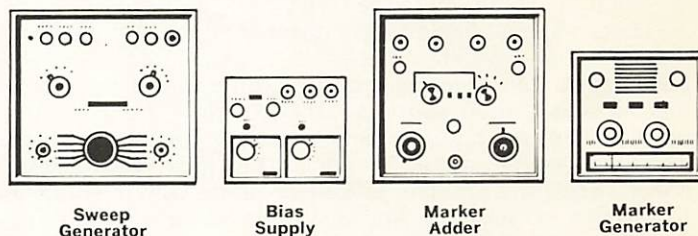
fies alignment of FM receiver IF stages and discriminators as well as automatic fine tuning circuits of TV sets, by providing continuous bandwidth reference markers at 100 kHz intervals.

- All crystal-controlled IF markers are available as RF equivalents at the generator output, for spot alignment of traps and pre-alignment of bandpass circuits. The marker frequencies can be unmodulated, or 400 Hz modulated for scope display of output.
- Video sweep output permits direct sweep alignment of chroma circuits where specified by manufacturers.
- RF cable terminating impedances of either 300 or 72 ohms, switch-selectable, permits signal injection at receiver antenna input terminals or directly into the IF stages. DC blocking is built into the RF cable termination.

### OTHER FEATURES

- Transistorized power supply regulators (zener-diode referenced) assure maximum stability and minimum drift.
- Built-in 15 kHz filter eliminates the need to disable the TV set's horizontal output circuits during alignment.
- After initial hook-up to TV set, IF and chroma response curves can be observed without additional intercabling changes. All intercabling changes and generator selections are accomplished internally with the master FUNCTION switch and other front panel controls.

### The 415 replaces these 4 instruments . . .



### SPECIFICATIONS

#### Outputs

1. Video sweep: 0-6 MHz.
2. IF sweep: 35-50 MHz.
3. Unmodulated markers.
4. Modulated markers.
5. Channel 4 RF sweep.
6. Channel 10 RF sweep.
7. 10.7 MHz sweep.

#### Sweep Widths

1. RF/IF: 1 MHz to over 10 MHz.
2. 10.7: 100 kHz to 2 MHz.

#### Output Impedances

1. 72 ohms.
2. 300 ohms.

#### IF Markers (Crystal-Controlled)

1. 39.75 MHz (Adj. Ch. pix trap).

2. 4.25 MHz (sound trap).
3. 41.67 MHz (IF chroma sideband carrier)
4. 42.17 MHz (chroma sub-carrier)
5. 42.67 MHz (IF chroma sideband carrier)
6. 42.75 MHz (IF tuner link)
7. 44.00 MHz (IF center frequency)
8. 45.00 MHz (IF frequency)
9. 45.75 MHz (pix carrier)
10. 47.25 MHz (Adj. Ch. sound trap)
11. Extra marker oscillator for user's option; accepts crystal in 35-50 MHz range.
12. External marker input provision.

#### 100 kHz Markers

Continuous string of markers with 100 kHz separations; for superim-

posing on any IF marker during FM and AFT alignment.

#### RF Equivalents of Markers

All IF and chroma markers are available on Ch. 4 and Ch. 10.

#### Bias Supplies (3)

1. Low impedance for solid-state, hybrid, or all-tube sets.
2. 2 each: 0-25 VDC, reversible polarity.
3. 1 each: 0-50 VDC, reversible polarity.

#### OTHER SPECIFICATIONS

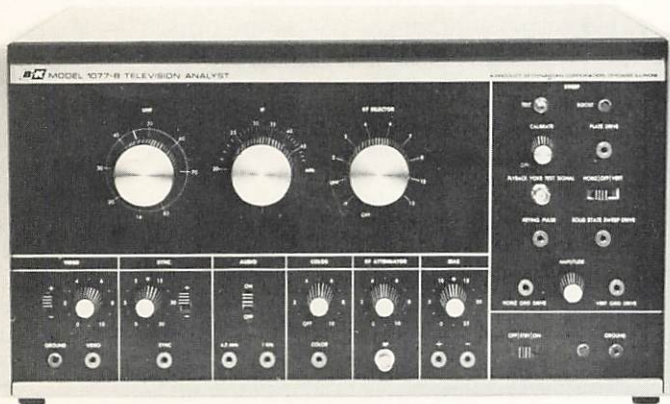
1. Size: 9x17 $\frac{1}{8}$ x10 $\frac{3}{8}$ ".
2. Power required: 105-125 VAC, 50/60 Hz; 25 watts. 3-wire line cord.
3. Net wt., 21 lbs.



# Television Analyst

**B&K** Model 1077B

454-108



- *Drives solid-state sweeps*
- *All UHF channels 14-83*
- *All 8 VHF channels*
- *20 to 45 MHz IF*
- *Audio, video, sync outputs*
- *Cuts troubleshooting time in half*

**Checks every stage of black-and-white and color TV receivers from antenna input to grid of the CRT...**

The Model 1077B continues to be the most versatile TV service instrument available. It has been shown time and again that by using the 1077B, service time is cut in half, especially on the "tough dog" or intermittent problems. With the 1077B and the signal substitution technique, you're able to inject the signal of your choice anywhere in the TV set and view the results on the set's picture tube. You can go through all the suspected stages quickly and pin-point the stage where the trouble originates. If you have an abnormal situation and the injected signal restores normal operation, you know the trouble is located somewhere between the injection point and the antenna. If the signal has no effect, then you know the trouble is between the point of injection and the picture tube or speaker. By continuing to check stages in the critical area, you quickly narrow down the problem to a single stage, and eventually, to a single component. And you do it all with just one instrument: the 1077B.

The 1077B works equally well on color or black-and-white TV, VHF or UHF, tube or transistorized circuitry.

The heart of the 1077B is the scanner, which modulates the RF and IF generators. The scanner uses slides of standard test patterns, which are supplied with the unit. In addition, you can use your own slides. The RF and IF generators and the scanner duplicate all the signals normally transmitted by TV stations as well as those produced within the TV receiver. Thus, you have at your command, for troubleshooting by signal substitution, the entire range of signals any TV set, black-and-white or color, is called upon to process. There is no more efficient, faster way to do the job, than with the 1077B.

Since the 1077B's scanner will reproduce any slide source, it can be used in closed-circuit TV systems for video paging; or, in store window or sales floor display promotions. Just replace the test pattern slide with the appropriate slide for the application, and the picture will appear on the TV set screen. You can make your own slides if you wish.

The 1077B also can be used to check the performance of community and master antenna systems.

## SPECIFICATIONS

### OUTPUTS

1. **IF:** 20 to 48 MHz; 0-70,000 microvolts minimum, at 75 ohms.
2. **VHF:**  
**Channels 2 to 6:** 0 to 12,000 microvolts minimum at 75 ohms.  
**Channels 7 to 13:** 0 to 6000 microvolts minimum at 75 ohms.
3. **UHF:** Channels 14 to 83: 0 to 1000 microvolts minimum at 75 ohms.
4. **Video:** Composite signal, 0 to 2.5 volts peak-to-peak minimum at 1000 ohms, positive or negative polarity.
5. **Sync:** 0-50 volts, peak-to-peak, continuously variable, (+) or (-) polarity. Output impedance, 10K ohms @ 50V; 1K ohms @ 10V.
6. **4.5 MHz:** Frequency-modulated by 1 kHz at 25 kHz deviation, @ 180 ohms.
7. **1 kHz:** 1 volt peak-to-peak min. @ 300 ohms.
8. **Color:** Crystal-controlled 3,563,795 Hz; .5 to 5 volts peak-to-peak; 100 ohms at minimum, 1000 ohms at maximum volts.
9. **Vertical Grid Drive:** 60 Hz; 0-150 volts peak-to-peak.
10. **Horizontal Grid Drive:** Crystal-controlled, 15,750 Hz,  $\pm 0.5\%$ ; 150 volts peak-to-peak min.
11. **AGC Keying Pulse:** 15,750 Hz; 400 volts peak-to-peak at 30K ohms.
12. **Horizontal Plate Drive:** Sufficient to drive all vacuum tube circuit flyback transformers.
13. **Horizontal Solid-State Sweep Drive.** Variable, 0 to 11 volts peak-to-peak.
14. **Vertical Plate Drive:** Sufficient to drive all vacuum tube circuit vertical transformers.
15. **Vertical Solid-State Sweep Drive.** Variable, 0-17 volts, peak-to-peak.

### GENERAL

**Size:** 9 $\frac{5}{8}$ " x 18" x 12" deep.

**Net Wt.,** 26 $\frac{1}{2}$  lbs.

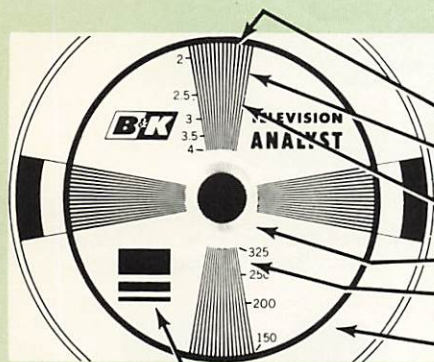
**Power Requirements:** 105-125 VAC, 50/60 Hz; 100 watts. 3-wire line cord. Complete with test pattern slides, all leads, and 100-page instruction manual.

**Model 1077B TV Analyst.**



## How the 1077B Cuts Servicing Time in Half

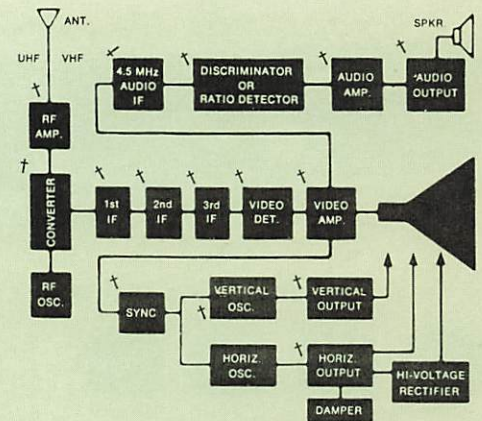
This standard test pattern or other signal of your choice may be injected at test points indicated at right.



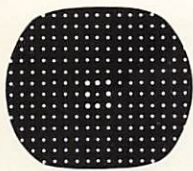
This Standard Test Pattern or other signal of your choosing may be injected at the indicated test points.

Typical problems that can be repaired using the 1077B:

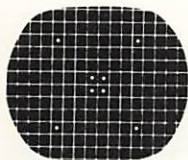
- To set proper size, set top and bottom of circle to top and bottom edges of receiver screen.
- Determine frequency response at point where lines of wedge merge. Bandwidth shown in megahertz.
- Ringing or overshoot is indicated by white trailing edges.
- Center of pattern should be adjusted to be at physical center of receiver screen.
- Determine resolution at point where lines of wedge merge. Resolution is shown in number of lines.
- Adjust receiver for perfect circle set linearity height and width.
- Low frequency phase shift is evidenced by black trailing smear.



## COLOR TV RECEIVER TEST PATTERNS



White Dot



Crosshatch



Color Bar

The above patterns are generated by the 1077B.

**White Dot and Crosshatch.** Used for checking color convergence.

**Color Bar.** Crystal-controlled, keyed rainbow color display and scanner signal, for checking color sync circuits, range of hue control, and aligning color demodulators. Also demonstrates correct color values to customers.

Burst and color signal also are provided, and are front-panel adjustable.

## WHAT THE 1077B DOES

### A. Generates:

All signals normally transmitted by a TV station and those produced within a TV receiver for point-by-point signal-substitution techniques throughout the complete television receiver.

VHF signals on 8 channels, for testing VHF tuners.

UHF signals on channels 14-83, for testing UHF tuners.

IF signals of 20-48 MHz for testing IF stages.

A positive or negative composite video signal for injection into video stages.

Keyed color bar pattern which modulates RF output for troubleshooting and adjusting color circuits.

Color rainbow signal for injection into color IF amplifiers and demodulators.

4.5 MHz sound channel test signal, frequency-modulated by a 1 kHz audio tone.

1 kHz tone for audio circuit testing.

Composite sync pulse signals of positive or negative polarity, adjustable in amplitude, for troubleshooting sync circuits, picture tubes, blanking circuits and transistor-

ized keyed AGC circuits.

Vertical grid drive for troubleshooting vertical sweep circuits (tube type).

Vertical plate drive for checking vertical output transformers (tube type).

Vertical solid-state sweep drive for checking solid-state vertical sweep circuits.

Vertical yoke test signal for checking vertical yoke windings.

Horizontal plate drive for troubleshooting horizontal sweep circuits (tube type).

Horizontal output drive for checking horizontal output (flyback) transformers.

Horizontal solid-state sweep drive for checking solid-state horizontal sweep circuits.

High-level keying pulse for testing keyed circuits, AGC, burst amplifiers and blanking.

Test pattern for horizontal and vertical linearity, size, and aspect ratio checks and adjustments.

Test pattern for color convergence adjustments.

### B. Provides:

B+ boost indication.

High-voltage indication.

Positive or negative bias supply, variable 0-25VDC, from a low-impedance power supply which is completely isolated from the 1077-PAL chassis and circuits.

A stable signal source for locating intermittent troubles.

### C. Checks:

Flyback transformers, horizontal deflection yokes and width coils for shorted turns.

Bandwidth, resolution, shading and contrast capabilities of TV receivers.

Performance of community, master antenna systems.

### D. Auxiliary Functions

Reproduces a 3x4" positive transparency as a picture source, to demonstrate the performance capabilities of a TV set.

Displays pictures on the screens of TV sets for advertising purposes.

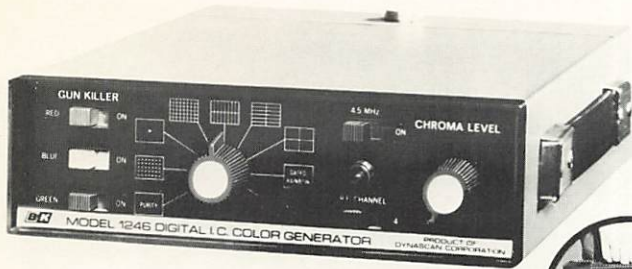
Acts as a transmitter for video paging systems at conventions, hospitals, etc.



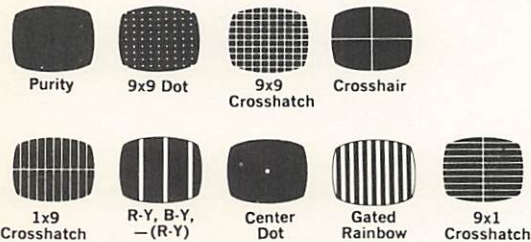
# Deluxe Digital IC Color Generators

**B&K** Model 1246

156

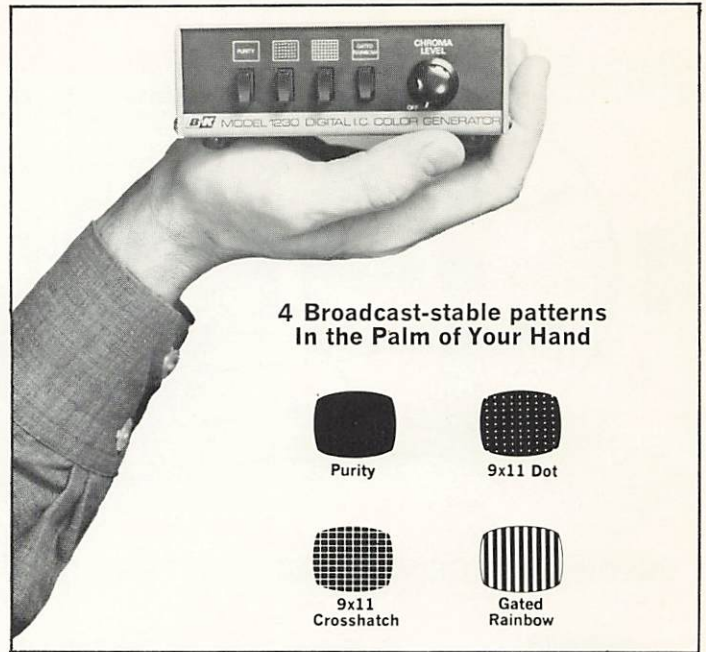


## 9 Rock-Steady Patterns

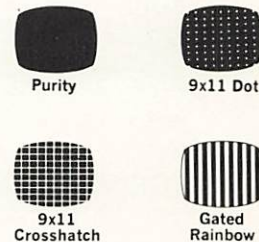


With "Instant-Use"  
Carrying Case

**B&K** Model 1230



## 4 Broadcast-stable patterns In the Palm of Your Hand



## integrated flip-flop circuits for broadcast station stability . . .

The most advanced color generators in the field today, offering totally new concepts. Unequaled for checking convergence, color, linearity, size and focus. Integrated flip-flop circuits perform all counting functions for rock-steady, "still photo" patterns. Ultra-stable sync and video pulses are synthesized from countdown chains by logic elements which accurately compute the proper signal. A unique mixer circuit adds all the synthesized pulses algebraically

to produce a composite video signal that closely approximates TV standards. Maximum stability is further ensured by crystal-controlled picture carrier oscillators. Both dot and vertical line width are user adjustable. All IC's and transistors are silicon. Power supply is transformer-isolated, full-wave rectified and transistor/zener regulated; delivers ripple-free voltage at all times.

**PURITY:** Provides sync and ultra-clean "reference black" level for clear raster. **9x9 or 9x11 DOT:** For checking convergence. **9x9 or 9x11 CROSSHATCH:** For dynamic convergence, linearity, size and overscan adjustments. **CROSSHAIR:** Aids in "roughing in" static convergence and checking deflection centering. **GATED RAINBOW:** Used in testing and aligning color circuits. **R-Y, B-Y, -(R-Y):** For expediting color alignment procedures. **CENTER DOT:** Simplifies static convergence—automatically pinpoints screen center. **1x9 CROSSHATCH:** Helpful when adjusting dynamic convergence on left and right sides at vertical center. **9x1 CROSSHATCH:** For convergence at top and bottom of picture.

### 1246 SPECIFICATIONS

**LINE WIDTH Horizontal:** 54 microseconds. **Vertical:** Preset to .25  $\mu$ SEC, internally adjustable, .1 to .8  $\mu$ SEC to adjust dot and line width. **CHROMA Offset Subcarrier System:** Uses frequency of 3.579545-MHz-1 horizontal line (15,816Hz) or 3.563729MHz,  $\pm$ .001%. Ten bars and R-Y are produced by gating with 189kHz and 63kHz, respectively. **Subcarrier Level:** Adjustable from 0 to 200% with front panel control. **RF OUTPUT Channels:** Crystal-controlled Channel 3 (61.25MHz) and Channel 4 (67.25 MHz); both  $\pm$ .005%. Selected by front panel slide switch. **Tuning Aid:** 4.5MHz unmodulated carrier,  $\pm$ .2%. **GUN KILLERS** Red, blue and green gun killers on front panel, with 4-ft. cable. **SIGNAL SYNTHESIS Progressive Scan System:** Uses digital binary logic elements to derive all sync and video information. Countdown chain is synchronized to crystal-controlled frequency of 189.800kHz,  $\pm$ .005%. **Composite Video Signal:** Approximates TV broadcast standards. **MECHANICAL Size:** 2.25" high, 7" wide, 10.75" deep. **Net Weight:** 3 lbs. **Cable Storage:** 30 cubic inches. **Operating Temperature Range:** -20°F to +140°F. **Power Requirements:** 100-130V AC, 50-60Hz. Includes black simulated leather

carrying case with white stitching, gun killers with cable and instructions.

**Model 1246**

### 1230 SPECIFICATIONS

**LINE WIDTH Horizontal:** One horizontal line. **Vertical:** Preset to .25  $\mu$ SEC, internally adjustable, .1 to .8  $\mu$ SEC for dot and vertical line width. **CHROMA Offset Subcarrier System:** Uses frequency of 3.579545MHz—1 horizontal line (15,734Hz) or 3.563811MHz,  $\pm$ .001%. Ten bars are produced by gating with a 188.8kHz square wave. The color subcarrier is derived from and synchronized with the master oscillator frequency of 4.751748MHz, the relationship being: 4.751748MHz = 4/3(3.563811MHz). **Subcarrier Level:** Adjustable from 0 to 200% with front panel control. **RF OUTPUT Channels:** Factory tuned to Channel 3 (61.25MHz  $\pm$ .5%); user adjustable to channels 4 or 5. **Level:** 10,000  $\mu$ V typical into a 300-ohm load. **SIGNAL SYNTHESIS Progressive Scan System:** Uses digital logic elements to derive all sync, video and chroma information. Entire countdown chain is synchronized to the 4.751748MHz  $\pm$ .001% master oscillator. **SYNC PULSES Horizontal Period:** 63.55  $\mu$ SEC (15,734Hz). **Horizontal Width:** 5.05  $\mu$ SEC. **Vertical Period:** 16.71mSEC (59.82Hz). **Vertical Width:** 254.2  $\mu$ SEC. **BLANKING PULSES Horizontal:** Front porch, 1.89  $\mu$ SEC; rear porch, 5.68  $\mu$ SEC; total, 12.62  $\mu$ SEC. **Vertical:** Front porch, 254.2  $\mu$ SEC; rear porch, 953.2  $\mu$ SEC; total, 1461  $\mu$ SEC. **MECHANICAL Size:** 1.725" high, 5" wide, 7.750" deep. **Net Weight:** 2 pounds. **Operating Temperature Range:** 0-70°C with no performance degradation. **Power Requirements:** 105-130V AC, 60Hz.

**Model 1230**



# Laboratory Power Supplies

**B&K**-Precision



## Model 1601 Regulated DC Supply

- 0-50 VDC, continuously variable, over full range, with a single control.
- 0-2 amperes; adjustable, fully automatic shut-down.
- Foolproof overload protection: unit shuts down automatically when overload occurs.
- Uses integrated circuits for highest reliability and stability.

Unique B&K features make these power supplies highly versatile and easy-to-use for schools, service technicians, labs and production applications. Fail-safe overload protection automatically shuts the power supply down whenever the current exceeds the preset level; both the ammeter and voltmeter go to zero, and the overload indicator on the front panel lights up. When the cause of the overload is cleared up, pushing the CURRENT LIMIT button resets the 1601 to operative condition, and the outputs return to the preset levels.

Output voltage is continuously variable and adjustment of output level is extremely simple. Just select one of the two meter scales and then adjust the variable control until the voltmeter reads the desired voltage output. Permits setting output to precise required level quickly and easily and makes performance evaluation of units under test over wide supply voltage range much more convenient.

### Other Features

- SET/RESET combination CURRENT LIMIT pushbutton simplifies setting current limit and resetting after overload.
- STANDBY switch disconnects load for safe, quick adjustment without disturbing voltage or current settings.
- ON/OFF switch combined with voltage output control assures zero output voltage when power supply is turned ON.

simplified current limit setting . . . does not require application of short circuit to output terminals

## FRONT PANEL CONTROLS

### MODEL 1601

Variable Voltage Control with ON/OFF Switch: Turns unit on and off; adjusts voltage output. Voltmeter Range Switch: Selects 0-25 or 0-50 VDC meter scale. Current Range/Coarse Current Limit Switch: Selects one of 5 current ranges; sets overload point, coarse adjustment. Concentric Current Limit Switch: Sets fine adjustment of current output limit, at 10-100% of each current range. Current meter: Indicates current output; reads current limit pre-setting. Voltmeter: Indicates voltage output. Overload Indicator Light: Lights up when current output exceeds pre-set level. Pilot Light: Indicates when power supply is ON. Standby Switch: Disconnects power supply from load. Terminals: Positive, negative and ground; heavy-duty, captive, six-way binding posts.

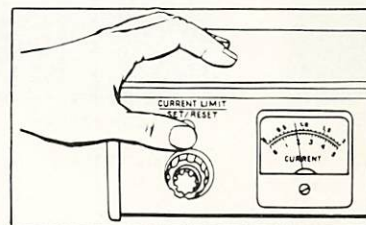
### MODEL 1602

Similar to Model 1601 except for additional control to set bias voltage, different meter ranges, no coarse current range set and has additional terminals.



## Model 1602 Regulated DC Supply

- 0-400 VDC, fully regulated, continuously variable over full range with a single control.
- 0-200 milliamperes; adjustable, fully automatic shut-down.
- 0-100 VDC @ 2 milliamperes, continuously variable.
- 6.3/12.6 VAC @ 3.5A.
- Foolproof overload protection.



### Pre-Setting Current Limit is easy . . .

To pre-set the current limit on the 1601, push and hold down the CURRENT LIMIT button, select the range and adjust the FINE knob until the ammeter reads the current limit desired . . . in this example, .8 A. No need to apply a short circuit to the output terminals. Procedure for Model 1602 is similar.

## SPECIFICATIONS

### Model 1601

**Input Voltage:** 105-125 VAC, 60 Hz.

**Output Voltage:** 0-50 VDC, continuously variable. Two ranges, 0-25 and 0-50 VDC.

**Output Current:** 0-2 amperes. Four ranges: 0-50 mA, 0-0.2 A, 0-0.5 A, 0-2 A.

**Load Regulation:** Minimum, 0.05%; maximum, 0.1%; typical, 0.07%.

**Line Regulation:** 0.02% typical. At output volts = 50 VDC and output current = 2 amperes. From 105-125 VAC.

**Ripple:** 5 millivolts peak-to-peak.

**Temperature Coefficient:** .002% of output volts per degree Centigrade.

**Size:** 14 $\frac{1}{8}$  × 3 $\frac{3}{8}$  × 10" deep. **Net Wt.:** 11 lbs. Complete with leads and instruction manual.

### Model 1601 Regulated DC Supply.

### Model 1602

**Input Voltage:** 105-125 VAC, 60Hz.

**400V DC SUPPLY:**

**Output Voltage:** 0-400V, continuously variable.

**Output Current:** 0-200 mA.

**Load Regulation:** 0.1%.

**Line Regulation:** 0.1% for 105-125 V line.

**Noise & Ripple:** Less than 10 mV peak-to-peak.

**Protection:** Adjustable shutdown 0-200 mA.

**BIAS SUPPLY:**

**Output Voltage:** 0-100 V, continuously variable. (floating)

**Output Current:** 0-2 mA.

**Load Regulation:** 1%.

**Line Regulation:** 1%.

**Noise & Ripple:** Less than 10 mV peak-to-peak.

**Protection:** Current limiting resistance.

**12.6 and 6.3 VAC (Non-Adjustable):**

**Output Voltage:** 12.6 V or 6.3 V ± 5% no-load (floating).

**Output Current:** 3.5 A continuous.

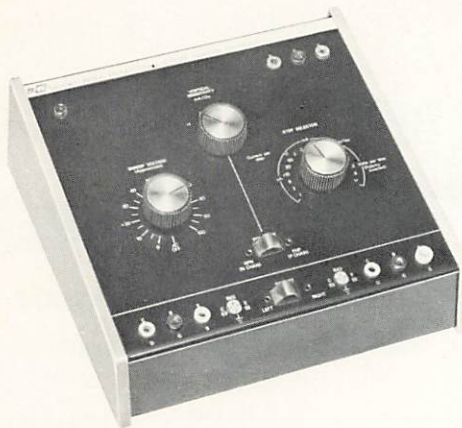
**Protection:** Thermal circuit-breaker (rear panel).

### MODEL 1602 Regulated DC Supply

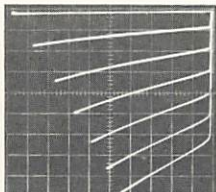


# Semiconductor Curve Tracer

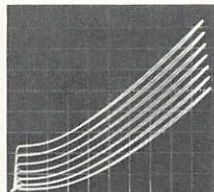
**B&K** -Precision Model 501-A



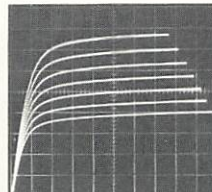
- Tests J-FET's, MOS-FET's, signal and power bipolar transistors, UJT's and diodes.
- Compatible with all oscilloscopes.
- Generates true current and voltage steps.
- Pin-points BAD devices in-circuit.



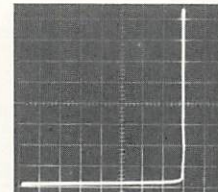
Good PNP  
transistor.



Leaky NPN  
transistor.



Good N-Channel  
F.E.T.



16-volt Zener  
diode breakdown.

*the most accurate way to analyze semiconductor devices . . .*

## Solid-State Device Dynamic Tester

The 501-A Curve Tracer is to solid-state devices what the mutual conductance tube tester is to vacuum tubes. It is generally recognized as the best and fastest way to analyze semiconductors: by displaying their characteristic curves or "fingerprints" on the screen of an auxiliary scope. (Any scope with external horizontal input will do, but a DC-coupled scope is recommended to avoid trace shift.)

Who uses curve tracers? Design engineers—to select devices with specific parameters for applications. Industry—for sorting bulk stock, for inspection (QC verification), and for testing on the line. Technicians—for troubleshooting, in- and out-of-circuit; sorting and selecting transistors for substitution; selecting balanced/complementary pairs; for sorting bulk stock. Schools—for lab and shop work, and for teaching the theory of semiconductors.

What the 501-A measures: Gain (beta)\*, leakage, breakdown voltage (nondestructive test), output admittance, linearity effects of capacitance and temperature. \*Can be read from the curve at a glance.

**FEATURES:** Electronic current limiting—insures full display of waveforms up to 100 volts at 100 mA—no IR drops to affect the curve. Also protects transistors under test. • Probe furnished for in-circuit testing (B & K FP-3 three-tip probe). • Built-in calibration—once scope is calibrated, no need to repeat. • "Quick-Test" positions on controls, for 90% of tests. • 16 current and voltage steps.

**TESTS:** Transistors, Unijunctions, Triacs, SCR's. • Tunnel diodes, Zener diodes, signal diodes, ordinary rectifier diodes. • Junction FET's, MOS-FET's (both depletion and enhancement types).

## SPECIFICATIONS

### Sweep Generator

**Range:** 0-100 volts peak at 100 mA maximum; 120 Hz full-wave rectified. **Polarity:** NPN or PNP.

**Current Limiting:** Automatic at approximately 125% of full scale for each vertical attenuator range.

### Step Generator

**11 Current Ranges:** 1-2-5-10-20-50  $\mu$ A and .1-.2-.5-1-2 mA per step,  $\pm 3\%$ ; constant-current steps.

**5 Voltage Ranges:** .05-.1-.2-.5-1 volt per step,  $\pm 5\%$ . Source resistance: 1000 ohms.

**Number of Steps:** 6, continuous display.

**Steps per Second:** 120. **Step Polarity:** NPN or PNP. Inverted in VOLTS/STEP positions.

### Calibration

**Source:**  $\pm .05$  to 5 volts peak-to-peak;  $\pm 3\%$  accuracy.

**Attenuator Range:** 1-2-5-10 mA per division vertically,  $\pm 3\%$ .

### Other Specifications

**Sockets:** Two transistor sockets (A and B), with each pin paralleled by a banana jack for external cables (3 pins per socket). Slide switch selects A or B.

**Output Terminals:** Banana jacks for vertical, horizontal and ground outputs to oscilloscope.

**Accessories:** Cables to scope; FP-5 probe; Mylar 10 x 10 division graticule.

**Power Requirements:** 105-125 VAC, 50-60 Hz; 3-wire line cord. Also available for 117/234 VAC, 50-60 Hz.

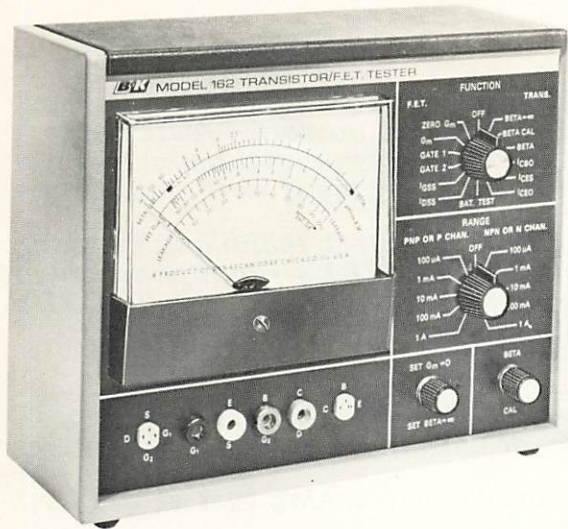
**Size:** 4 x 10 x 9 $\frac{1}{2}$ ". **Net Wt.:** 3 lbs.

**Model 501-A Curve Tracer.**



# Transistor/F.E.T. Tester

**B&K** Model 162



*fastest solid-state device tester*

## FEATURES

- Read Beta, Gm and leakage directly on large 4½" meter scales.
- Tests at collector current from 1 mA to 1 ampere.
- Balances out circuit impedances as low as 6 ohms, for in-circuit Beta tests.
- Checks gates of dual-gate F.E.T.'s separately.
- Three leakage checks:  $I_{CBO}$ ,  $I_{CEO}$ ,  $I_{CES}$ —find failures missed by other testers, especially "avalanche mode" breakdowns.
- Leakage tests made out-of-circuit, for maximum accuracy.
- Battery check on front panel.

## SPECIFICATIONS

**Tests:** Bipolar and field effect transistors (F.E.T.'s). Also tests diodes, unijunctions, SCR's and Triacs.

**Collector Current:** 100  $\mu$ A to 1 A in steps of 10.

**Collector Voltage:** 1.5 VDC.

**Beta:** 1-50, 10-500, 100-5000.

**Leakage:** 0-100  $\mu$ A; 0-1, 10, 100 mA; 01- A.

**Measures:**  $I_{CBO}$ ,  $I_{CES}$ ,  $I_{CEO}$ ,  $I_{GSS}$ ,  $I_{DSS}$ , Beta, Gm (Gm: 0-50,000  $\mu$ mhos).

**Sockets:** Front panel sockets for bipolars and F.E.T.'s.

**Meter:** 4¾", high-sensitivity.

## OTHER SPECIFICATIONS

**Jacks and Test Leads:** Color-coded.

**Battery Check:** "BAT TEST" position on FUNCTION switch.

**Size:** 9 x 7¼ x 4" deep. **Net Wt.:** 6¼ lbs. (with batteries). Complete with batteries and test leads, detailed instruction manual.

**Model 162 Transistor/F.E.T. Tester.**

## tests transistors and F. E. T.'s in-circuit and out-of-circuit

The Model 162 is a portable transistor/F.E.T. tester that provides the fastest method for in-circuit testing, independent of transistor manuals. In essence, the 162 tests for gain, and for leakage. All leakage tests are made out-of-circuit, for maximum accuracy. You read Beta, F.E.T. Gm, and leakage, directly on meter scale. Step-by-step instructions in the instruction manual clearly show how to test the various devices, including diodes, UJT's, SCR's, and Triacs in addition to transistors and F.E.T.'s. Tests signal, intermediate power and power transistors. Provision for balancing out circuit impedances as low as 6 ohms, for in-circuit Beta test.

## CONTROLS

**FUNCTION SWITCH.** Selects either F.E.T. or transistor and the tests to be performed.

**RANGE SWITCH.** Selects the current range for leakage tests. Also selects collector current for power or signal transistor Beta tests.

**BETA CAL.** A dual potentiometer used to calibrate the Beta scale. SET Gm = 0/SET BETA =  $\infty$ . Calibrates the BETA =  $\infty$ , for transistors; calibrates the Gm = 0 point for F.E.T.'s.



## Model FP-5 "Dyna-Flex" Probe

*for fast, one-handed, in-circuit testing...*

With the FP-5 "Dyna-Flex" probe, the only contact possible is positive. That's because the tips of the three probes are spring-loaded and needle sharp. They actually pierce the terminal solder. Adjust to any spacing from 1/32" to 5/8", using only one hand. Provides rapid, easy access for testing densely packed, miniaturized arrays. Eliminates costly unsoldering operations. Can be used to make temporary component substitutions on P.C. boards. Each tip is color-coded for fast, easy identification. Ideal for use with the Model 162 above, the 501-A Curve Tracer on page 21, or with any VTVM, VOM or other transistor tester.

**Model FP-5.**



# CRT Restorer / Analyzer

**B&K** Model 467



Size: 10" x 13½" x 5¼" thick

- Restores color and B/W picture tubes like new! Uses the most powerful restoration method known with minimal danger to the CRT. You can guarantee it with confidence.
- Exclusive multiplex test technique tests all three guns of color CRT's simultaneously under actual operating conditions . . . even CRT's with common G1 and G2 . . . with real dynamic tests
- Checks all CRT's with identical procedure—including all "in-line" and "one-gun" types
- Instant, automatic tracking test at the push of a button
- Guaranteed speed, accuracy and reliability from automatic digital circuit techniques
- Nothing to look up after the initial setup—no calculations, charts or replugging needed
- Test indications are clear enough to be understood by your customers
- **EXCLUSIVE! Tests focus electrode!**

The exclusive patent-applied-for multiplex B&K test method lets you see the performance of each gun on its own meter simultaneously. Model 467 measures true usable beam current, current that passes through the G1 aperture. You test only that part of the cathode that emits electrons during actual operation . . . true dynamic testing.

It's unusually easy to use this analyzer and restorer because digital programming circuitry lets you use the same simple automatic procedures for any kind of picture tube. Push-button sequences and setup procedures are indicated by simple instructions right on the face of the instrument.

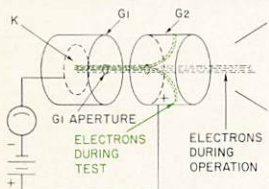
Unlike other testers and restorers, Model 467 provides definite yes or no answers to tube condition; after setup you need no charts; you don't need to make any calculations and your customer will have the extra confidence he gets

when he can clearly see picture tube performance for himself.

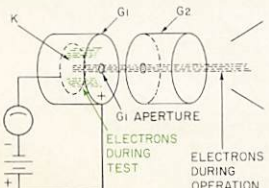
The automatic circuitry compensates for different size heaters and cathodes without adjustment, assuring restoration without damage. Model 467 has protective circuitry that prevents simultaneous application of heater voltage and rejuvenation voltage. You can be confident that you are using the safest and most effective rejuvenation method possible.

You can make rejuvenation a short, sure, quick operation on more house calls as well as on the bench; even the adapters are designed to speed service: The lightweight test adapters included test all common CRT's, and there's plenty of room for new adapters as new tube models are introduced.

Another time saver is a unique focus electrode continuity test that saves futile focus circuit analysis.



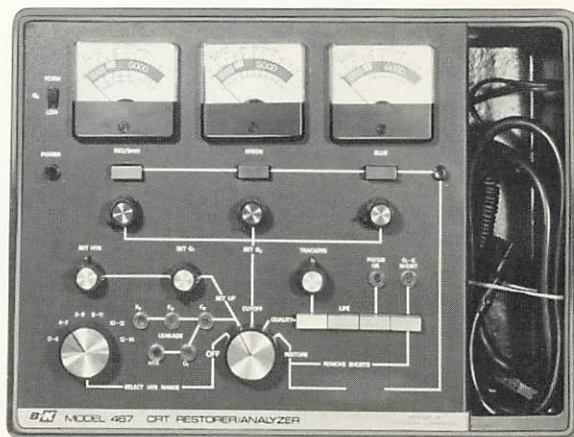
**B&K DYNAMIC TEST**



**OTHER TEST METHOD**

## Follow This Path to Picture Tube Profit

Ask your B&K distributor for a detailed brochure that explains how you can make more money with CRT restoration. It will show you how you follow the setup path printed on the face of the instrument through only four easy steps which completely analyze CRT condition and restore it to peak operation.





# CRT Tester and Rejuvenator

**B&K** Model 466

- Tests new CRT's, including Trinitrons
- Separate G-2 control for each color gun
- Monitored rejuvenation—see what you're doing

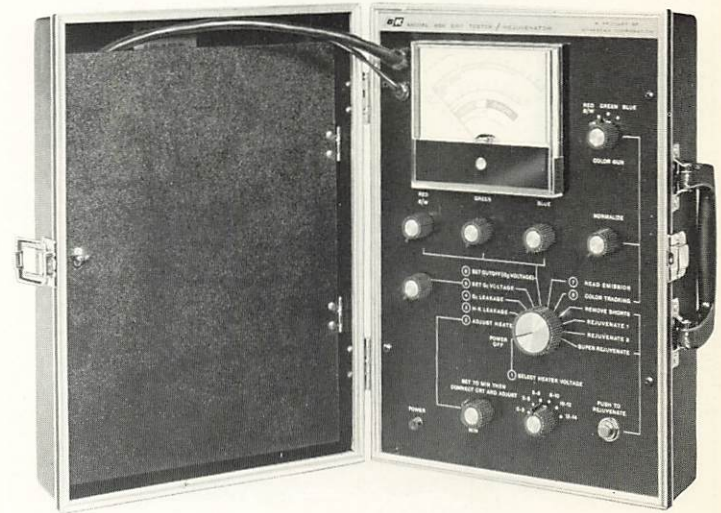
The latest model, professional quality, black-and-white and color CRT Tester/Rejuvenator—with all the proven features of its predecessors and new features reflecting the latest advances in the state of the art. From the laboratories of B & K, originators of CRT Tester/Rejuvenators in 1954—another industry pacesetter!

## MAJOR FEATURES

- Tests all CRT's in accordance with manufacturers' recommended procedures. Unlike other CRT testers, no tube elements are allowed to "Float free." In all test modes, key CRT elements are connected to test points, all others are shorted to ground. Insures greater accuracy, eliminates damage to CRT.
- Separate G-2 control for each color gun. Sufficient G-2 voltage range to check color CRT guns to cut-off with recommended G-1 voltage setting. Accelerates tracking tests.
- "Normalize" control greatly simplifies evaluation of color gun tracking.
- G-1 voltage measured directly on meter; permits setting to accurate G-1 voltage under all conditions.
- Exclusive monitored rejuvenation permits reading relative cathode emission improvement directly—saves time, provides accurate rejuvenation for maximum picture tube life.
- Unique "Super-Rejuvenate" function for restoring emission of otherwise worthless CRT's, with high-energy "shock treatment."
- Human-engineered front panel simplifies step-by-step testing.
- Large 4½" meter is numerically coded to panel controls for fast, accurate readings.
- Continuously variable and metered, heater, G-1 and G-2 voltages. Effectively protects the 466 from being obsoleted by new CRT's with new heater voltages; permits checking CRT's under actual operating conditions for reliable test results.

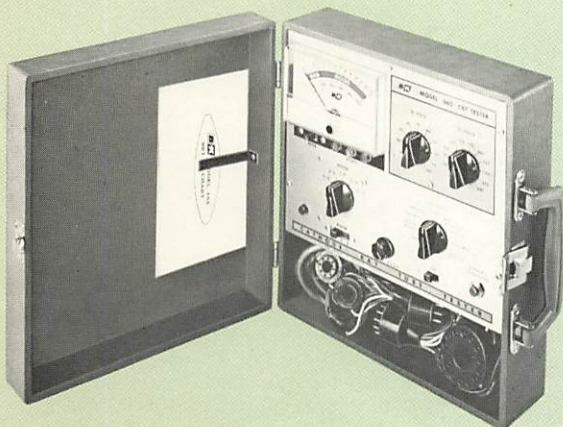
Oversize storage compartment holds all adapters, manual, charts plus small tools. Handsome, lightweight, computer-styled, attache-type carrying case. Size, 13¼ x 9½ x 5¼" deep. Complete with 3 multi-socket adapters: CR-62, CR-63 and CR-64. For 105-125 VAC, 50-60 Hz. Net wt., 8 lbs.

### Model 466 CRT Tester/Rejuvenator.



## WHAT THE MODEL 466 WILL DO

- Monitors heaters right at tube pins—gives precise indication of heater voltage on meter. Insures setting correct heater voltage regardless of heater load or line voltage variations.
- Rapidly tests CRT's for opens, shorts or leakage between elements, without removing tube from set.
- Checks cathode emission of each gun separately; quickly evaluates tracking of guns in a color picture tube.
- "Reserve Power" rejuvenation restores low-emission CRT's; repairs shorted or leaky tubes. "Super-Rejuvenate" feature permits rejuvenation of many otherwise worthless tubes.
- Checks warm-up performance; makes relative useful life test.
- With 3 multi-socket adapters provided, tests new CRT's such as Trinitrons, and the GE 11SP22 and 11WP22.



### CRT INFORMATION SERVICE

Covers all B & K CRT testers—specify model no. Each new chart complete in itself; lists CRT's commonly used, plus new types, as data becomes available. Issued twice a year. Annual subscription: \$4.00.

## Model 465 CRT Tester and Rejuvenator

Recognized standard of the industry for testing and repairing CRT's—both black-and-white and color—right in the TV set. An outstanding value that will make money for any service shop.

**FEATURES:** Continuously variable element voltages match CRT's in new transistorized TV sets. Heater voltages metered and adjustable, 0-13 volts. G-1 voltage, 0-100; G-2, 25-300 volts. Checks for leakage, shorts, opens; emission. Large 4½" meter for fast, easy readings. Two- and 4-minute tests for color tube warm-up checks. Repairs inter-element shorts and leakage. Restores emission and brightness with precision timing circuit for maximum safety. Life test checks cathode emissive coating, predicts remaining useful life of CRT.

Supplied with CR-60 and CR-61 adapters. Operates from 105-125 VAC, 50-60 Hz. Size 10½x11½x4½" deep. Net wt., 7 lbs.

### Model 465 Tester/Rejuvenator.

## TESTS AND REJUVENATES

- Color CRT's, including the new rectangular 25", 23", 21", 19", 16" and the standard 21".
- All picture tubes, with correct filament voltage—adjustable 0-13 volts.
- All high G-2 and low G-2 picture tubes, including the new low-beam current types.
- GE 11" color CRT's and imported color CRT's—with inexpensive optional adapters.

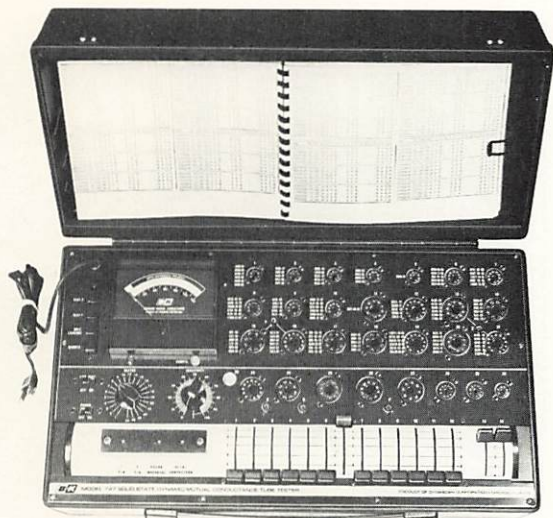
## ADDS SERVICE INCOME 2 WAYS:

- 1—Tests and repairs color and black-and-white CRT's right in the home.
- 2—Makes new CRT sales much easier.



# 100% Dynamic Gm Tube Tester

**B&K** Model 747B Solid-State "Dyna-Jet"



## FRONT PANEL OVERLOAD RESET!

Eliminates need for fuse replacement—  
saves time—indicates overload condition.

**Shorts and Leakage.** Leakage paths up to 1 megohm will light the SHORTS lamps; meter detects leakage current as low as 0.5 microamp.

**Grid Emission Test.** Single push-button checks for gas, grid emission and grid-to-cathode leakage. Grid leakage paths up to 100 megohms easily detected on meter.

**Life Test.** For preventive maintenance and to reduce call-backs, a qualitative life expectancy test is made with the flip of a switch.

**Multi-Section Tubes.** Each section is fully tested separately.

**Patented Automatic Line Voltage Compensation.** A B & K exclusive, insures reliable test results at all times.

**Plastic Molded Case.** Professional molded case, for light weight and ruggedness.

*tests all tubes with true dynamic mutual conductance test . . .*

The ideal tube tester should (1) have a high-speed section for testing the tubes most often used in radio and TV; (2) be obsolescence-proof; (3) test all amplifier tubes with a true dynamic mutual conductance test; and (4) be 100% solid state for instant-on operation and trouble-free service through long life. The new B & K 747 gives you all these features and more:

**Jet-Check Section.** The vast majority of TV-radio tubes can be checked in this section at very high speed. Only two settings are required: HEATER and SENSITIVITY. There are 21 pre-wired sockets and for the most popular types, the settings are shown next to the sockets. One push-button gives a direct reading of the tube's mutual conductance in terms of BAD?-GOOD.

**Programmed Section.** Less popular tube types are tested for dynamic mutual conductance here. A program switch for each tube pin sets up the test circuit. This eliminates obsolescence: New tube types that cannot be checked in the Jet-Check section can be tested here with the new tube data provided as they are introduced. One reset lever resets all program switches simultaneously, speeding new set-ups.

**Diodes and Rectifiers.** These non-amplifying tubes are tested for emission, which is the only way they can be tested. Again, the most popular types are tested in the Jet-Check section for speed.

**High-Voltage Regulators.** The 747 is the only tube tester that provides an effective dynamic test for voltage regulators that separates the good VR's from the bad ones. Most other testers either are unable to detect bad VR's, or may destroy the tube under test. Size, 5 $\frac{5}{16}$  x 20 $\frac{1}{2}$  x 11 $\frac{1}{2}$ " deep. Operates from 105-125-VAC, 60 Hz. Net wt.: 13 lbs.

Model 747 B. Dynamic Gm Tube Tester.

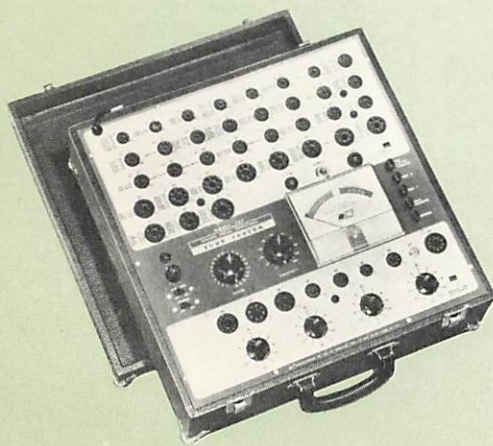
## Model 707 Dynamic Gm Tube Tester

### 30 Gm Sockets Plus "Dyna-Quick" Emission Test Section

The 707 combines dynamic mutual conductance tube testing with emission testing, to provide wide coverage, and very fast, reliable testing. The average set can be checked with equal ease in the home or shop. The Gm section has 30 pre-wired sockets, plus 5 quick-check sockets for rectifiers. The sensitivity setting is printed next to each socket, for all popular tube types. Only 2 controls to set, then push button and read the Gm directly on the large 4 $\frac{1}{2}$ " meter. Checks for shorts, grid leakage and gas, each with one button. Also, one-button "LIFE" test. Emission tube test section requires setting of only 3 controls—then push button to read emission at rated current load. One switch

for shorts test; one-button grid emission, gas and "LIFE" tests. TESTS: New and old color and B&W TV and radio tubes; Nuvistors and Novars; both types of 10-pin tubes; 12-pin Compactrons; hybrid auto radio tubes; thyratrons; voltage regulators; European hi-fi tubes and most industrial tube types. Checks each section of dual-section tubes separately. Grid emission circuit adjustable through front panel; sensitivity, over 100 megohms. Socket contacts all are phosphor bronze for long life. For 105-125 VAC, 50-60 Hz. Size, 5 $\frac{7}{8}$  x 15 $\frac{3}{4}$  x 16 $\frac{1}{8}$ " D. Net wt., 15 lbs.

**Model 707.**  
Gm Tube Tester.





# High-Speed Solid-State Tube Tester

**B&K** Model 607 "Dyna-Jet"

**EXCLUSIVE! Lockout pushbuttons open any tube's multiple-connected pins . . .**

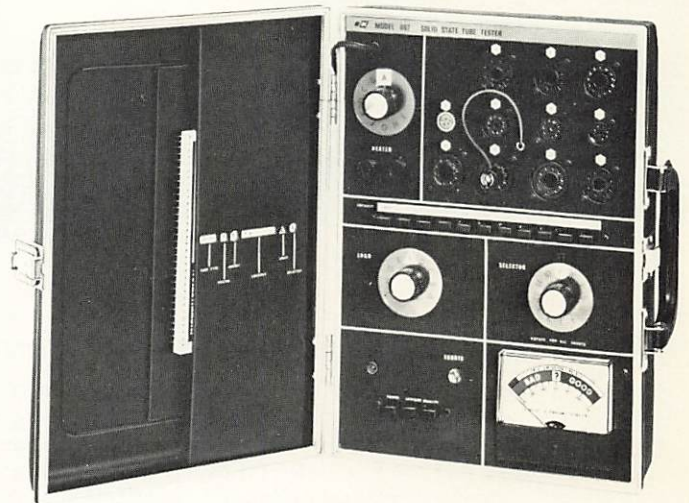
Here's the only tube tester in its price class that gives you positive SHORTS indication in any tube being tested. How many times have you been frustrated because the chart says, "Shorts normal" or "disregard shorts"? This is because there was no way of opening up the pin connections. The Model 607 Dyna-Jet provides 10 lockout pushbuttons that can open any and all multiple-connected pins in any tube under test. Reset button clears all lockouts.

Set-up is fast and easy. Only 4—and in some cases 3—settings, for QUALITY test. Shape-coded symbols match control to chart, speed testing and eliminate typical human errors. Cathode emission is checked the accurate way—under simulated load conditions. Provides high-sensitivity grid emission and gas tests. The Dyna-Jet finds "tough dogs" and weak tubes easily. Also checks for leakage, gas. Phosphor bronze sockets insure long life. "Human-engineered" special chart with holder for fast, easy display. "Computer-styled" in professional-looking, black attache-type case, 13½ x 9½ x 4" deep. Operates from 105-125 VAC, 50-60 Hz. Net wt., 6 lbs.

## FEATURES

- Exclusive multiple-pin lockout pushbutton switches (10): Open any and all pins in tube under test—ALL tubes now can be tested for shorts; positively detect ALL shorts regardless of pin connections; eliminate all FALSE shorts. Reset button clears all lockouts.
- Tube testing speed doubled by (1) exclusive shape-coded symbols that match controls to chart, and (2) minimum number of settings—maximum of 4, and in some instances, only 3 are required.
- Checks tubes accurately—under simulated load conditions.
- Exclusive grid leakage and gas tests.
- Simplified heater voltage setting.
- Power "ON" indicator.
- Superior load and plate voltage capability.

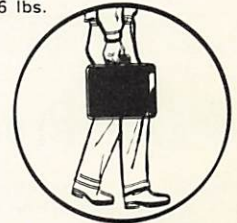
**Model 607 Dyna-Jet.**



Smallest tube tester! Size, 13½ x 9½ x 4". Carrying wt., 6 lbs.

## TESTS

Newest tube types—plus all old types used in TV and radio, including Nuvistors, Novars, Magnovals, new 10-pin tubes and 12-pin Compactrons. Also, auto radio hybrids, imported hi-fi tubes and many industrials, specials.



**handsome  
attache-type  
case**

## NEW TUBE INFORMATION SERVICE

Published every 4 months. Available on annual subscription basis at the following cost: For all B&K testers except the 747, \$5.00 per year. For the 747 "Dyna-Jet" Gm Tube Tester, \$6.00 per year.

# Model 606 "Dyna-Jet" Quick-Check Tube Tester

## Low-Cost Tube Checker for Radio, Color and B & W TV Tubes

The 606 has been the "old reliable" tube tester in service shops across the country for many years. It's easy to use, extremely rugged, and it provides the sockets and features you need to service current-model sets as well as the older ones.

## FEATURES

- 13 sockets for maximum coverage.
- Only 3 controls to set—then push "QUALITY" button—that's all there is to it!
- Rotate one switch to test for all SHORTS.
- Tests emission at current loads that simulate actual operating conditions.
- Checks each section of multi-section tubes.

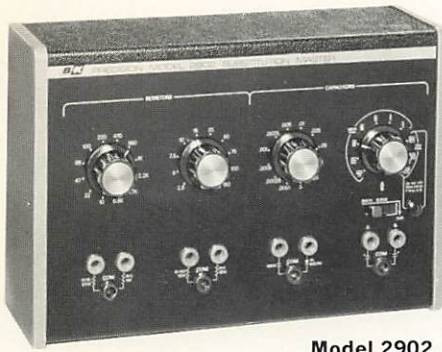
The 606 checks for all SHORTS, leakage and gas—as well as grid emission—under simulated load conditions. Grid emission circuit is adjustable through front panel; has sensitivity of over 100 megohms. Molded tube sockets have phosphor-bronze contacts for long, trouble-free life. Complete tube listings are provided in a handy reference index stored in the cover. TESTS: Latest color and B & W TV tubes and radio tubes; Nuvistors, Novars, both types of 10-pin tubes; 12-pin Compactrons; European hi-fi tubes; voltage regulators and many industrial types. Size: 4⅞ x 11 x 8½"D. For 105-125 VAC, 50-60 Hz. Net wt., 5 lbs.

**Model 606 Tube Tester.**





# Substitution Boxes



Model 2902



Model 2901

- *Save time by placing components you need at your fingertips.*
- *Resistors, capacitors, electrolytics, rectifiers.*

## how B & K's surge protector circuit works . . .

The surge protector circuit in the 2901 and 2902 prevent the inadvertent heating of a defective electrolytic by the charging surge and the resultant masking of the problem—causing call-backs, adding service time to find the true defective capacitor, etc. B & K's surge protector circuit automatically introduces a resistor in series with the sub capacitor which limits the initial charging surge. Then, after the capacitor is fully charged, the switch is moved to the SUB position, taking the surge-limiting resistor out of the circuit. A special

switch mechanism permits locking in the SUB position. After substitution, the switch is spring-returned to the DISCH position, insuring safe RC discharge of the sub capacitor. This eliminates any shock hazard and prevents the accidental and dangerous discharge of the sub electrolytic the next time it is used into a low voltage circuit. In addition, low-voltage electrolytics are protected by an overload indicator light which warns you not to substitute if the applied voltage is over 75 volts.

## **B&K** -Precision Model 2901 Substitution Box

Ultra-compact, 36-component substitution box for fast, easy and safe substitution of the part you need, when you need it. Ideal for portable, caddy use. Has high-capacity, low-voltage capacitor for transistorized circuits. Surge protection circuit described above prevents arcing of electrolytics; overload indicator protects low-voltage electrolytics.

### SPECIFICATIONS

#### 24 CARBON RESISTORS

**1 Watt, ±10%, 500 VDC:** 10, 22, 47, 68, 100, 220, 470, 680, 1K, 2.2K, 4.7K, 6.8K ohms.

**½ Watt, ±10%, 350 VDC:** 10K, 22K, 47K, 68K, 100K, 220K, 470K, 680K ohms; 2.2, 4.7, 6.8 megohms.

#### 9 DISC/TUBULAR CAPACITORS

**±10%, 500 VDC:** .0001, .0005, .001, .0025, .005, .01 mfd.  
**±10%, 600 VDC:** .05, .10, .50 mfd.

#### 3 ELECTROLYTIC CAPACITORS

**450 VDC:** 10, 100 mfd.  
**75 VDC:** 1000 mfd.

#### OTHER SPECIFICATIONS

**Size:** 2 x 4¼ x 4" deep.

**Net Wt.:** 1¼ lbs.

**Model 2901 Substitution Box.**

## **B&K** -Precision Model 2902 Substitution Master

The Model 2902 Substitution Master saves you valuable time by placing at your fingertips an array of 76 most-needed resistors and capacitors, including 20 electrolytics with special capability for transistorized circuits—plus a diode rectifier. Surge protection circuit described above prevents arcing of electrolytics; low-voltage electrolytics are protected by front-panel overload indicator. You can select up to 5 components for simultaneous substitution, including signal and power resistors, paper/disc and electrolytic capacitors. This enables you, for example, to make up a complete power supply circuit, including bleeder and power resistors, filter capacitors and the rectifier. Also, you can make up a voltage divider by selecting the 2 resistors of the desired values and taking the low-voltage output off the common jack on the panel. The 2902 will prove to be one of your most valuable troubleshooting instruments!

### SPECIFICATIONS

#### 24 CARBON RESISTORS

**1 Watt, ±10%, 350 VDC:** 10, 22, 47, 68, 100, 220, 470, 680, 1K, 2.2K, 4.7K, 6.8 ohms.

**½ Watt, ±10%, 350 VDC:** 10K, 22K, 47K, 68K, 100K, 220K, 470K, 680K ohms; 1, 2.2, 4.7, 6.8 megohms.

#### 20 POWER RESISTORS

**20 Watts, ±10%:** 2.5, 5, 7.5, 10, 15, 25, 50, 75, 100, 150 ohms.  
**15 Watts, ±10%:** 250, 500, 750, 1K, 1.5K, 2.5K, 5K, 7.5K, 10K, 15K ohms.

#### 12 DISC/TUBULAR CAPACITORS

**±10%, 500 VDC:** .0001, .00027, .0027, .00047, .001, .0047, .01 mfd.  
**±10%, 600 VDC:** .1, .027, .27, .047, .47 mfd.

#### 20 ELECTROLYTIC CAPACITORS

**450 VDC:** 200, 100, 50, 20, 5, 2; 35, 140, 60, 35, 15, 7, 3 mfd.  
**75 VDC:** 500, 1000, 2000; 500, 1500, 500 mfd.

**NOTE:** Surge protection prevents arcing.

Selectable in single or dual capacitors from output jacks.  
May be connected in series or parallel combinations.

#### SILICON DIODE RECTIFIER

**Rating:** 1.0 ampere @ 600 peak inverse volts.

#### OTHER SPECIFICATIONS

**Size:** 10¾x7¼x3⅝" deep.

**Net Wt.:** 3¼ lbs.

**Model 2902 Substitution Master.**



# In/Out-of-Circuit Capacitor Analyst

**B&K** Model 801

*... quickly locates defective capacitors in-circuit/ out-of-circuit*



For quick, accurate, capacitor testing both in- and out-of-circuit. Tests the following types: foil, mica, ceramic, general-purpose, temperature-compensating, and electrolytic capacitors. All out-of-circuit tests are made by disconnecting only one lead of the capacitor from the circuit.

**TESTS FOR LEAKAGE:** Measures leakage in-circuit with a unique 3-lead test, for accurate, meaningful readings. Two voltages available—3 volts and 100 volts. The same voltage can be used to measure leakage out-of-circuit—up to 50 megohms can be measured. **SHORTS:** Test results appear directly on GOOD-BAD scale. **OPENS:** Detects open circuits with a 20 MHz signal and a  $\frac{1}{4}$ -wave transmission line. Reads directly on GOOD-BAD scale.

**CAPACITANCE:** The Model 801 accurately measures capacitance out-of-circuit of any capacitor with a rating of 3 VDC or more, 25 pfd to 100 mfd. Reads directly on meter scale. Power supply is line-isolated and meter is fully protected against overload. Supplied complete with cables and instruction manual. Size,  $5\frac{1}{2}$ " high x  $12\frac{3}{4}$ " wide and  $6\frac{3}{4}$ " deep.

Rugged steel case. For 105-125 VAC, 60 Hz; also available for 117-234 VAC, 50-60 Hz. Net wt.,  $8\frac{1}{4}$  lbs.

**Model 801 Capacitor Analyst.**

**TESTS ELECTROLYTICS** (Out-of-circuit only): Units rated up to 2000 mfd are tested with a circuit that automatically takes into account the electrolytic's inherent characteristics of equivalent series-parallel resistance. Only one lead of the capacitor is disconnected; the capacitor then is charged and discharged under load. Capacitor cannot be de-formed by a reverse-polarity voltage.

## Model 970 Transistor Equipment Analyst

255

*... the fastest way to check transistors*



For testing FM, AM, auto, home and portable radios, transistorized TV sets and audio amplifiers—any solid-state circuitry. The 970 gives you everything you need to make transistor circuit servicing fast, uncomplicated and efficient (which means more money in the profit column). It's a complete lab in itself. No un-soldering of transistors or other components is required. Stage-by-stage trouble-shooting is a snap with the 970.

**IN-CIRCUIT TEST:** For quick checking of any stage of amplification, including transistorized power stages—at their normal working currents—without unsoldering anything.

**OUT-OF-CIRCUIT TEST:** Reads Beta directly on meter scale and also tests for leakage current. Both signal and power transistors are accurately measured at proper current levels.

**GENERATOR OUTPUTS:** 250 to 2000 KHz (AM); 10 to 11.4 MHz (AM or FM); 88-108 MHz (FM)—all with vernier tuning. Also, 400 HZ audio signal or modulation. AM modulation, not less than 30%; FM deviation not less than 70 KHz. Audio output level adjustable and suitable even for speaker testing. Individual modulation and RF controls.

Complete with cables and instruction manual. Size,  $8\frac{1}{2}$ " H,  $15\frac{1}{2}$ " W, 9" D. For 105-125 VAC, 60 Hz. Also available for 117/234 VAC, 50-60 Hz. Net wt.,  $22\frac{1}{4}$  lbs.

**Model 970 Transistor Equipment Analyst.**

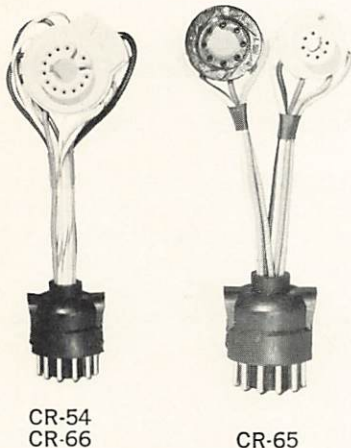
### OTHER FEATURES

- Built-in power supply with 5 ampere output and low ripple. Output voltage, 1.5-15 volts in eight 1.5 volt steps, plus 6.8 and 13.6 volts for auto radios. Either plus or minus can be grounded. Fused input and output.
- Heavy-duty banana jacks insure reliable, trouble-free connections.
- 100% solid-state circuitry.



# B&K ACCESSORIES

## For CRT Testers, Tube Testers, TV Analyst



### CRT Tester/Rejuvenator Adapters

#### Replacement Adapters

The following CRT adapters are furnished with B&K Models 466 and 465 CRT Tester/Rejuvenators and are listed here for replacement purposes only.

**Model CR-60.** Black-and-white CRT adapter; replaces adapter furnished with the B&K Model 465.

**Model CR-61.** Color CRT adapter; replaces adapter furnished with the B&K Model 465.

**Model CR-62.** A, B and C black-and-white CRT adapter; replaces unit furnished with B&K Model 466.

**Model CR-63.** H, J, color CRT adapter; replaces adapter furnished with the B&K Model 466.

**Model CR-64.** K, L color CRT adapter; replaces unit furnished with the B&K Model 466.

### Special CRT Adapters for B&K CRT Tester/Rejuvenators

Special CRT adapters for use with B&K Tester/Rejuvenators. These adapters are not furnished with the instruments; they are optional accessories. They increase the versatility of the testers.

**Model ASM-58B** Replaces "D" adapter furnished with testers; adapts to Type 23EP4 CRT. For use with all B&K models, except the 466.

**Model CR-54** 90° color adapter for B&K Model 465 CRT Tester/Rejuvenator. Checks G. E. CRT's: 15MP22, 15YP22, 17EXP22 and 17FJP22.

**Model CR-55** Adapts to Type 12BRP4 transistorized CRT. For use with B&K Models 445 and 465 CRT Tester/Rejuvenators.

**Model CR-56** 110° color CRT adapter for B&K Model 465 CRT Tester. Checks CRT types: 18VANP22, 19VBLP22, 19VCWP22.

**Model CR-57** Adapts to 20 mm-neck CRT's. For B&K Models 445, 465.

**Model CR-58** Adapts to G.E. Type 11SP22 and 11WP22 color CRT's. For use with B&K Model 465.

**Model CR-65** Black-and-white CRT adapter for B&K Model 466. Checks CRT types 23EP4, 23Q4 and a number of imported CRT's.

**Model CR-66** 90° color CRT adapter for B&K Model 466. Checks G. E. CRT's: 15MP-22, 15YP22, 17EXP22 and 17FJP22.

**Model CR-67** 110° color CRT adapter for B&K Model 466. Checks RCA types: 18VANP22, 19VBLP22, 19VCWP22.

**Model CR-69** For use with RCA in-line CRT's.

### Tube Tester Adapters

**Model TC-1.** Adapts for 6EU7. For use with B&K Models 600, 606 and 607.

**Model TC-70.** Adapter for high-voltage rectifier tubes. For use with B&K Models 600, 606 and 700.

**Model TC-75.** Adapter for Type 6BK4 tube. For use with B&K Models 600, 606, 700 and 707.

**Model TC-80.** Adapter for Magnoval tubes and Novar sockets. For use with B&K Models 600, 700, and 707.

### TV Analyst Slides

The following slide sets are for use with the B&K TV Analyst, which reproduces the slide on the screen of any TV set. The Model ASM-110 Slide Set is furnished with the TV Analyst.

**Model ASM-110 Slide Set.** 4 slides of flying spot scanner patterns for Model 1077. Furnished with the TV Analyst.

**Model PM-77 Clear Slide.** For Models 1076, 1077. Make your own pattern with grease pencil. Not furnished with the TV Analyst.

**Set of 6 Slides.**

*State Quantity Desired*



## For Alignment Generator, VOM's, VTVM's, Oscilloscopes

### RF Probe

**Model AV-1A RF Probe.** For use with Model 175 VTVM, Model 177 VTVM and Model 375 VTVM. Extends frequency range to 250 MHz.

### High-Voltage Probes

**Model AV-2A High-Voltage Probe.** For B&K Model 175 VTVM, Model 177 VTVM and Model 375 VTVM. Extends DC voltage range to 60,000 VDC.

### Demodulator and Other Probes

**Model PR-16 Combination 10:1/Direct Probe.** Input impedance: Low-capacity, 10:1, 10 megohms/18 pF; direct, 1 megohm/120 pF. For B&K scopes: Models 1440, 1460, 1465 and 1470.

**Model CLP-18 Tip Only.** Spring-loaded clip-on tip, for use with PR-16 probe body.

**Model PR-20 Combination 10:1/Direct Probe.** Consists of the PR-16 probe body, with the CLP-18 spring-loaded tip. For use with B&K scopes: Models 1440, 1460, 1465 and 1470.

**Model PR-21 Isolation/Direct Probe.** For B&K Models 281 and 282 Digital Multimeters, 277 and 290 F.E.T. VOM's, 1403 scope. Prevents capacitive loading when measuring DC in RF circuits. Has switchable 100K ohm isolating resistor. Terminated in molded double banana plug.

**Model PR-43 DC/AC/Ohms Probe.** Exact replacement for test probe supplied with B&K VTVM's: Models 175, 177 and 375.

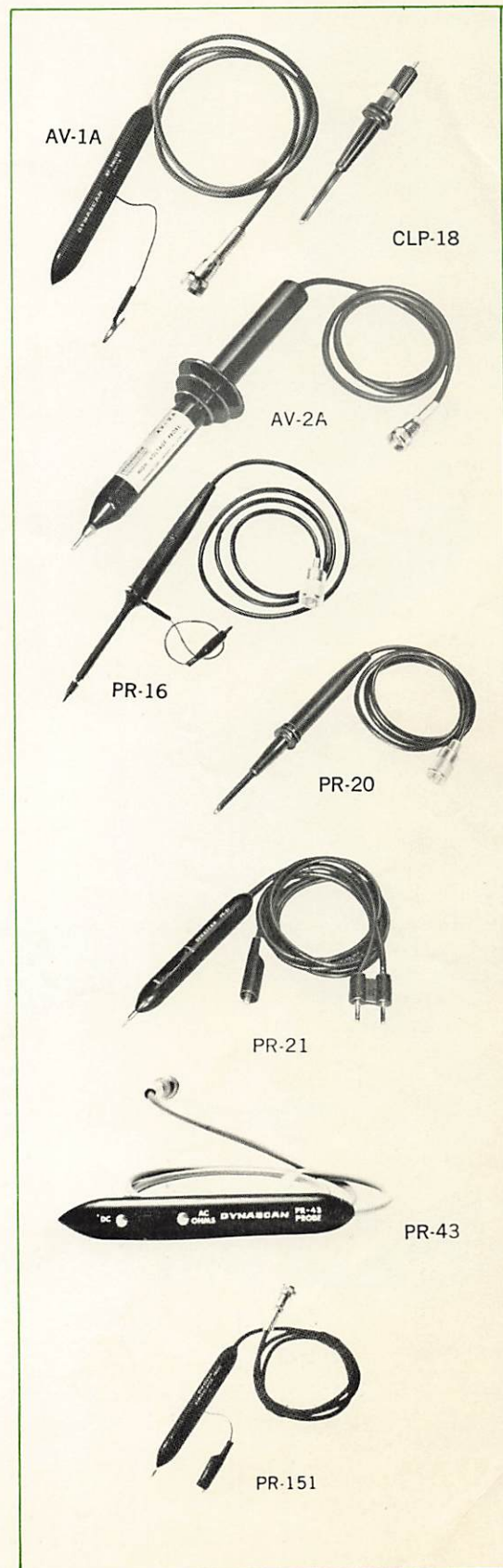
**Model PR-151 RF Demodulator Probe.** Exact replacement for probe furnished with B&K Model 415 Alignment Generator.

**Model PR-152 RF Demodulator Probe.** For viewing RF and IF modulation waveforms on B&K scopes: Models 1440, 1460, 1465 and 1470.

**Model TP-41 RF Cable.** Exact replacement for cable furnished with B&K Model 415 Alignment Generator. With selectable terminations of 75 or 300 ohms.

**Model FP-5 "Dynaflex" Probe.** For use with Model 162 Transistor/F.E.T. Tester, or with any VOM, VTVM. Positive contact is assured by spring-loaded, needle sharp tips. Spacing adjustable with one hand, from 1/32" to 5/8". Each tip is color-coded for easy identification. Ideal for rapid access to densely packed, miniaturized circuit arrays. Eliminates costly unsoldering. (See page 23 for illustration.)

**Model PR-23 RF Demodulator Probe.** For use with any electronic voltmeter, DVM or oscilloscope.





# **B&K** Deluxe Carrying Cases

*extra convenience and protection for  
your B&K Instruments in truck and shop*

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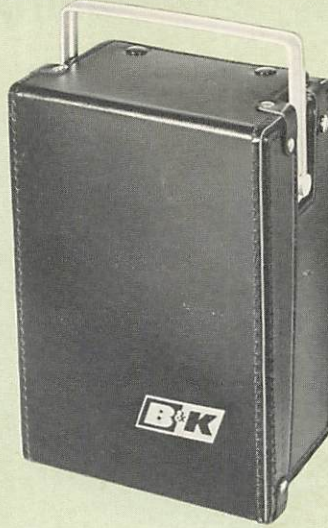
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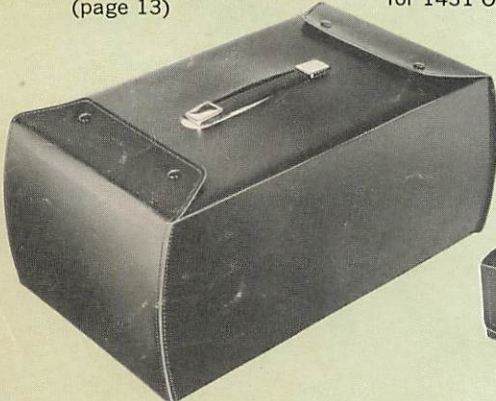
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