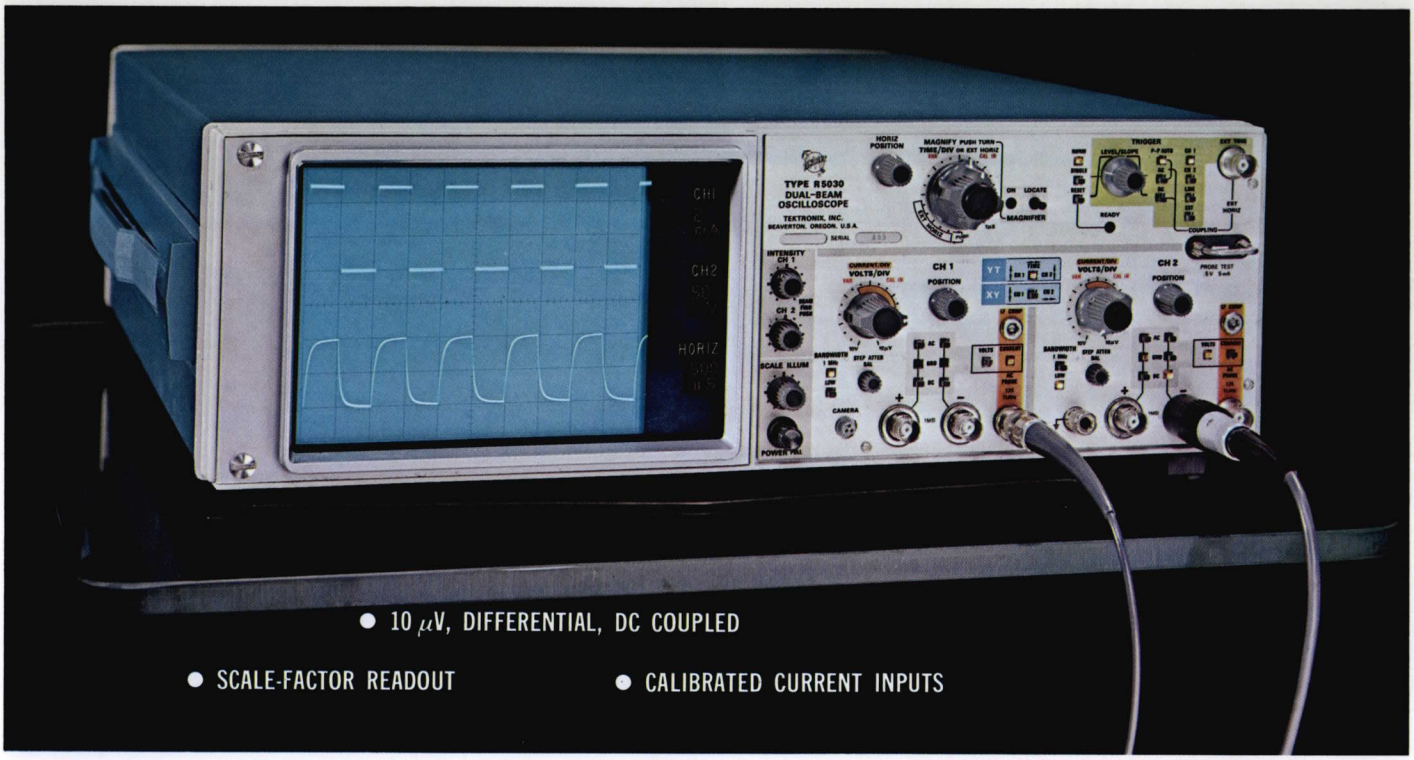
R5030 DUAL-BEAM OSCILLOSCOPE R5030



- 10 μV, DIFFERENTIAL, DC COUPLED
- SCALE-FACTOR READOUT
- CALIBRATED CURRENT INPUTS

The Type R5030 is the first dual-beam oscilloscope to offer current inputs, high-gain differential inputs, auto scale-factor readout, and 1-MHz bandwidth.

While adding more capability, the design stresses usability. Controls are color coded to outline functions; switching is simplified; scale-factors are read out via fiber-optics; and the viewing area of the CRT is increased by 50%. Each beam has a full scan of 8 x 10 divisions (1.27 cm per division). Readouts indicate current or voltage amplitude plus the time as set by the deflection controls. When any of the controls is in an uncalibrated position, two visual means to detect this condition are provided. The knob will show red, while the auto scale-factor readout will have a "greater than" (>) sign appear in front of that scale factor. The complementary color scheme aids the user in readily distinguishing different functions. Green panel areas identify trigger controls; mode functions are designated by the color blue; the color salmon distinguishes those functions associated with current inputs; while voltage inputs, time-base controls, as well as CRT controls are outlined in gray.

Unique to this instrument is a LOCATE function associated with the time-base magnifier. When depressed, the time base is returned to a X1 magnification position and the area which will be magnified is intensified. The magnifier, which is direct reading on the auto scale-factor readout offers five positions of magnification on the time-base switch. The locate feature allows the operator to easily pick out where on the trace he has chosen his magnified sweep.

The trigger circuit is greatly simplified by a peak-to-peak auto circuit. When in this mode, the trigger circuit detects the peak-to-peak excursions of the displayed waveform and matches the range of the level control to the range of the displayed signal. The trigger level and slope controls are combined in this new instrument. When used with the peak-to-peak auto position, the operator can go thru the maximum excursions on either slope and never reach an untriggerable position on the control.

Other features to aid the operator are beam finders on the intensity controls, and lamps that indicate the operating mode. When the volts push button is depressed, the AC, GND, or DC switch positions light; when switched to current mode, all the voltage-control function lights are extinguished. When switching from the Y-T mode of operation to the X-Y mode, all trigger-functions lamps are extinguished, indicating that you do not have control with the time base.

Additional capabilities which make the R5030 even more versatile: 1. The vertical sensitivity is 10 μV with a low-noise figure, as well as excellent differential, common-mode-rejection ratio. 2. The vertical channels have current inputs which allow simultaneous measurements of current and voltage. 3. The bandwidth is 1 MHz at all deflection factors. (However, bandwidth may be limited to approximately 5 kHz, allowing the operator to eliminate wide-band noise in his measurement.) These measurement capabilities, plus the many convenience features make this instrument useful in a wide variety of applications.

CHARACTERISTIC SUMMARY

VERTICAL

Bandwidth—Selectable: DC to 1 MHz or DC to 5 kHz (within 10% at —3 dB).

Deflection Factor—10 μV/div to 10 V/div or 1 mA/div to 200 mA/div.

Input RC—1 megohm paralleled by approximately 50 pF.

Common-Mode-Rejection Ratio — at least 100,000:1 (DC to 100 kHz).

HORIZONTAL

Time Base—1 μs/div to 5 s/div.

Magnifier—up to 5 magnification steps (×50 mag max).

External Input—20 mV/div to .5 V/div.

CRT

Display Area—each beam 8x10/div (1.27 cm/div).

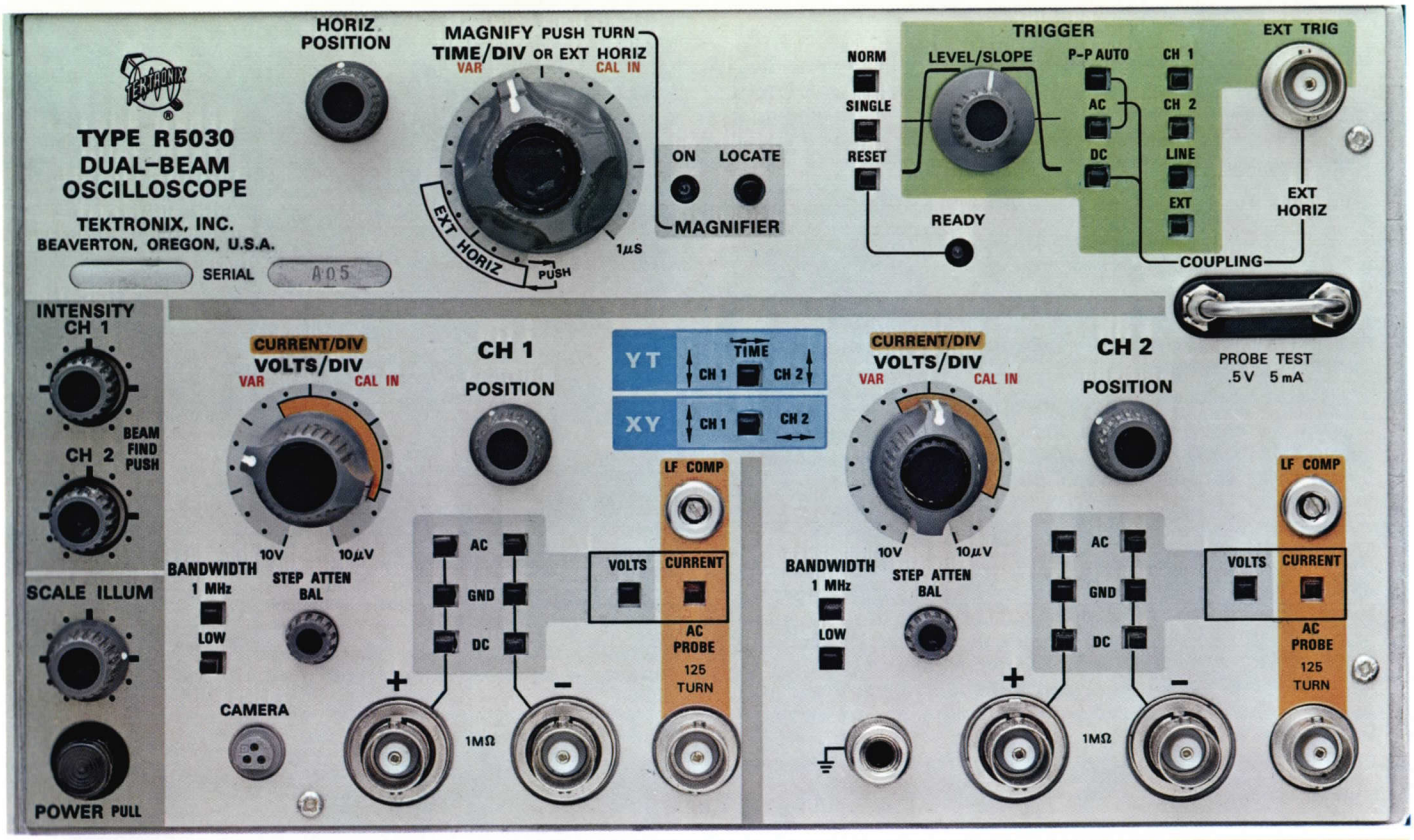
Accelerating Voltage—4 kV.

Phosphor—P31.

OTHER

Amplitude Calibrator—0.5 V and 5 mA, 1-kHz square-wave.

Power Requirements—90 to 140 V or 180 to 280 V, 48 to 440 Hz; 100 watts.



DISPLAY MODES

Y-T (Two-Beam Display)—Normally, Channel 1 and Channel 2 plotted on vertical axes versus time on horizontal axis. Dual-beam curve tracing provided by plotting Channel 1 and Channel 2 on vertical axes against an external horizontal signal on horizontal axis. Y, Y, X phase difference is 5° from DC to 100 kHz, or AC coupled from 1 kHz to 100 kHz. The two vertical deflection systems are independent of each other and share the same horizontal deflection system.

X-Y (Single-Beam Display)—Channel 1 plotted on vertical axis versus Channel 2 on horizontal axis provides curve tracing at full sensitivity of vertical deflection system (10 μV/div). X-Y phase difference with Channel 1 and Channel 2 DC coupled at the same calibrated deflection factor (unused inputs grounded) is ≤1° to 200 kHz, increasing to ≤4° at 1 MHz. In X-Y mode, time and external horizontal systems are disabled and lamps are extinguished. Trace intensity is controlled by Channel 1 intensity control.

VERTICAL DEFLECTION

Two identical channels, each provided with differential voltage inputs and a separate current input. Voltage or current mode is selected by push button.

When current mode is enabled, lamps associated with voltage inputs are extinguished to avoid confusion. Volts switch extinguishes current lamp. Full 1-MHz bandwidth or limited (≈5-kHz) bandwidth for eliminating wideband noise, selectable by push button.

Bandwidth

DC to 1 MHz or DC to 5 kHz, within 10% at —3 dB, selectable by push button. Lower —3 dB limit: AC coupled 2 Hz or less; current mode 10 Hz or less.

Deflection Factor

Voltage Mode—10 μV/div to 10 V/div in 19 calibrated steps (1-2-5 sequence) accurate within 3%. Uncalibrated, continuously variable between steps to approximately 25 V/div.

Current Mode—1 mA/div to 200 mA/div in 8 calibrated steps (1-2-5 sequence) accurate within 5%. Uncalibrated, continuously variable between steps, extends deflection factor to approximately 500 mA/div.

Input RC

1 MΩ within 1% paralleled by 50 pF within 10%.

Maximum Safe Inputs

(Inputs are fuse protected—no damage will occur)

Voltage

RANGE	DC	AC*
10 μV to 100 mV/div	10 V (DC+Peak AC)	300 V (DC)
200 mV to 10 V/div	300 V (DC+Peak AC)	300 V

*Input switch must be initially set to ground when signal is applied to input to charge (or discharge) input coupling capacitor.

Current—10 A peak.

Common-Mode-Rejection Ratio

RANGE	DC COUPLED DC-100 kHz	AC COUPLED 50 Hz-100 kHz
10 μV to 100 mV/div	100,000:1*	1,000:1
200 mV to 10 V/div	1,000:1	1,000:1

*With up to 20-V peak-to-peak sinewave. CMRR is not specified when display is 0.1 div or less from DC to 1 kHz, or 0.2 div or less from 1 kHz to 100 kHz.

Displayed Noise

Voltage Mode: ≤15 μV. (Tangentially Measured)
Current Mode: ≤200 μA.

Input Gate Current

≤200 pA.

DC Drift

With Time: Short term—5 μV or less per minute after five-minute warm-up. Long term—10 μV or less or 0.1 division or less, whichever is greater, during any hour after one-hour warm-up.

With Temperature: ≤50 μV per degree C.

With Line Voltage: ≤100 μV for 10% change in line voltage.

HORIZONTAL DEFLECTION

Full-range time base (1 μs to 5 s/div), up to 5 magnification steps (X50 maximum) and unique magnifier locate feature. Full-bandwidth (1-MHz) calibrated external-horizontal input permits dual-beam X-Y presentations. Horizontal deflection common to both beams.

Time Base Sweep Rate

1 μs to 5 s/div in 21 calibrated steps (1-2-5 sequence) accurate within 3% in the center 8 divisions. Uncalibrated, continuously variable between steps and to approximately 12 s/div.

Sweep Magnifier

Up to 5 magnification steps (1-2-5 sequence) from the initial unmagnified time/div control setting. Maximum magnified sweep limited to 1 μs/div. Magnified time base accurate within 5% in the center 8 divisions of display. Locate push button disables magnifier and restores normal sweep display, intensifies that portion of sweep to be magnified. Horizontal position control acts as time position of that portion of sweep to be magnified.

Sweep Modes

Normal or signal sweep; ready indicator lights when sweep circuit is triggerable.

External Horizontal Input

Bandwidth: DC to at least 1 MHz at —3 dB; lower —3 dB limit is 15 Hz or less.

Deflection Factor: 20 mV/div to 500 mV/div in 8 calibrated steps (1-2-5 sequence) accurate within 3% in the center 8 divisions. Uncalibrated, continuously variable between steps to approximately 1.25 V/div.

Input RC: 1 MΩ within 2% paralleled by 50 pF within 10%.

Maximum Input: 100 V (DC + peak AC) decreasing to 100 V peak-to-peak at 1 MHz.

Y, Y, X Phase Difference: ≤5° from DC to 100 kHz; AC coupled from 1 kHz to 100 kHz.

TRIGGER

A simplified trigger circuit combines the trigger LEVEL and SLOPE controls and provides a peak-to-peak auto mode. When in peak-to-peak auto, the range of level adjustment is automatically established at the positive and negative peaks of the displayed waveforms. Also, the sweep is always triggered, or reverts to a free-running mode in the absence of a trigger signal or when the trigger signal is less than 15 Hz.

Coupling

Peak to Peak auto, AC or DC coupling. These push buttons select the coupling of trigger and external-horizontal input signals.

Source

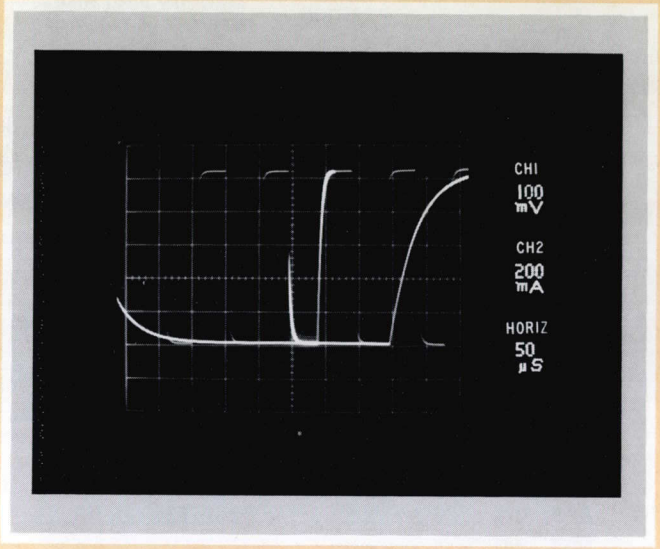
Internal (Channel 1 or Channel 2), Line, or External.

Sensitivity

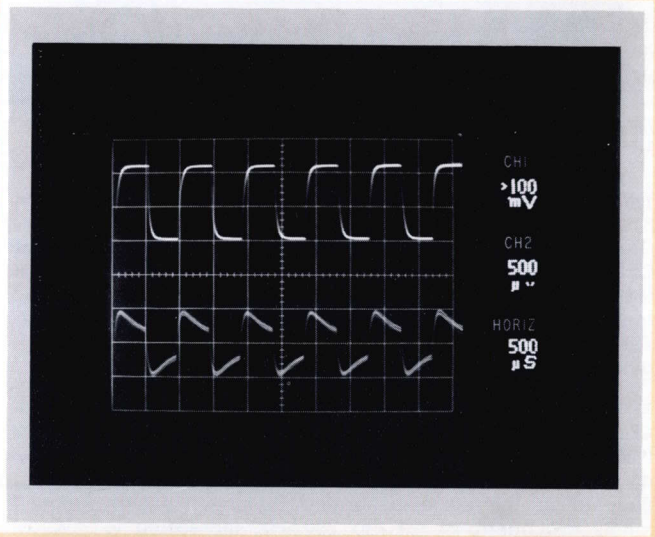
Coupling	Internal	External
Peak to Peak Auto	0.5 div, 15 Hz to 1 MHz	0.5 V, 15 Hz to 1 MHz
AC	0.3 div, 15 Hz to 1 MHz	0.25 V, 15 Hz to 1 MHz
DC	0.3 div, DC to 1 MHz	0.25 V, DC to 1 MHz

Maximum Input

100 V (DC + peak AC).



MAGNIFIER LOCATE (Double Exposure)
Magnifier Locate control depressed returns sweep to X1, intensifies portion of sweep to be magnified. When control is released, magnified sweep is displayed.



SCALE-FACTOR READOUT
Photo shows CH 1 variable volts control in uncalibrated condition, CH 2 mA/div out of range.

CRT AND DISPLAY FEATURES

Auto Scale-Factor Readout

Reads out scale-factors associated with Channel 1, Channel 2 and Horizontal. CH 1 and CH 2 read 10 μV to 10 V in 19 steps or 1 mA to 200 mA in 8 steps (1-2-5 sequence). HORIZ reads 1 μs to 5 s in 21 steps or 20 mV to 500 mV in 8 steps (1-2-5 sequence). Scale illumination control selects intensity of readout.

Tektronix Dual-Beam CRT

8x10 div per beam (1.27 cm/div). Separate vertical deflection plates; common horizontal. 4-kV accelerating potential provides a bright display. P31 phosphor normally supplied; P7 optional without extra charge. Consult your Field Engineer, Representative or Distributor for application information and availability.

Graticule

Internal, variable illumination. 8 x 10-div display area. Vertical and horizontal center lines marked in 0.2 divisions.

Display Controls

Combination push-button beam finder and intensity control for each beam. Dynamic focus eliminates requirement for control.

ENVIRONMENTAL CAPABILITIES

Ambient Temperature

Operating: 0°C to +50°C (—15°C to +55°C with no functional failure)

Non-operating: —55°C to +75°C

Altitude

Operating: 15,000 feet

Non-operating: 50,000 feet

Vibration

Operating: 15 minutes along each axis at 0.015 inch peak-to-peak displacement (1.9 g's at 55 c/s). 10 to 50 to 10 c/s in 1-minute cycles.

Shock

Operating: 30 g's, 1/2 sine, 11-ms duration, 2 shocks in each direction along 3 major axes, total of 12 shocks.

OTHER CHARACTERISTICS

Rear Panel Inputs and Outputs

Z-Axis Inputs: Seperate inputs for Channel 1 and Channel 2 DC to 1 MHz; 0 V to 5 V equal to full-intensity range, negative signal intensifies. Input RC approximately 10 kΩ paralleled by 60 pF. Maximum Input: 50 V.

Vertical Signal Outputs: Channel 1 and Channel 2 outputs provide an output of the vertical deflecting signal (DC coupled), amplitude at least 0.2 V per displayed div. Source impedance—10 kΩ within 10%. DC to ≥100 kHz bandwidth at —3 dB.

Auxiliary Functions: + Gate Output is ≥5 V from source impedance of 10 kΩ. Rise and fall times ≤5 μs into 100 pF.

Sawtooth Output: ≥5 V from source impedance of 10 kΩ.

Camera: Power to and sweep reset from camera to oscilloscope.

Probe Test

0.5 V into 1 MΩ and 5 mA accurate within 2%. Repetition Rate—1 kHz accurate within 10%.

Power Requirements

Quick-change line-voltage selector permits operation from 90 V to 124 V, 102 V to 140 V, 180 V to 248 V, or 204 V to 280 V. The Type R5030 will operate over a line frequency range from 48 Hz to 440 Hz with a power consumption of 100 W at 115 V AC, 60 Hz.

Dimensions and Weights

Rackmount (Type R5030)		
Length	21-7/8 in	55.5 cm
Width	19 in	48.3 cm
Height	5-1/4 in	13.4 cm
Net weight	33 lb	15.0 kg
Domestic shipping weight	49 lb	22.2 kg
Export-packed weight	69 lb	31.4 kg
Low Profile Cabinet (Type R5030 Option 4)		
Length	21-1/2 in	54.7 cm
Width	17-5/8 in	44.8 cm
Height	6-1/16 in	15.4 cm
Net weight	32 lb	14.6 kg
Domestic shipping weight	48 lb	21.8 kg
Export-packed weight	69 lb	31.4 kg

Included Standard Accessories

Two instruction manuals (070-1000-00)

RACKMOUNT

Type R5030 is equipped with a set of tracks and slides for rackmounting.

Order Type R5030 ..... **$1850**

LOW-PROFILE CABINET

Type R5030 Option 4 is equipped with feet, tilt bail and handle for bench top use.

Order Type R5030 Option 4 ..... **$1850**

OPTIONAL ACCESSORIES

Optional accessories increase measurement capabilities and provide added convenience. Cameras, Probes, Scope-Mobile® Carts and other major accessories are completely described in the catalog accessory pages.

Probes

P6052 10X, 1X selectable attenuation probe, order 010-0241-00 ..... $50
P6021 AC current probe, order 010-0237-00 ..... $85

Scope-Mobile® Cart

Model 205-1, storage drawer, and 9-position tilt-lock oscilloscope tray, order 205-1 ..... $150

Cameras

Either the C-12 or C-27 camera can be used with the Type R5030 thru use of an adapter-frame/lens combination. The adapter frame accepts camera mounting adapter normally used for Tektronix 5-inch round CRTs.

C-12/C-27 to Type R5030 Camera Adapter, order 016-0264-00, adapter-frame/corrector lens $35

All cameras are sold without mounting adapter.

Standard C-12 provides no-parallax viewing, f/1.9—1:0.85 lens, Polaroid* Land Pack-Film back, order C-12 ..... $490

C-12 to 5-inch round CRT adapter, order 016-0226-01 ..... $15

Standard C-27 has a rotating back and removable viewing hood, f/1.9—1:0.85 lens. Polaroid Land Pack-Film back, order C-27 ..... $460

C-27 to 5-inch round CRT adapter, order 016-0225-02 ..... $15

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