The HP 130C Oscilloscope

High Resolution Picture of the HP 130C Oscilloscope

Click-Here for High-Resolution Display of this picture

Inside View, from top, of the HP 130C

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Inside View, from bottom, of the HP 130C

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The Model 130C Oscilloscope in the 1963 Catalog

Page 30 of the 1963 Catalog

130C 200 μv/cm OSCILLOSCOPE

Features Identical Amplifiers for X-Y Plots

Advantages:

- 200 μv/cm sensitivity eliminates preamplifiers
- 500 kc bandwidth all ranges
- Identical X and Y amplifiers for phase measurements
- Constant impedance and balanced input on all ranges
- x2 to x50 sweep magnification for viewing waveform detail
- Automatic triggering, beam finder simplify operation
- No-parallax, non-glare CRT
- One instrument for rack and bench

Uses:

- General purpose for lab, production and medical applications
- Accurately measures phase shift and time
- Observe output directly from rf detectors, strain gages, transducers
- View complex waveforms

The *hp* Model 130C Oscilloscope, which has identical 200 μv/cm vertical and horizontal amplifiers with 500 kc bandwidth on all sensitivity settings, is a versatile all-purpose instrument for laboratory, production line, industrial process measurements and medical applications. A x2 to x50 sweep magnifier effectively expands the sweep up to 500 cm for measurement of waveform detail. In addition, a front panel switch allows observation of single shot phenomena or random events by providing single sweep operation. Through the use of both solid state and vacuum tube circuits, the 130C has superior performance, excellent reliability and low power consumption.

Model 130C is easy to operate even by inexperienced personnel. Controls are color coded to front panel markings and are logically arranged by function. An internal graticule CRT provides a bright, clear, non-glare display without parallax. Automatic triggering minimizes adjustments. A positive pushbutton beam finder immediately locates an off-screen trace.

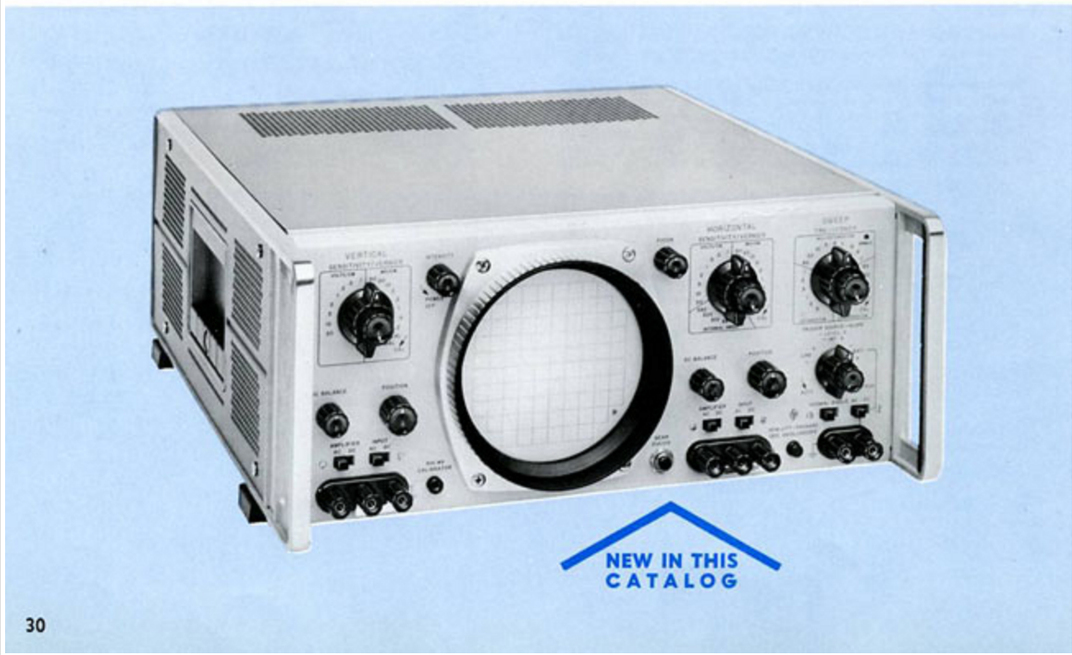
Identical Amplifiers

Identical horizontal and vertical amplifiers provide a high sensitivity of 200 μv/cm from dc to 500 kc and balanced inputs on all ranges. Balanced output signals from low level transducers such as those used in industrial and medical fields can be measured directly without external amplification. The amplifiers may also be used single ended with ac or dc coupling. Regulated power supplies, high stability components and extensive feedback insure excellent gain stability and low noise even on the most sensitive ranges. A front panel switch (Amplifier AC-DC) provides ac coupling between amplifier stages and virtually eliminates all drift—even on the most sensitive range. Phase shift between amplifiers is held to less than ± 1° up to 100 kc for accurate phase measurements.

Probes may be used with both the horizontal and vertical amplifiers, and since the input impedance is constant, the probes will not require recompensation between sensitivity ranges.

Automatic Triggering

Trigger adjustments are minimized with the 130C by the "automatic" triggering feature. This feature provides a base



line in the absence of an input signal. For fast expanded sweep times where the automatic base line would be too dim for observation, a free run mode establishes a bright base line. A trigger level control is located on the front panel so that automatic triggering may be easily locked out if desired, and a preset trigger level established.

Versatile Sweeps

For versatility, twenty-one linear direct reading sweep times from 1 μsec/cm to 5 sec/cm are available, accurate within ± 3%. A calibrated x2 to x50 magnifier expands the sweep up to 0.2 μsec/cm, accurate within ± 5%. A vernier control permits continuous adjustment between calibrated ranges and extends the slowest sweep speed to at least 12.5 sec/cm. In addition, a front panel switch for either normal or single sweep permits observation of single shot phenomena or random events. Switching to single sweep will disable the sweep circuit after a single sweep so that it can not be re-triggered until manually rearmed. A front panel sweep "armed" light indicates when the sweep is armed and ready to be triggered.

No Parallax CRT

The internal graticule of the *hp* Model 130C CRT is in the same plane as the phosphor and trace. In this way the usual vertical and horizontal parallax error, which is inherent in conventional CRT's, is avoided. Waveform measurements are easier, quicker and more accurate since the ambiguity caused by the parallax is eliminated. In addition, the etched safety glass face plate on the CRT of the 130C minimizes reflections and glare which are common in conventional CRT filter and face plates.

Modular Cabinet

The 130C is packaged in the modular cabinet which gives maximum versatility for either bench or rack mounts. Rack mounting brackets (supplied with the instrument) may be quickly attached to convert the unit from bench to a sturdy rack mount. Top and bottom cabinet covers may be quickly removed giving complete access to the components and adjustments within the instrument. When used on the bench, other instruments may be stacked on the top surface.

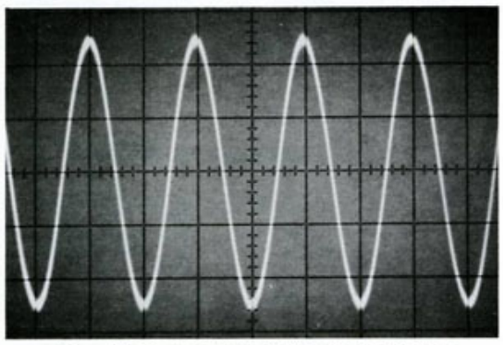


Figure 1. Strain gage output showing resonance in a part (200 uv/cm sensitivity).

Specifications

Sweep Generator

Internal Sweep: 21 ranges, 1 μsec/cm to 5 sec/cm, accuracy within ± 3%. Vernier provides continuous adjustment between ranges and extends slowest sweep to at least 12.5 sec/cm.

Magnification: x2, x5, x10, x20, x50, accuracy of magnified sweeps ± 5% for sweep rates slower than 0.2 μsec/cm.

Automatic Triggering: Base line is displayed in the absence of an input signal.
- **Internal:** 50 cps to 500 kc signal causing 0.5 cm or more vertical deflection and also from line voltage.
- **External:** 50 cps to 500 kc, 0.5 volts peak-to-peak or more.
- **Trigger Slope:** Positive or negative slope of external sync signals or internal vertical deflection signals.

Amplitude Selection Triggering:
- **Internal:** 10 cps to 500 kc, 0.5 cm or more vertical deflection signal.
- **External:** DC coupled: dc to 500 kc, 0.5 v peak-to-peak or more; ac coupled: 20 cps to 500 kc, 0.5 v peak-to-peak or more.
- **Trigger Point and Slope:** Internally from any point of the vertical waveform presented on screen or continuously variable from + 10 volts to − 10 volts on either positive or negative slope of external signal.
- **Single Sweep:** Front-panel switch permits single sweep operation.

Vertical and Horizontal Amplifiers

Bandwidth:
- **DC Coupled:** DC to 500 kc.
- **AC Coupled (Input):** 10 cps to 500 kc.
- **AC Coupled (Amplifier):** 25 cps to 500 kc at 0.2 mv/cm sensitivity. Lower cut-off frequency is reduced as sensitivity is reduced. At 20 mv/cm the cut-off frequency is 0.25 cps. At lower sensitivities, amplifier is automatically dc coupled.

Sensitivity: 0.2 mv/cm to 20 v/cm. 16 ranges in 1, 2, 5, 10 sequence with an attenuator accuracy within ± 3%. Vernier permits continuous adjustment of sensitivity between ranges and extends minimum sensitivity to at least 50 v/cm.

Internal Calibrator: Approximately 350 cps square wave; 5 mv ± 3%. Automatically connected for checking gain when the sensitivity is switched to CAL.

Input Impedance: 1 megohm shunted by 45 pf, constant on all sensitivity ranges.

Input Capacitor Rating: 600 v peak (dc + ac).

Balanced Input: On all sensitivity ranges.

Common Mode Rejection: At least 40 db from 0.2 mv/cm to 0.2 v/cm sensitivity; common mode signal not to exceed 4 volts peak-to-peak. At least 30 db from 0.5 volts/cm to 20 volts/cm; common mode signal not to exceed 40 v peak-to-peak from 0.5 v/cm to 2 v/cm sensitivities and 400 v peak-to-peak from 5 v/cm to 20 v/cm sensitivities. Specified rejection from dc to at least 50 kc.

Phase Shift: Within ± 1° relative phase shift at frequencies up to 100 kc with verniers in CAL position and equal input sensitivities.

General

Calibrator: Approximately 350 cps, 500 mv ± 2% available at front panel.

Cathode Ray Tube: *hp* type, (P31) internal graticule, monoaccelerator, 3000 volts accelerating potential. P2, P7, and P11 phosphors are available. Equipped with non-glare safety glass faceplate.

Internal Graticule: Parallax-free 10 cm x 10 cm, marked in cm squares. 2 mm subdivisions on major horizontal and vertical axis and at the 10% and 90% amplitudes (1st and 9th cm) of full scale to facilitate rise-time measurements.

Beam Finder: Depressing beam finder control brings trace on CRT screen regardless of setting of balance, position or intensity controls.

Intensity Modulation: Terminals on rear; + 20 volt pulse blanks CRT at normal intensity.

Power: 115 or 230 volts ± 10%, 50 to 1000 cps, approximately 90 watts.

Dimensions: 16¾" wide, 7-5/16" high, 18⅜" deep overall; hardware furnished for quick conversion to 7" x 19" rack mount. Rack mount depth, 16⅜".

Weight: Net 32 lbs. Shipping 45 lbs.

Accessories Available: A complete line of accessories, including voltage divider probes, current probe and amplifier, test mobiles, and adapters is listed on pages 54-55.

Options (no extra charge):
02-P2 in lieu of P31.
07-P7 in lieu of P31.
11-P11 in lieu of P31.

Data subject to change without notice.

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