

2236

Dc to 100 MHz Bandwidth

Integrated Counter/Timer/DMM

Lightweight, Easy to Use

2 mV Sensitivity

5 ns/Div Sweep Rate

100 MHz Counter

Gated Counter Measurements

ΔTime

Channel 1 Ac and Dc Volts

Three Year Warranty—Five Year Option

TYPICAL APPLICATIONS

Digital Design and Testing
Field Service
Amplifier Design and Testing

See page 277 for available Application Notes.

The 100 MHz 2236 introduces a new concept in waveform measurement: a 100 MHz counter/timer/DMM, integrated into the scope's vertical, horizontal and trigger systems. This convenient feature simplifies setup (by allowing consolidated set-ups and combinations of measurements), heightens measurement confidence and expands scope versatility. The 2236 replaces mental gymnastics and roundabout

problem-solving with simple, direct, accurate, digital readouts that supplement your analog measurements.

The Tek 2236 provides easy, accurate, and versatile measurements through micro-processor-driven waveform analysis. Autoranged and autoaveraged counter/timer measurements are made on the signal triggering the A sweep, or in gated modes on the signal triggering the B sweep. Autoranged DMM measurements are made through floating DMM side inputs and up-range at 5000 counts. Channel 1 voltage measurements made on Channel 1 signal include: dc, relative dc, relative and true ac RMS voltage. Self-testing includes power-on and user interactive routines.

The 2236 uses intensified markers on-screen to define the area to be measured on a burst or short duration pulse train. Gated counter measurements are made via the B trigger with operator prompting and automatic, digital readout of results (see Figures 1, 2, 3). With period averaging the 2236 can make low frequency measurements instantly, in contrast to the several seconds delay encountered on conventional counter/timers.

The scope and DMM can be applied simultaneously, with concurrent CRT and digital readout displays. The same probe feeds data to the scope and provides information

to the DMM, thus eliminating tangled leads and extra set-up time required to obtain true ac RMS or dc voltage readings (see Figure 6).

DMM autoranging simplifies set-up. An ohmmeter range of 2 GΩ—a hundred times the range of most such devices—allows service technicians to quickly pinpoint even small amounts of transformer leakage, or designers to accurately check the insulating property of capacitors (see Figure 9).

Frequency, period and width measurements are pushbutton simple, with accuracies to 0.001% and beyond. On-screen operator prompts further ensure failsafe set-up (see Figure 7).

An audible, automatic diode/junction detection and continuity signal saves both time and interpretation errors by allowing the operator to concentrate on probing rather than on observing the front panel (see Figure 8).

In strong testimony of the incomparable reliability of the 2000 Family of oscilloscopes, Tek offers a three year warranty: All labor and parts, including CRT, excluding probes. And then, beyond the "basic three years" of warranty coverage, Tek will extend your service coverage up to five years, offering you a choice of three practical service plans to meet your specific service needs.

See page 297 for Characteristics.

Gated Frequency Measurement

2.17588 6

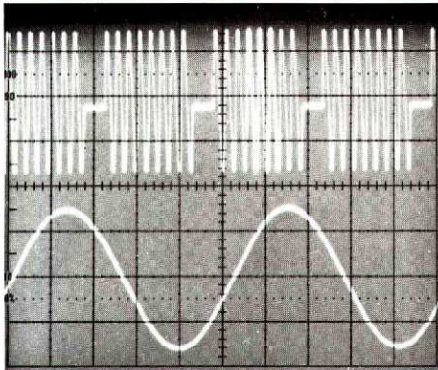


Figure 1. With the B sweep triggered, the frequency within the intensified zone on the A sweep is measured.

Gated Period Measurement

20.35948 - 6

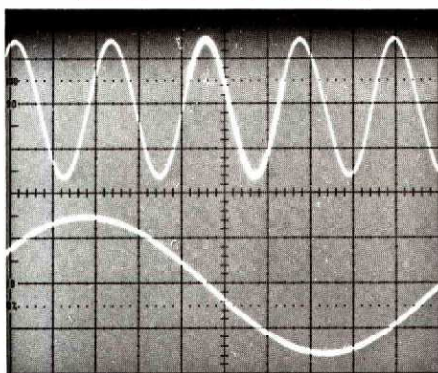


Figure 2. With the B sweep triggered, the period within the intensified zone on the A sweep is measured.

Gated Width Measurement

7.974888 - 3

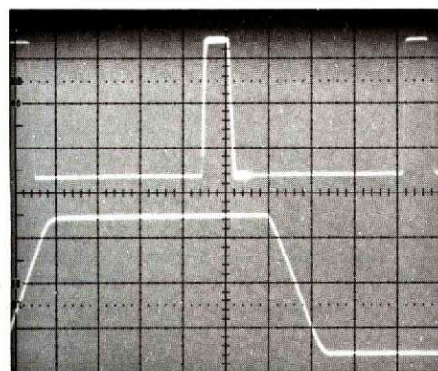


Figure 3. With the B sweep triggered, the width to be measured is within the intensified zone and polarity is selected by the B trigger slope control.

Gated Totalize Measurement

With the B sweep triggered, the events within the intensified portion of the A sweep are totalized. A single events count can be made using single sweep.

Delay Time Measurement

2.035367 - 3

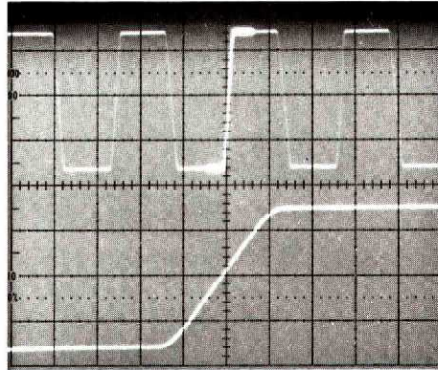


Figure 4. Delay time is measured from the start of the A sweep to the start of the intensified zone.

Delta Time Measurement

358.1470 - 6

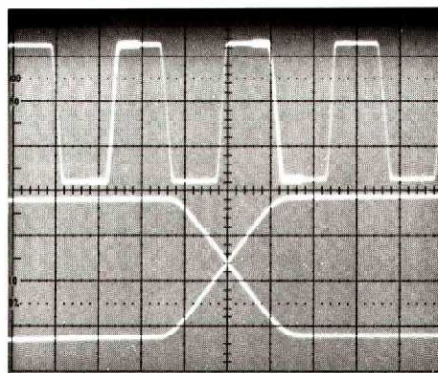


Figure 5. The time between the two intensified zones on the A sweep is measured with up to 10-picosecond resolution.

Channel 1 Volts Measurement

dC 5.16

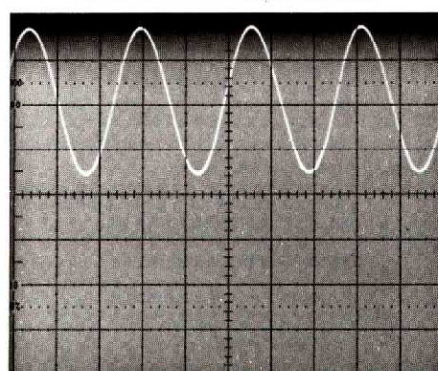


Figure 6. The average dc or true ac RMS component of a waveform is measured directly through channel 1 or from the floating DMM input.

Continuity Measurement

Resistances > 5 Ω, the message "OPEN" is displayed. < 5 Ω, a tone is generated and the message "SHORT" is displayed.

Operator Prompting

no b tr, 9
no DELTA

Figure 7. Error messages and prompts make counter/timer/DMM measurements easier.

Diode Detection and Test

Fd .654

Figure 8. Automatic junction detection during normal resistance measurements first displays "DIODE" and then the forward voltage drop to 1%.

Extended Range Resistance Measurement

191 9

Figure 9. 0 Ω (with 0.01 Ω resolution) to 1.99 GΩ, to find hard-to-trace problems like leaky caps or bad transformers.

Temperature Measurement

23.2 °C

With optional P6602 Probe: From -62°C to +230°C (-80°F to +446°F); resolution to 0.1° (either range).

Microprocessor Diagnostics

SELF - TEST

Automatic power-up and user-interactive diagnostic routines simplify CTM service.

Accurate Time Measurement

Time base error only 10 ppm (0.001%) standard, and only 0.5 ppm (0.00005%) with optional temperature compensated crystal oscillator.

Measurement Ease and Accuracy

See the measurement you make on the CRT, read the result with digital accuracy on the 9-digit display.

For further information and characteristics, see page 297.



2236 Counter/Timer/Multimeter

CHARACTERISTICS

The following characteristics are unique to the 2236.

Time Base Accuracy — Standard: 10 ppm (0.001%). With Option 14 TCXO: 0.5 ppm (0.00005%).

Frequency — Range: ≤ 0.2 Hz to ≥ 100 MHz. Maximum Resolution: 0.00001 Hz. Maximum Accuracy: Equal to time base accuracy. Can be gated.*1*2

Period — Range: ≥ 5 s to ≤ 10 ns. Maximum Resolution: 10 ps. Maximum Accuracy: Equal to time base accuracy. Can be gated.*1*2

Width — Range: ≥ 5 s to ≤ 5 ns. Maximum Resolution: 10 ps. Maximum Accuracy: Equal to time base accuracy ± 10 ns. Can be gated.*1*2

Delay Time — Range: ≥ 2.5 s to ≤ 500 ns. Maximum Resolution: 10 ps. Maximum Accuracy: Equal to time base accuracy ± 20 ns.*2

Δ Time — Range: ≥ 2.5 s to ≤ 1 ns. Maximum Resolution: 10 ps. Maximum Accuracy: Equal to time base accuracy ± 50 ps.*2

Totalize — Over 8,000,000 events. Can be gated.

Dc Volts — Range: 0 V to 500 V. Maximum Resolution: 100 μ V. Accuracy: $\pm 0.1\%$. Input: Through side DMM leads.*2

RMS Ac Volts — Ac Coupled: True RMS with 20 Hz to 20 kHz frequency range. Range: 0 V to 350 V. Maximum Resolution: 100 μ V. Accuracy: $\pm 1.0\%$. Input: Through side DMM leads.*2

CH 1 Volts — Measures average dc voltage (with CH 1 dc coupling) or true RMS voltage (with CH 1 ac coupling); 1X/10X ranged by coded probes: Single Sweep button zeros display and permits relative dc and ac RMS measurements. Range, Dc and Ac Volts: 0 V to 50 V (500 V dc/350 V ac with P6121 10X Probe). Maximum Resolution, Dc and Ac Volts: 100 μ V (1 mV with P6121). Maximum Accuracy, Dc Volts (18°C to 28°C): $\pm 0.3\%$ with 1X probe, $\pm 0.5\%$ with 10X probe. Maximum Accuracy, Ac Volts with 1X probe (18°C to 28°C): $\pm 2\%$, 50 Hz to 100 Hz, $\pm 1\%$, 100 Hz to 20 kHz. Maximum Accuracy, Ac Volts with 10X Probe: $\pm 2\%$, 20 Hz to 20 kHz, with proper probe compensation.*2

Resistance — Range: 0 Ω to 1.99 G Ω . Maximum Resolution: 0.01 Ω . Accuracy: To 0.15%. Automatic

diode detection displays forward voltage drop to $\pm 1\%$; continuity mode activates tone if resistance is $< 5 \Omega$.*2

Temperature — Uses Optional Tektronix P6602 Temperature Probe. Temperatures in C or F selected with Freq/ Δ Time button. Range: -62°C to $+230^\circ\text{C}$ (-80°F to $+446^\circ\text{F}$). Resolution: To 0.1° (either range). Accuracy: To $\pm 2\%$ of reading $\pm 1.5^\circ\text{C}$; $\pm 2\%$ of reading $\pm 2.70^\circ\text{F}$.

Multimeter Inputs — Isolated from oscilloscope ground. Input Z: 10 M Ω . Maximum Input Voltage: 500 V (dc + peak ac), for all functions.

*1 Ranges, resolutions, and accuracies can be degraded due to gating errors and a smaller number of automatic averages made during a gated frequency, period, or width measurement. For complete formula specifications see operator's manual.

*2 For complete accuracy and resolution error formula specifications see operator's manual.

ORDERING INFORMATION

2236 Oscilloscope With Counter/Timer/Multimeter **\$2,650**

Includes: Two P6122 10X voltage probes; DMM leads; reference guide; operator manual (070-4205-00).

2235 Oscilloscope **\$1,575**

Includes: Two P6122 10X voltage probes; operator manual (070-4207-00).

2235 Option 01 Oscilloscope (AN/USM-488) Order 2235L **\$1,995**

Includes: Two P6122 10X Voltage Probes; P6101A 1X Voltage Probe; viewing hood (016-0566-00); BNC T-connector; BNC male to binding post; front panel cover; accessory pouch; two grabber tips; operator manual (070-4976-00); service manual (070-4977-00).

OPTIONS

Option 02 — (2235, 2236 only) Front panel cover and accessory pouch. **+\$47**

Option 14 — (2236 only) TCXO Temperature-Compensated Crystal Oscillator, 0.5 ppm accuracy. **+\$295**

Option 33 — (2235, 2236 only) Travel Line Package. See page 305. **+\$200**

CONVERSION KITS

Rackmount Adaptor — See page 305
(2235) Order 016-0466-00 **\$115**
(2235 Option 01) Order 016-0833-00 **\$170**
(2236) Order 016-0015-00 **\$255**

Travel Line Package Retrofit Kit — See page 305.

TCXO Retrofit Kit — (2236 only) Temperature compensated crystal oscillator, 0.5 ppm accuracy. Order 040-1136-00 **\$365**

INTERNATIONAL POWER PLUG OPTIONS

Option A1 — Universal Euro 220 V, 50 Hz. Order 020-0859-00.

Option A2 — UK 240 V, 50 Hz. Order 020-0860-00.

Option A3 — Australian 240 V, 50 Hz. Order 020-0861-00.

Option A4 — North American 240 V, 60 Hz. Order 020-0862-00.

Option A5 — Switzerland 220 V, 50 Hz. Order 020-0863-00.

WARRANTY-PLUS SERVICE PLANS

SEE PAGE 497

M1 — (2235/2236 Option 01) 2 Calibrations. **+\$135**

M1 — (2236) 2 Calibrations. **+\$160**

M2 — (2235/2236 Option 01) + 2 Years Service. **+\$125**

M2 — (2236) + 2 Years Service. **+\$150**

M3 — (2235/2236 Option 01) 2 Years Service & 4 Calibrations. **+\$380**

M3 — (2236) 2 Years Service & 4 Calibrations. **+\$450**

M4 — (2235/2236 Option 01) 5 Calibrations. **+\$385**

M4 — (2236) 5 Calibrations. **+\$425**

M5 — (2235/2236 Option 01) 9 Calibrations + 2 Years Service. **+\$805**

M5 — (2236) 9 Calibrations + 2 Years Service. **+\$900**

OPTIONAL ACCESSORIES

Front Panel Cover and Accessory Pouch*1 — Order 020-0672-02 **\$55**

Front Panel Cover*1 — Order 200-2520-00 **\$6.25**

Accessory Pouch*1 — Order 016-0677-02 **\$48**

Viewing Hoods —

(Collapsible) Order 016-0592-00 **\$14**

(Binocular) Order 016-0566-00*1 **\$18.75**

(Polarized) Order 016-0180-00 **\$60**

Carrying Strap — Order 346-0199-00 **\$17**

Carrying Case — Order 016-0792-01*2 **\$355**

Rackmount Adaptor Kits —

(2235) Order 016-0466-00 **\$115**

(2235 Option 01) Order 016-0833-00 **\$170**

(2236) Order 016-0015-00 **\$255**

CRT Light Filter —

(Clear*1) Order 337-2775-01 **\$1.95**

(Blue) Order 337-2775-00 **\$3.75**

1107 Mounting Kit — Order 016-0785-00 **\$50**

1107 DC Inverter — See page 307. **\$525**

1106 Battery Pack — See page 306. **\$1,265**

1105 Power Supply — See page 306. **\$1,690**

RECOMMENDED PROBES

See Probe Section for additional probes, page 464.

P6121 — 10X Probe. **\$100**

P6122 — 10X Probe. **\$58**

P6420 — DMM RF. **\$145**

40 kV DMM — Order 010-0277-00 **\$180**

P6602 Temperature Probe — For use with 2236 CTM. **\$225**

A6901 Ground Isolation Monitor — See page 478. **\$650**

A6902B Voltage Isolator — See page 479. **\$1,795**

RECOMMENDED CAMERAS

C-5C — See page 450.

(2235 Option 01) C-5C Option 02 **\$465**

(2235, 2236) C-5C Option 04 **\$495**

C-7 — See page 448.

(2235, 2236) C-7 Option 02 **\$595**

(2235 Option 01) Option 03 **\$565**

C-4 — (2235 Option 01) See page 446. **\$370**

RECOMMENDED CART

K212 — For on-site mobility. See page 461. **\$330**

SERVICE MANUALS

(2235) Order 070-4206-00 **\$25**

(2236) Order 070-4204-00 **\$25**

*1 Standard with the 2235 Option 01 (AN/USM-488).

*2 Recommend use with front panel cover (200-2520-00).

PORTABLE OSCILLOSCOPES

