



The 496P complies with IEEE Standard 488-1978, and with Tektronix *Standard Codes and Formats*.

496 **496P** GPIB IEEE-488

Microprocessor Aided Controls

Automatic Modes

Portable Form Factor (Compact Size/Light Weight)

1 kHz to 1800 MHz Coverage

Amplitude Comparison in 0.25 dB Steps

1 kHz Frequency Resolution in ΔF Mode

CRT Readout of all Important Parameters

Fully Calibrated in Amplitude and Frequency

80 dB Dynamic Range

GPIB/Fully Programmable (496P)

Three-knob Operation

Environmentalized per MIL-T 28800B

Digital Storage and Signal Processing

The 496 provides high performance spectrum analysis and measurements in the 1 kHz to 1.8 GHz range. Its high stability and 80 dB dynamic range meet your demands for proof-of-performance measurements, on site or on the bench.

The 496 offers state of the art performance and rugged portability. Resolution bandwidth can be varied from 1 MHz to 30 Hz over the entire frequency range. Automatic phase lock stabilization reduces incidental FM to 10 Hz p-p; phase noise sidebands are at least -75 dBc at 30 times the resolution offset. Frequency drift with phase lock is typically 1 kHz in 10 minutes after 30 minute warmup. And the 496 provides 1 kHz frequency resolution in ΔF mode.

Easy to use. Anywhere.

Simple 1,2,3 knob adjustment sets center frequency, frequency span and reference level. Power on sequence automatically normalizes operational settings and provides maximum input protection.

Digital storage eliminates time-consuming display adjustments. SAVE A, B MINUS SAVE A, MAX HOLD and AVERAGE modes let you compare, subtract, save maximum values or noise average (smooth) your spectral displays. Constant tuning rate lets you position the signal quickly and accurately at any frequency span.

Microprocessor-aided controls take care of the rest. Most-used functions are automatically controlled.

The 496 Goes Where You Go

Light weight and compact size combine to provide unmatched portability in a laboratory quality spectrum analyzer. With its single-handle carry, the 496 is easily moved around the design lab or systems test area, to the field, or wherever it may be needed.

It even fits under an airplane seat.

Automate your Spectrum Analysis with the 496P

The 496P is the fully programmable/GPIB compatible version of the 496 Spectrum Analyzer. Operation, features and benefits of the 496P are essentially the same as the 492P. See discussion on pages 201 and 202. 496 Spectrum Analyzer specifications also apply to the 496P.

The Tektronix 4932 GPIB Extender provides a cost-effective way to interconnect remotely located GPIB instruments, allowing communication at distances of up to 500 meters (1650 feet). See page 26 for additional information.

Manual instruments can be converted to programmable instruments at a later time. Contact your Tektronix Sales Engineer for details.

CHARACTERISTICS

The following characteristics and features apply to the 496/496P Spectrum Analyzers after a 30-minute warm up period unless otherwise noted.

FREQUENCY RELATED

Center Frequency Range — 1 kHz to 1800 MHz.

Frequency Accuracy — ± 5 MHz $+20\%$ of span/div**.

***Frequency Readout Resolution** — Within 1 MHz. 496P TUNE Command Accuracy (Span/div ≤ 50 kHz) — $\pm 7\%$ or ± 100 Hz, whichever is greater.

***Delta Frequency Readout Accuracy (Span/Div ≤ 50 kHz)** — $\pm 5\%$ of the Delta Frequency Readout.

Residual FM (short term), Phase Lock ON — ≤ 10 Hz p-p over 20 ms.

Residual FM (short term), Phase Lock OFF — ≤ 1 kHz p-p over 20 ms.

Long Term Drift (at constant temperature and fixed center frequency) — Phase Lock ON ≤ 3.3 kHz/10 minutes. Phase Lock OFF ≤ 33 kHz/10 minutes.**

Resolution Bandwidth (-6 dB) — 30 Hz, then 100 Hz to 1 MHz in decade steps, plus an AUTO position. Resolution bandwidth is within 20% of selected bandwidth.

Resolution Shape Factor (60 dB/6 dB) — 7.5:1 or less. 15:1 or less for 30 Hz Resolution Bandwidth.

Noise Sidebands — At least 75 dBc at 30 times the Resolution Bandwidth offset from the Center Frequency (70 dBc for 100 Hz Resolution Bandwidth or less).

Frequency Span/Div Range — From 50 Hz/div to 100 MHz/div in a 1-2-5 sequence.

Maximum Span — When selected, the entire effective frequency range is scanned and displayed.

Zero Span — When selected, the horizontal axis of the CRT is calibrated in time (instead of frequency). The span/div readout is changed to time/div.

Frequency Span/Div Accuracy — Within 5% of the selected span/div over the center eight divisions of the ten-division CRT display.

** ΔF mode provides measurements to the nearest kHz plus direct center frequency readout to the nearest kHz between 1 kHz and 500 kHz.*

***After 2 hour warmup.*

AMPLITUDE RELATED

Reference Level Range (full screen, top of graticule) — -123 dBm to +40 dBm (+40 dBm includes maximum safe input of +30 dBm and 10 dB of IF gain reduction) for 10 dB/div and 2 dB/div LOG modes. 20 nV/div to 2 V/div (1 W maximum safe input) in LIN mode.

Reference Level Steps — 10 dB, 1 dB, and 0.25 dB for differential (Δ) measurements in LOG mode. 1-2-5 sequence and 1 dB equivalent increments in LIN mode.

Reference Level Accuracy — Accuracy is a function of changes in RF attenuation, Resolution Bandwidth, Display Mode and Reference Level. See amplitude accuracies of these functions. The RF attenuator steps 10 dB for reference level changes above -30 dBm (-20 dBm when Minimum Noise is active) unless Minimum RF attenuation is greater than normal. The IF gain increases 10 dB for each 10 dB Reference Level change below -30 dBm (-20 dBm when Minimum Noise is active).

Display Dynamic Range — 80 dB at 10 dB/div, 16 dB at 2 dB/div, and 8 divisions in LIN mode.

Display Amplitude Accuracy — ± 1.0 dB/10 dB to a maximum cumulative error of ± 2.0 dB over the 80 dB window and ± 0.4 dB/2 dB to a maximum cumulative error of ± 1.0 dB over the 16 dB window. LIN mode is 5% of full scale.

Differential Amplitude — Delta A mode provides differential measurement in 0.25 dB increments.

Display Flatness — ± 1.5 dB, 1 kHz to 1800 MHz measured with ≥ 10 dB RF attenuation.

Sensitivity

| Resolution Bandwidth | Average Noise Level |
|----------------------|---------------------|
| 30 Hz | -126 dBm |
| 100 Hz | -123 dBm |
| 1 kHz | -115 dBm |
| 10 kHz | -105 dBm |
| 100 kHz | -95 dBm |
| 1 MHz | -85 dBm |

SURIOUS RESPONSE

Residual (no input signal) — -100 dBm or less referenced to mixer input.

Third-Order Intermodulation Distortion (Minimum Distortion mode) — At least -70 dBc below any two on-screen signals within any frequency span.

Harmonic Distortion (cw signal, Minimum Distortion mode) — At least -60 dBc for a full-screen signal.

Zero Frequency Spur (referenced to input mixer) — 20 dBm or less.

LO Emissions (referenced to input mixer) — -70 dBm maximum.

INPUT SIGNAL CHARACTERISTICS

RF Input — Type N female connector.

Input Impedance — 50 Ω ; vswr 1.3 maximum (1.2 typical) with 10 dB or more RF attenuation.

Input Level (optimum level for linear operation) — -30 dBm referred to input mixer. Full screen not exceeded and MIN DISTORTION control setting.

1 dB Compression Point — -18 dBm, no RF attenuation.

Maximum Input Level (RF attenuation at 0 dB) — +30 dBm.

Maximum Input Level (with 20 dB or more RF attenuation) — +30 dBm (1 W) continuous 75 W peak, pulse width 1 μ s or less with a maximum duty factor of 0.001 (attenuation limit). Dc must never be applied to RF input.

OUTPUT SIGNAL CHARACTERISTICS

Calibrator (Cal Out) — -20 dBm ± 0.3 dB at 100 MHz ± 1.7 kHz.

1st and 2nd LO — Provides access to the output of the respective local oscillators (1st LO +7.5 dBm minimum to a maximum of +15 dBm, 2nd LO -16 dBm minimum to a maximum of +15 dBm). These ports must be terminated in 50 Ω at all times.

Vertical Out — Provides 0.5 V $\pm 5\%$ of signal per division of video above and below the centerline.

Horizontal Out — Provides 0.5 V either side of center. Full range -2.5 V to +2.5 V $\pm 10\%$.

Pen Lift — TTL compatible, nominal +5 V to lift pen.

IF Out — Output of the 10 MHz IF. Level is ≈ -16 dBm for a full screen signal at -30 dBm input reference level. Nominal impedance 50 Ω .

496P Only: IEEE Standard 488-1978 Port (GPIB) — In accordance with IEEE Standard 488.

Probe Power — Provides operating voltages (+5 V, +15 V, -15 V, and ground) for active probes.

GENERAL CHARACTERISTICS

Sweep Time — 20 μ s/div to 5 s/div in 1-2-5 sequence (10 s/div in Auto).

CRT Readout — Displays: Reference Level, Frequency, Frequency Span/div, Vertical Display, RF attenuation, and Resolution Bandwidth.

CRT — 8 x 10 cm. P31 Phosphor.

Configuration — Portable, 20 kg (44 lb), 17.5 x 32.7 x 49.9 cm (6.9 x 12.9 x 19.7 in) without handle or cover.

Input Voltage — 90 to 132 V ac or 180 to 250 V ac, 48 to 440 Hz.

Power — 210 W maximum, 3.2 A, at 115 V and 60 Hz.

Environmental Characteristics — Per MIL-T-28800B, Type III, Class 3, Style C.

INCLUDED ACCESSORIES

Power cord, 115-V (161-0118-00); 50 Ω coaxial cable, N to N connectors, 6 ft (012-0114-00); 50 Ω coaxial cable, BNC to BNC connectors, 18 in (012-0076-00); adaptor, N male to BNC female (103-0045-00); cord clamp (343-0170-00); fuse 4 A fast blow (2) (159-0017-00); fuse 2 A, fast blow (159-0021-00); CRT visor (016-0653-00); CRT mesh filter (378-0726-01); CRT light filter, blue (378-0115-00); CRT light filter, amber (378-0115-01); CRT light filter, gray (378-0115-02); 496P also includes GPIB cable, 2 meter, double shield (012-0630-03).

ORDERING INFORMATION

496 Spectrum Analyzer \$22,950

496P Fully Programmable/GPIB

Spectrum Analyzer \$26,950

496 to 496P Conversion (040-1046-02) — Conversions made by your Tektronix Service Center. Contact your Spectrum Analyzer Sales Engineer or Service Center for details.

Option 30 — Rackmount 19 inch rack width with front panel input/outputs +\$790

Option 31 — Rackmount 19 inch rack width with rear panel input/output capability +\$840

Option 32 — Benchmark adds side and top panels, carrying handles and feet for a stackable benchtop configuration +\$940

INTERNATIONAL POWER CORDS & PLUG OPTIONS

Option A1 — Universal Euro 220 V/16A, 50 Hz NC

Option A2 — UK 240 V/13A, 50 Hz NC

Option A3 — Australian 240 V/10A, 50 Hz NC

Option A4 — North American 240 V/15A, 60 Hz NC

Option A5 — Switzerland 250 V/10A, 50 Hz NC

PERIPHERAL PRODUCTS FOR

496P SPECTRUM ANALYZER

4041 System Controller \$4,995

4052A Graphic Computing System Controller \$9,900

4611 Hard Copy Unit \$4,550

4631 Hard Copy Unit \$5,950

4662 Interactive Digital Plotter \$4,800

4924 Digital Cartridge Tape Drive \$2,990

4932 GPIB Extender \$1,195

OPTIONAL ACCESSORIES

75 Ω to 50 Ω Minimum Loss Attenuator

Order 011-0112-00 \$60

Dc Block BNC to BNC Order 015-0221-00 \$85

P6201 FET Probe to 900 MHz Order 010-6201-01 \$1,090

1405 TV Sideband Adapter (525/60 Markers) \$5,460

For more information on the 1405 see page 213.

TR 503 Tracking Generator \$6,400

For more information on the TR 503 see page 212.

C-5C Camera \$525

TV Trigger Synchronizer Order 015-0261-01 \$330

Hard Case (transit) Order 016-0658-00 \$625

Soft Case Order 016-0659-00 \$125

Lab Cart Model 3 \$525

Note: The 490 Series spectrum analyzers are compatible with all Tektronix C-50 Series cameras. Battery pack 016-0270-02 is required for C-50, C-51, C-52 and C-53 Cameras.