Compact, Light Weight

Internal Phase Lock

Calibrated Dispersion to 100 MHz

Coupled Resolution

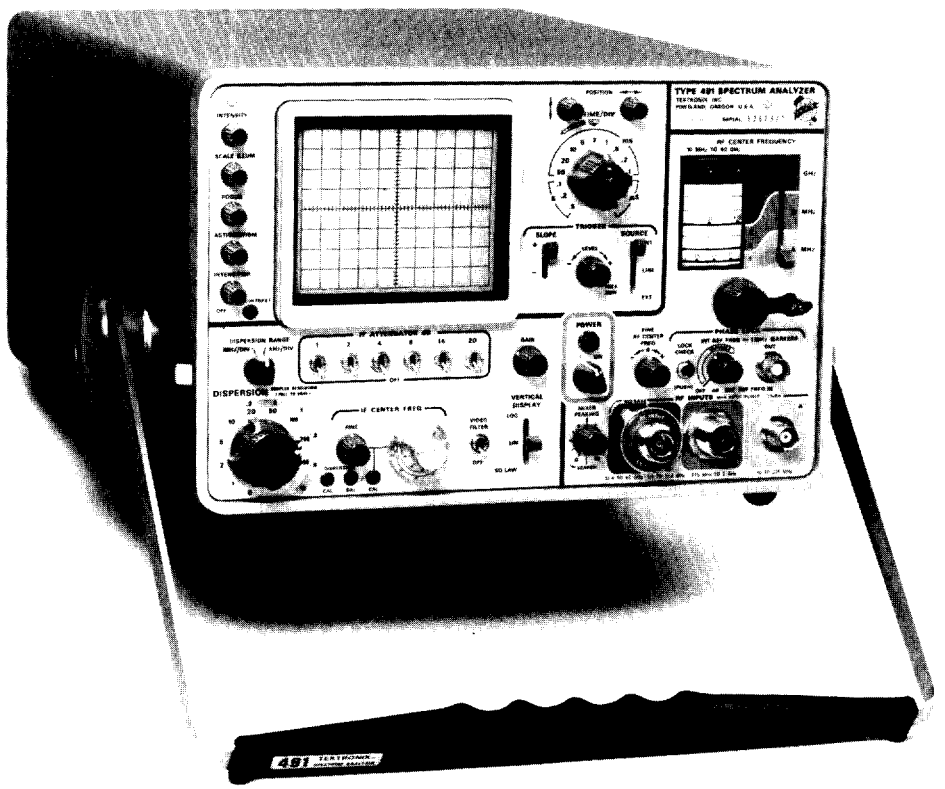
Wide-Range Time Base

Low Power Consumption

Environmentalized

All Solid-State

Battery Power Supply Available



The 491 is a precision, wide-band spectrum analyzer designed for rugged environmental conditions and easy mobility. It is an easy-to-carry package weighing less than 40 pounds complete with accessories. The R491 is electrically identical, requires only 7 inches of rack height.

Operation is simple. Resolution and calibrated dispersion controls are coupled, providing narrow resolution bandwidth at narrow dispersion and wide resolution bandwidth at wide dispersion. Since dispersion is calibrated, frequency differences can be read directly from the crt. Internal phase lock provides stable displays even at 1 kHz/div dispersion.

Two modified instruments are available for applications which do not require the full center frequency range (10 MHz to 40 GHz) of the 491. These are the Option 1, (10 MHz to 2000 MHz) and the Option 2 (1.5 GHz to 40 GHz). Specifications for the Option 1 and Option 2 are the same as for the 491 except where noted.

Each instrument is completely self-contained, has oscilloscope-type time base and trigger circuits, 8 x 10-div crt with P7 phosphor and internal graticule. They operate over a wide range of ac voltages, require only 55 W, maximum.

Operation, independent of ac power source, is made possible by the new 1105 Battery Power Supply.

BAND	FREQUENCY RANGE	MINIMUM CW SENSITIVITY* 1-kHz RESOLUTION	100-kHz RESOLUTION
1	10 MHz to 275 MHz	≥ —100 dBm	≥ —80 dBm
2	275 MHz to 900 MHz	≥ —110 dBm	≥ —90 dBm
3	800 MHz to 2000 MHz	≥ —105 dBm	≥ —85 dBm
4	1.5 GHz to 4.0 GHz	≥ —110 dBm	≥ —90 dBm
5	3.8 GHz to 8.2 GHz	≥ —100 dBm	≥ —80 dBm
6	8.2 GHz to 12.4 GHz	≥ —95 dBm	≥ —75 dBm
7	12.4 GHz to 18.0 GHz	≥ —90 dBm	≥ —70 dBm
8	18.0 GHz to 40 GHz	≥ —80 dBm to 26.5 GHz ≥ —70 dBm to 40 GHz	≥ —60 dBm ≥ —50 dBm

*Signal + noise = 2X noise

Bands 1-8 are covered in the 491.

Bands 1-3 are available in Option 1.

Bands 4-8 only are available in Option 2, bands 4-6 directly, bands 7-8 using optional accessories.

CHARACTERISTICS

Dial Accuracy— ±(2 MHz + 1% of dial reading).

Calibrated Dispersion— 1 kHz/div to 10 MHz/div in 1-2-5 sequence, 2 ranges (kHz/div and MHz/div). Accuracy throughout full range of rf-center frequency control, within ±3% except at 2 MHz/div (±5%) and 1 MHz/div (±7%). Accuracy can be increased using internal 1-MHz crystal markers for calibration. Dispersion linearity within ±3%. Zero dispersion useful for prf measurements.

Coupled Resolution— 1 kHz to 100 kHz, coupled with calibrated dispersion positions but separately switchable.

Display Flatness—Maximum amplitude variation over 100-MHz dispersions up to 12.4 GHz is 3-dB or less, except over 50-MHz dispersion in Band 1. Above 12.4 GHz the maximum amplitude variation (100-MHz dispersion) is 6-dB or less.

Incidental FM—Less than 300 Hz at fundamental, with Phase Lock.

Frequency Stability—kHz/div dispersion range— ±10 kHz throughout line voltage range after 1 minute; ±5 kHz/°C. MHz/div dispersion range— ±200 kHz throughout line voltage range after 1 minute; ±20 kHz/°C.

Phase Lock—Internal 1-MHz reference. External input accepts 1-MHz to 5-MHz signals from 1 V to 5 V peak to peak.

Input Impedance—Approx 50 Ω for coaxial inputs.

Maximum Input Power— +30 dBm for linear operation, +15 dBm (25 mW) safe diode power limit.

IF Attenuator— 51 dB in 1-dB steps, ±0.1 dB/dB.

IF Gain Control— >50-dB range.

IF Center Frequency— ±25 MHz adjustment of center frequency from 5 MHz/div to 0.2 MHz/div dispersion positions, ±10-MHz adjustment at 10 MHz/div, ±2.5-MHz adjustment from 500 kHz/div to 1 kHz/div dispersion positions.

Vertical Display (8 Divisions)—Log — ≥40-dB dynamic range. Linear. Square Law— ≥13-dB dynamic range.

HORIZONTAL DEFLECTION

Internal Sawtooth Generator— 10 μs/div to 0.5 s/div in 15 calibrated steps (1-2-5 sequence). Uncalibrated continuously variable between steps and to approx 1.25 s/div.

Trigger Source—Internal, external, or line. 100-V maximum external input (dc + peak ac).

Trigger Requirements— 0.2-div deflection or 0.2-V external from 20 Hz to 100 kHz.

CRT AND DISPLAY FEATURES

Crt— 8 x 10-div display area (each div = 0.8 cm); P7 phosphor.

Graticule—Internal, no parallax, variable edge lighting.

Display Features—Intensity, focus and astigmatism controls. Intensifier adjusts relative brightness of signal and baseline for convenient viewing and photography.

ENVIRONMENTAL CAPABILITIES

Electromagnetic Interference—Meets specifications of MIL-I-6181D over the following frequency ranges: Radiated (with included crt mesh fitler installed) is 150 kHz to 1 GHz; conducted (power line) is 150 kHz to 25 MHz.

Temperature—Operating: −15° C to +55°C. Nonoperating: −55° C to +75° C.

Altitude—Operating: 15,000 feet. Nonoperating: 50,000 feet.

Humidity—Operating and storage: 5 cycles (120 hours) to 95% relative humidity referenced to MIL-E-16400F (Paragraph 4.5.9 through 4.5.9.5.1, Class 4).

Vibration—Operating: 15 minutes along each of the three axes, 0.025 inch peak to peak displacement (4 g's at 55 c/s) 10 to 55 to 10 c/s in 1-minute cycles.

Shock—Operating and nonoperating: 30 g's, ½ sine, 11-ms duration, 1 shock per axis.

OTHER CHARACTERISTICS

Power Requirements— 90 to 136 V ac or 180 to 272 V ac, 48 to 440 Hz; 55 watts maximum. Rear panel selector provides rapid accommodation for six line-voltage ranges.

Rear Panel Connectors—BNC connectors for external trigger input, sawtooth output (70 to 90 mV p to p) and recorder output (≥4 mV/div of displayed signal in LIN mode, dc-coupled, approx 600-Ω source resistance).

Cabinet Model Dimensions and Weights

Height	≈7 in	18.2 cm
Width	≈12 in	31.6 cm
Depth (incl. panel cover)	≈20 in	50.0 cm
Depth (with handle extended)	≈22 in	54.7 cm
Net weight (w/o panel cover)	30 lb	13.6 kg
Weight (with panel cover and accessories)	38 lb	17.3 kg
Shipping weight	48 lb	21.7 kg

Rack Model Dimensions and Weights

Height	7 in	17.8 cm
Width	19 in	48.3 cm
Rack depth	17.5 in	44.4 cm
Net weight	41 lb	18.6 kg
Shipping weight	69 lb	31.3 kg

Included Standard Accessories— 6-ft BNC cable, 50-Ω miniature coax (012-0113-00); 6-ft N cable, RG 223/U coax (012-0114-00); 2-ft TNC cable, RG 223/U coax (012-0115-00); wave guide mixer, 12.4 to 18 GHz (119-0097-00); wave guide mixer, 18 to 26.5 GHz (119-0098-00); wave guide mixer, 26.5 to 40 GHz (119-0099-00); 10-dB attenuator, Type N fittings (011-0085-00); 20-dB attenuator, Type N fittings (011-0086-00); 40-dB attenuator, Type N fittings (011-0087-00); two BNC male and N female adapters (103-0058-00); two BNC female to N male adapters (103-0045-00); wave guide mixer adapter (119-0104-00); power cable (161-0024-03); protective cover (016-0074-01); blue light filter (378-0558-00); amber light filter (378-0559-00); clear crt protector plate (386-0118-00); ornamental ring (354-0248-00); two one-ampere fuses (159-0022-00); ½-ampere fuse (159-0025-00); front cover (200-0633-03); instruction manual (070-0598-01). The R491 includes all above accessories except the front cover and protective cover, also includes slide-out assembly and hardware.

ORDERING INFORMATION

491 Spectrum Analyzer **$5195**
R491 Spectrum Analyzer (rackmount) **$5295**
Option 1 (10 MHz to 2 GHz) ..... **Subtract $1395**
Option 2 (1.5 GHz to 40 GHz) ..... **Subtract $1195**
1105 Battery Power Supply **$525**

See index for the location and full description of the 1105.

491 OPTION 1

The 491 Option 1 has a center frequency range of 10 MHz to 2000 MHz. The chart on the first page defines the Frequency Range and Minimum CW Sensitivity (S + N = 2N) of the option. The appearance is the same as that of the 491 with the following exceptions: the C-band input is removed and the center frequency range dial is changed to reflect the reduction in the number of frequency bands.

Included Standard Accessories (491 Option 1 Only)— 6-ft BNC cable, 50-Ω miniature coax (012-0113-00); 6-ft N cable, RG 223/U coax (012-0114-00); power cable (161-0024-03); protective cover (016-0074-01); blue light filter (378-0558-00); amber light filter (378-0559-00); two 1-ampere fuses (159-0022-00); ½-ampere fuse (159-0025-00); front cover (200-0633-03); ornamental ring (354-0248-00); clear crt protector plate (386-0118-00); and special instruction manual.

The R491 Option 1 also includes slide-out assembly (351-0101-00) and hardware (016-0096-00). The front cover and protective cover are deleted.

491 OPTION 2

The 491 Option 2 has a center frequency range of 1.5 GHz to 40 GHz with optional accessories. The chart on the first page defines the Frequency Range and Minimum CW Sensitivity (S + N = 2N). The appearance is the same as that of the 491 with the following exceptions: the A and B band inputs are removed and the center frequency range dial is changed to reflect the reduction in the number of frequency bands.

Included Standard Accessories (491 Option 2 Only)—6-ft N cable, RG 223/U coax (012-0114-00); power cable (161-0024-03); protective cover (016-0074-01); blue light filter (378-0558-00); amber light filter (378-0559-00); two 1-ampere fuses (159-0022-00); ½-ampere fuse (159-0025-00); front cover (200-0633-03); ornamental ring (354-0248-00); clear crt protector plate 386-0118-00); and special instruction manual.

The R491 Option 2 also includes slide-out assembly (351-0101-00) and hardware (016-0096-00). The front cover and protective cover are deleted.

OPTIONAL ACCESSORIES FOR THE 491 OPTION 2

NOTE: These accessories are required to extend the frequency range of the Option 2 from 12.4 GHz to 40 GHz.

Cable, TNC, coaxial, 2 feet (012-0115-00) ..... **$ 11**
Waveguide mixer adapter (119-0104-00) ..... **$ 50**
Waveguide mixer 12.4-18.0 GHz (119-0097-00) ..... **$ 85**
Waveguide mixer 18.0-26.5 GHz (119-0098-00) ..... **$ 97**
Waveguide mixer 26.5-40.0 GHz (119-0099-00) **$150**

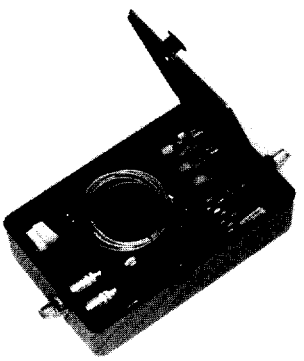
OPTIONAL ACCESSORIES FOR THE 491 OPTION 1 AND 2

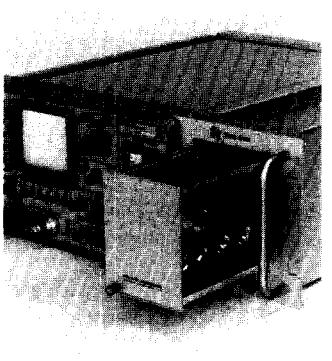
BNC male to N female adapter (103-0058-00) ..... **$ 5**
BNC female to N male adapter (103-0045-00) ..... **$ 5**
10-dB attenuator, Type N fittings (011-0085-00) **$55**
20-dB attenuator, Type N fittings (011-0086-00) **$55**
40-dB attenuator, Type N fittings (011-0087-00) **$65**

CONVERSION KITS

Portable To Rack-Model—Kit includes hardware and instructions to convert the 491 Analyzers for rack installations.
Order 040-0444-00 ..... **$165**

Rack Model To Portable—Kit includes cabinet, panel cover, oscilloscope cover, and instructions to convert the R491 Analyzers for portable operation.
Order 040-0445-00 ..... **$100**





Accessory Storage—Included panel cover for the 491 and drawer for the R491 hold all standard accessories except manual and protective cover.