

7L14 in 7603 mainframe with internal spectrum analyzer graticule.

## 7L14

**Excellent Stability, Resolution Bandwidth Range**

**Digital Storage and Averaging**

**Swept Measurements with the Tek TR 502**

**1 kHz to 2.5 GHz Coverage with Option 39**

**Input Limiter for Extra Input Protection**

**Semiautomatic Measurements with the Tek 7854**

The Tektronix 7L14 provides high performance spectrum analysis in the 10 kHz to 1.8 GHz range. Option 39 increases coverage to 1 kHz to 2.5 GHz. Option 23—deleting the built-in input limiter—results in 1 kHz to 1.8 GHz coverage.

7L14 capability translates to confidently making communications systems or EMC measurements. Check the 7L14's specifications to find out about its excellent resolution bandwidth range and filter shape factor, high stability, and spectral purity. Combined with the Tek TR 502 Tracking Generator, the 7L14 is the heart of a very stable scalar analysis system available at an affordable price. Check RF networks, filters, amplifiers, and more. . .see page 172 for details.

Digital storage helps you compare A and B displays; MAX HOLD captures maximum frequency excursions (as with a drifting oscillator) and max amplitudes, or short duration signals such as in spectrum occupancy monitoring. The 7L14 also features a built-in input limiter that protects the first mixer from overload—you can apply up to one watt to the 7L14.

Make semiautomatic measurements by using the Tek 7854 Digitizing Mainframe. This programmable unit's calculation and marker capabilities can greatly enhance your productivity using the 7L14 Spectrum Analyzer. The 7854 Mainframe can also be used with your choice of other Tek 7000 Series test and measurement plug-ins—versatility plus! Get full details from your Tek sales engineer or ask for Application Note Number 26W-5653.

### CHARACTERISTICS

The following characteristics and features apply to the 7L14 Spectrum Analyzer after a 20 minute warm-up period.

#### FREQUENCY RELATED

**Center Frequency Range** — 10 kHz to 1.8 GHz.

**Center Frequency Readout Resolution** — Within 1 MHz.

**Center Frequency Readout Accuracy** —  $\pm(5 \text{ MHz} + 20\% \text{ of frequency span/division})$ .

**Frequency Span/Division Range** — 200 Hz/div to 100 MHz/div in calibrated steps in a 1-2-5 sequence.

Accuracy: Within 5% of the span selected.

Linearity: Within 5% of the span selected.

Maximum Span: Provides 1.8 GHz of span.

Zero Span: Provides fixed frequency operation for time domain display.

**Resolution Bandwidth (6 dB)** — 30 Hz to 3 MHz, in decade steps.

Accuracy: Within  $\pm 20\%$  of the resolution selected.

**Resolution Shape Factor (60/6 dB)** — 4:1 or less for 3 MHz to 300 Hz; 12:1 or less for 30 Hz resolution.

**Signal Level Change Between Any Two Bandwidths** —  $\pm 0.5 \text{ dB}$  at room temperature.  $\pm 2.0 \text{ dB}$  maximum over operating temperature (net level at  $-30 \text{ dBm}$ ).

**Residual FM** — 13 Hz (p-p) when phase locked  $\pm 10 \text{ kHz}$  (p-p) for 20 ms when not phase locked.

**Stability** — At a fixed temperature after two-hour warmup;  $\pm 2 \text{ kHz/hour}$  phase locked;  $\pm 75 \text{ kHz/hour}$  not phase locked. Wait ten minutes/GHz of tuning when the frequency is changed to make frequency related measurements.

#### AMPLITUDE RELATED

##### Display Modes

Log 10 dB/Division: Provides 70 dB display dynamic range. Accuracy is within 0.15 dB/dB to 2 dB maximum over 70 dB dynamic range.

Log 2 dB/Division: Provides 14 dB display dynamic range. Accuracy is within  $\pm 0.4 \text{ dB}/2 \text{ dB}$  to 1.0 dB maximum over 14 dB dynamic range.

LIN: Within 10% over eight divisions. Deviation Between Display Modes (For Full Screen Signal):  $\pm 2 \text{ dB}$  from 2 dB/div to 10 dB/div, 0.5 div from 2 dB/div to LIN.

##### Reference Level

Below 100 kHz:  $+30 \text{ dBm}$  to  $-50 \text{ dBm}$ , as the center frequency approaches 10 kHz.

Above 100 kHz:  $+30 \text{ dBm}$  to  $-110 \text{ dBm}$  in 10 dB calibrated steps.

**Display Flatness** —  $\pm 1.5$  dB, with respect to 50 MHz, over any selected frequency span.

**Sensitivity** — At 50 MHz, applicable from 100 kHz to 1.8 GHz.

Resolution Bandwidth	Averaged Noise Level
30 Hz	-130 dBm
300 Hz	-120 dBm
3 kHz	-110 dBm
30 kHz	-100 dBm
300 kHz	-90 dBm
3 MHz	-80 dBm

#### SPURIOUS RESPONSES

**Residual** —  $< -100$  dBm (referenced to the first mixer input).

**Second Order Intermodulation Products** — 100 kHz to 1.8 GHz; down 70 dBc or more from two -40 dBm signals, within any frequency span.

**Third Order Intermodulation Products** — 100 kHz to 1.8 GHz; down 70 dBc or more from two -30 dBm signals, within any frequency span.

**RF Attenuator** — 60 dB range in 10 dB steps.

**Accuracy** —  $\pm (0.25 \text{ dB} + 1.2\% \text{ of dB reading})$ .

#### IF Gain

**Range** — 70 dB (80 dB when operating in 30 Hz resolution bandwidth).

**Step Accuracy** —  $\pm 1$  dB/10 dB step to  $\pm 2$  dB maximum over entire range.

#### GENERAL CHARACTERISTICS

**Noise Sidebands** — -70 dBc minimum at frequency offsets  $\geq 25\times$  resolution bandwidth settings.

**Sweep** — Triggered, manual, external.

**Sweep Time** — 10 s/div to 1  $\mu$ s/div in a 1-2-5 sequence.

**Accuracy** —  $\pm 5\%$  of selected Time/Division.

**Triggering Modes** — Internal, External, Ext in Horiz/Trig and Line.

**Sensitivity** —  $\pm 0.6$  div of internal signal (p-p) and/or  $\pm 0.6$  V (p-p) of external signal.

**Shipping Weight** — 10.8 kg (24 lb).

#### INPUT SIGNALS

**RF Input** — Maximum Input Power Level: +30 dBm. Maximum Input Power Level to the RF Attenuator  $\geq 10$  dB: 1 W average (including dc), 100 W peak simultaneously. Input Impedance: 50  $\Omega$ ; vswr 1.35 maximum with 10 dB of RF attenuation.

**External Horizontal/Trigger Input Connector** — Input Voltage Range: Typically 0 V to 10 V for 10 div sweep. Typically 0.5 V (p-p) to trigger the sweep circuits. 40 V peak maximum.

#### OUTPUT SIGNALS

**Calibrator** — (Cal Out) -30 dBm,  $\pm 0.3$  dB at 50 MHz,  $\pm 0.01\%$ .

**1st Lo Out, 2nd Lo Out, Swp Out and Video Output**

#### ENVIRONMENTAL

The 7L14 meets its electrical characteristics over the environmental limits per MIL-T-28800 Type III Class 6, Style E instruments. The 7L14 is operable over the limits of a MIL-T-28800 Class 5 instrument. The 7L14 is physically and electrically compatible with all Tektronix 7000 Series mainframes.

## Option 39

### Extended Frequency Range

Option 39 extends the 7L14's frequency range from 1 kHz to 2.5 GHz.

#### CHARACTERISTICS

##### FREQUENCY

**Range** — 1 kHz to 2.5 GHz.

**Center Frequency Accuracy** —  $\pm (5 \text{ MHz} + 0.5\% \text{ of center frequency} + 20\% \text{ of Span/Division setting})$ .

##### AMPLITUDE

**Display Flatness** —  $\pm 1.5$  for 10 kHz to 1.8 GHz, with respect to 50 MHz,  $+1.5$ ,  $-2.5$  for 1.8 GHz to 2.5 GHz.

##### SPURIOUS RESPONSES

**Residual** —  $\leq -95$  dBm to 2.5 MHz.  $\leq -100$  dBm for 2.5 MHz to 1.8 GHz.  $\leq -60$  dBm for 1.8 GHz to 2.5 GHz.

**Second Order Intermodulation Products** — Down 70 dB or more from two -40 dBm signals.

**Third Order Intermodulation Products** — Down 70 dB or more from two -30 dBm signals within any frequency span.

**IF Feed-Through** — At least 15 dB down at 2.095 GHz input.

**Images** — At least 10 dB down at 4.095 GHz to 6.795 GHz.

#### ORDERING INFORMATION

**7L14 Spectrum Analyzer** **\$18,060**

**Includes:** Spectrum analyzer graticule, 6 ft 50  $\Omega$  coax cable with BNC connectors (012-0113-00); BNC male to female adaptor (103-0058-00); light filter (378-0625-07); amber light filter (378-0684-01); clear plastic implosion shield with Log, Lin, Ref, and F (frequency) direction markings (337-1439-01), for 7603 oscilloscope and (337-1159-02) for other 7000 Series oscilloscopes, instruction manual (070-3434-00).

##### OPTIONS (7L14)

**Option 23** — Deletes input limiter. **+\$50**

**Option 39** — 1 kHz to 2.5 GHz Extended Frequency Range. **+\$500**

##### RECOMMENDED MAINFRAMES

**7603 Oscilloscope, 100 MHz.** (See page 201.) **\$3,250**

**R7603 Rackmount Oscilloscopes, 100 MHz.** (See page 201.) **\$3,720**

##### MAINFRAME OPTIONS (7603/R7603)

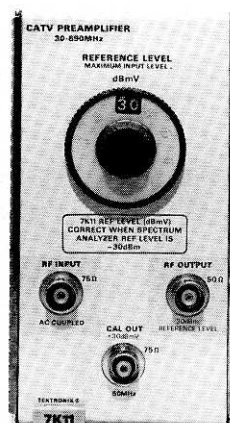
**Option 06** — Internal Spectrum Analyzer Graticule. **+\$50**

**Option 08** — Protective Front Cover. (Cabinet only.) **+\$115**

**Option 77** — GM (P7) Phosphor and Internal Spectrum Analyzer Graticule. **+\$100**

**7854 Digitizing Oscilloscope, 400 MHz.** (See page 318.) **\$15,830**

Tektronix offers service training classes on the 7L14 Spectrum Analyzer. For further training information, contact your local sales/service office or request a copy of the Tektronix Service Training Schedule on the return card in the center of this catalog.



## 7K11 CATV Preamplifier

**75  $\Omega$  Input Impedance and Calibration in dBmV**

**Extra Sensitivity for CATV and Field Intensity Measurements**

This 7000 Series plug-in preamplifier is for use with the 7L12 or 7L14 and tailored to CATV and field intensity measurement applications, where extra sensitivity is required for demanding measurements. The 7K11 handles 12 channels without overload.

The 7K11 provides a 75  $\Omega$  input impedance and calibration in dBmV. Its low noise figure makes it especially suitable for signal-to-noise and low-level radiation measurements.

#### CHARACTERISTICS

(with 7L12 or 7L14)

**Frequency Range** — 30 MHz to 890 MHz.

**Display Flatness** —  $\pm 1.0$  dB, with respect to the level at 50 MHz over the frequency range of 50 MHz to 300 MHz; increasing to  $+2.0$  dB,  $-2.5$  dB over the full frequency range.

**Sensitivity** — Signal + noise = 2X noise, in Lin mode at 50 MHz. -90 dBmV at 30 Hz, -80 dBmV at 300 Hz, -73 dBmV at 3 kHz, -65 dBmV at 30 kHz, -55 dBmV at 300 kHz, -45 dBmV at 3 MHz. Noise figure is  $\leq 5$  dB.

**Intermodulation Distortion** — 1md products and harmonics from two signals within the frequency range are 70 dB or more down from the reference level for third order intermodulation with two signals at the reference level (full screen).

**Reference Level** — Calibrated level in 1 dB steps from +79 dBmV to 0 dBmV. Accuracy is referenced to the +30 dBmV calibrator at 50 MHz.

**Input Impedance** — 75  $\Omega$ .

**Calibrator** — 50 MHz  $\pm 0.01\%$  with an absolute amplitude level of +30 dBmV  $\pm 0.3$  dB, from 75  $\Omega$ .

#### ORDERING INFORMATION

**7K11 CATV Preamplifier** **\$1,100**

**Includes:** 5.5 inch BNC to BNC 50  $\Omega$  cable (012-0214-00); BNC to F adaptor (013-0126-00); 42 inch BNC to BNC 75  $\Omega$  cable (012-0074-00); instruction manual (070-1664-00).