



The 7L5 makes accurate baseband communications measurements such as noise, spurious response, distortion, and transient interference, all with the certainty of 10 Hz resolution. The 7L5 Option 25 provides swept frequency measurements from 20 Hz to 5 MHz. The tracking generator is built into a "three-wide" 7L5 plug-in analyzer.

This highly capable audio/baseband analyzer finds a place in many areas of use, including baseband evaluation of FM broadcast and television stereo signals, measurement of communications system basebands, power line distortion, EMC/RFI, and computer systems.

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 7L5 Spectrum Analyzer. Specify 7L5 Option 12 for proper 7854 interface. Get full details from your Tek Sales Engineer or ask for Application Note 26W-5653.

7L5 Option 25 Spectrum Analyzer with L3 (50 Ω, 600 Ω, 1 MΩ) plug-in module in a 7603 Option 06 mainframe with internal spectrum analyzer graticule. The L3-1 module (shown at upper right) is switch selectable to 75 Ω, 600 Ω or 1 MΩ.

7L5

- Synthesizer Tuning
- Digital Storage and Averaging
- Three-Knob Operation
- Preset Reference Level and Dot Frequency for Extra Input Protection
- Swept Measurements (Option 25 Tracking Generator)
- Selectable Input Impedance; Calibration in dBm, dBV, or Volts/Division
- Semiautomatic Measurements With the Tek 7854

The Tektronix 7L5 is a high performance, high value spectrum analyzer providing easy-to-use low frequency measurement capability. The 7L5 can cover 20 Hz to 5 MHz in one display. Resolution bandwidth can be varied from 10 Hz to 30 kHz, with residual FM of no more than 1 Hz peak-to-peak.

Digital storage proves particularly useful in the 7L5. With digital averaging and

peak detection, you can accurately measure low level signals, such as intermodulation distortion products, in the presence of noise. With Max Hold, you can capture short duration signals and random transient phenomena that would otherwise be lost.

The 7L5 combines high performance with easy-to-use three-knob operation—

- 1) Set frequency span
- 2) Set center frequency
- 3) Set reference level... and measure!

Sweep speed and resolution bandwidth are set automatically.

Digital tuning and synthesizer stability let you set center frequency with six-digit accuracy immediately upon turn-on. Reference level can be set in 1 dB and 10 dB steps, eliminating the need to interpolate amplitude levels. And for measuring wide relative amplitude differences, the 7L5 offers 80 dB spurious-free display dynamic range.

CHARACTERISTICS

The following characteristics and features apply to the 7L5 Spectrum Analyzer after a warm-up period of ten minutes.

FREQUENCY RELATED

Center Frequency Range—Input Frequency Range: 20 Hz through 5.0 MHz. Dot Frequency Range: 0 Hz through 4999.75 kHz tuned in 10 kHz or 250 Hz steps. Accuracy at 0 to 50°C: $\pm(20 \text{ Hz} + 10^{-5} \text{ of dot frequency})$. 20 to 30°C: $\pm(5 \text{ Hz} + 2 \times 10^{-6} \text{ of dot frequency})$.

Frequency Span/Division Range—50 Hz/div to 500 kHz/div (maximum) in a 1-2-5 sequence. Accuracy: Within 5%. Linearity: Within 5% over the center eight divisions. Zero Span: Provides fixed frequency operation for time domain display.

Resolution Bandwidth (6 dB)—10 Hz to 30 kHz in eight steps. Coupled position electronically couples resolution to span/division selection so that both are controlled by the same knob. Accuracy: Within 20% of resolution selected (30 Hz to 30 kHz). 10 Hz is 100 Hz $\pm 20 \text{ Hz}$ 70 dB down.

Resolution Shape Factor (60/6 dB)—10:1 or better for 10 Hz to 1 kHz and 5:1 or better for 3 kHz to 30 kHz.

Signal Level Change Between Any Two Bandwidths—30 kHz to 100 Hz: ≤ 0.5 dB. 30 kHz to 10 Hz: ≤ 2.0 dB.

Residual FM— ≤ 1 Hz (p-p) for frequency span of 50 Hz/div to 2 kHz/div. ≤ 40 Hz (p-p) for frequency span of 5 kHz/div to 500 kHz/div.

Stability— ≤ 5 Hz/hour.

AMPLITUDE RELATED

Display Modes—Log 10 dB/Division: Provides 80 dB display dynamic range. Accuracy is within 0.08 dB/dB to 2 dB maximum over 80 dB display dynamic range. Log 2 dB/Division: Provides 16 dB display dynamic range. Accuracy is within 0.15 dB/dB to 1 dB maximum over 16 dB display dynamic range.

LIN: 20 nV/div to 200 mV div in a 1-2-5 sequence. Accuracy is within 5%.

Reference Level—+21 to -128 dBm (50 or 75 Ω input impedance), +10 to -139 dBm (600 Ω input impedance), +8 to -141 dBV (1 M Ω input impedance). Calibrated in 1 and 10 dB steps.

Display Flatness—0.7 dB maximum from 20 Hz to 5 MHz (add 0.5% quantization error in digital storage).

Sensitivity—Equivalent input noise for each resolution bandwidth setting is measured in video average mode with 10 s/div sweep rate and input buffer control off. Sensitivity is degraded an additional 8 dB when the input buffer is on.

Resolution Bandwidth	Averaged Noise Level	
	dBm 50 Ω	dBV 75 Ω
10 Hz	-135 dBm	-140.5 dBV
30 Hz	-133 dBm	-138.5 dBV
100 Hz	-130 dBm	-135.5 dBV
300 Hz	-125 dBm	-130.5 dBV
1 kHz	-120 dBm	-125.5 dBV
3 kHz	-115 dBm	-120.5 dBV
10 kHz	-110 dBm	-115.5 dBV
30 kHz	-105 dBm	-110.5 dBV

SPURIOUS RESPONSES

Residual— ≤ -143 dBV (noncalibrator related, referenced to the input).

Intermodulation Products—Within any frequency span for two on-screen signals of any input level, third order down 75 dB or more and second order down 72 dB or more; of any input level up to -53 dBV or of any input level with input buffer on, second and third order down 80 dB or more.

GENERAL CHARACTERISTICS

Sweep—Triggered, manual, auto.

Sweep Time—10 s/div to 0.1 ms/div in a 1-2-5 sequence.

Accuracy—Within 5% of selected time/division.

Triggering—Sources are free run, internal and line. Modes are normal, manual sweep and single sweep.

Sensitivity— ≥ 1.5 div of internal signal for both normal and single sweep modes over the approximate frequency range of 30 Hz to 500 kHz.

Shipping Weight—7.6 kg (17 lb).

INPUT SIGNALS

Maximum Input Power Level—1 M Ω /28 pF: 15 V (p-p) for ac or pulse signals with rise times of 2 V/ μ s or faster (pulses or ac beyond this specification may open an input fuse). 40 V (dc plus peak ac) for signals with rise times slower than 2 V/ μ s.

600 Ω (Internally Terminated): 12 V dc or RMS (+24 dBm). 50 Ω (Internally Terminated): 3.5 V dc or RMS (+24 dBm).

Input Impedance—Switch selectable 1 M Ω in parallel with 28 pF, 50 Ω (75 Ω for L3 Option 01) termination, or 600 Ω termination.

OUTPUT SIGNAL

Calibrator—(Cal Out) 500 kHz squarewave within ± 0.15 dB of -40 dBV into the plug-in impedance.

Video Out—50 mV/div $\pm 5\%$ (about the CRT center) with source impedance of 1 k Ω .

Horizontal Out—0 V dc to about -6 V dc sawtooth with a source impedance of 5 k Ω .

Option 25 Tracking Generator

The 7L5 with Option 25 Tracking Generator provides selectable 50 Ω , 75 Ω , or 600 Ω impedance source that has a calibrated output level for swept frequency tests from 20 Hz to 5.0 MHz. The output frequency can be adjusted so it tracks within 10 Hz of the spectrum analyzer frequency. The frequency span and rates are controlled with the spectrum analyzer. The output level is controlled from the tracking generator. Output level is calibrated and controlled in 10 dB and 1 dB steps over a 63 dB range. An Aux Output may be used to drive a frequency counter. The 7L5 with Option 25 is a threeframe unit for the 7000 Series mainframes.

CHARACTERISTICS

Frequency—Range 20 Hz to 5.0 MHz.

Output Impedance—50 Ω , 75 Ω , or 600 Ω selected by a front panel switch.

Amplitude—The output level is calibrated in dBm or dBV and selectable in 10 or 1 dB steps. A vernier provides continuous variation between calibrated steps.

Range—50 Ω : 0 to -63 dBm. 75 Ω : -6 to -69 dBm. 600 Ω : -17 to -80 dBm.

Accuracy (Maximum Output Calibrated at 500 kHz)—50 Ω : 0 dBm ± 0.25 dB. 75 Ω : -6 dBm +0.4, -0.2 dB. 600 Ω : -17 dBm +0.5, -0.1 dB.

Attenuator—Range: 0 to 63 dB in 10 dB or 1 dB steps. Accuracy: Within 0.2 dB/dB to a maximum of 0.25 dB/10 dB absolute.

Flatness—50 and 75 Ω : Within 0.5 dB p-p. 600 Ω : Within 1.0 dB p-p. Total System Flatness (7L5 with L3 Plug-In Module and Option 25) 50 and 75 Ω : Within 1.0 dB p-p. 600 Ω : Within 1.25 dB p-p.

Dynamic Range (7L5 With Option 25)— ≥ 110 dB.

Residual FM (p-p)—(7L5 with Option 25). Spans to 2 kHz/Div: 2 Hz. Spans 5 kHz/Div or Greater: 40 Hz.

Stability—25 Hz/5 minutes after ten minute warmup decreasing to 25 Hz/hour maximum after one hour.

Spurious Suppression, 20 Hz to 5.0 MHz (Harmonic and Nonharmonic)—40 dB or more with respect to the carrier.

Auxiliary Output— ≥ 200 mV RMS into 50 Ω .

BALANCED INPUT TRANSFORMER

Frequency Range—50 kHz to 3 MHz, usable from 10 kHz to 20 MHz.

Flatness—0.25 dB p-p maximum (50 kHz to 3 MHz) including nominal 0.1 dB insertion loss.

Common-Mode Rejection—25 dB minimum (50 kHz to 3 MHz).

Output Termination—Switchable between 124 Ω , 135 Ω , and none for bridging or external termination.

Connectors—WECO (0.37 in with 0.090 center) on 0.625 inch spacing for balanced input. BNC for single-ended output.

ORDERING INFORMATION

7L5 Spectrum Analyzer, 20 Hz to 5 MHz (Requires L3 Plug-In Module). **\$12,500**
Includes: Spectrum analyzer graticule (337-1159-00); (7000 Series), and (337-1439-01); (7603), light blue filter (378-0684-00); operator manual (070-1734-01); service manual (070-2184-01).

OPTIONS

Option 11—L3 Module with Option 01 **+ \$1,775**

Option 12—7854 Oscilloscope capability. **+ \$165**

Option 20—L3 Plug-In Module without Option 01. **+ \$1,775**

Option 25—Tracking Generator. **+ \$1,765**

L3 Plug-In Unit to 7L5—50 Ω , 600 Ω , 1 M Ω . **+ \$1,775**

Option 01—75 Ω , 600 Ω , 1 M Ω . NC
Includes: Instruction manual 070-2154-02

CONVERSION KIT

Tracking Generator—To add to existing 7L5. Order 040-0810-04 **\$2,345**

RECOMMENDED MAINFRAMES

7603*1 Oscilloscope, 100 MHz. **\$3,995**

R7603*1 Rackmount Oscilloscope, 100 MHz. **\$4,910**

7854 Waveform Processing Oscilloscope, 400 MHz. **\$15,275**

*1 Suggested oscilloscope.

OPTIONS (7603/R7603)

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

Option 08—Protective Front Cover (7603 only). **+ \$115**

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

OPTIONAL ACCESSORIES

75 to 50 Ω Minimum Loss Attenuator— AC coupled. Order 011-0112-00. **\$60**

P6105A—10X, 2 m Probe. **\$93**

Balanced Input Transformer— Order 013-0182-00. **\$385**