

Features

- ◆ 20 Hz to 200 kHz Level Meter
- ◆ Ease of use – single button operation
- ◆ 100 hours operation with dry cells
- ◆ Level recorder
- ◆ Automatic Loss Measurement (ALM)
- ◆ Noise w/wo Tone Meter*
- ◆ Quantisation Distortion / SNR*
- ◆ Return Loss Measurement
- ◆ Impulse Noise / Interruptions testing
- ◆ Oscillator
- ◆ Complex impedance
- ◆ Audio monitor
- ◆ Line voltage, current and ringing
- ◆ Telephone
- ◆ Data storage
- ◆ Battery voltage monitor

Transmission Testing



H HEUER INSTRUMENTS

LEVEL METER LM41

LEVEL METER LM41

20 Hz to 200 kHz

The Level Meter LM41 is a handheld battery powered instrument. The main characteristic of the LM41 is the large number of facilities provided in such a small package. It combines the features of a comprehensive Level Meter (including Noise Meter, Return Loss, Impulsive Noise, Dropout Testing) with the fully Automatic Loss Measurement (ALM) function. ALM is used in conjunction with the Responder R41 to automatically evaluate bi-directional loss and noise at both terminations of a transmission link. Telephone conversation is supported via a plug-in handset. Ring voltage, loop voltage and loop current is measured and line activity is monitored by a speaker.

Easy and Fast Operation

Most instruments of this complexity revert to menu tree mode selection thereby necessitating handbook guidance or on screen help. The LM41 can be operated without these aids. Every measurement function is activated by a single key making the LM41 fast and easy to use.

Battery Life

Long battery life is one of the most important features of portable equipment. The LM41 runs for 100 hours on quality dry cells. The battery condition is continuously monitored and if the voltage falls below 3.8 V a warning is given. Every time the LM41 is turned on it displays the battery voltage for 2 seconds as a guide to the user as to the remaining battery life.

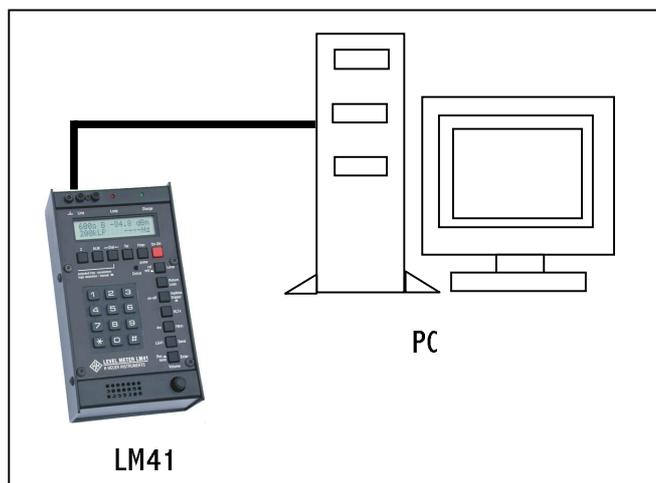
Data storage

All measurement results can be stored with a single button push; there is no need to select particular memory locations. Results can then be up loaded to a PC for evaluation and printing. Measurements are stored with the origin and destination telephone numbers, serial number, duration and time stamp.

LM LinkView

The LM LinkView software package is included as a standard accessory with the LM41.

- Up-loads records from LM41
- Groups measurements into monthly files according to dates and LM41 serial No



- Provides simple navigation on lap-top without a mouse
- Allows easy browsing of consecutive records
- Copies records, details, tables and graphs to WORD or EXCEL
- Provides cursor correlation between plotted points and table entries
- Prints pre-designed transmission test reports with
 - a formal header section including company and client details
 - a company logo that can be freely selected
 - a measurement section that includes result tables and a high quality graph

Wideband Level Meter

The LM41 measures signals in the range 20 Hz to 200 kHz and noise levels down to -90 dBm with the channel filter or the psophometric filter. Noise with tone, SNR and Quantisation Noise measurements are also possible together with the above filters*. High resolution mode gives 0.01 dB and 0.1 Hz. On many occasions it is important to set a particular range manually especially when monitoring line activity.

Features

- 600 terminating
- 600 bridging
- TN12 terminating
- TN12 bridging
- relative
- high resolution
- mV
- manual ranging
- channel filter
- psophometer
- 1020 Hz notch filter*

*Only available with 1020 Hz Notch Filter option.

Relative Level

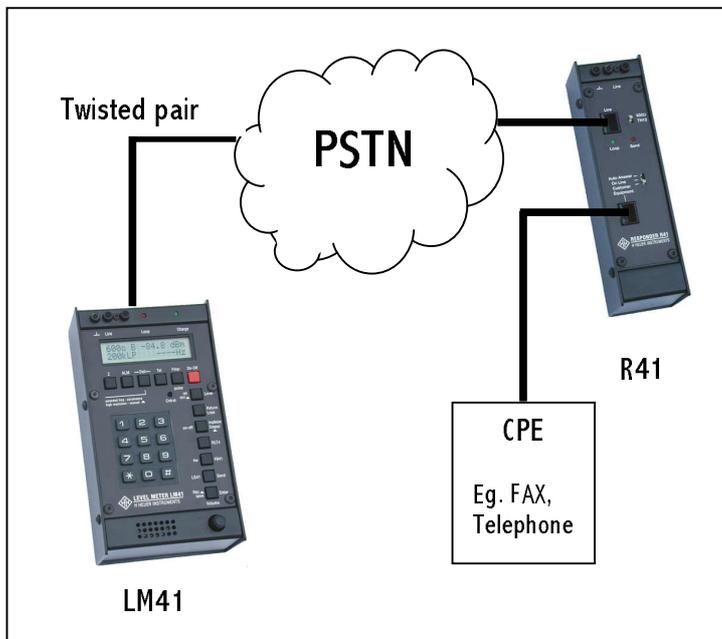
In this mode, the LM41 groups individual measurements into one frequency response plot. This is different to a conventional frequency sweep in that it allows the user to select measurements to be included. A cursor correlates table entries with plotted points.

Recorder

Intermittent faults are a constant frustration to experienced technicians. The Recorder function of the LM41 works like a chart recorder to help identify these faults. The real-time stamp allows correlation to other events. A long term noise recording is much more likely to pinpoint some of those more difficult problems than just a simple spot noise measurement.

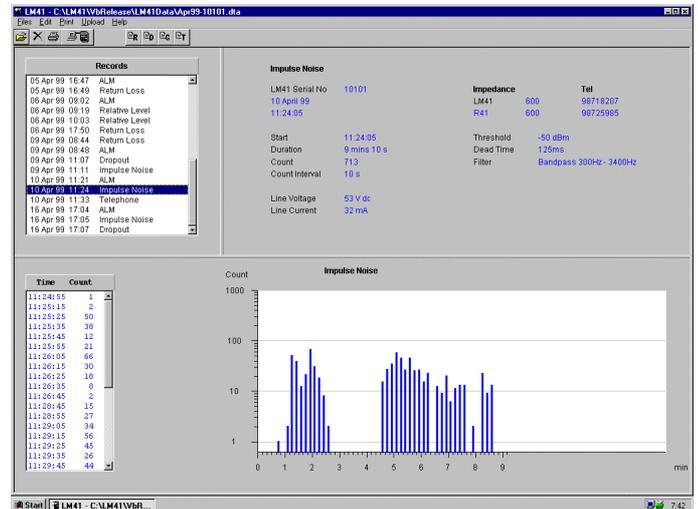
Return Loss Measurement

Control of echoes, essential to good transmission, depends on maintenance of adequate return loss within the circuit at points of transition between four-wire and two-wire facilities. Impedance mismatches cause particular problems for data signals because reflections distort the wave-shape. The LM41 measures return loss at single frequencies, or 3 or 13 spot frequencies, both at 600 Ohms and complex impedance(TN12).



Impulse Noise Measurement

Data circuits are especially susceptible to impulse noise, particularly where received data signals are at their lowest levels. As with other impairments, the susceptibility of data signals to impulse noise varies with the transmission rate and with the type of modulation. The LM41 measures impulse noise via a channel-weighting filter, thresholds are -50 dBm to 0 dBm.



Automatic Loss Measurement (ALM) to Responder R41

The most significant parameters that determine the quality of a voice-band channel are loss, slope and noise. The fully Automatic Loss Measurement (ALM) evaluates bi-directional transmission loss, slope and the psophometric and bandpass noise at both terminations in conjunction with the Responder R41.

ALM measures

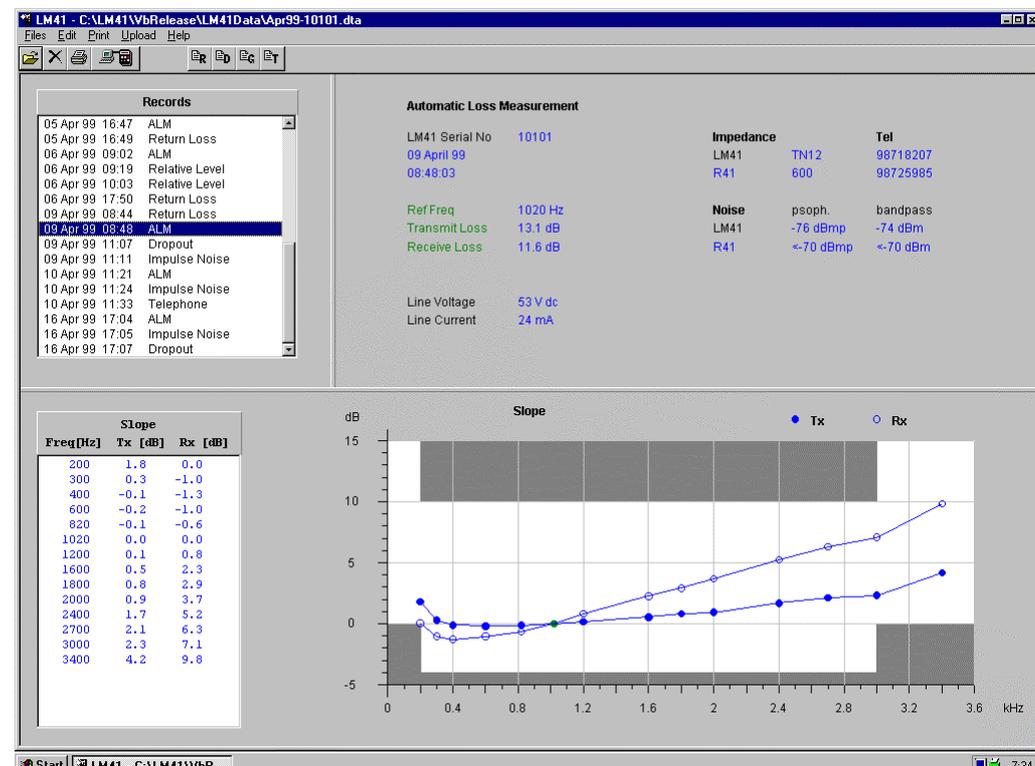
- Rx-loss
- Tx-loss
- Rx-slope
- Tx-slope
- psophometric remote noise
- bandpass remote noise
- psophometric local noise
- bandpass local noise

Dropout Measurement

Rapid gain and phase changes on transmission media cause data errors. The seriousness of a given transient depends on the type of signal transmitted and the method of signal detection. The LM41 measures dropouts via a channel-weighting filter; thresholds are 1 dB to 20 dB below received signal level.

Telephone

A quality handset with mute control is provided for telephone conversation. This affords privacy in contrast to a hands free speakerphone.



Oscillator

A test tone of -10 dBm with either 600 Ohms or TN12 is provided

Audio Monitor

A monitor volume control is available to manually regulate the audio signal. Signalling and test tones can be heard without gain switching interference by activating range hold.

Technical Specifications (LM41)

Frequency Measurement

<i>Range</i>	20 Hz to 200 kHz, autoranging with level > -50 dBm wideband
<i>Resolution</i>	1 Hz, 30 Hz to 20 kHz 10 Hz, 20 kHz to 200 kHz
<i>expanded</i>	0.1 Hz, 10 Hz to 1.7 kHz
<i>Accuracy</i>	± 0.05 % ± 0.1 Hz

Level Measurement

<i>Level range</i>	-60 dBm to +30 dBm fully autoranging or manual range setting
<i>Attenuator accuracy</i>	+30 dBm to -30 dBm: ±0.1 dB less than -30 dBm: ±0.2 dB
<i>Frequency response (wideband)</i>	100 Hz to 20 kHz: ±0.1 dB 30 Hz to 50 kHz: ±0.2 dB 200 kHz: ±0.5 dB
<i>Level Measurements</i>	absolute(dBm/mV), relative(dBr)
<i>Resolution</i>	0.1 dB, expanded: 0.01 dB
<i>Detector type</i>	True RMS
<i>Bridging Loss</i>	< 0.10 dB, 200 Hz to 20 kHz
<i>Return Loss</i>	≥ 35 dB, 200 Hz to 20 kHz
<i>Balance Ratio</i>	≥ 40 dB, 30 Hz to 20 kHz

Input Impedance

600 Ω, TN12 balanced (220 Ω + 120 nF || 820 Ω)
600 Ω bridging (100 kΩ), TN12 bridging (100 kΩ)

Filters

<i>Wideband</i>	20 Hz to 200 kHz
<i>Channel filter</i>	300 Hz to 3400 Hz (ITU-T O.41)
<i>Psophometric</i>	ITU-T O.41
<i>1020 Hz Notch*</i>	860 Hz to 1180 Hz (ITU-T O.132)

Noise Measurement

<i>Noise level range</i>	-80 to +10 dBm
<i>Accuracy</i>	± 1 dB
<i>Resolution</i>	0.1 dB or 0.01 dB
<i>Filters</i>	Wideband, Channel, Psophometric

Noise-with-tone Measurement*

<i>Noise level range</i>	-80 to +10 dBm
<i>Test Tone frequency</i>	1000 to 1025 Hz
<i>Filters</i>	Wideband, Channel, Psophometric

Quantising Noise Measurement (ITU-T O.132) /

Signal-to-Noise Ratio Measurement*

<i>SNR measurement range</i>	10 to 40 dB
<i>Accuracy</i>	± 1 dB
<i>Test tone frequency</i>	1000 to 1025 Hz
<i>Filters</i>	Wideband, Channel, Psophometric

Built-in Oscillator

<i>Frequency</i>	820 Hz (600Ω) and 1020 Hz (TN12)
<i>Level</i>	-10 dBm ± 0.1 dB
<i>Distortion</i>	< 0.5 %

Return Loss Measurement

<i>Reference Impedance</i>	600 Ω or TN12
<i>Frequencies</i>	As for ALM measurement
<i>Tx Level</i>	-10 dBm
<i>Range</i>	0 to 40 dB
<i>Accuracy</i>	± 0.5 dB, ±5 % of reading for 600 Ω ref.

Impulsive Noise (ITU-T O.71)

<i>Threshold level range</i>	-50 to 0 dBm
<i>Accuracy</i>	± 1 dB
<i>Threshold resolution</i>	1 dB
<i>Dead time</i>	125 ms
<i>Count range</i>	0 to 65535
<i>Timer range</i>	0 secs to 99 hours
<i>Test tone frequency</i>	1000 to 1025 Hz
<i>Filters</i>	Channel, 1020 Hz Notch*

Simple Interruptions (ITU-T O.61)

<i>Test tone level range</i>	-50 dBm to 0 dBm
<i>Threshold range</i>	1 to 20 dB
<i>Accuracy</i>	± 1 dB
<i>Threshold resolution</i>	1 dB
<i>Dead Time</i>	3 ms
<i>Count range</i>	0 to 65535
<i>Timer range</i>	0 secs to 99 hours

Dialling

<i>Dial Method</i>	DTMF, Pulse (loop disconnect)
<i>Redial</i>	Up to last 16 digits
<i>Talk/Listen</i>	external handset

Line Monitor

<i>DC Line Voltage</i>	5 to 100 Vdc, ± 2 %
<i>Resolution</i>	1 V
<i>Ring Voltage</i>	5 to 100 Vrms, ± 5 %
<i>Resolution</i>	1 V
<i>Loading</i>	REN~3
<i>Loop Current</i>	5 to 70 mA, ± 5 %
<i>Resolution</i>	1 mA

Automatic Loss Measurement (ALM) with Heuer Instruments R41

<i>Insertion loss range</i>	-4 dB (gain) to 20 dB: ± 0.2dB 20 dB to 26 dB : ± 0.4 dB +10 dBm to -80 dBm (ITU-T O.41)
<i>Noise at LM41</i>	less than -70 dBm
<i>Noise ranges at R41</i>	between -70 dBm and -60 dBm greater than -60 dBm
<i>Transmit frequencies</i>	
<i>default</i>	300 Hz, 820 Hz (600 Ω) 1020 Hz (TN12) and 3 kHz
<i>extended range</i>	300 Hz, 400 Hz, 600 Hz, 820 Hz, 1020 Hz, 1200 Hz, 1600 Hz, 1800 Hz, 2000 Hz, 2400 Hz, 2700 Hz, 3000 Hz, 3400 Hz
<i>Accuracy</i>	± 1 Hz

Serial Interface to PC

Uploading of saved results and configuration information to PC
Optically isolated link at 4800 baud, Operates with "LM LinkView"

Interfaces

<i>Input</i>	balanced, floating 3-pin CF connector
<i>PC/FB41</i>	RJ-11 6P6C socket
<i>Handset</i>	RJ-11 4P4C socket
<i>LG41</i>	RJ-11 6P6C socket
<i>Charging</i>	2.5 mm DC socket

Power Supply

<i>Battery Type</i>	4 AA (NiCd or Alkaline)
<i>Battery Life</i>	30 hrs typical (NiCd) > 100 hrs (Alkaline, basic LEVEL mode)
<i>Low Battery Indication</i>	< 3.8 V
<i>AC Operation (& charging)</i>	Ext. Adaptor: 240Vac to 12 Vdc (200mA)
<i>Auto Power-Off</i>	12 mins after last button press (except Impulse Noise measurement)

General

<i>Display</i>	16x2 LCD
<i>LEDs</i>	Loop Hold, Charging
<i>Audio Monitor</i>	built-in speaker with volume control
<i>Operating Temperature</i>	0 °C to 50 °C
<i>Storage Temperature</i>	-20 °C to 60 °C
<i>Dimensions</i>	178 mm x 97 mm x 55 mm (L x W x H)
<i>Weight</i>	790g with batteries

* Only available with 1020 Hz Notch Filter option.
Data subject to alterations without notice



H HEUER INSTRUMENTS PTY LTD

766 Pennant Hills Road, Carlingford NSW 2118
Sydney, Australia Web: www.heuer.com.au
Tel: +61 2 9871 8207 Fax: +61 2 9872 5985