LINE TESTER LT41

Features

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

Transmission Testing

H HEUER INSTRUMENTS

LINE TESTER LT41

The Line Tester LT41 is a handheld battery powered instrument. The main characteristic of the LT41 is the large number of facilities provided in such a small package. It combines the features of a comprehensive Line Tester (including Audio Oscillator, Noise Meter, Return Loss, Impulsive Noise, Dropout Testing) with the fully Automatic Loss Measurement (ALM) function. ALM is used in conjunction with a second LT41 acting as a responder to automatically evaluate bi-directional loss over the PSTN or a pair of data lines. 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 LT41 can be operated without these aids. Every measurement function is activated by a single key, making the LT41 fast and easy to use.

Battery Life

Long battery life is one of the most important features of portable equipment. The LT41 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 LT41 is turned on it displays the battery voltage for 2 seconds as a guide to the user as to the remaining battery life.

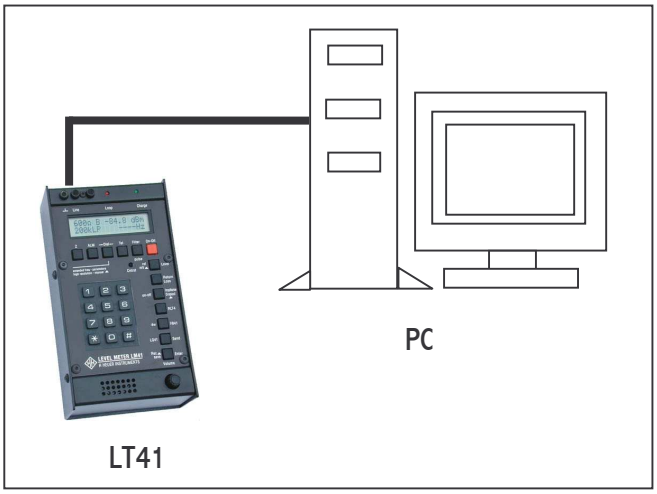
Data storage

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.

LinkView

The LinkView software package is included as a standard accessory with the LT41.

- Up-loads records from LT41
- Groups measurements into monthly files according to dates and LT41 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 LT41 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. 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
- 2600 Hz Notch filter (optional)

Relative Level

In this mode, the LT41groups 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

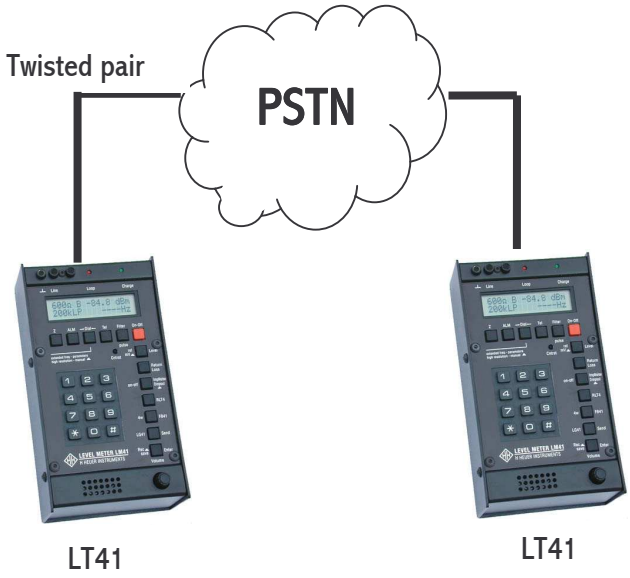
Intermittent faults are a constant frustration to experienced technicians. The Recorder function of the LT41 works like a chart recorder to help identify these faults. The real-time stamp allows correlation to other events. A long term noise recording is much more likely to pinpoint some of those more difficult problems than just a simple spot noise measurement.

Oscillator

The output frequency of the LT41 oscillator can be varied over the audio range between 20 Hz and 20 kHz with a resolution of 1 Hz. The output level can be set between –30 dBm and 6 dBm in 1 dB steps with a choice of 2 output impedances: 600 Ω or TN12. The output Frequency can be stepped or automatically swept through 21 predefined (SELCAL) values.

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 LT41 measures return loss at single frequencies, or 3 or 21 spot frequencies, both at 600 Ohms and complex impedance (TN12)



Automatic Loss Measurement (ALM) to second LT41

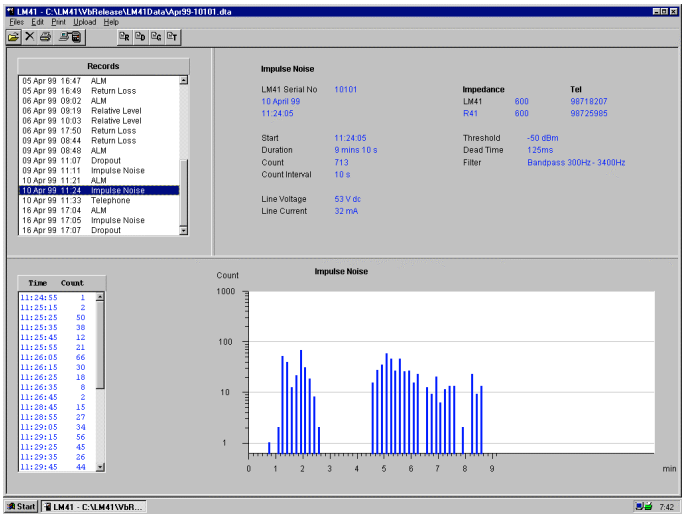
Together with a second LT41, the fully Automatic Loss Measurement (ALM), evaluates bi-directional transmission loss and slope at fixed step frequencies (3 or 21) over the voice channel bandwidth. The ALM can be performed over the PSTN (the second LT41 automatically answers and terminates the call), or simply over any pair of wires (eg. Data cabling).

ALM measures:

- Rx-loss
- Tx-loss
- Rx-slope
- Tx-slope

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 LT41 measures impulse noise via a channel-weighting filter, thresholds are -50 dBm to 0 dBm.

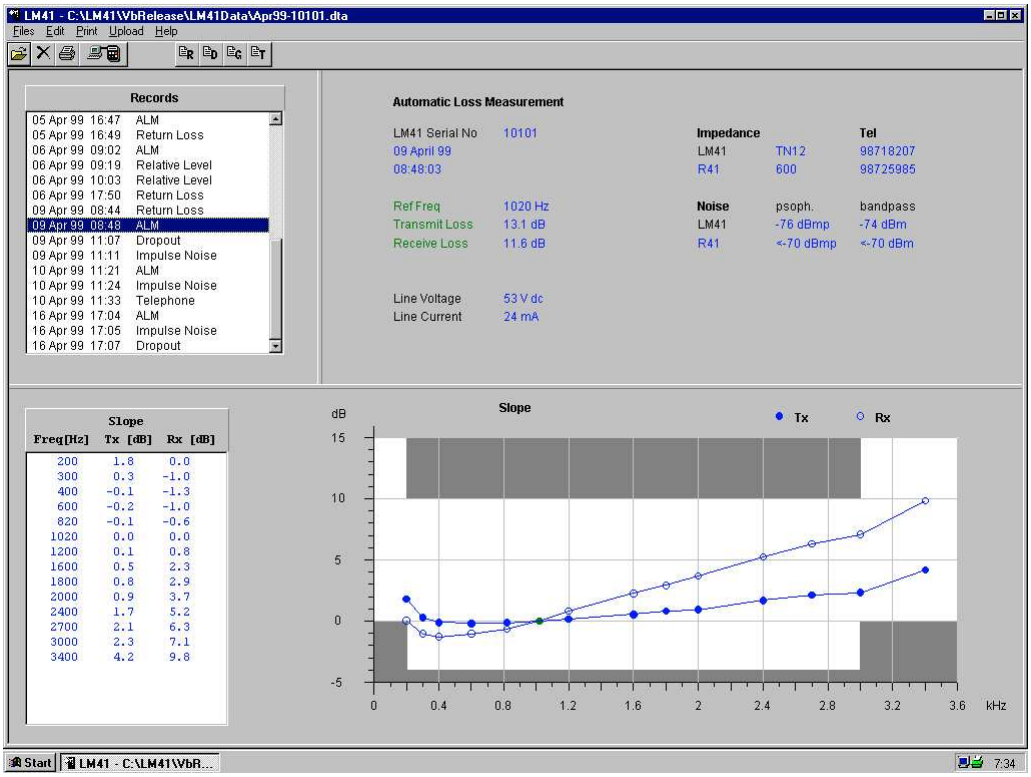


Dropout Measurement

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 LT41 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.



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 (LT41)

Frequency Measurement

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

Level Measurement

Level range	-60 dBm to +30 dBm fully autoranging or manual range setting
Attenuator accuracy	+30 dBm to -30 dBm: ± 0.15 dB less than -30 dBm: ± 0.25 dB
Frequency response (wideband)	100 Hz to 20 kHz: ± 0.1 dB 30 Hz to 50 kHz: ± 0.2 dB 200 kHz: ± 0.5 dB
Level Measurements	absolute(dBm/mV), relative(dBr)
Resolution	0.1 dB, expanded: 0.01 dB
Detector type	True RMS
Bridging Loss	< 0.10 dB, 200 Hz to 20 kHz
Return Loss	≥ 35 dB, 200 Hz to 20 kHz
Balance Ratio	≥ 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

Wideband	20 Hz to 200 kHz
Channel filter	300 Hz to 3400 Hz (ITU-T O.41)
Psophometric	ITU-T O.41
*2600 Hz Notch**	2200 Hz to 3000 Hz (-3 dB Freq)

Noise Measurement

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

Noise-with-tone Measurement*

Noise level range	-80 to +10 dBm
Test Tone frequency	2580 to 2620 Hz
Filters	Wideband, Channel, Psophometric

Signal-to-Noise Ratio Measurement*

SNR measurement range	10 to 40 dB
Accuracy	± 1 dB
Test tone frequency	2580 to 2620 Hz
Filters	Wideband, Channel, Psophometric

Oscillator

Range	20 Hz to 20 kHz, +6 to –30 dBm
Output Impedance	600 Ω, TN12
Frequency Accuracy	± 0.1 % ± 0.1 Hz, 1 Hz resolution
Step Frequencies	as for ALM (ext), 2s PULSE mode
Sweep Operation	5s ON at each Step frequency above

	100 Hz to 5 kHz	Upto 20 kHz
-20 dBm to +6 dBm	± 0.2 dB	± 0.3 dB
-30 dBm to –20 dBm	± 0.3 dB	± 0.5 dB

Level resolution	1 dB direct entry, 3 dB stepping
Distortion	< 0.5 %

Simple Interruptions (ITU-T O.61)

Test tone level range	-45 dBm to 0 dBm (+threshold)
Threshold range	1 to 20 dB in 1 dB steps
Accuracy	± 1 dB
Dead Time	3 ms
Count range	0 to 65535
Timer range	0 secs to 99 hours

Impulsive Noise (ITU-T O.71)

Threshold level range	-45 to 0 dBm in 1 dB steps
Accuracy	± 1 dB
Dead time	125 ms
Count range	0 to 65535
Timer range	0 secs to 99 hours
Test tone frequency	1000 to 1025 Hz
Filters	Channel, 2600 Hz Notch

Return Loss Measurement

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

Dialling

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

Line Monitor

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

Automatic Loss Measurement (ALM) to second LT41

Insertion loss range	-3 dB (gain) to 35 dB: ± 0.3dB
Transmit frequencies	
default	350 Hz, 1050 Hz and 3315 Hz
extended range	350 Hz, 490 Hz, 600 Hz, 630 Hz, 770 Hz, 785 Hz, 910 Hz, 1050 Hz, 1190 Hz, 1330 1470 Hz, 1610 Hz, 1955 Hz, 2125 Hz, 2295 Hz, 2465 Hz, 2635 Hz, 2805 Hz 2975 Hz, 3145 Hz, 3315 Hz
Accuracy	± 1 Hz

Serial Interface to PC

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

Interfaces

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

Power Supply

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

General

Display	16x2 LCD
LEDs	Loop Hold, Charging
Audio Monitor	built-in speaker with volume control
Loop Hold Capability	In all Terminated Modes (incl. OSC)
Operating Temperature	0 °C to 50 °C
Storage Temperature	-20 °C to 60 °C
Dimensions	178 mm x 97 mm x 55 mm (L x W x H)
Weight	790g with batteries

**** Only available with 2600 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