LT

Tester of laser range finders

Fig. 1. Photo of the LT test system

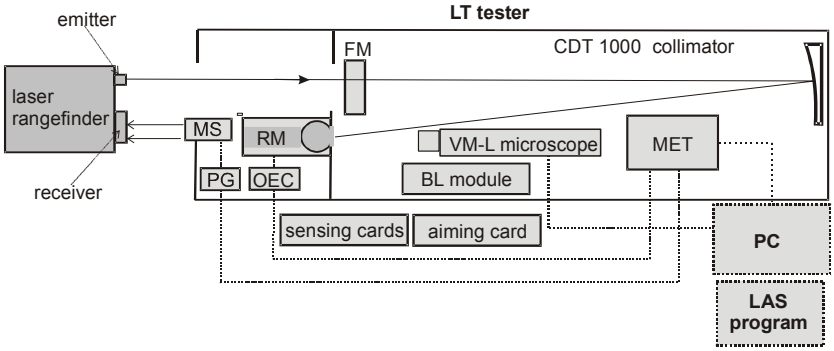

Fig.2. Block diagram of the LT test system

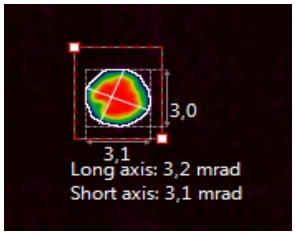

Fig.3. Image of laser beam

BASIC INFORMATION:

The LT test station is a modular measuring set that enables measurement of all important parameters of laser systems (laser range finders, laser designators, laser illuminators, laser pointers).

General concept of testing laser range finders is based on an idea to collimate the emitted laser pulse; measure energetic, temporal and spatial parameters of the pulse; and emit with a regulated temporal delay an optical pulse (a series of pulses) into the receiver module of the laser range finder. When testing laser designators, or laser pointers LT station works only in passive mode.

Basically the LT test station is built from three main blocks: LT tester, PC (with frame grabber), LAS software.

The LT test station enables measurement of the following parameters of laser range finders: pulse energy, pulse power, pulse width, pulse frequency, beam divergence, receiver sensitivity, accuracy of distance measurement (single target), accuracy of distance measurement (case of multiply reflections), bore-sighting of the laser emitter (in reference to optical axis of an internal optical sight, or external visible imager/thermal imager) and aligning of receiver (in reference to the emitter).

Due to some new modern features (very wide pulse energy range, simulation of multiply reflections, ability to test high frequency laser range finders, wide range of regulation of receiver sensitivity level) the LT test stations significantly exceed other commercially available stations for testing laser systems.

LT

Tester of laser range finders

TEST CAPABILITIES

LT station enables:

- measurement of following parameters of laser range finders: pulse energy, pulse peak power, pulse time width, pulse repetition frequency, missing pulse, pulse coding, distance measurement accuracy (test for both single target or multiply targets), distance discrimination, receiver sensitivity, extinction ratio ER , divergence angle
- boresight and determination of following aligning errors: transmitter relative to external/internal aiming device (thermal imager. VIS-NIR camera, optical sight), receiver relative to transmitter

Tab. 1. List of measured parameters of LRFs and laser designators

No	Parameter	Measurement range
1	Pulse energy	.25 mrad to 4 mrad
2	Pulse peak power	2W-10 MW
3	pulse time width	4 - 500 nsec
4	pulse repetition frequency	0.1 Hz – 20kHz
5	distance measurement accuracy	300-30000m
6	distance discrimination	50-500m
7	receiver sensitivity	Simulating targets at distance from 400 m to 30 000 m
8	extinction ratio	Up to 40dB
9	divergence angle	0.2 to 4 mrad
10	aligning error of transmitter relative to external/internal aiming device (thermal imager. VIS-NIR camera, optical sight)	0.1 to 5 mrad
11	aligning error of receiver relative to transmitter	0.1 to 5 mrad

Tab. 2. List of measured parameters of laser pointers or laser illuminators (option)

No	Parameter	Measurement range
1	power range	0,001mW - 3W
2	power resolution	0,001mW
3	divergence angle	0.25mrad to 10mrad

FEATURES

1. Ability to test both monopulse LRFs and multipulse LRFs
2. LRFs working at all typical wavelengths can be tested: 905/910 nm, 990 nm, 1060nm, 1540nm, 1550nm, 1570nm.
3. Ability to simulate targets of different angular size (from 0.25 mrad to 4 mrad).
4. Computerized test system. Distance target- LRFcan be controled from PC. The incoming pulses and digitally recorded and analysed.
5. Ability to test laser range finder equipped with night vision channel
6. Ability to test laser range finder equipped with thermal imaging channel.
7. Ability to test laser range finder equipped with VIS-NIR camera.
8. Exceptional wide rage of pulse frequency up to 20 kHz

9. Exceptional wide range of measured energy (from 0.001mJ to 200mJ). Typical test stations can measure energies only over 1 mJ.
10. Continuous regulation of receiver sensitivity level.
11. High temporal resolution of pulse width measurement: 1ns.
12. Continuous regulation of simulated distance up to 40km.
13. Ability to test performance of laser range finders under real field conditions (case of multiply reflections).
14. LT can be used to align both emitter and the receiver of the tested LRF.

VERSIONS

LT test stations are basically offered in two different types of slightly different design: LT-X and LT-Y.
LT-X station is developed to enable typical extended tests of LRFs to be done at laboratory conditions. LT-Y station is developed to enable typical simplified tests of LRFs to be done at depot conditions.

Tab. 3. Comparison of two types of LT station

Parameter	***LT-X***	***LT-Y***
Pulse energy	Yes	Yes
Peak pulse power	Yes	Yes
Pulse width	Yes	Yes
Pulse Repetition Frequency	Yes	Yes
Missing pulses	Yes	Yes
Divergence angle	Yes	Yes
Distance measurement accuracy	Yes (with up to five reflections)	Yes (for only one reflection)
Receiver sensitivity tests	Yes (absolute)	Yes (relative)
Aligning of the laser emitter with internal optical sight/TV camera/thermal camera	Yes	Yes
Aligning of the laser receiver with the laser emitter	Yes	Yes
Testing laser illuminators and laser pointers	Option	No
Sensitivity spectral range	0.9-1.6μm	0.9-1.6μm
Measurement pulse energy range	0.002-200 mJ	0.002-100 mJ
Peak pulse power	2W-10 MW	2W-10 MW
Pulse width range	4 - 500 nsec	4 - 100 nsec
Resolution of pulse width measurement	±1ns	±2ns
Pulse Repetition Frequency	0.1 Hz – 20kHz	0.1 Hz – 1kHz
Optical aperture of tested laser range finder	140 mm	140 mm
Measured divergence angle range	0.2 to 4 mrad	0.2 to 4 mrad
Divergence angle resolution	0.05 mrad	0.1 mrad
Source of simulated reflected pulses	Five exchangeable sources (1.55, 1.52, 1.57, 1.06 and 0.9μm)	Five exchangeable sources (1.55, 1.52, 1.57, 1.06 and 0.9μm)
Number of simulated targets	up to 3	1
Receiver sensitivity regulation range	500:1	1000:1
Range simulation	300-30000m	300-30000m
Resolution of range simulation	2.5 m	5 m
Bore-sighting target	visual and thermal	visual and thermal
Working temperature:	from 10ºC to 30ºC	from 3ºC to 40ºC
Humidity	up to 90% (non condensing)	up to 95% (non condensing)
PC	Typical commercial desktop	

Software	LAS-X program: • Communication and control of MET module, MS module and VM-L microscope (the communication is done using RS232 and USB ports). • Analysis of data got from MET module and calculation and presentation of Pulse energy, pulse width, PRF parameters of the tested laser • Analysis of data got from VM-L microscope and calculation and presentation of beam divergence parameter of the tested laser • Regulation of parameters (simulated distance, amplitude) of impulses generated by MS module to test laser range finder distance measurement accuracy and sensitivity • Generation of test report and storing the test result
Dimensions	1290x330x 350mm
Mass	LT-X 29 kg; LT-Y 20 kg

Structure of both versions is very similar and presented in table below.

Tab. 4. Components of LT stations

LT-X	**LT-Y**
LT-X tester (LT-X base module, set of sensing cards, aiming card, set of pulse sources, PC, frame grabber, LAS-X software)	LT-Y tester (LT-Y base module, set of sensing cards, aiming card, set of pulse sources, PC, frame grabber, LAS-Y software)

Comparison of LT station with other Inframet test station

LT station offers almost the same test capabilities as LTE station. However, the latter station is more automatized. More steps in LT station must be manually done (like target/attenuators exchange). However, big advantage of LT station is reflective optics that enables to test LRFs using thermal imagers as aiming devices. Ability to test pointers and illuminators is another advantage of LT station.

Version 4.1

CONTACT:

Tel: +48 604061817 Fax: +48 22 3987244 Email: info@inframet.com