

FCLIP

Boresight tester of fused vision clip ons

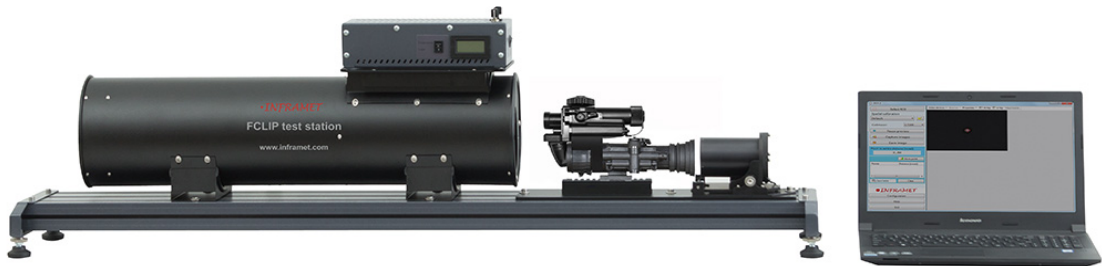


Fig. 1. Photo of FCLIP test station

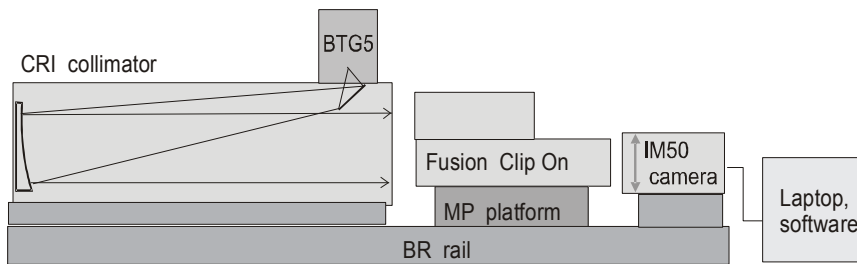


Fig. 2. Block diagram of FCLIP test station

BASIC INFORMATION:

Fused vision clip on is a detachable, dual channel afocal electro-optical system, built by combining afocal visible imager (typically night vision device) with an afocal thermal imager.

The output image generated by fused vision clip on is to be seen by a telescopic sight. The combined system (fused vision clip on and telescopic sight) can be used to generate clear image of observed scenery at night or other low visibility conditions. In this way a soldier/hunter can shoot using a rifle with a telescopic sight at day conditions, and after adding fused vision clip on he can operate at night/low visibility conditions.

Fused imaging clip on is an afocal optical system that generates images of long distance targets to be seen by a telescopic sight. Fused vision clip on can be considered perfect when there is no noticeable shift between the image generated by the telescopic sight cooperating with fused vision clip on and the image generated by the telescopic sight looking directly to the targets. This requirement is valid for all three work modes of fused clip on: fused mode, visible only, thermal imaging only. Badly aligned fused vision clip, when attached to the rifle, produces some image shift (can be different in different channels) and then the shooter will miss the target even after a perfect aiming.

FCLIP is a computerized test station developed to for testing fused clip ons. In detail, this station enables measurement of four alignment parameters that precisely characterize image earlier mentioned image shift.

Test concept is based on an idea to project reference images to input of tested fused clip on and to analyze copies of the reference images generated by this imaging device. In detail the reference images are generated by BTG5 broad band target generator and are projected by CRI reflective collimator into direction of tested fused clip on. Next, copies of the reference images are captured by IM50 visible camera and send to PC. Finally image analysis is done by specialized software.

Tested fused vision clip on is attached to the test station using the standard Picatinny (MIL-STD 1913) rail like in case of real rifles. Other rails are possible, too.

FCLIP in basic version is optimized to measure alignment errors. However this station to be delivered in expanded version capable to measure additional parameters that describe resolution and sensitivity of both imaging channels.

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BLOCKS OF NCLIP STATION

FCLIP is a modular station build from following blocks:

1. BTG5 target generator
2. CRI760 of axis reflective collimator (option: CRI11100 collimator)
3. MP1913 mechanical platform (simulates standard Picatinny rail)
4. IM50 camera
5. BP rail
6. laptop
7. BOR computer program

TEST CAPABILITIES

Test capabilities depends on version of the test station.

FCLIP-A enables measurement of three parameters:

1. Deflection angle of night vision channel
2. Deflection angle of thermal vision channel.
3. Alignment error between thermal vision channel and night vision channel.

FCLIP-B enables additionally measurement of a new parameter :

1. Rotation angle between image from visible channel relative to image from thermal imaging channel (optional).

FCLIP-C enables additionally measurement of resolution and sensitivity of both channels. The list can be expanded.

SPECIFICATION

Parameter	Value
Acceptable diameter of output optics of clip on	Up to 70mm (option 110mm or more)
Fixing position to test station	standard Picatinny rail
Range of measurement of alignment errors	Up to 40 mrad
Resolution of measurement of the alignment errors	Not worse than 0.03 mrad
Range of measurement of rotation error	Up to 5°
Resolution of measurement of rotation angle	0.5°
FOV of tested clip on	<12° (recommended case) < 30° (optional case)
Minimal required brightness gain of night vision channel	500 lm/lm
Maximal thermal resolution of thermal channel	200 mK
Reticle	Cross with graduations in X and Y (software generated)
Emission bands of BTG5 target generator	LWIR/MWIR and Visible
Simulated illuminance range	At least from 1 mlx to 100 lx
Simulated temperature difference range	At least up to 20K
Focal length of CRI collimator	600mm (option 1000 mm)
Aperture of CRI collimator	70 mm (option 110 mm)
Resolution of CRI collimator	At least 60 lp/mrad (option 80 lp/mrad)
Sensitivity of IM50 camera	Not worse than 0.1 lx

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Spectral band of IM50 camera	400-700 nm
Resolution of IM 50 camera	Not worse than 0.05 mrad

WHY FCLIP?

Alignment errors of fused vision clip ons can be measured using non computerized methods. However, these methods can work but are sensitive to human subjectivity errors and real measurement accuracy is rather low. FCLIP is a new generation test station that use fully achievements of modern computer technology. This computerization significantly improved accuracy of measurement of the alignment errors, shortened measurement time, eliminated human subjectivity error and made possible to archive test results.

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