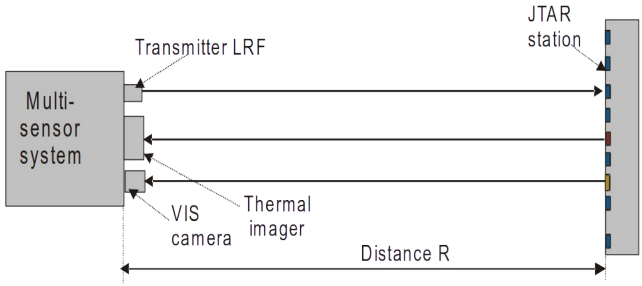
JTAR

Portable stations for boresighting multi-sensor systems

a)



b)

Fig. 1. JTAR boresight station a)photo, b)test concept

BASIC INFORMATION:

Boresight is a process to align optical axis of single system or a series of optical or electro-optical systems with a certain reference optical axis or mechanical axis. Proper boresight is particularly critical in case of multi-sensor imaging/laser systems built from a series of systems like thermal imager, VIS-NIR camera, and laser range finder.

Inframet offers several test systems (MS systems, JT systems, JIMS systems, and JAT200 stations) that can be used for accurate boresight multi-sensor imaging/laser systems. However, the first three systems (MS/JT/JIMS) are big laboratory class systems that are difficult to be used at field conditions. JT200 is a small mobile boresight station that got positive opinion as a tool for accurate measurement of boresight errors of multi-sensor imaging/laser systems at field conditions (typically airfields). However, Inframet obtained also reports that tests using JAT200 are time consuming, transport at grass airfield can be a problem, and that boresight accuracy slightly deteriorate at extreme ambient temperatures. JTAR is a portable boresight station designed to eliminate drawbacks of earlier mentioned boresight systems.

Typical test system for boresight of imaging/laser systems is built as an image projector combined with set of laser sensing sensors. Image projector is typically built as a reflective collimator combined with a source of light in both thermal range and visible spectral range. The collimator is quite big and must be aligned to achieve situation when its aperture is at very short distance to tested system and the collimator aperture overlaps all optics of the tested system. This design generates drawbacks discussed earlier.

JTAR station is designed using a boresight concept totally different comparing to classical boresight system based on image projector located at very short distance to tested system and well aligned to the tested system. JTAR station is a based on a concept a portable station located at significant distance from the tested system that is used as a shooting target to laser of the tested system. The target is visible for both imagers (thermal imager and VIS-NIR camera) to enable measurement of boresight error between the imaging sensors. Next, its electronics can detect position of center of laser beam to enable measurement of boresight error between imagers and transmitter of LRF. Finally, a radio block being a part of JTAR enables communication with test crew that operates tested multi-sensor system and gets immediately information on measured boresight errors.

Specialized design optimized for boresight of precisely defined type of multi-sensor system (wavelength/peak power, divergence angle of LRF, and FOV, resolution, optics size and locations of imaging sensors) is the only drawback of JTAR station comparing to quasi universal boresight station of JT/JIMS type.

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TEST CAPABILITIES

Measurement/checking of:

1. Alignment error for a thermal imager working in different FOVs,
2. Alignment error for VIS-NIR camera working in different position of zoom objective,
3. Alignment error between optical axis of VIS-NIR camera and a thermal imager,
4. Alignment error between transmitter of LRF and VIS-NIR camera,
5. Alignment error between transmitter of LRF and thermal imager.

FEATURES

- Perfect tool to check boresight of multi-sensor imaging/laser systems at field conditions before important missions (Yes/No tests) or as maintenance tester
- Tests are to be done when JTAR station is located at distance from about 50m to about 500m depending on specifications of divergence angle of transmitter of LRF
- No limitations on optical aperture of optics of sensors of tested multi sensor system
- The station is packed in a large suitcase and easily transported to any location
- Possible to test thermal imagers from some distance (no necessity to remove imager from a helicopter to test it)

VERSIONS

JTAR station is typically designed for boresight of multi sensor imaging/laser system of following features:

- Blocks of tested system: thermal imager, VIS-NIR camera, laser range finder
- Type of LRF: monopulse (emitting high power pulses of peak power over 0.5mJ)
- Wavelength of LRF: 1064nm, 1530nm, 1540nm, 1570nm
- Divergence angle of LRF: not higher than 2 mrad
- NETD of tested imager: not higher than 100mK
- Sensitivity of VIS-NIR cameras: not higher than 1lx.

However, JTAR can be optionally delivered in versions capable to test systems of different configurations.

SPECIFICATIONS

Parameter	Value
Modules	JTAR station, TR transmitter, Tablet, JTAR Control program
Boresight uncertainty	0.05mrad
Laser sensing area	400×400 mm
Thermal/visible source aperture	10mm
Regulation of intensity of thermal/visible source	Yes
Radio communication range	250m
Operating temperature range	-5°C to 45°C (option -40ºC to +60ºC)
Storage temperature range	-15°C to 55°C (option -10ºC to +50ºC)
Humidity	Up to 90% (non-condensing)
Power	Battery DC12V, option AC 230V
Accessories	DC 12V/AC 220V converter
Mass	32 kg
Dimensions	580x360x660mm

Version: 1.6

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