

**SPECIFICATIONS**  
**FOR**  
**STABILIZED ELECTRO-OPTICAL CAMERA/TURRET SYSTEM**

20 March 2007

Naval Research Laboratory

## Stabilized EO CAMERA/TURRET SYSTEM Specification

This specification establishes the requirements for a small-dimension turret that utilizes a gimbal mounted, stabilized sensor suite that is able to accurately point multiple electro-optical cameras, independent of the platform's position. The stabilization should allow for mapping video images from day or night and isolate the effects of aircraft vibrations and motion. The camera system should be capable of slewing dynamically to stare at a location of interest. It should automatically fix on a designated point (set of latitude, longitude, elevation coordinates) regardless of clouds or other obscurants.

The system will include the following components and functionalities:

- 1) 12" or smaller diameter steerable turret
  - 55 lbs or lighter (weight does not include control unit or hand controller)
  - turret system must be co-mounted with GPS/Inertial Measurement Unit (IMU) hardware to enable active line of sight stabilization and direct georeferencing of image pixels.
    - pointing accuracies must be equal to or less than 20  $\mu$ radians
    - 4 axis stabilization and steering (pitch, yaw, azimuth, elevation)
    - Line of site pan (azimuth) range of 360 degrees continuous
    - Line of site tilt (elevation) range of at least 90 to -120 degrees.
  
- 2) Imaging sensor suite should be modular with the following minimum component specifications:
  - a 3<sup>rd</sup> generation thermal imager or uncooled microbolometer with a minimum resolution of 640x480 pixels and at least one lense setting with field of view of approximately 30°. The spectral response should be 3-5  $\mu$ m (acceptable) or 7.5 to 13.5  $\mu$ m (preferred)
  - a CCD color video camera with a resolution of at least 525 TV lines and a fixed focal length lense with a field of view of approximately 30°. Camera must sample at 15 frames per second or higher
  - a CCD color video camera with a resolution of at least 525 TV lines and a fixed focal length lense with a field of view of approximately 15°. Camera must sample at 15 frames per second or higher
  - Interfaces to video data stream should include analog RS-170 output as a minimum, with digital pathways such as CameraLink, Firewire, or Ethernet preferred.
  
- 3) 1/2 ATR (Air Transport Rack) Master Control Unit (weighing no more than 20 lbs). Electro-optical and infrared image sensors and controller components must allow
  - vibration isolation
  - be capable of targeting a user prescribed earth location using software control
  - be able to provide ground coordinates of a sequence of camera image.

- 4) hand controller to allow manual operation of turret
- 5) GPS system with integrated access to OmniSTAR and CDGPS L-band satellite technology (consistent with the Novatel ProPak-LBplus).
- 6) Input Power: The system shall draw less than 280 watts average while operating.
- 7) Geopointing Capability: The geopointing capability will rely upon use of an in-turret inertial measurement unit to provide the capability to point to a geographic location and estimate the geographic location of the line-of-sight. Camera pointing and image location information will be obtained using metadata from the GPS and IMU systems. Information relating to geolocationing the image must be accessible for storage to a digital file (of non proprietary type unless conversion software is included) to allow for use of subsequent image post-processing algorithms. These fields include camera pan, tilt, and roll angles and camera position as well as timing information.
- 8) FAA certification – contractor should provide evidence that the system has or is capable of receiving FAA certification for use on manned aircraft.
- 9) CABLING all required cabling shall be included with delivery of the system.
- 10) SOFTWARE:
  - a) Geo-pointing software to assure turret can stare at a specified target
  - b) Geo-locationing software to determine ground coordinates of collected imagery
- 11) DOCUMENTATION:
  - a) Operation, maintenance and installation manuals
  - b) sensor calibration information
- 12) DELIVERY: The system shall be delivered FOB Destination no later than 1 November 2007.
- 13) WARRANTY: 1-Year warranty or standard commercial warranty.