The M-CLASS MARINE Long Range STABILIZED Multi Sensor platform is a robust Marine Grade imaging system designed to withstand the rigors of oceangoing vessels in all weather conditions. The M-CLASS can be used as a stand alone system or can be easily integrated into existing marine electronics including radar and navigation systems. The highly configurable M-CLASS can be controlled by a variety of bridge mounted controllers or tied into common protocol systems you already have. The long range stable M-CLASS is ideal for coastal surveillance from land or from vessels underway. The M9 is the only IP68 completely sealed nitrogen purged system on the market that can withstand 100% humidity and operate while completely submerged. The M-CLASS is the preferred platform for integration into the latest USV/ASV programs. The clear choice for coastal asset protection.

THE HIGHLY CONFIGURABLE M-CLASS EO/IR SYSTEMS ARE THE SINGLE SOLUTION FOR ALL YOUR COASTAL SECURITY IMAGING APPLICATIONS
BORN TO SERVE YOUR NEEDS

The Ultra Long Range M9 CLASS COOLED MWIR M9 is a highly sensitive mid-wave IR camera designed for long-range surveillance and security applications. Manufactured to exacting standards and customer centric design philosophies.

MODULAR OPEN DESIGN ARCHITECTURE

- A true integrated approach to surveillance systems where all the system elements and their interactions are considered on a continuous basis
- Support both new and legacy platforms and applications
- Provide a seamless upgrade path as requirements and technologies change
- Our goal is zero obsolescence, at a system level, and the lowest cost over the life of the program or platform
- We aim to achieve this goal while providing users with the capability to deploy the latest and best sensor technology available.
- Design system modules as true line replaceable units to simplify maintenance and support capability upgrades in the field.
- Eliminate the need for any special tools or equipment
- Eliminate or reduce the need for sensor alignment after replacement
- Maximize the use of captive fasteners for all lrs to support installation in extreme and challenging environments
- Minimize the use of external cables to simplify system integration and reduce potential failure points.
- Internal system controller design supports rapid integration of new sensor packages
- User interface is common regardless of sensor selection
- FPGA artwork, firmware and operational software can be updated over the network to support new capabilities and changing requirements
- Expanded pelco-d interface to support direct integration into existing c2 systems
- Modular system design - the system can be rapidly installed and reconfigured in the field. Maintenance is simplified with symmetrical external covers and hinged service panels to expose all the internal sub-systems

SYSTEM ARCHITECTURE FEATURES

- Key components from the Striker Commanders pan viewer were utilized for the system
- Edge cooled cards and system components validated iaw mil-std-810f operation between -40c and +85c
- Blind-mating, hot swappable sensor packages eliminate external cabling and support rapid system integration with excellent bore-sight.
- Light weight modular configuration to support rapid deployment
- Single screen gui with a familiar game controller interface
- ETASS compliant
- Expanded pelco-d interface for integration into existing command and control systems

EXCLUSIVE MOTOR DRIVE DESIGN

- Direct drive servo motors and encoders directly connected to the azimuth and elevation drive shafts support the full resolution of the 19 bit absolute encoders with no hysteresis.
- Brushless motors and oversize bearings provide high reliability, excellent alignment retention and significant structural margin
- There are no wear or limited life components in the system that require service or maintenance. No gears, chains or belts to break.

INDUSTRY LEADING RELIABILITY

- Direct drive servo design eliminates any wear issues associated with competing systems that use chains, belts and gears.
- Large diameter high strength bearings and shafts provide significant structural margin and precise motion.
- Edge cooled circuit cards, qualified to an edge temperature of 85c, provide reliable operation in extreme environments.
- Sensor suite is fully sealed and submersible.
- Encoders are designed and tested for extreme temperature and high vibration environments.
- Major components have been field proven as part of the us military pan viewer system (THOUSANDS of units fielded).
- The M9 system, which is comprised of the M9 pan/tilt and sensor suite, has an MTBF greater than 40,000 hours.

THE HIGHLY CONFIGURABLE M-CLASS EO/IR SYSTEMS ARE THE SINGLE SOLUTION FOR ALL YOUR STABILIZED LONG RANGE IMAGING APPLICATIONS
**SPECIFICATIONS**

**Optical Assembly**
- Image Sensor: Full Frame 100% pixel depth CMOS 1/1.8” 1020x1080 SENSORS multi-mode high sensitivity CMOS
- Camera Hardening: Hardened wiring harness and staked connectors to military standards boresight retention over range
- Sensor Stabilization: 4 Layer 4 Axis Electronically and Mechanically Stabilized Optical Platform
- Output Resolution: 1080p HD 60 FULL 1920x1080 output through system
- Lens: 200mm UFA™ (UltraFast Autofocus) 12-bit registered with bore sight stability to better than 2% over the entire zoom range
- Optical Zoom: Fast Continuous zoom visual
- Minimum Illumination: 0.0035 lx full color (1/3) .0002 LX BW (1/3) STD.
- Fog/Haze Filter: Atmospheric penetrating Bi Linear Fog/Haze mitigation routine for Long Range Disturbance Attenuation (LRDA)
- Backlight Compensation: BLCHL/CHWDR (Digital WDR)
- Optical Enclosure: Hardened 99% transmissible. CLEAN ROOM assembly. Rated IP68 100% humidity submersible

**Thermal Imager**
- Image Sensor: HD InSb Lattice Mesh FPA High Sensitivity Cooled MWR
- Sensor Stabilization: Mechanical and Electronic Layer 4 Axis Centerline Stabilization
- Lens Focal Length: 1200mm Extended range continuous zoom
- Array Format: 640x512
- DRIR Detection Range: 51+KM
- Digital Detail Enhancement: Digital Detail Enhancement (DDE) Low/Medium/High
- Image Processing: LAP Local Area Processing Gain for Wide Dynamic range imaging and target discrimination in challenging environments.
- Cooler Lifetime: 40,000 hours (rated), nitrogen purged
- Window: Hardened DLC 99% transmissible CLEAN ROOM assembly. Rated IP68 100% humidity submersible

**Pan/Tilt Mechanical**
- Drive Unit: Direct Drive Zero Hysteresis
- Pan Angle: 360° Continuous Pan Rotation
- Tilt Angle: 180° + 90° Full Tilt Angle
- Positioner Speed: +1.001° sec to 180° Aec in Pan and Tilt axis
- Positioner Accel. 200°/sec in Pan and Tilt axis
- Encoder: 19bit absolute encoder
- Resolution: 0.0008
- Electro Optical Stab.: x50 Axial
- Backlash: None
- Gyro Stabilization: Up to 4 Axis Layered Composite Gyro Mechanical Payload and Positioner stabilization
- Absolute positioning: Yes
- Payload Mount: Quick disconnect zero downtime blind mate gold plated connectors TASS connection

**Environmental**
- Operating Temperature: -40°C to +70°C Standard
- Humidity: 100% Relative with total submersion testing on every unit waterproof IP68
- NBC/HEMIB: Operational with Nucelar/Chemical/Biological protective gear MOPP IV protective suit.

**Sensors**
- GPS/Compass: Geo Location sensors and DMC with real time on screen symbology
- Radar Integration: Radar Ready for Slew To Cue Integration
- Processor: Integrated TASS image processor to provide enhanced imaging capability in hot Tropical conditions.

**Manufacturing**
- Country Of Origin: MADE IN THE USA
- Certificate: ISO 9001 AS9100B
- Fabrication: Complete in house machining and fabrication for quality control
- Optical Assembly: CLASS 16,000 clean room facility for all optical package assembly

**THE HIGHLY CONFIGURABLE M-CLASS EO/IR SYSTEMS ARE THE SINGLE SOLUTION FOR ALL YOUR STABILIZED LONG RANGE IMAGING APPLICATIONS**

Sierra Pacific Innovations Corp - Las Vegas, NV, USA - 702-369-3966 - sales@x20.org - www.x20.org

SPI products may be under control of BIS or Department of State ITAR. Sales to qualified entities only. This document is information only and not an offer to sell. Contact SPI Corp for an official quotation. Specifications subject to change without notice. SPI terms and conditions can be reviewed online at http://www.x20.org/terms-conditions/
COMPANY OVERVIEW

- Focused on military and homeland security applications
- Team of talented engineers, technicians and sales support staff
- 27,000 square foot manufacturing facility and 3,000 square foot support center
- Extensive CNC machine shop and automated inspection
- ISO 9001 and AS9100 registration (perfect scores)
- Factory capacity can support >40 integrated surveillance or camera systems per month
- Key markets are airborne systems, ultra long range surveillance systems, armored vehicle sights, border protection and coastal security

PRODUCT AREAS

- Precision 2, 3 and 4 axis gimbals
- Industry leading rugged, reliable sensor systems
  - Ultra long range IR and visible/low light camera systems
  - Ultra long range, eye safe at the aperture laser pointer
  - Ultra long range eye safe laser illuminators
  - Integrated laser range finders
  - Color night vision
- Integrated, network enabled surveillance systems based on optimized selection and integration of gimbal and sensor configurations
- Airborne sensor systems
  - Hunter uav take off/landing camera, kc-767 tanker vision systems, c-17 load master vision system, advanced flight research sensor systems for nasa t/18, f/15, 747, and high altitude research aircraft
- Environmental enclosures for demanding applications from oil production to space based imaging
- Firmware, software and user interfaces based on extensive field testing and deployment
- Complete systems engineering services from requirements development to optimized ESS and acceptance testing

MANUFACTURING CAPABILITIES

- 27,000 square foot facility with integrated design, fabrication, assembly integration and test capabilities
- Extensive cnc machine shop running two fully staffed shifts and one autonomous operation shift
- Class 10,000 clean room with laminar flow bench
- Optical integration lab
- Laser integration and test lab
- Integrated environmental test center
- Integrated in house design, fabrication assembly, testing, and support
- All processes and procedures are documented and certified to AS9100b certified and ISO 9001
- Integrated product development including requirements definition and analysis, mechanical design engineering, electrical design, software development and support, precision assembly, inspection and test
- Two shift machine shop and one assembly and test shift delivering >40 multi-sensor suites per month
- Every sensor and laser product is subjected to full ess, immersion, test, and functional testing
- Extensive field testing and validation
- Close, long term supplier and customer relationships
- Flexible lean operations

TESTING/VALIDATION

- Thermal stress test of camera and lens to identify components requiring replacement, active cooling/heating, modification or hardening
- Incorporate changes and perform validation thermal stress test
- Integrate modified components on baseline optical bench
- Perform vibration stress test to identify components requiring reinforcement or isolation
- Incorporate changes and perform validation vibration stress test
- Repeat thermal validation tests
- Perform ESS testing on all units to storage temperature and maximum operation vibration levels

THE HIGHLY CONFIGURABLE M-CLASS EO/IR SYSTEMS ARE THE SINGLE SOLUTION FOR ALL YOUR STABILIZED LONG RANGE IMAGING APPLICATIONS