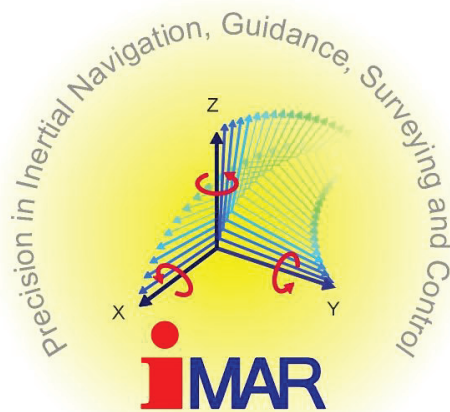


Stabilized Sensor Platform iIPSC-MSG

Naval and Surface Platforms for EO/IR Imaging,
Antenna Pointing, Target Tracking
with Geo-Referencing Capability



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Document History

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1.0	15.09.08	System Definition
2.0	13.01.09	Review and Prototype
3.0	28.08.09	CDR
4.0	08.04.2010	Additional features INS and TVT
4.1	19.04.10	Video tracking extension
4.2	30.04.10	Communication Protocol expanded according to Customer Requests
4.3	02.05.10	Joystick panel picture added
4.4	16.05.10	Operational Mode explained more in detail.
4.5	26.06.10	Protocol extended
4.6	05.08.10	Joystick panel function detailed, software description added
4.7	27.08.10	SKIP command adapted to TVT capabilities
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Quick Guidance through this Manual:

Maintenance Hints are marked by a blue indicator.

Safety Hints (Danger!) are marked by a red indicator.

Operational Hints are marked by a green indicator.



1 Introduction

This document describes the system configuration and performance characteristics of iPSC-MSG, a Two Axes or Four Axes Stabilized Platform of Series iPSC with two degree of angular freedom (pan/tilt or also called azimuth/elevation) for stabilization of electro/optical sensors (EO/IR) like thermal (infrared) and daylight cameras, laser range finder, laser designator, radar and communication antennas or other equipment.



The platform is stabilized using an integrated high performance inertial measurement unit and using a multi target acquisition capable video tracker.

The iPSC-MSG is designed to be used on navy and marine police / customs vessels as well as on surface vehicles like tanks and trucks.

Figure 1: Gyro Stabilized EO/IR Imaging Platform iPSC-MSG

The iPSC-MSG contains (some components are options):

- 2-axes or 4-axes high precision stabilized gimbal with or without window wiper
- Inertial Measurement System iIMU-FCAI or iIMU-FSAS for stabilization,
- TV-Tracker iOET² for high performance optical target tracking
- Image fusion of thermal and daylight image to provide one overlaid image (option)
- Stabilization & Control Unit iSCU
- Joystick Control panel iJP with video screen
- Support devices like Uninterrupted Power Supply (UPS), Enslaving Data Interface for Remote Control (option)
- Anti radar design (stealth)

- Water cooling for high dynamic operation in high ambient temperature environment (option)
- Customized Interfaces and Features: due to its modular architecture the system can be easily adjusted to specific payloads. A proposal of payloads can be found in document "payload EO/IR Sensor Selection Guide for iMAR's Gyro Stabilized Platforms of Type iPSC", Doc No. DOC101128001.

The full iPSC-MSG system is designed and manufactured by iMAR in Germany, from the inertial measurement system via the target tracking system iOET², the high sophisticated control algorithms up to the advanced mechanical gimbaled system, which is also fully manufactured at iMAR on their 5 axes CNC machine tools in house. Therefore iMAR supplies the unique capability to serve its customers with standard systems as well as with customized solutions.

This iMAR design do not contain any ITAR related components, therefore the systems are in use worldwide without those export limitations.

iMAR is certified according to ISO9001 (industrial applications) as well as to EN9100 (airborne and military systems). All systems are qualified at iMAR's in-house environmental lab for vibration, shock and temperature, furthermore they are designed according to MIL-STD810F and MIL-STD416E.

Features:

- Elevation over azimuth gimballed two or four¹ axes stabilized sensor platform with built-in control and power electronics.
- Position readout resolution better than 0.000'1 deg.
- Smooth stable rates over large dynamic range suitable for long focal length sensors
- Continuous rotation in azimuth and continuous or limited angular freedom in elevation
- Direct drive brushless torquers and direct shaft mounted non-optical position encoders
- Designed for high dynamic operation (a an option >2'000 °/s²); provision for water cooling for operation in high ambient temperature environment
- Sealed for sea coast and naval vessel environment
- Sensor bay with mounting provisions and windows for off-the-shelf or customer furnished sensors or iMAR factory designed payload, e.g. containing:
 - IR imager 3...5 µm
 - IR imager 8...12 µm
 - daylight or micro-light cameras
 - laser range finder
 - aim point projector(see DOC101128001 for details)
- Stealth design for anti radar protection as an option
- Integrated iSCU Stabilization and Control Unit for video tracker control, remote control via joystick or external command interface. Available interfaces:
 - RS422 (UART, up to 115.2 kBd)
 - Ethernet (TCP/IP, UDP)

¹ Four axes are used where minimum friction is required despite of an extended sealing

- CAN Bus
- Customized
- Joystick supported or autonomous operated iOET² Opto Electronic Target Tracking, with multi target acquisition and tracking provision (switchable by software between infrared or daylight camera). Optional image fusion capability available to generate one image from an overlay of thermal image and daylight image.
- Open user interface to allow direct drive control by the user if desired (option).
- Provision to apply vibration damping elements to isolate the platform against vibration and shock impact.
- Built in diagnostics, data logging capability and maintenance tools ascertain system health prior to its utilization.
- iMAR's open system architecture and design allows us to adapt the device easily to customers requirements like:
 - change of payload (all kinds of cameras, antennas, laser range finder, designator...)
 - change of geometry (central payload or T geometry)
 - dynamics of drive system
 - environmental conditions
 - size, weight, hardening