



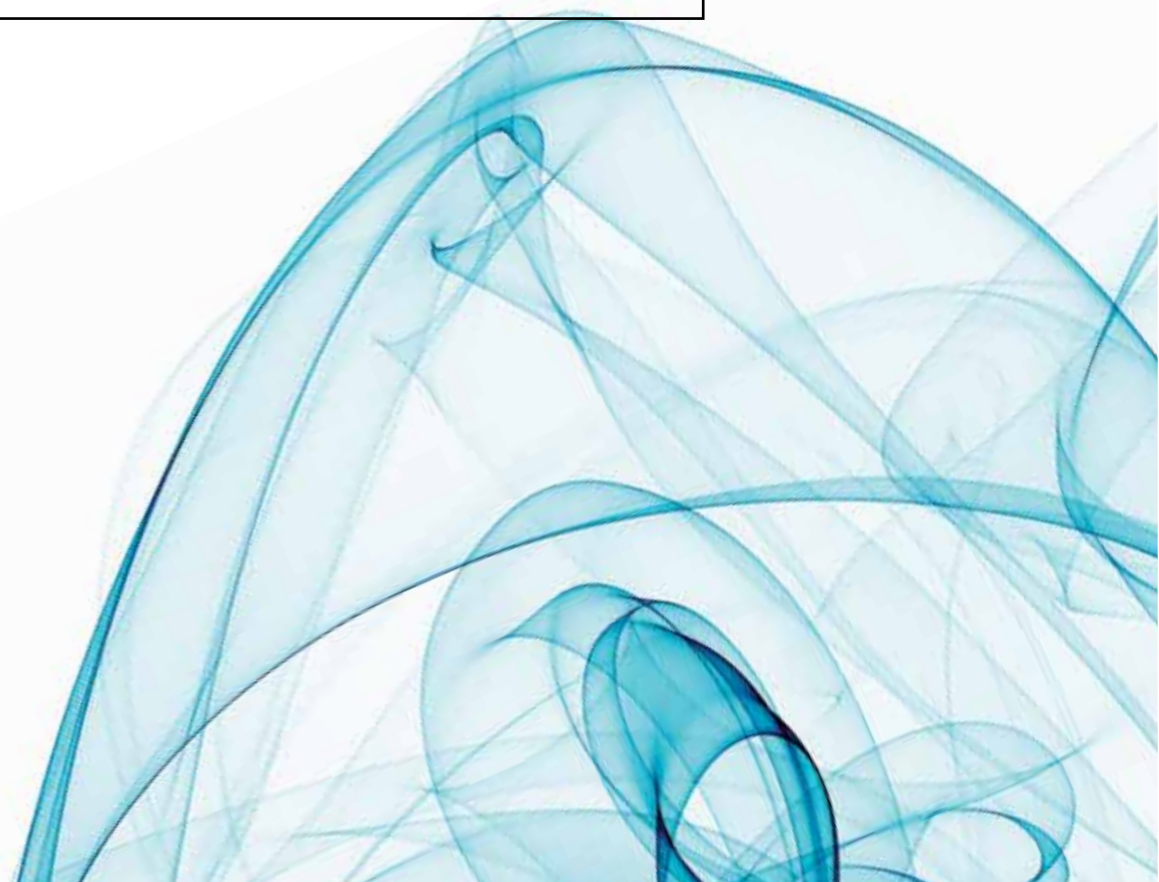
**indra**

SECURITY & DEFENSE

# **P2006T MRI SURVEILLANCE SYSTEM**

Cost effective Airborne System for Maritime Surveillance

[indracompany.com](http://indracompany.com)



# P2006T MRI SURVEILLANCE SYSTEM



TECNAM P2006T MRI

## MARITIME SURVEILLANCE

Maritime Surveillance is the effective knowledge and understanding of all activities carried out at sea within the territorial waters or Economic Exclusivity Zone that could impact the security, safety, economy, or environment of a country.

A set of different missions may be executed:

- Maritime Safety
- Search and Rescue
- Fisheries Protection
- Maritime Oil Fields Protection
- Marine Environmental Protection
- Drugs interdiction
- Illegal Immigration Interdiction
- Defence Readiness
- Other Law Enforcement Missions

## THE SYSTEM

Many countries around the world have deployed Coastal Surveillance Systems or Vessel Traffic Services Systems which allow the coverage of their coastal waters up to a range of 40/50 NM. Beyond that range blue waters are explored by heavy maritime patrol aircrafts and vessels.

Light/Medium helicopters are commonly used at ranges from 20 to 100 NM from the coast, the performance of such platforms, even though of paramount importance in rescue operation, in search operations is normally very poor and very expensive.

The concept of the design is to develop an airborne surveillance platform allowing to explore the area situated between 50 and 200 NM with a very low cost of acquisition and extremely low cost of flight hour. The result is an airborne surveillance platform allowing to explore areas from 3000 to 8000

square NM at a typical range of 100 NM from the coast with an acquisition cost similar to that of a light helicopter and a probability of intercept close to 100%.

System design is based on four main factors:

- Use of a low cost aircraft.
- Use of a well proven airborne search & identification radar.
- Use of a large format long range day and infrared stabilized optical sensors.
- Use of Vessel Automatic Identification System.

The result is an excellent Maritime Surveillance Airborne System which may execute all the missions required on the maritime scenario and may very efficiently enhance the detection range and performance of existing coastal surveillance systems.

The experience of five major companies has contributed to the success of the design:

- **Indra**, largest provider of shore based Maritime Surveillance Systems worldwide.
- **Tecnam**, the number one manufacturer of Light Sport Aircrafts (LSA) worldwide.
- **SELEX Galileo**, European leader in airborne radar.
- **Flir Systems**, one of the world top electro-optics manufacturers.
- **Airborne Technologies**, which gathers an important experience on installation of systems on the P2006T.



## TECNAM P2006T

The MRI is based on the TECNAM P2006T platform. The aircraft was selected taking into consideration a number of factors like reliability, economy of operation, maintainability and performances. Minimum pilot rating (PPL/ME) is required to fly the aircraft.

### Flexible fuel system

MOGAS (automotive 95 oct) / AVGAS.

### Twin engine

Tecnam P2006T is a twin-engine four-seat aircraft equipped with two four-cylinder four-stroke Rotax 912S3 liquid cooled engines of 100hp (73kW) each with an exceptional TBO of 2000 hours.

### High Wing

The superior high-wing configuration offers stability, cabin comfort and excellent visibility.

### Payload capacity

P2006T is a robust yet very light airframe, resulting in an outstanding payload to total weight ratio.

### Fully retracting landing gear

The fully retracting landing gear allows the installation of multiple sensors on the belly avoiding reflections, obstacles and interferences thus maximizing the sensors performance.

### Long endurance

Two fuel tanks are located outboard of the engines holding 200 litres in total providing 6 hours fly time.

### Very low stall speed

The P2006T configuration allows stall speeds lower than 48 kts with very short take-off/ landing distances (500 m) making it ideal to operate in short runways.

### Advanced cockpit

The P2006T can be equipped with the most advanced IFR Glass Cockpit Display (Garmin 950) and other navigation aids like Autopilot, Synthetic Vision Display, Storm scope, DME, etc.

### Safety

The cabin's structural design ensures the required crashworthiness prescribed in recent amendments to the FAA-FAR23 and EASA-CS23 codes.

### Reliability

The twin-engine configuration of the Tecnam P2006T is extremely dependable, enabling the aircraft to travel long over water distances or over rough terrain.

### Maintainability

Simple and convenient access to the engine compartment allows for fast daily inspections.

### Reduced operating costs

Low fuel consumption and minimum maintenance requirements convey in extremely affordable operating costs.

## PERFORMANCE

Max speed at sea level	140 kts
Cruise speed (75%, 7000ft)	131 kts
Cruise speed (65%, 9000ft)	122 kts
Stall speed flap down	47 kts
Climb rate, s.l.	1190 ft/min
Climb rate, s.l. (single engine)	300 ft/min
Range to 65%, 30' reserve	500 n.m.
Service ceiling (twin engine)	14000 ft
Single-engine ceiling	6000 ft
Takeoff distance	1476 ft 450 m
Takeoff run	771 ft 235 m
Landing distance	1050 ft 320 m
Landing run	623 ft 190 m
Wing Span	37,40 ft 11,4 m
Wing Area	159,31 sq ft 14,8 sqm
Fuselage Length	28,50 ft 8,7 m
Fuselage Height	9,35 ft 2,85 m
Cabin Width	48,03 in 1,22 m
Cabin Length (with bagg.)	11 ft 3 3,35 m

## DESIGN WEIGHT AND LOADING

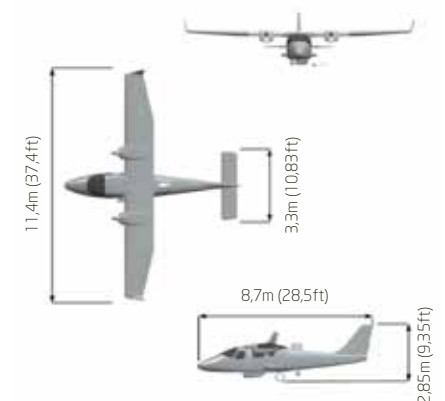
Maximum Take-off weight	2712 lb 1230 kg
Standard Empty Weight	1874 lb 850 kg
Standard Useful Load	838 lb 380 kg
Ultimate Load factor	+5,7g/ -2,9g
Baggage Allowance	176 lb 80 kg

## ENGINE

Manufacturer	ROTAX
Model	912S3
Number of cylinder	4
Take-off performance	73,5 kW 98 hp
Max continuous performance	69 kW 92 hp
Gearbox reduction ratio	2,43:1

## PROPELLER

Manufacturer	MT PROPELLER
Type	Const speed, full feathering
Number of Blades	2
Model	MTV-21-A-C-F/CF178-05



## MISSION SYSTEM

The Mission System is the core of the MRI and the result of years of experience in Surveillance Systems. Being conceived as a state-of-the-art software system it fully integrates the information gathered by the all the sensors, controls them and manages the communication with the Ground Station.

### Integration

All the systems are integrated in a unique software application that controls all the sensors, collects, fuses and records the data received by them and presents all the information in a single moving image.

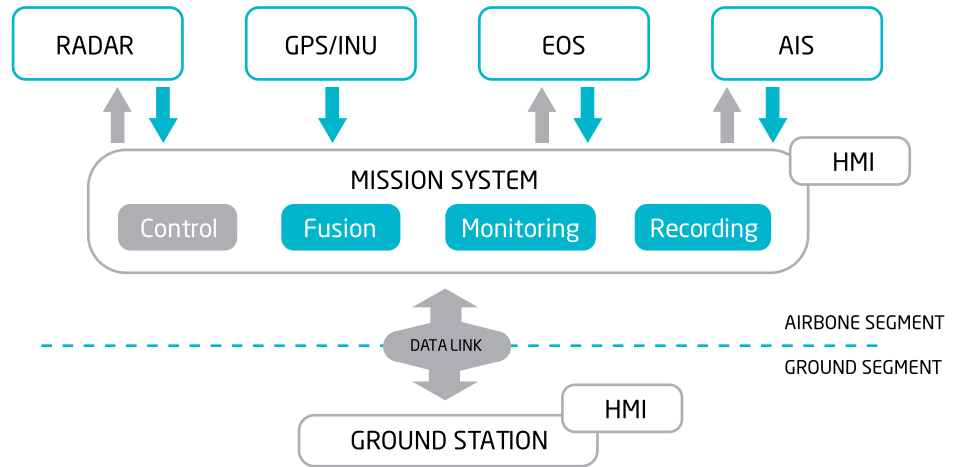
### Simplicity

Simple and clear design. Advanced functions involving the use of multiple sensors are easily achieved, executed and learnt by the operators.

### Operation

The operating concept is simple but powerful, combining and exploiting the maximum performance of every sensor:

- The Radar search capabilities are used to detect and locate the targets with a very high Probability of Intercept.
- The AIS information is correlated with the radar providing identification of those targets carrying AIS transceivers.
- The SAR/ISAR modes are used to classify the unknown targets.
- The EOS provides the identification of the targets.
- All the information is presented graphically as an overlay over a map display.
- All the information generated is recorded and transferred in real time to the Ground Station through the datalink.
- The operator receives support information (voice or data) sent by the Ground Station personnel.
- All the information is recorded, making possible the reproduction of the complete scenario from any computer.





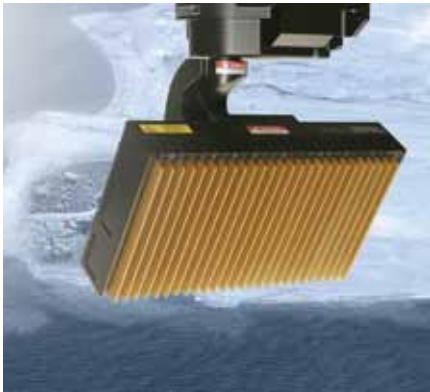
## SEASPRAY 5000E

### Multimode RADAR

The ITAR free Seaspray 5000E Active Electronically Scanned Array (AESA) multi-mode surveillance radar from SELEX Galileo provides an unrivalled surveillance capability as the primary sensor to meet the challenges of the 21st century.

### Active Electronically Scanned Array (AESA)

Seaspray 5000E employs the Seaspray family common processor, coupled with a compact state-of-the-art AESA antenna to provide a cost-effective radar system with a wide range of capabilities from its unique eScan enabled small target detection to long range search and covering air-to-surface and air-to-air environments.



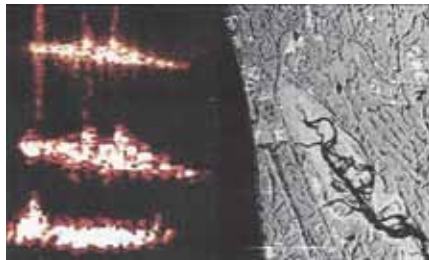
### Lightweight and compact system

Comprising just two Line Replaceable Units (LRU), it is a highly reliable lightweight system that can be easily integrated with other mission sensors and avionics using industry standard interfaces. Seaspray 5000E requires no waveguide connections thus making installation and maintenance much simpler.

### True Multi-Mode operation and Mode Interleaving

Multiple radar modes are available which provides very flexible multi-mission capabilities. Modes are internally interleaved allowing transparent use of several modes simultaneously.

- Long range search
- Priority Track
- Small target mode
- Weather modes
- Beacon detection modes
- Image modes (Spot SAR, Strip SAR, ISAR)
- Surface & Air Moving Target Indication (MTI)



### Superior reliability and maintainability

Seaspray 5000E delivers high operational availability and probability of mission success by replacing the conventional single point failure transmitter with many high reliability Transmit Receive Modules (TRMs).

### Low cost of ownership

The customer benefits from reduced maintenance and spares holding requirements through the high reliability and availability provided by Seaspray 5000E resulting in significant cost benefits through the life of the system.



## CHARACTERISTICS

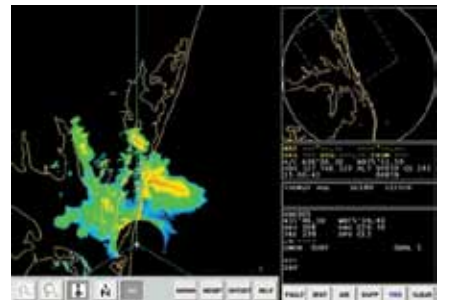
Frequency	X Band
Scan coverage	360 deg
Maximum range	> 100 Nm
Mean Time Between Failure	≈ 2000 hours
Cooling	Unconditioned air
Weight	< 48 kg
Dimensions (approx.)	
Processor	500x260x210 mm
Antenna	485x220x115 mm
Interfaces	Ethernet, Mil Std 1553B, ARINC 429, ARINC 419, RS422, RS232, USB and synchro
Video outputs	RGB, Stanag 3350, VGA, Digital Video

## CAPABILITIES

Surface Surveillance	Long range search Priority track Small target mode
Navigation	Real beam ground map Weather detection Turbulence detection
Beacon Detection	Search and Rescue Transponder (SART)
Target Imaging / Classification	ISAR Range profiling
Ground Mapping	SPOT SAR High resolution ground mapping STRIP SAR Medium resolution wide area ground mapping Oil Slick detection Iceberg detection
Moving Target Detection	GMTI Air-to-air MTI

## FUNCTIONS

Track While Scan	Automatic
Track Identification	AIS Integration
Mode Interleaving	Simultaneous dual mode operation



## ULTRA FORCE 275 HD

### Electro-Optical System

Ultra Force 275 is a compact High Definition electro-optical payload from FLIR SYSTEMS equipped with Infrared and CCD sensors delivering fully digital HD output for all video channels.

### Main features

- **Infrared Sensor.** Large format 640 x 512 thermal camera. Continuous zoom 3-5µm thermal imager which allows target identification and analysis at safe ranges in all weather conditions.

### OVERVIEW

275 mm (D) x 378.5 mm (H), 12 kg

ITAR Free

Fully digital HD-SDI video outputs

Environmental RTCA DO-160E

Auto Tracker

### THERMAL IMAGING

Sensor type 3rd gen 640 x 512

3-5 µm focal plane array

FOVs Continuous zoom  
35.5° x 28.7° to 1.83° x 1.47°

Image Enhancements: Non Uniformity Correction, Automatic Gain Control, Histogram Equalization, Digital Details Enhancement (DDE)

Ezoom 2x

- **High definition color camera.** The 1920x1080 HD CCD with 20x zoom camera maximizes detection range during daytime surveillance missions; the low light function extends operation into dawn or dusk.

- **Aircraft designed.** A single LRU and 4 axis stabilization system provides outstanding imagery, critical for long range surveillance.

- **ITAR Free.** All the components are manufactured in Europe.

### GIMBAL

LOS Pan range 360 degrees continuous

LOS Tilt range +20 / -120 degrees

AZ/EL slew rate Up to 60°/s

Stow Magnetically held in stow position

4 axis stabilization

### DAYLIGHT IMAGING

High Definition CCD Sensor

Resolution 1920 x 1080 HD

Continuous optical zoom 20x

Ezoom Up to 4x continuous

Low Light Function



## AIRBORNE AIS TRANSPONDER

The MRI platform integrates an AIS (Automatic Identification System) transponder specifically designed for aircraft installation. The system is world-wide used in Search and Rescue (SAR) and maritime surveillance missions.

### Performance enhancement

Airborne AIS transponders greatly improve surveillance of large areas. The AIS transponder broadcasts and receives information about all AIS equipped vessels within VHF coverage, increasing the level of success in Security, Environmental Protection and Rescue Missions.

### Integration

This AIS information is integrated and correlated with the Radar tracks creating a single picture on the operator console, obtaining a surveillance capability that drastically simplifies the decision making process.



## COMMUNICATIONS DATA LINK

### State of the art technology

The platform is provided with the latest generation of IP-based Line Of Sight (LOS) data link, allowing the establishment of a high bandwidth, flexible, secure and reliable bi-directional Air to Ground link.

### Best coverage

The use of COFDM and Diversity techniques offers the best coverage to bandwidth possible ratio.

### Bidirectional communication

It enables a secure data transmission between the aircraft and the Ground Station in both senses of the link, allowing a unique tactical picture in real time.

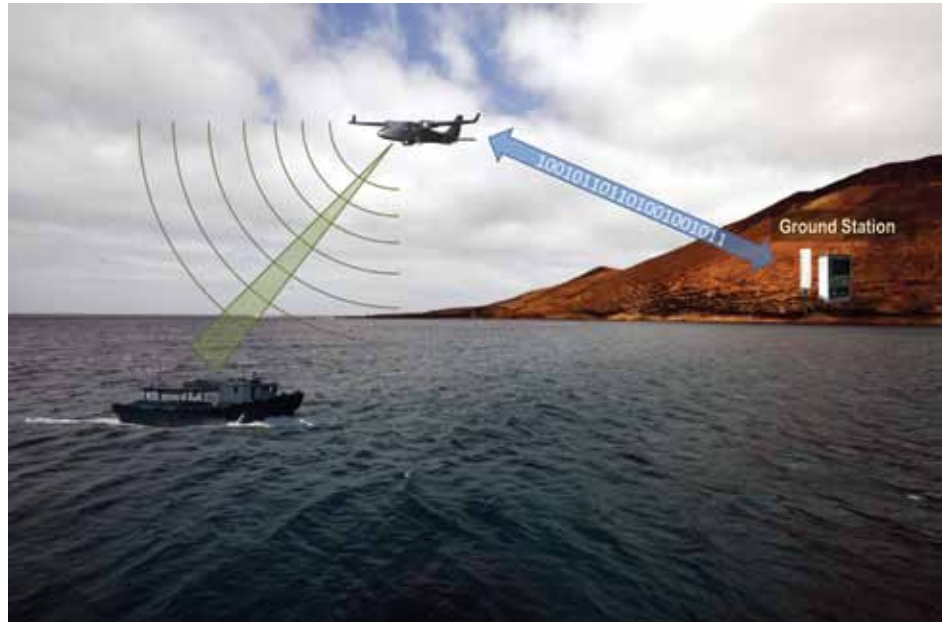
### Integration ready

Being based on standard IP protocol, the system can integrate and interconnect any IP interfaced device already used by the customer.

### Scalability

For specific needs, the system is fully prepared to integrate other communication systems, e.g. SATCOM.

## COMMUNICATIONS DATA LINK



## GROUND SUPPORT STATION

The Ground Support Station (GSS) is an integral part of an Airborne Surveillance System. Its main capabilities are Mission preparation, real-time Mission tracking and Mission debriefing/playback. Mission tracking and playback provide a fully integrated operational picture including aircraft position, video signals, radar data and images and AIS information.

### Full operation

The GSS consists of a data terminal linked with the aircraft capable of receiving all information gathered by the MRI and transmitting support tactical data.

Data are presented to the operator in a similar interface as it is on the aircraft, allowing Ground Operators to perform the same functions as in the air, including control of radar and EOS.

The GSS is also equipped with VHF communication transceivers providing the system with a voice link with the aircraft.

### Post processing

The GSS can record and reproduce all the data generated during any mission, simplifying the task of making decisions.

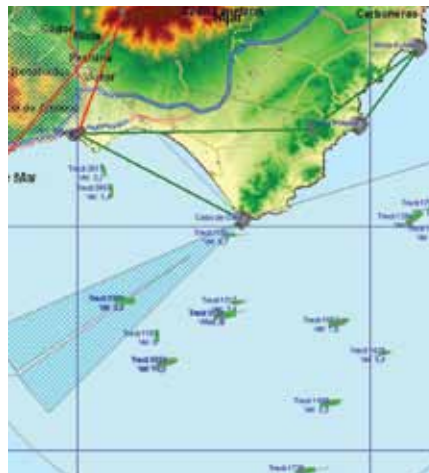
### Integration with existing systems

Modular and Scalable architecture. The System can be fully integrated with any legacy Coastal Surveillance System or Vessel Traffic Management System already deployed with a minimum impact.

The fully IP external interface allows a simple and smooth integration with any existing IP platform (e.g. VoIP, e-mail, file transfers, data base access, etc.)

### Customizable

The modular and flexible system architecture allows the adaptation of the software to specific user needs.





## About Indra

Indra is the premier Information Technology Company in Spain and a leading IT multinational in Europe and Latin America. It is ranked as the second European company in its sector according to investment in R&D with nearly € 500 M during the last three years. In 2010 revenues reached € 2,557 M of which a 40% came from the international market. The company employs more than 31,000 professionals and has clients in more than 110 countries.

Indra is also the leader in Europe in Maritime surveillance systems with systems deployed in Spain, Portugal, Latvia, Romania and Hong Kong; Indra is also the leader of "Perseus Project" PERSEUS (Protection of European seas and borders through the intelligent use of surveillance) to be developed for the European Union with a budget over € 40 M.



## About Tecnam

TECNAM traces its roots back to the activities of the Italian brothers Luigi and Giovanni Pascale, who developed and produced innovative aeroplanes soon after the end of WWII (1948) and have continued ever since to create original models that gained worldwide recognition under the name Partenavia. Established in March 1986, Costruzioni Aeronautiche TECNAM now operates in two production facilities and has over 100 service centres worldwide.

Tecnam has produced more than 3,800 aircrafts in the LSA category. Currently Tecnam manufactures the P2006T, P2002 and P92, which are some of the most successful Light Sport Aircraft (LSA) all over the world.



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