TSA & TSB 2500
IFF Interrogator and CIT
Medium/Long range - Aero and Surface

- Modes 1, 2, 3/A, C, S, 4, 5 and National Secure Mode
- Fully compliant with the latest IFF military and civil standards (Mode 5, Mode S)
- Modular concept matching various operational/integration needs (E-Scan and M-Scan)
- Unmatched compact size and weight
- Qualified on many platforms (Rafale, Erieye, NH 90, Gripen… Naval & Ground Systems)
Aero and Surface IFF Interrogator and CIT

Description

The BlueGate TSA/TSB 2500 is a family of advanced MKXIIA/Mode S Interrogators (TSA 2500) and Combined Interrogators Transponders (TSB 2500). It provides all civil and military modes: 1, 2, 3/A, C, S, 4, 5 (Level 1 & 2) and National Secure Mode. More than 1200 units have been manufactured and TSA/TSB 2500 IFF equipment have been integrated and qualified on many platforms including Rafale, Erieye, NH 90, JAS 39 Gripen, M2000, MIG 29, SU 30, CN 235, Naval & Ground Systems.

Scan interrogator operation is provided by a unique core processor unit interfaced with an Antenna Adapter Unit (AAU) for Mechanical Scan (M-Scan) or with an Antenna Control Unit (ACU) for Electronic Scan (E-Scan). Other versions of the BlueGate TSA/TSB 2500 are available and in service. They are designed to fit various specific requirements such as equipment-form factor for M2000 or full Modes/ABS-In operation for AEW applications. All equipment of the BlueGate TSA/TSB 2500 family are qualified to interface with relevant US or European Mode 4/Mode 5 or National Secure Mode appliqué crypto computer.

Operation

The interrogator and transponder functions are controlled via a MIL STD 1553B, Serial RS 422 or Ethernet bus interface and operates according to STANAG 4193. The interrogator provides target designated or sector scanned interrogation and reports. It also offers an embedded target tracking capability which enables an easy integration onto the platform. Monopulse processing provides accurate azimuth measurement.

The E-Scan version can manage two antenna arrays - top and bottom - and discriminate targets from top, central and bottom sectors. The M-Scan version is fitted with a high speed serial input providing an accurate tracking capability of the radar antenna position. Digital pulse processing, defruiting and a statistical reply evaluator ensure optimal signal extraction and ground clutter elimination, even in adverse environments.

The interrogator includes the latest NATO mode 5 as well as the civil mode 5. The transponder provides diversity operation, includes mode 5 level 1 & 2, and mode 5 up to level 3 capability as well as enhanced and elementary surveillance services. An optional remote Control and Display Unit can be provided if the transponder is required to be controlled independently from the MIL STD 1553B bus. In order to facilitate the integration, Thales can propose a pseudo MIL 5 crys computer PSK 77 (no mode 4 or mode 5 keys required, no Time Of Day loading required).

Testability

Each SRU is fitted with a powerful BIT detection for failures down to the chip level and reporting to the Central Processing Unit, according to the latest IEEE 1149.1 BIT techniques.

Operational advantages

The BlueGate TSA/TSB 2500 family is perfectly suited to advanced fighters, surveillance aircraft, helicopters, as well as for ground or naval applications. Fully compliant with the latest NATO mode 5 and ICAO mode 5 standards, it delivers to the Armed Forces an unprecedented identification and surveillance capability for the coming decades. The remote active Antenna Control or Adaptor Units provide a superior performance margin compared to other systems, offering an outstanding capability to identify friendly aircraft beyond the radar range.

The modularity of the Interrogator and Transponder functions enables delivery as a Transponder, an Interrogator or a Combined Interrogator Transponder.

Platforms

**FIGHTER**
- Rafale
- Mig 29
- SU-30
- M2000
- JAS 39 Gripen

**HELICO**
- NH-90
- NH-90 A5W
- Sea King Mk7

**MISSION A/C’s**
- Erieye
- CN-235
- EMB 145
- SAAB 340
- SAAB 2000
- Atlantique 2

**SURFACE SHIP**
- Squid OPV
- Patilfa frigates
- LPD-2
- Sigma Corvette

Technology

The BlueGate TSA/TSB 2500 family is highly integrated and modular. It allows more than 50% weight and volume reduction with regard to conventional IFF systems. A dual frequency power amplifier and a deploy/switch performs the transmission functions. A unique core processor unit interfaced with an Antenna Adapter Unit or an Antenna Control Unit, integrates the Electronic Scan (E-Scan), M-Scan or full Modes/ABS-In operation for AEW applications. The BlueGate TSA/TSB 2500 family, including all civil and military modes: 1, 2, 3/A, C, S, 4, 5 (Level 1 & 2) and National Secure Mode, are highly flexible and versatile regarding either future upgrades or platform integration.

Mode S / Mode 5

- **TSB 2510**
  - Combined Interrogator Transponder
  - And E-Scan ACU

- **TSB 2520**
  - Combined Interrogator Transponder for M-Scan Antenna

- **TSA 2540**
  - Full Mode S Interrogator

- **TSB 2510**
  - Combined Interrogator Transponder for M-Scan Antenna
MAIN FEATURES

General characteristics

Interrogator
- Transmitter: All Solid State
- Center Frequency: 1030 ± 0.01 MHz
- Output Power (Max):
  - TSB 2510: 3200 W
  - TSB 2520: 2000 W
  - TSA 2540: 500 W
- Receiver: Dual channel superheterodyne
- Center Frequency: 1090 ± 0.1 MHz
- Minimum Decoding Level (MDL): > -83 dBm
- RSLS, STC: According to application
- Processing: ASIC and DSP
- Processing Range: Up to 475 km
- Modes:
  - MkXIIA: 1, 2, 3/A, C, 4, 5 (L1&L2), National Secure Mode (NSM)
  - STANAG 4193 Ed 3 / DoD AIMS 03-1000B
  - Mode S (dual channel for interrogator only)
  - ADS-B In
- Operating: Automatic or manual
- BITE: Automatic operation

Transponder
- Transmitter: All Solid State
- Center Frequency: 1090 ± 0.01 MHz
- Output Power: 500 W @ 1 % DC
- Receiver: Dual channel superheterodyne
- Center Frequency: 1030 ± 0.05 MHz
- Minimum Triggering Level (MTL): > -77 dBm
- Dynamic Range: > 55 dB
- Processing: ASIC and DSP
- Modes:
  - MkXIIA: 1, 2, 3/A, C, 4, 5 (L1&L2), National Secure Mode (NSM)
  - STANAG 4193 Ed 3 / DoD AIMS 03-1000B
  - Mode S level 2/3
  - ADS-B Out
- Interface: Adaptable to any system
  - Main control and Antenna position using MIL-STD 1553B, Serial RS422 or Ethernet
  - Interface to external transponder control unit
  - Transponder & Interrogator suppressions in/out
  - Discretes
- BITE: Automatic Operation

Physical

TSB 2510
- CIT (WxHxD): 157x193x332 mm
- ACU (WxHxD): 330x120x150 mm
- Weight: CIT 8.8 kg, ACU 5.5 kg
- Power Requirement: 28 V DC

TSB 2520
- CIT (WxHxD): 157x193x332 mm
- AAU (WxHxD): 33x193x313 mm
- Weight: CIT 8.8 kg, AAU 2.7 kg
- Power Requirement: 28 V DC

TSA 2540
- INT (WxHxD): 157x193x332 mm
- Weight: INT < 9 kg
- Power Requirement: 28 V DC

System Parameters
- MTBF: > 1800 Hours
- MTTR: < 10 mn

Environment
- Temperature:
  - Operating: -40 °C to +75 °C,
  - Storage: -55 °C to +85 °C
- Shocks, Vibrations: MIL STD 810E
- Not subject to ITAR regulations and not subject to German Export Control