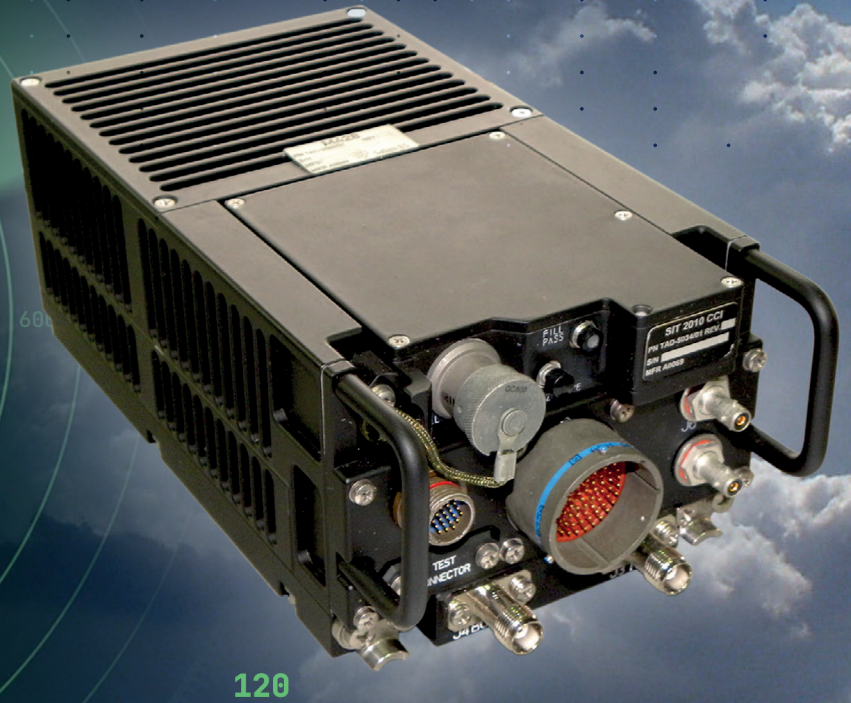# M428

MKXIIA & Mode S IFF Transponder

The M428 transponder is the ultimate evolution of the existing and well proven family of MkXIIA (MkXII + Mode 5) transponders developed under the NGIFF program. Military identification is achieved through Mode 5, supported by a removable encryption unit designed entirely in house (SIT 2010 ITAR free) or KIV77 crypto appliques both certified by NATO Authorities (SECAN).

Variants of the equipment can be provided for non-NATO applications with a property or National Secure Mode capability.

M428 is Compatible with the legacy and latest ATC standards, Mode 1, 2, 3/A, Modes C, S (up to Enhanced Surveillance) that includes an ADS-B capabilities.
The transponder is packed into a reduced ½ ATR form factor for hard mounting, specially designed for small size applications and it is configurable to maximize flexibility in the integration on the platform.
A conventional dedicated Control Panel (M910) can be provided for stand-alone applications.

The equipment has been designed in accordance with Design Assurance Level RTCA 178C and DO-254 DAL B and is suitable for all applications including avionic (fixed or rotary wings), UAS and ships plus future air surface identification as Reverse Mode 5.

Furthermore M428 provides:
- TCAS II Version 7.1 (RTCA/DO-185B or EUROCAE/ED-143)
- Capability to receive simultaneously data from two GNSS (e.g. Military and Civil GPS or Galileo) from several interfaces (MIL-STD-1553, ARINC-429, Ethernet, serial line).

MAIN FEATURES

- Dimensions: 124mm (w) x 87mm (h) x 200mm (d)
- Weight: 3 kg max
- Full MkXIIA, Mode 5 capability (compliant to STANAG 4193 Ed.3, ICAO Annex 10 Amd. 85)
- Easily interchangeable with equipment of previous generation (i.e. M425) also form & fit with special purpose mechanical adapter
- Removable crypto (SIT 2010) AIMS certified , i.a.w. DoD AIMS 04-900A option B
- ADS-B OUT compliant to DO-260B
- Receive up to two different data input from GPS equipment, one from a SAASM GPS (for military use) and one from a SBAS GPS (civil mode)
- Reverse mode 5
- ADS-B IN and Reverse Mode 5 growth capability
- Multiple, configurable system control and data interfaces
- Compatible with MIDS Data Link.

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REVERSE MODE 5

Reverse Mode 5 is for Air-to-Surface Identification (ASID) according to STANAG 4722.

OPERATION

The equipment is fully solid state and of modular construction to facilitate maintenance. Replies are transmitted on two RF connectors to provide full diversity operation, supported by a receive section that provides two matched channels.

Multiple options are available in order to interface the Host platform; all interfaces are available in the same unit and are automatically selected at power-up.

These options are:
- MIL-STD-1553 to interface an avionic bus
- RS 485 to interface an FMS or dedicated Control Panel
- ARINC 429 to interface an FMS
- Ethernet.

For integration on legacy platforms that do not include a Data Bus or FMS, M428 is compatible with M910 Control Panel for Mode S operation. The equipment is capable of providing Enhanced Surveillance operation. The equipment is also capable of operating in conjunction with a TCAS II (V7.1) processor. Extensive BITE is provided, including Power-Up, Continuous and Initiated BIT; test results and diagnostic information are available on the control interface.

CONFIGURATION

The transponder system includes:
- Transponder LRI
- Mounting tray
- Dummy unit to replace removable crypto appliquè when secure Mode of operation is not required.

In order to support the system, the company can provide a full range of solutions covering:
- Diagnostic SW (on OTS platform) for troubleshooting, and basic diagnostic exploiting built in self test capability.
- Special Test Equipment
- Automatic Test Equipment.

TECHNICAL SPECIFICATIONS

OPERATING MODES

- MkXA (1, 2, 3/A, C) i.a.w. STANAG 4193 Part I to III
- Mode 5 Level 1, 2 (upgradable up to 2B) i.a.w. STANAG 4193 Ed. 3 and DOD AIMS 03-1000B Amndt. 1, with the removable crypto compliant to DOD AIMS 04-900A Option B
- Mode S (Enhanced Surveillance) i.a.w. STANAG 4193 and ICAO Annex10, Vol. IV (Amd 85) and ADS-B i.a.w. RTCA DO-260B, TCAS interface i.a.w. TCAS II (V7.1)
- Mode 5 Reverse interrogation (Air to Surface) i.a.w. STANAG 4722, with SIT-2012 crypto appliquè.

DESIGN STANDARDS

Hardware:	i.a.w. level B of DO-254
Software:	i.a.w. level B of DO-178C, AIMS certified
Crypto Appliquè:	SIT 2010 crypto appliqué format i.a.w. AIMS 04-900 option B, SECAN & AIMS Certified, CCI Unclassified when keyed Weight 0.5kg
System Interface:	MIL-STD-1553B, ARINC 429, RS-485, Ethernet (growth capability)
Sensitivity:	i.a.w. STANAG 4193
Output Power:	i.a.w. STANAG 4193
Receive data from:	SAASM GPS (for military use) and from a SBAS GPS (for civil use)
Reliability:	MTBF > 4000 H @ ARW, 40 °C, i.a.w. MIL-HDBK-217F
Maintainability:	TTR < 10m @ LRU level
Testability:	95% fault isolation @ 2 SRUs
Environmental conditions:	MIL-STD-810G / RTCA DO-160G
Operating temperature:	-54 °C to +71 °C, Cold startup -40 °C
Electromagnetic Compatibility:	RTCA DO-160G / MIL-STD-461F
Dimensions:	½ ATR compact: 124mm (w) x 87mm (h) x 200mm (d)
Weight:	< 3.4 Kg (including crypto appliquè)
Input power:	28 VDC i.a.w. MIL-STD-704F
Power consumption:	< 40W with crypto installed
Cooling:	No cooling air is required
Mounting:	Hard mounted

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