



indra

SECURITY AND DEFENSE

MK XIIA/MODE S TRANSPONDER

Security and defense in five continents

indracompany.com



MK XIIA/MODE S TRANSPONDER



An advanced low cost solution for intelligence, surveillance, target acquisition and reconnaissance (ISTAR) missions in short range tactical operations

T50_UAV_MD5

The T50_UAV_MD5 is the most advanced Transponder in the market, meeting the requirements defined in STANAG 4193 and MIL-STD.

The equipment is based on "state of the art" technology and complies with the high reliability required for military use.

The transponder has been tested under the most stringent environmental conditions. Thereby it is equipment capable of operating in any military platform.

T50_UAV_MD5 is a system easy to use and maintain. It has been designed to minimize the maintaining actions.

The high versatile capability of the equipment allows it to be installed in any platform due to its variable configurations. The T50_UAV_MD5 operates in Modes SIF (1, 2, 3/A, C), Mode 4, Mode S and Mode 5.

This equipment is another outstanding result of Indra's experience in Identification Products.

Indra has integrated all identification modes including Mode 5 capability in its Transponder T50_UAV_MD5 in order to avoid fratricide risk and the situational awareness. The equipment offers the best solution due to its technical characteristics and versatility.

The T50_UAV_MD5 is a transponder designed to carry out the self-identification in presence of any interrogating-platform. It's reduced size and weight (<3 Kg; ATR, 70x184x225 mm) allows it to be installed at any platform.

Mode 5

The main and more advanced characteristic of the Transponder T50_UAV_MD5 is its ability of replying to Mode 5 interrogations, in addition to Modes SIF, 4 and Mode S. This mode of operation provides significant operational and performance improvements: better use of available bandwidth, increased probability of identification and improved performance in presence of interferences.

Mode 5 provides improved security and increased system capacity and permits maximum commonality with IFF Mk XII and Mode S installations.

Size, weight and versatility

Size, weight and versatility have been three important characteristics in the design process of transponder T50_UAV_MD5.

The T50_UAV_MD5 outstanding operational and environmental characteristics as well as its mechanicals specifications and modular design makes easy the complete adaptation of the T50_UAV_MD5 to any platform, military and civil either.:

- Size: It's reduced size (70x184x225 mm) allows the installation of the equipment in small platforms (with reduced bay area).
- Weight: (< 3 Kg) allows the installation of the equipment in light (or ultra-light) platforms (such as Unmanned Air Vehicles)
- Versatility: It's multiple configurations (stand-alone/ remote-controlled) allows the installation and integration of the equipment in multiple platforms, with multiple communications configuration (multiple buses are supported).
- Multiple altimeter configurations are allowed (Serial altimeter, Gillham, etc.)

Configurations supported

The T50_UAV_MD5 is designed to work in multiple platforms (due to it's high versatility capability). Three configurations have been defined:

- Stand-Alone: In this case platform only provides Power to the T50_UAV_MD5. Configuration of the T50_UAV is performed on ground by a Personal Computer (CDS). Configured parameters are:
 - Reply Modes (1, 2, 3/A, C, S, 4 and 5)
 - Reply Codes
 - BITE
 - Squitter configuration

- Remote-controlled (Optional upgrade): In this case platform provides configuration data to T50_UAV_MD5 by means of Mission Computer (commanded from ground control). T50_UAV_MD5 is commanded from a remote control by serial full-duplex line RS-485 as default, but can be also controlled by Bus 1553, ARINC429, ETH, RS232. Mission Computer allows operator to configure reply modes and reply codes and all the controls and indications necessary for the T50_UAV_MD5 operation.

Controls and status

Due to T50_UAV_MD5 high versatility. Operator is able to command and check the following operation parameters:

- Control:
 - Independent selection of Mode 1, 2, 3/A, C, 4, S, 5.
 - Squitter Mode 5 and S
 - Reply codes for Modes 1,2,3/A,4
 - PIN, NO, MC
 - SPI
 - EMM
 - ZEROIZE and HOLD for M4 crypto keys
 - STANBY, NORMAL, EMCON
 - Mode 4, Mode 5, Mode S and SIF controls according to STANAG 4193
- Status:
 - All Controls commanded
 - BITE information
 - Keys Status

Technology

The modular solid-state design, the extensive use of modern microprocessors and Digital Signal Processors (DSP's), the powerful Application Specific Integrated Circuit (ASIC) and Field-Programmable Gate Array (FPGA) technology and integrated Built-In-Test Equipment (BITE) provides to T50_UAV_MD5 maximum reliability.

The FPGA technology allows all the interfaces to be programmed by a special configurative parameters. This provides an easy adaptation to any platform.

In order to minimize maintenance tasks the T50_UAV_MD5 consists of independent shop-replaceable units (SRUs). This allows to an inexperienced operator repair the equipment if necessary. SRUs that composes the T50_UAV_MD5 system are:

- The Radiofrequency Assembly which is based on high power, low noise and extensive dynamic range amplifiers
- The Power Supply Assembly which meets MIL-STD-810 and MIL-704 requirements and comprises high reliability DC/DC modules

- The Transponder Processor Assembly which performs all process in the system (interrogations decode, communications, reply generation, BITE...)

The SRU's are designed to allow the addition of future developments to provide the equipment with new modes of operation and/or to adapt it to different platforms or costumer specifications.

Qualification

The T50_UAV_MD5 has been subjected to the most restraining environmental conditions: Temperature, Humidity, Altitude, Shock, Vibration, Acceleration, Fungus, Salt and Fog, Explosive Atmosphere, Lightning, Acoustic noise and EMC, according to standards MIL_STD_810, MIL_STD_461 and MIL_STD_462.

Built-in-test equipment (BITE)

BITE process detects equipment failures and test external interfaces (antenna cable and communication lines). BITE has been designed to minimize the rate of "False Failures" and spurious failures. For that purpose three different BIT are performed:

- PBIT: exhaustive test during "Power ON"
- IBIT: exhaustive test under user request
- CBIT: continuous and periodical BIT during normal operation of T50_UAV_MD5

Maintenance and reliability

The IFF Transponder T50_UAV_SIF exhibits high reliability. It is showed in its high MTBF and low MTTR which implies a low maintenance and embodies a Built-In Test system (PBIT, CBIT, IBIT) which makes possible quick and easy maintenance

Experience in IFF systems

Indra has been developed IFF systems (interrogators, transponders and combined interrogator-transponders) for 30 years. This fact has made Indra one of the most important IFF developers of the world. Indra has developed IFF systems for the most important and restraining platforms such as:

- F-18
- P3 Orion
- F-100
- F-105
- Airbus A400M
- Eurocopter Tiger
- Eurocopter NH-90
- S-80 submarine
- T50_UAV PASI
- T50_UAV ATLANTE

Integration

Its high outstanding operative characteristics and environmental performances make the T50_UAV_MD5 equipment suitable for its integration in multiple platforms, especially for airplanes (such as UNMANNED AIR VEHICLES), helicopters and surface and on ground platforms.



Technical Characteristics

GENERAL CHARACTERISTICS

Size	<ul style="list-style-type: none"> • (H) $70 \pm 1 \text{ mm} \times (\text{W}) 184 \pm 1 \text{ mm} \times (\text{D}) 225 \pm 1 \text{ mm}$ (without connectors) • (H) $70 \pm 1 \text{ mm} \times (\text{W}) 184 \pm 1 \text{ mm} \times (\text{D}) \leq 243 \pm 1 \text{ mm}$ (with connectors)
Weight	$\leq 3 \text{ Kg}$
Voltage	According to MIL-STD-704
Type	+28 V DC (nominal)
Consumption	50 W (max.)
BIT	Extensive BITE for easy maintenance (PBITE, CBITE, IBITE)

RECEIVER CHARACTERISTICS

Diversity	Dual channel
Sensitivity	According to STANAG 4193
Dynamic Range	MDL to -22 dBm
Carrier Frequency	$1030 \pm 0,5 \text{ MHz}$

TRANSMITTER CHARACTERISTICS

Carrier Frequency	$1090 \pm 0,01 \text{ MHz}$
Peak Power	$\geq 51,2 \text{ dBm}$
Duty Cycle (long-term)	According to STANAG 4193

PROCESSING CHARACTERISTICS

Modes of Operation	1, 2, 3/A, C, 4, S Level 2 Enhanced, 5 Level 2. Easy growth to Mode S Level 3, 4, 5 and Mode 5 Level, 3, 4
ISLS Operation	Yes
Mode S ADS-B	Yes

ENVIRONMENTAL CHARACTERISTICS

Operating Temperature	-40°C to +71°C
Storage Temperature	-50°C to +85°C
Altitude	40.000 ft (Operating)

Fully qualified to operate in air platforms (UAV, aircraft, helicopters, etc).

Compliant with MIL-STD-810E, MIL-STD-461/462

RELIABILITY / MAINTAINABILITY CHARACTERISTICS

MTBF / MTTR	Better than 3.500 hours / 15 minutes
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Main features

- Mk XIIA/Mode S Transponder (Mode 1, 2, 3/A, C, 4, S, 5)
- Appliqué Mode 4 and Mode 5 crypto (COMSEC).
- Dual, RS485, RS232, ARINC429, ETH interfaces. (By customer order MIL-STD-1553B).
- ARINC429 interfaces for TCAS, Altitude
- Two antenna interfaces for diversity operation
- DSP-FPGA processing
- Very Low Weight, Small Size
- EMI/EMC and Environmental qualified for military use according to MIL_STD_461/462 and MIL_STD_810



ISO 9001:2000



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