

Battlefield Combat Identification



TSE 6010

COMBINED INTERROGATOR TRANSPONDER

- > **36 GHz Millimetric wave IFF**
- > **Operates through Dust, Smoke, Rain, Foliage**
- > **Protects Friendly Forces**
- > **Contributes to Situational Awareness**
- > **Reduces Engagement Time**
- > **STANAG 4579**
- > **Covert, Secure: TRANSEC, COMSEC**
- > **Compatible with Laser Range Finder**
- > **Rugged Modular design for simple integration**
- > **Production contract in progress**

TSE 6010

Combined Interrogator Transponder

GENERAL

BIFF, Thales Battlefield Identification Friend or Foe solution, is a millimeter wave based (36 GHz band) cooperative identification system (Question & Answer) designed to equip all friendly platforms operated on the battlefield. BIFF is a trade mark from Thales.

BIFF Ground-to-Ground identification range is better than 6 Km (> 8 Km Air-to Ground) and the Probability of Identification is greater than 99%.

Combined Interrogator / Transponders (CIT) are required for attacking platforms such as Main Battle Tanks, Armoured Vehicles with gun or machine-gun, Recce vehicles, fixed, mobile or portable Anti-tank Missile Launchers and Attack Helicopters.

Transponders are required for non attacking platforms such as Armoured Personnel Carriers (APCs), transport and sanitary vehicles and Utility Helicopters .

In average, the quantity of Transponders required is approximately double that of CITs.

DESCRIPTION

The TSE 6010 is a small size, light weight, rugged, modular Combined BIFF Interrogator Transponder (CIT) system.

The TSE 6010 consists of the following units:

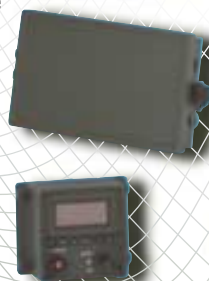
- Transponder mmW Antenna/Transceiver LRU
- CIT Processor LRU (including crypto)
- Interrogator mmW Antenna/Transceiver unit
- Remote Control Unit (RCU)

As shown here, the TSE 6010 modular construction allows various LRU arrangements to accommodate any type of platform's integration constraints.

In addition to its dedicated control and display features, the (RCU) provides hardware and software adaptable interface capabilities allowing easy integration in any type of platform.

As a standard feature, the RCU is fitted with RS 232 and CANBus; Digibus or 1553 B are available as an option.

TSE 6010 Combined Interrogator Transponder ▶



TSE 6010/Combined Interrogator Transponder with Processor installed externally ▶

OPERATION

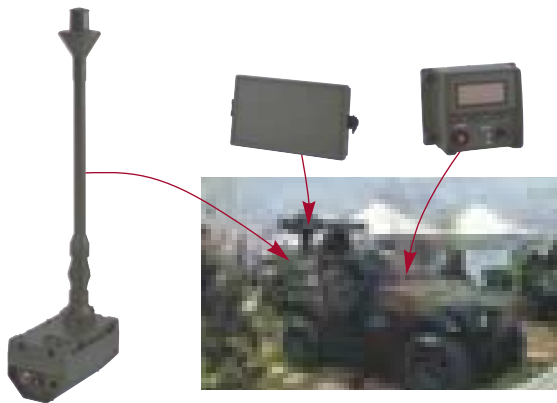
BIFF's primary function is the identification of friendly platforms using a Question/Answer process. Used in conjunction with a primary sensor (optical sights, optronics, TV, Radar) the TSE 6010 performs the identification as follows:

- Upon manual or semi-automatic identification requests, the TSE 6010 transmits a ciphered interrogation sequence within a narrow azimuth sector, centered on the aiming system's line-of-sight
- Having authenticated the interrogations, the transponders located within the illuminated sector send back a ciphered reply sequence
- Friendly replies are received, processed, authenticated by the TSE 6010 which then, provides the following results to the operator:
 - "Friend" status, identity and laser-correlated range of the aimed target as well as identity and number of non-laser correlated friends in sector
 - "Unknown" status of the aimed target after a series of unsuccessful interrogations

In addition to the identification function, the BIFF provides a Data Link capability aimed at significantly improving the Situational Awareness, as specified in STANAG 4579.

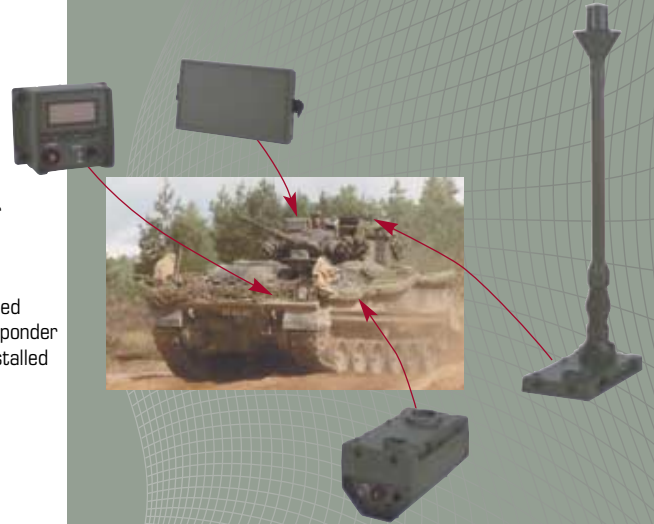
The directional Data Exchange Mode (DEM) is available to require specific data (Position Report, BMS type, Time Factor of Merit..) from a previously identified platform. DEM operates up to 6 Km and beyond.

The omnidirectional Digital Data Link Mode (DDL), is a broadcasting mode enabling unsolicited intra-platoon or platoon-to-platoon data transmission. DDL allows platforms to exchange their knowledge of the tactical situation with "friends" using a network type operation. DDL operates up to 1 Km.



◀ TSE 6010/Combined Interrogator Transponder with Processor installed externally

TSE 6010/Combined Interrogator Transponder with Processor installed internally ▶



TECHNOLOGY

The TSE 6010 uses a highly integrated design based on state of the art techniques:

- In each mmW LRU, the antenna and the Transmitter/Receiver are co-located, eliminating the need for costly and lossy RF waveguides or cables to interconnect LRUs
- Exchanging intermediate frequency signals allows use of low cost cables, eliminates cable losses at mmW frequencies and allows range performance to be reached with a smaller antenna and a less powerful amplifier
- Signal and data processing are performed by means of ASICs/FPGA and microprocessors
- TRANSEC and COMSEC functions are embedded

TESTABILITY

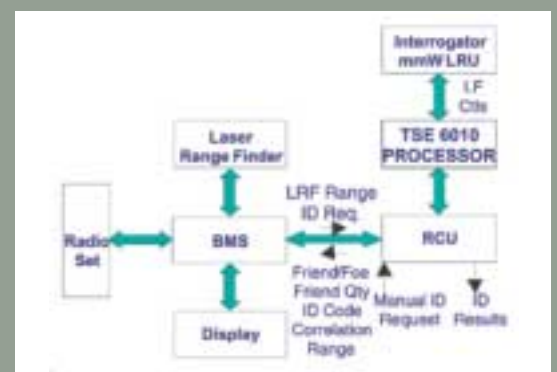
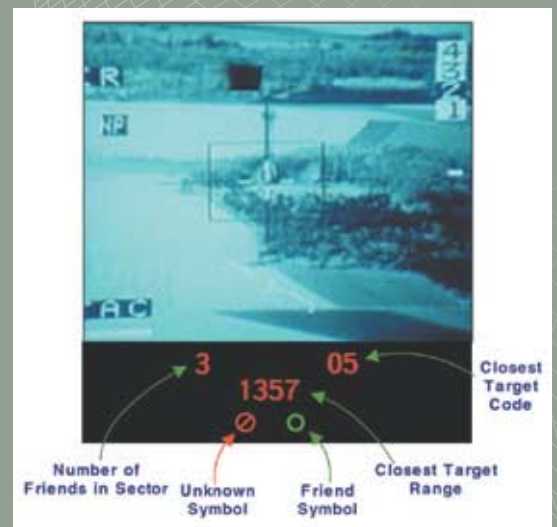
Within the Processor LRU, each SRU is fitted with a set of Built-In-Test (BIT) functions reporting to the main BIT Controller located on the Processing Board.

The RCU and both mmW LRUs are fitted with their own BIT Controller reporting to the main BIT Controller.

OPERATIONAL ADVANTAGES

- BIFF has proven satisfactory identification results, even exceeding requirements, in extreme conditions like heavy rain, dust, smoke and foliage. Field tests have already been performed in Europe and Equatorial areas
- BIFF has proven interoperability with the only other fielded system, the U.S designed BCIS
- BIFF design already includes the capability to perform Coalition type operations
- BIFF has already been satisfactorily tested aboard helicopters, exceeding the 8 Km range requirement

TSE 6010/
BMS Integration ▶



TSE 6010

GENERAL CHARACTERISTICS

INTERROGATOR	
Transmitter	All MMIC
Frequency	36 GHz Band
Eff. Isotropic Radiated Power	STANAG 4579
Receiver Sensitivity	STANAG 4579
Range Clear Sky	Required 6 Km (15 Km demonstrated)
Rain	Required 3 Km (>7 Km demonstrated)
Probability of Correct ID	> 99%
Processing	ASIC and μ P
BITE	Automatic Operation
TRANSPONDER	
Transmitter	All MMIC
Frequency	38 GHz Band
Eff. Isotropic Radiated Power	STANAG 4579
Receiver Sensitivity	STANAG 4579
Processing	ASIC and μ P
BITE	Automatic Operation

SYSTEM PARAMETERS

MTBF	> 5000 Hours
MTTR	< 30 min
Cooling	Natural convection

PHYSICAL

PROCESSOR LRU	
Dimensions CIT (W x H x D)	140 x 92 x 250 mm
Weight	2,8 kg
Power requirement	28 V DC / 5W
INTERROGATOR mmW LRU	
Dimensions (W x H x D)	250 x 150 x 41 mm
Weight	1,8 kg
Power requirement	DC / 5W (from Processor LRU)
TRANSPONDER mmW LRU	
Dimensions (W x H x D)	140 x 28 x 250 mm
Weight	1,7 kg
Power requirement	DC / 5W (from Processor LRU)
REMOTE CONTROL UNIT	
Dimensions (W x H x D)	100 x 100 x 75 mm
Weight	0,5 kg
Power requirement	28 V DC

ENVIRONMENT

Temperature Operating	-40°C to +70°C
Storage	-40°C to +70°C
Shocks, Vibrations	MIL STD 810 E
EMC	MIL STD 461C / 462 C

OPTIONS & ANCILLARIES

Hard Mount
Ballistic Armour
Data Loader

THALES

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