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Securing your future

Self-Protection for Helicopters
Thales – France

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Aéronautique
• Helicopter Self-protection requirements
  • THALES helicopter self-protection systems
  • VIP helicopter self-protection
  • Advanced self-protection concepts
HELICOPTERS GROWING IMPORTANCE

VARIED MISSIONS

- ANTI-TANK / SUPPORT / SEAD / ESCORT
- ANTI-HELOS / UAV-UCAV
- TRANSPORT / ASSAULT / SPEC.FORCES
- ANTI-SHIP / SITES PROTECTION
- URBAN WARFARE
- BATTLEFIELD RECCE / MARITIME PATROL / ESM
- TACTICAL INTELLIGENCE
- HUMAN HELP / SURVEY / MEDIVAC
- SEARCH AND RESCUE

VARIED FLIGHT PROFILE
A THREATENING ENVIRONMENT

Air to Air Missiles

Radar Controlled Air Defense

IR Guided SAMs

Anti Aircraft Artillery

Laser Guided Air Defense
HELCOPTERS GROWING SELF-PROTECTION REQUIREMENT

HELOS BECOME HIGH VALUE ASSETS
LARGE RADAR CROSS SECTION
PROXIMITY / EXPOSURE TO THREATS
MORE LETHAL RADAR/IR/AAA/LASER THREATS

- RADAR WARNING: ACCURATE REAL TIME SITUATION AWARENESS
- MISSILE WARNING: FAST RELIABLE DEPENDABLE WARNING
- LASER WARNING: IMMEDIATE DETECTION & IDENTIFICATION

- DECOYING: AUTOMATIC, EFFECTIVE AGAINST ALL THREATS
- RF JAMMING: SMART MULTI-THREAT DIGITAL JAMMING

NOT DETECTED ➔ NOT TRACKED ➔ NOT DESTROYED
Three types of critical aspects for the equipment:

- **Installation**
  - Size, weight critical aspects
  - Platform electronic system integration

- **Operation of the equipment**
  - Easy to operate equipment far away from usual support bases
  - Easy maintenance concept required
  - Automatic, to minimize crew workload

- **Performance**
  - Multi-sensor (radar, laser, missile)
  - Very dense EM environment
  - Low to very-low altitude flight profile
  - Intervisibility with radars not always ensured
  - Reliable instantaneous unambiguous threat declaration
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THALES SELF-PROTECTION ON-BOARD HELICOPTER

SA 342 Gazelle
AS 332 S Puma / AS 532 COUGAR
EC 725 Cougar
AS 565 Panther
NH 90
EC 665 Tiger
AS 555 Fennec
Lynx, MI 24, Sokol
EH 101 Merlin
WAH 64D APACHE
TIGER / NH 90 ELECTRONIC WARFARE SYSTEM

MULTI-SPECTRAL EWS OPTIMISED FOR INTEGRATION ONBOARD TIGER & NH-90 HELICOPTER

TWE
- High performance wide band radar and laser warning
- EW system management
- Single processing unit
- Glass cockpit compatible design
- Standard packaging
- Integrated modular design
- Compact, low weight & easy maintenance
COUGAR SAR SELF-PROTECTION SYSTEM

- MWS-20: Missile Approach Warning
- RALM01: Laser Warning Receiver
- SHERLOC-SF: Instantaneous Wide Band Receiver, System Management
- ELIPS NG: Chaff and Flares Dispenser
- VLCD: Colour Display

THALES
MWS-20 MISSILE WARNING SYSTEM

COMPACT

ALL WEATHER / CONDITIONS

EFFECTIVE

• Installed on C130, PUMA, COUGAR
• Validated in live firing conditions
• In operational use

RELIABLE

OPTIMIZED FOR INSTALLATION ON BOARD HELICOPTERS AND WIDE BODY AIRCRAFT

PROVIDES ACCURATE MISSILE APPROACH WARNING DATA
**Active Approach Missile Warning System based on Pulse Doppler RADAR principles**

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**MWS-20 : KEY FEATURES**

- **Detection of incoming missiles** by coherent radar processing (Digital Fast Fourrier Transform and Radar Cross Section detection)
- Continuous detection during all missile flight phases (**including post-burnout**)
- Range/velocity coherency algorithms (**low false alarm rate**)
- Fast reaction time
- Real time estimation of Time To Impact (TTI)
- Optimized ECM triggering (programmable TTI for automatic dispensing)
- Multi-threat (simultaneous missiles detection capability)
- No need for missile signature data
- Nominal performance above all kinds of terrain, in all weather conditions

**MWS-20 is a key asset for VIP/HOS aircraft Protection combining detection effectiveness and very low false alarm rate**
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Real Danger for HOS/VIP Aircraft

- Worldwide Increase of Terrorism
- IR SAM are cheap, easy to operate and proliferating (SA-7, SA-16, SA-18...)
- Can be operated by uncontrolled military or terrorist groups
- Vulnerability of Head Of State / VIP helicopter during low/medium altitude flight phases
Protection of HOS/VIP Platform is necessary during critical phases and requires:

- Detection, tracking and assessment of the threats
- Triggering the most appropriate reaction at the right time
- Automatic operations
- High reliability and extremely low false alarm rate
- Proven effective safe counter-measures
- Civil aviation authorities certification

**Fundamentals of HOS/VIP Protection**

1. Detection of approaching threats
2. Estimation of Time To Impact
3. Measurement of Sector of Arrival
4. Appropriate CM actions triggering
5. False alarm rate optimization
Example of WIPPS Configuration for HOS

- **AAR-60 MILDS**
  - Ultraviolet Missile Warning

- **ALE-47 TACDS**
  - Threat Adaptive Dispenser

- **MWS-20**
  - Pulsed Doppler Radar Missile Warning

- **EWCS/MFD**
  - Electronic Warfare Processor/Display

- **AVSYS INCORPORATED**

- **MJU-51 & 53**
  - Advanced Threat Safe Decoys

- **IR Decoys**
  - MJU-7
  - MJU-10
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OPERATIONAL CONCEPT OF NEW EW FUNCTIONS

Phase 1
TACTICAL FUNCTIONS
• Long range covert detection - identification, data fusion
• Localisation: 3D A/S EOB*

Phase 2
TACTICAL FUNCTIONS
• Threat danger level evaluation
• Tactical digital radar jamming
• Opportunity localisation/avoidance/evasion/designation

Phase 3
SELF-PROTECTION
• Immediate threat warning
• Fire control radar jamming
• IR decoying/jamming

JAMMING USE DURING SHORT AND RELEVANT OPERATIONAL PHASES

REAL TIME THREAT GEO-LOCATION FOR IMPROVED SITUATION AWARENESS
STANDARD GEO-LOCATION PRINCIPLES

- PSEUDO RANGE (Received power level): extremely poor accuracy
- INTERFEROMETRY & TRIANGULATION

Performance linked to angle rate

• Operational
• Robust

Not adapted for helicopters (antenna array installation, platform velocity)

*DOA: Direction Of Arrival
PASSIVE FAST GEO-LOCATION

- Phase change rate interferometry
- Standard Radar Warning Antenna
- Algorithms adapted to helicopters flight

Performances class
5% of range accuracy within seconds

+/- 500m at 10 km
+/- 2Km at 40 km

THALES Aeronautique

FASTER ACQUISITION / WEAPON DELIVERY
BETTER USE OF PROTECTION FUNCTIONS
**Compact Airborne Threat Surveyor (CATS) family**

- Dedicated to the self-protection in all types of mission and theater
- Provides advanced situation awareness and threat geolocation for avoidance, evasion or destruction
- Broad band digital receiver for smart RF signal interception, deinterleaving and analysis
- Latest THALES EW modular family of equipment designed to be the core system of comprehensive EW defensive suites
- Modular, Small, Compact & Lightweight
CATS / COFEUX NETWORK CENTRIC OPERATION
AND TACTICAL SITUATION MANAGEMENT