



SAAB

THE CHALLENGE - ADAPTING MILITARY EW TECHNOLOGIES FOR CIVIL SECURITY APPLICATIONS - CASE STUDY CAMPS



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TITLE CAMPS CASE STUDY

THEME

What will the expected nature of the threat be beyond 2020 and how do we meet the challenge?

SCENARIO

- The **asymmetric environment** implies that all operators in an area, military as well as civilian, now face the same threats.
- Due to the pressure on military forces, humanitarians and international relief organisations have to rely more often than not on **civil contractors** to supply the services required, exposing them to traditional military risks.
- For the same reasons that the military need protection against threats, civilians in the same environment **require the same technology**.
- The technology that is available for the military can not readily be acquired by non-military operators due to **export restrictions** and control regulations.
- Civil security requirements now involve **traditional defence contractors**.
- This merger of civil and military requirements is complex and regulated by **international treaties** and regulations governing the sale and export of technology, military or otherwise.

SCENARIO

- Saab, like most other traditional defence contractors, is becoming increasingly involved in supplying and **adapting technology for civil security** applications.
- Our **CAMPS** (Civil Aircraft Missile Protection System) is a flagship in this effort.
- Through the CAMPS programme Saab learnt (and is still learning) **valuable lessons** on what the implications are.

AIM

This presentation will highlight SAAB Avitronics' experiences along the potentially treacherous and expensive route of adapting existing military technology for civil application



Photo by ©Frans Dely/Avpix.co.za for Naturelink

SCOPE

- Introduction
- CAMPS Overview
- Operator and Regulatory Requirements
- Support Requirements
- Conclusion

Introduction

VULNERABILITY OF COMMERCIAL AND SPECIAL MISSION AIRCRAFT



Airbus A300 damaged by MANPADS in IRAQ

Introduction



European Efforts

- ▶ 2006 - European initiative launched including most European EW companies.
- ▶ 2006 - Saab Avitronics, Chemring Countermeasures and Naturelink (Charter Company in RSA) started to initiate a proof of concept study in preparation for flights trials.
- ▶ 2007 - Successful flight trials in March 2007.
- ▶ 2008 - 'Proclaim' is a new European effort regarding civil countermeasures installation (similar to DHS efforts).
- ▶ **2009 - First CAMPS equipped aircraft deployed.**

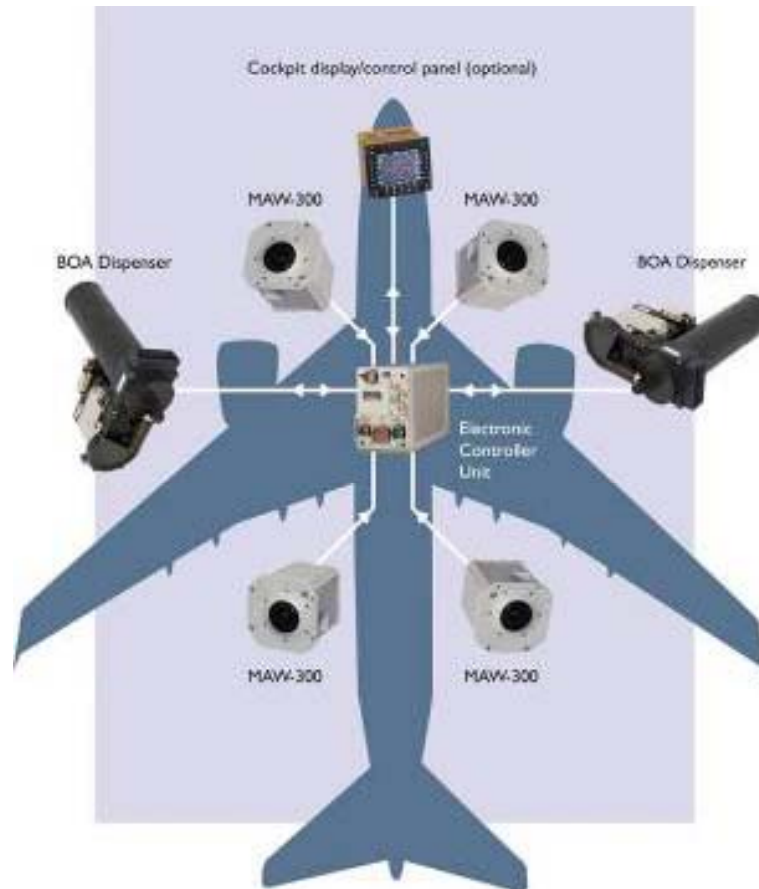
SCOPE

- ▶ Introduction
- ▶ CAMPS Overview
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CAMPS – CIVILIAN AIRCRAFT MISSILE PROTECTION SYSTEM

This is what we set out to do:

- Low cost of operation
- Tailored to commercial aviation
- Reliable
- Low acquisition/integration cost
- Simplified logistics
- Minimal additional drag
- Safe
- Exportable
- Wassenaar compliant
- ITAR free



CAMPS Overview

Interim Pyrotechnic Decoy Systems

- The most mature countermeasure system used in military applications with proven effectiveness.
- Dispense pyrotechnical MTV flares by means of electrical squibs.
- Flares are hazardous to operate and handle (Armament).
- Low cost systems.

But

- **Civil certification unlikely.**
- **Export to all civil clients unlikely.**



BOA Dispenser

Dispenser characteristics:

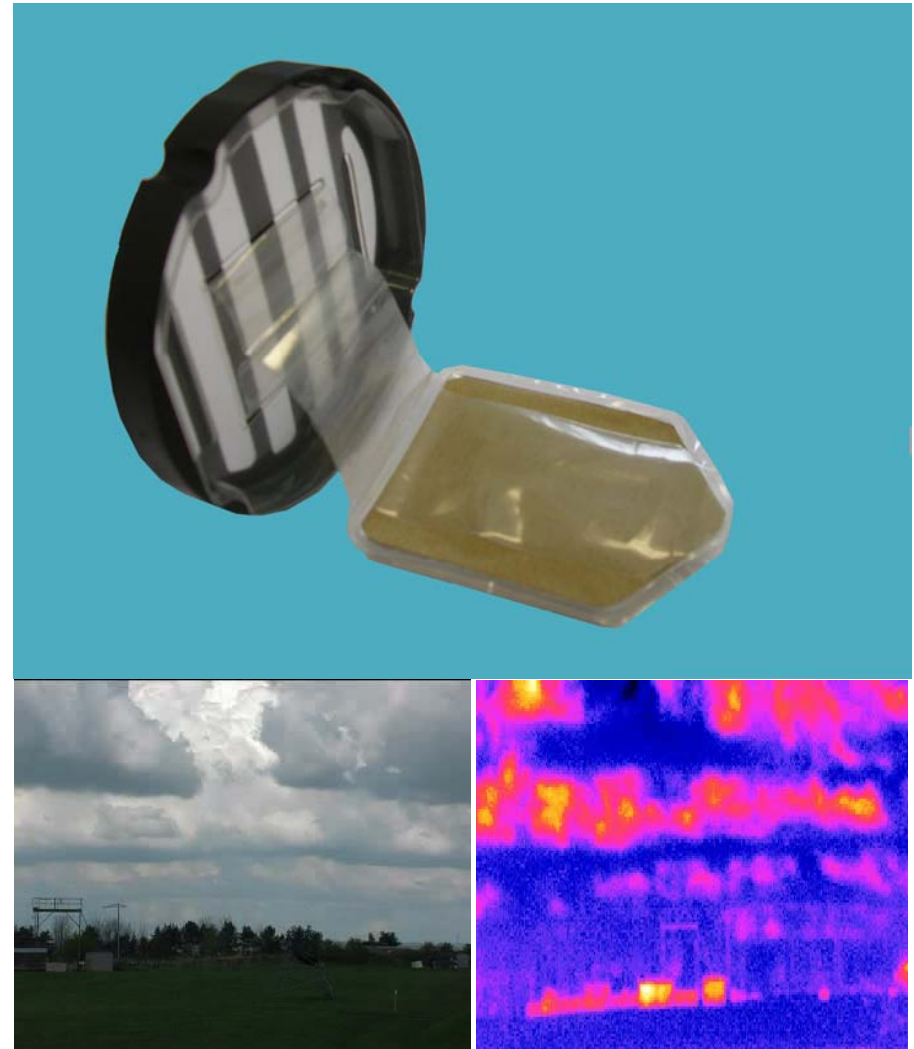
- Designed for civil application
- No recoil
- Light weight
- Internal installation
- Loading and unloading easy and safe
- Low power consumption (28VDC and 115VAC 400Hz)
- Mechanical (no squibs)
- Safe



CAMPS Overview

PYROPHORIC DECOY

- Based on military pyrophoric decoy
- Releases all the energy in the relevant IR-spectrum.
- **Invisible to the human eye.**
- Civil certification.
- **Not classified as armament.**
- **Air transportable.**
- Safe
 - No collateral damage on ground or in air in case of an inadvertent dispense event.
 - Requires airspeed for package to open up and disperse pyrophoric material.



MAW 300 (UV)

Sensor Characteristics:

- Designed for military application but adaptable for civil use
- Light weight
- Internal installation
- Low power consumption
- Zero drag penalty



Cockpit Interface

Characteristics:

- Existing Threat Display and Control Unit (TDCU)
- Mounted on instrument panel to give pilots instantaneous situational awareness
- Provide status feedback
- Audio signals
- Various interface possibilities



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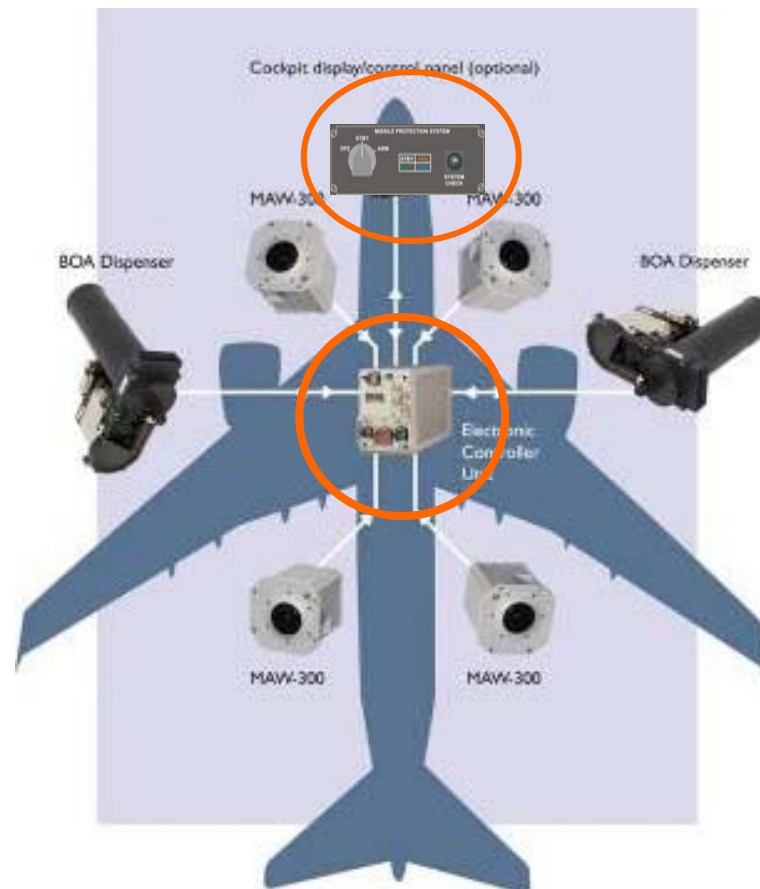
Operator and Regulatory Requirements

System design requirements (We thought we knew)

- ▶ Increase platform survivability under threat
 - Multiple threat handling
 - High probability of detection
 - Provide some situational awareness and control to crew
 - Initiate effective countermeasures automatically
 - Safety during operation (operator, collateral)
- ▶ Cost-effectiveness
- ▶ Availability
- ▶ Certification (Civil Certification of EW Equipment)
- ▶ Exportable
- ▶ Free of ITAR etc.
- ▶ OEM involvement/approval

CAMPS – CIVILIAN AIRCRAFT MISSILE PROTECTION SYSTEM

- Low cost of operation
- Tailored to commercial aviation
- Reliable
- Low acquisition/integration
- Simplified logistics
- Minimal additional drag
- Safe
- Exportable?
- Wassenaar compliant?
- ITAR?



BOA Dispenser

Dispenser characteristics:

- Designed for civil application
- No recoil
- Light weight
- Internal installation
- Loading and unloading easy and safe
- Mechanical (no squibs)
- Safe
- For STC (EASA) a firewall is required
- Low power consumption (28VDC and 115VAC 400Hz)
- Civil VIP jets will in future use 28VDC



MAW 300 (UV)

Sensor Characteristics:

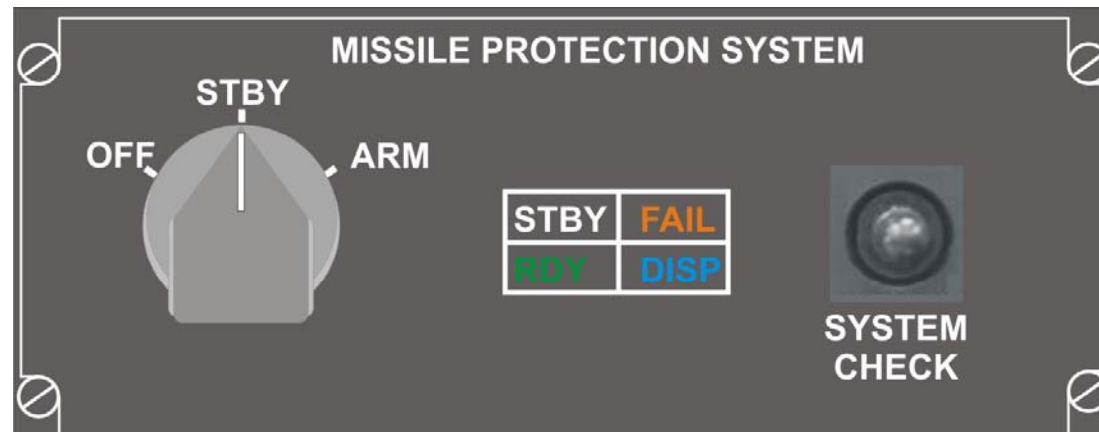
- Designed for military application
- Light weight
- Internal installation
- Low power consumption
- Zero drag penalty



Cockpit Interface

Characteristics:

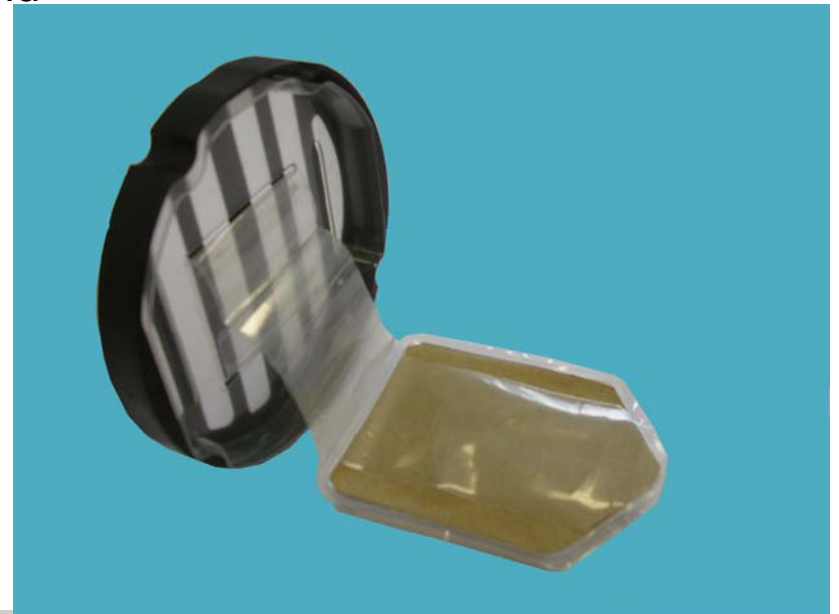
- Designed for civil application
- Out of field of view installation
- No flashing lights
- No audio signals



CAMPS Overview

PYROPHORIC DECOY

- Releases all the energy in the relevant IR-spectrum.
 - Almost invisible to the human eye.
 - Civil certification.
 - Safe
 - No collateral damage on ground or in air in case of an inadvertent dispense event.
 - Requires airspeed for package to open up and disperse pyrophoric material.
-
- **Under UK MOD export control**
 - **Hazard class for transport - same as a pyrotechnic flare. Surface transport.**



Operator and Regulatory Requirements

System design requirements (We thought)

Lessons learnt along the way (We now think we know)

- Increase platform survivability under threat
 - Multiple threat handling
 - High probability of detection
 - Provide some situational awareness and control to crew
 - No situational or other awareness to the crew allowed
 - Initiate effective countermeasures automatically
 - Safety during operation (operator, collateral)
- Cost-effectiveness
- Availability
- CIV-IR hazard class implies surface transport only
- Certification (Civil Certification of EW Equipment)
- Exportable
- CIV-IR declared military and under UK MOD export control
- Not free of ITAR if the US decides it is a “Defence Article”
- OEM involvement/approval
- OEMs want little or no involvement, will not approve due to liability
- Warranty implications

Operator and Regulatory Requirements

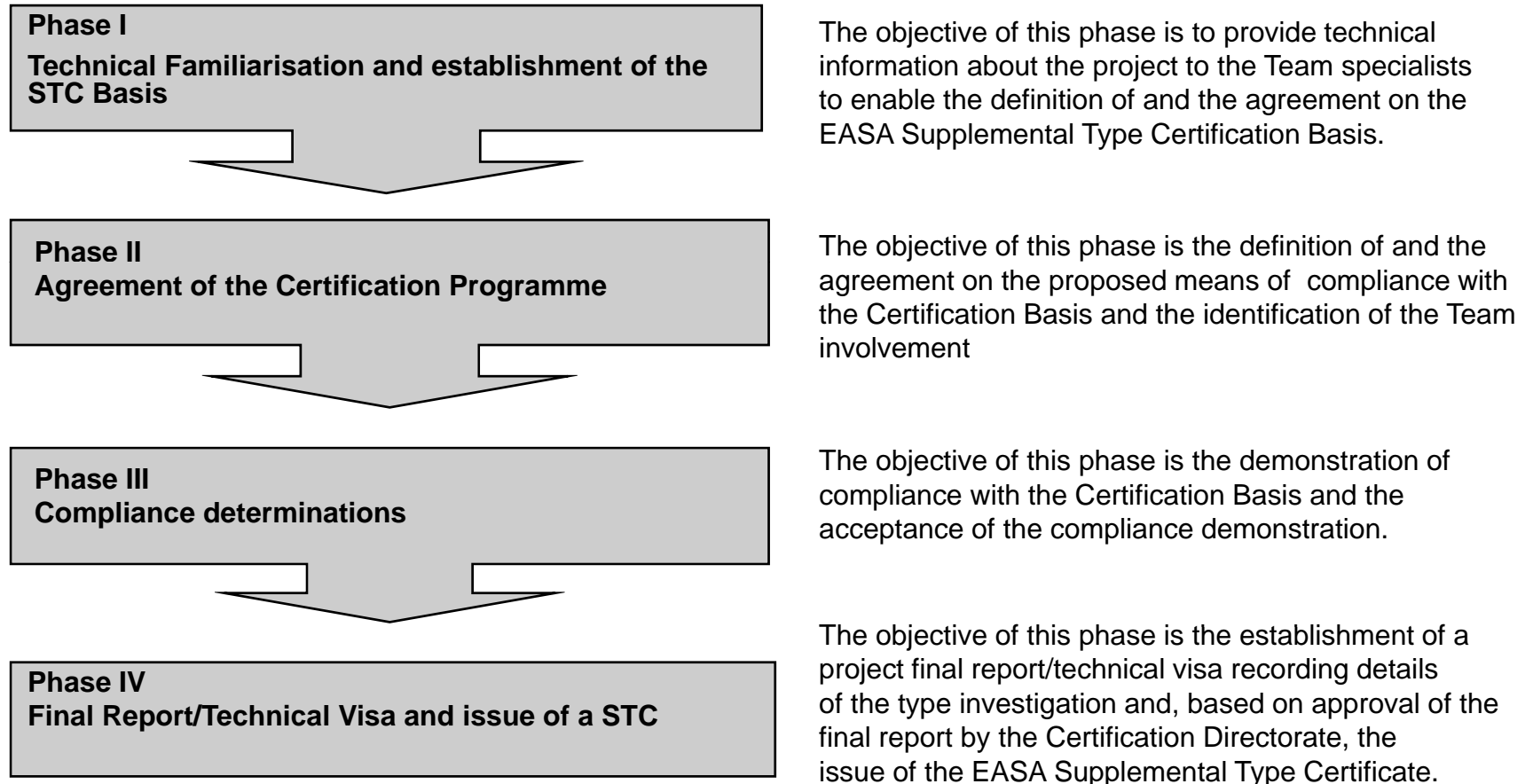
System Certification and Qualification

- EASA
- Wassenaar Arrangement
- Local CAA
- ITAR
- Qualification

Operator and Regulatory Requirements

EASA STC PROCESS

Once an application has been accepted and a certification team is established, the EASA supplemental type certification process can generally be divided into the following phases.



Wassenaar Compliance

	Requirement <i>Note ML4.c. does not apply to AMPS having all of the following:</i>	Compliance Method	Compliance Statement
a.1.	Passive sensors having peak response between 100-400 nm.	MAW 300 sensor peak response is around 280 nm.	Comply
c.	Flares, which exhibit both a visible signature and an infrared signature, for decoying surface-to-air missiles.	Pyrophoric decoys leave smoke trail in visible band and clear signature in IR band.	Comply
d.1.	The AMPS is only operable in a specific "civil aircraft" in which the specific AMPS is installed and for which a Civil Type Certificate or ICAO equivalent has been issued.	Ensure compliance per project. (Civil registered military owned aircraft?)	Comply
d.2.	The AMPS employs protection to prevent unauthorised access to "software"	By design. Binary files are downloaded into processors and no provision is made to download the software, not even by SAAB Avitronics.	Comply
d.3.	The AMPS incorporates an active mechanism that forces the system not to function when it is removed from the "civil aircraft" in which it was installed.	1. E-tagging of system components. 2. "Pin-strapping" of ECU connector pins in aircraft wiring harness.	Comply

Wassenaar Compliance

CAMPS Compliance towards Certifications & Regulations

Regulations	Part	Requirement	Approved by	Compliance
Export	CAMPS System	Wassenaar Arrangement	ISP(SE) & DCAC(ZA)	By design
	CAMPS System	Non export control	ISP(SE) & DCAC(ZA)	End User Statement and verified installation
	Decoy	UK Export and re export regulations	UK MOD	End user statement
	CAMPS System (for US customers/flights only)	ITAR	US Government	TBD
Certification	CAMPS System	EASA regulations PART 21, PART 145	DOA and EASA	In progress, first Supplementary Type Certificate (STC) by Oct 1 st

Operator and Regulatory Requirements

WASSENAAR ARRANGEMENT

Controls the export of dual use technology between countries.
Dual use implies the uncontrolled use of certain civil technologies for military purposes and vice-versa.

Wassenaar compliance implies no restrictions on export.

Major design compliances include eg:

- Specifically designed for civil application (Various interpretations)
 - In RSA, system context, in Sweden once installed etc.
- Tamper protection (Implementation alternatives)
- Monitoring of platform and owner changes.
- Decoy may not be invisible.

LOCAL CAA CERTIFICATION

The manufacturers normally have no intention to become involved in local certification work. The certification documentation supplied for STC and EASA certification will be sufficient to satisfy local requirements.

Operator and Regulatory Requirements

QUALIFICATION REQUIREMENTS

Military versus Civilian qualification requirements

- ▶ We are used to Military qualification compliance.
- ▶ It is not a direct read across to the civil specification.
- ▶ These two requirements overlap only to some degree but address unique areas where re-qualification is required.

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Support Requirements

➤ Full spectrum

- Supply of hardware with installation support.
- Turn key solution - installation with STC.
- Lease options.

➤ In service support:

- Overhaul exchange programme.
- 72 hour turn around.
- 24 Hour call centres.

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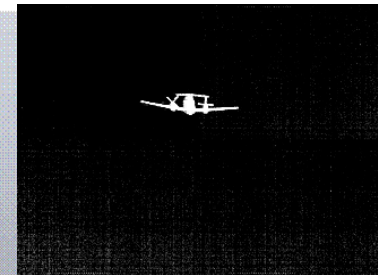
CONCLUSION

Result

- First EMB120 now flying.
- EASA certification in late 2009.
- Wassenaar compliant (RSA, Sweden)
- ITAR (RSA, Sweden, UK) not in the USA.



- 1 – MAW 300
- 2 – BOA Dispenser
- 3 – MAW 300





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