

Pod-Mounted Anti-Ship Missile Defence Evaluation Facility

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- The Military Problem
- The operational requirement
- The operational scenario
- The implementation
- Summary and conclusions

The Military Problem – “The ASM Threat”

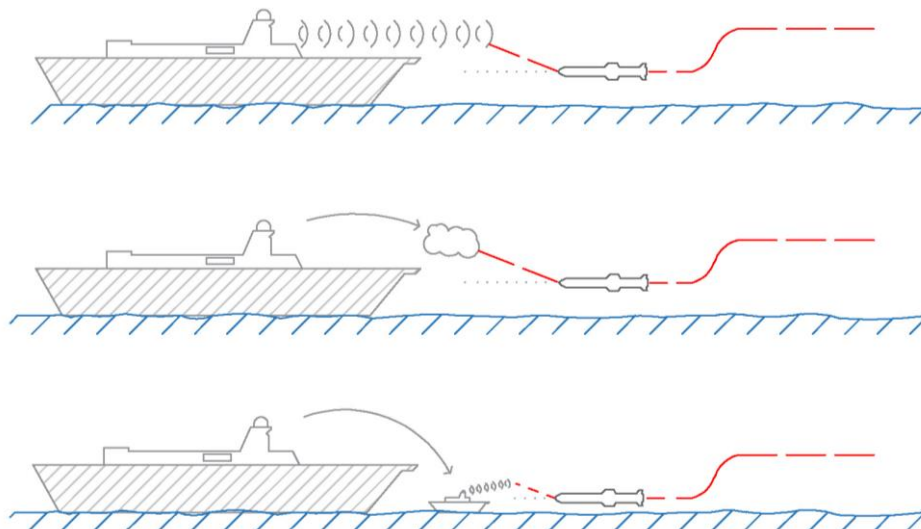


Clips from “Missiles Launch - The Exocet Missile - The Sea Dart - Episode 6”

The operational requirement – “Assess ASMD’s Soft-Kill and Hard-Kill” capabilities



Soft-Kill: the ship produces electronic countermeasures **to deceive the threat.**



Hard-Kill: e.g. Surface Air Missiles (SAM) and Close-in-weapon-system (CIWS) **to intercept and kill the threat.**



The operational requirement – “Assess ship’s ASMD reaction time”



- In both SK or HK the ASMD **reaction time** is fundamental.
- ASM may be detected when it pops up from radar horizon at a typical distance of 24Km or in final-guidance (homing) at closer range.
- Depending on the speed of the ASM the time from detection to impact ranges from **90 sec. to 25 sec.**
- Therefore the reaction time of SK and/or HK must be guaranteed within approx.:



Subsonic

(Mach 0.8 missile)

90 seconds



Supersonic

(Mach 3 missile)

25 seconds

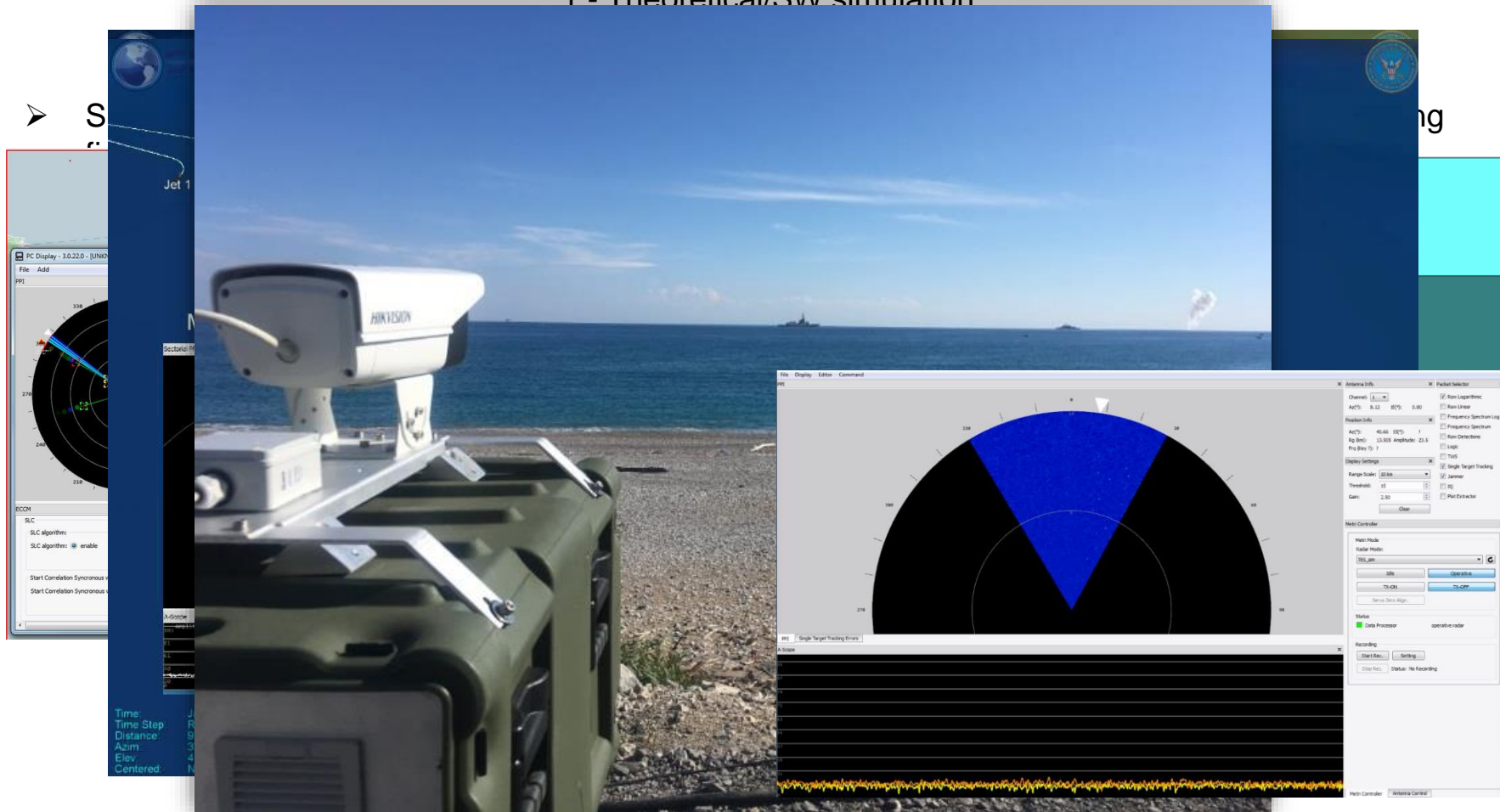


The operational requirement – “Assess SK effectiveness on the threat”



32-Field Testing with ~~FW~~ **Threat Emulators**

1 - Theoretical/SW simulation

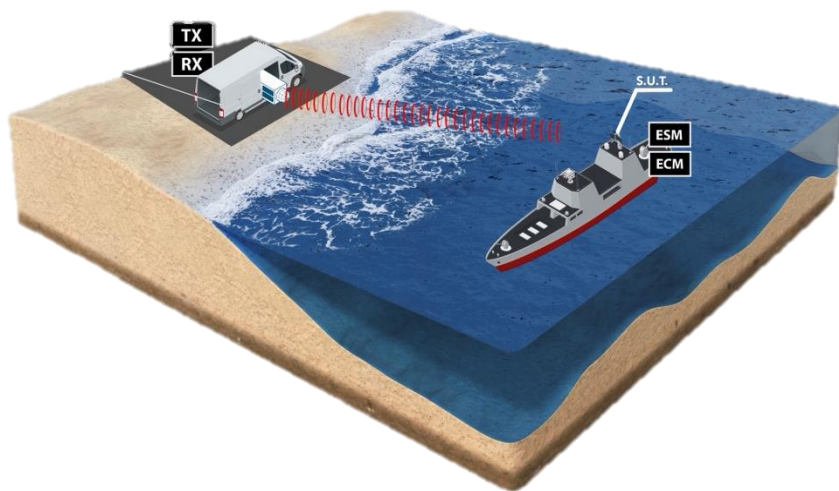


The operational scenario – “Field-Test scenario” (i)

The “Field Test scenario” to assess SK against ASM can be of two types:

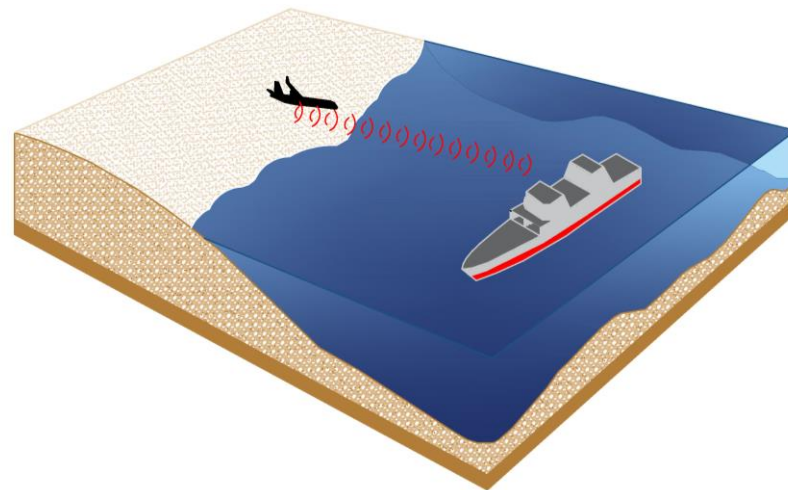
➤ Static

Threat is located **on the shore** at real engagement distance but does not mimic the ASM flight profile.



➤ Dynamic and most realistic

Threat is at real engagement distance, and it is installed on an **airborne platform**, that mimic the ASM flight profile.



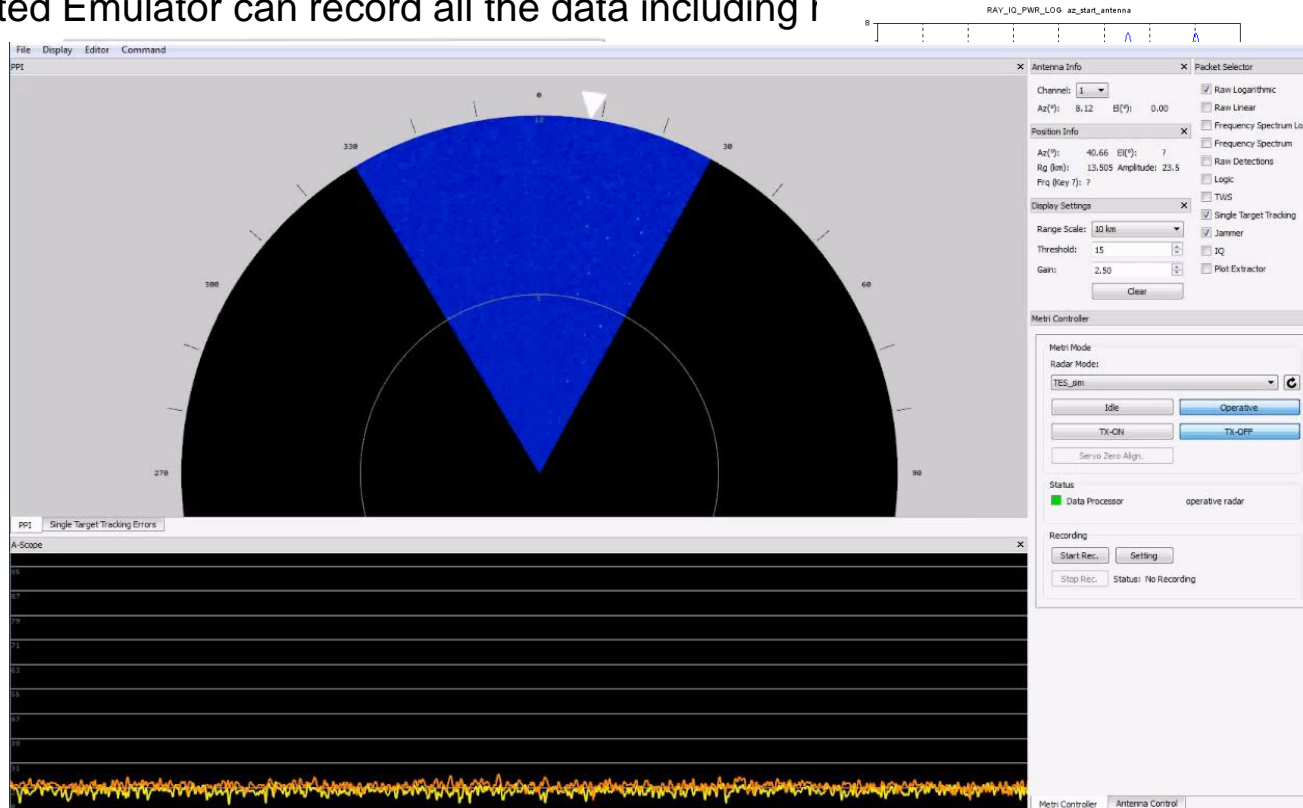
The operational scenario – “Dynamic Field-Test scenario” (i)

- Airborne platform simulates **anti-ship missile** radar system;
- Airborne platform simulates as close as possible the **missile flight profile**;
- Ship **deploys SK** against the simulated ASM attack.



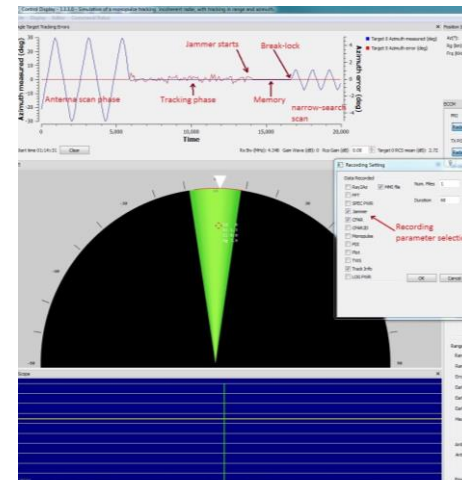
The operational scenario – “Dinamic Field-Test scenario” (ii)

- Record data and use the shipboard transmission for as long as possible (essentially Soft Kill capabilities target).
- Pod-mounted Emulator can record all the data including reaction time.



The implementation – “Use existing technology for solution”

- Important that technology exists to minimise risk.
- Re-use technology of “static” field-test scenario as much as possible.



- Gimbal Detail

The implementation – “Use existing technology for solution”

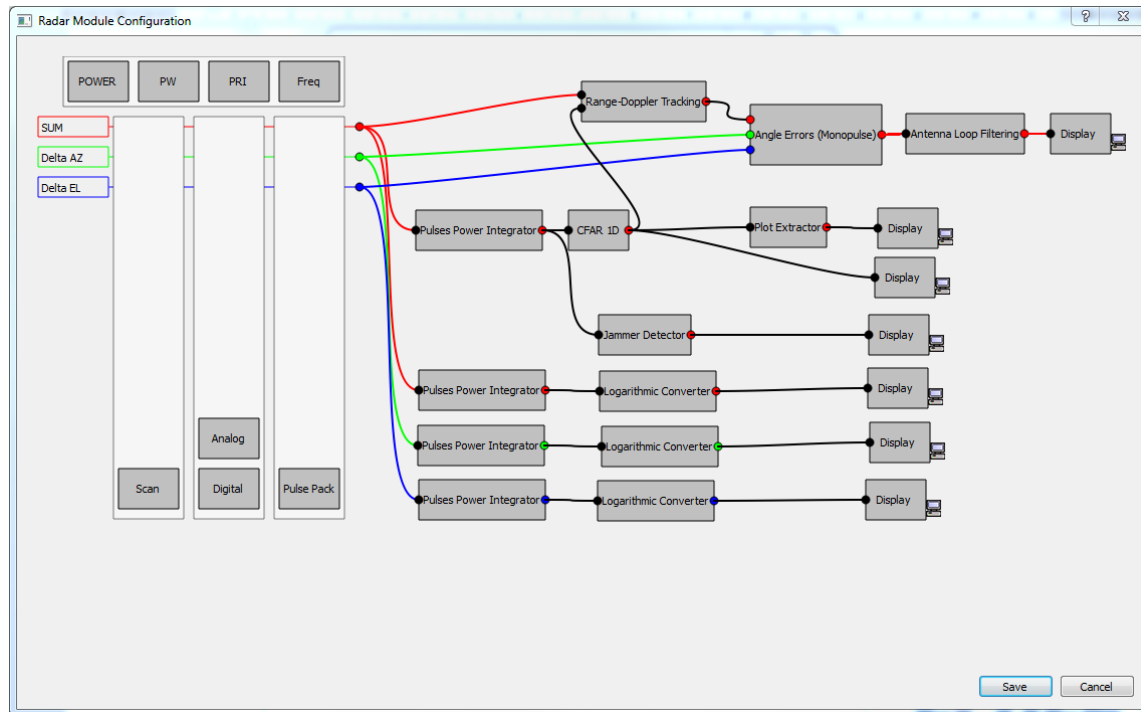
- Use the SEEKER EMULATOR in a POD.



- Use existing airborne platform.

The implementation – “Overview of existing solution – Features”

- User-defined ASM threat models through SDR capabilities.
- Seeker Emulator generates the waveforms and digitizes the received signals (I/Q).
- SW tools to model the signal processor for the emulated ASM threat.



The implementation – “Overview of existing solution – Features”

- ASM threat logics and ECCM are **user-defined** through a dedicated GUI.

Radar Modes
Logic Modes

Name	Section	Embedded	Type
test_trk	section	false	Track
reject mode 0	section	true	Search
trk_start	section	true	Track
trk_wait	section	true	Search
trk_tentative	section	true	Search
trk_target_scan	section	true	Search
trk_target	section	true	Search
trk_target_loop	sub_section	true	Search
trk_target_fading_scan	section	true	Search

Logics

Name
1 trk_target_scan commands
2 Check_trk_loss
3 Check_trk_wait
4 Check_trk_tentative
5 Check_trk_initialize

Steps

Type	Value
1 Command	S/N Computation mode
2 Command	AGC Control
3 Command	Transmitter Control
4 Command	antenna_scan

Parameters

Scan type: ☐ Raster ☐ Fixed ☒ Sector

Direction: Bidirectional

Scan rate (deg/s): 30

Type: Horizontal

Sector size (deg): 15

Flyback time (s): 0

Init elevation ang: Tracking Elevation

Init azimuth ang: Tracking Azimuth

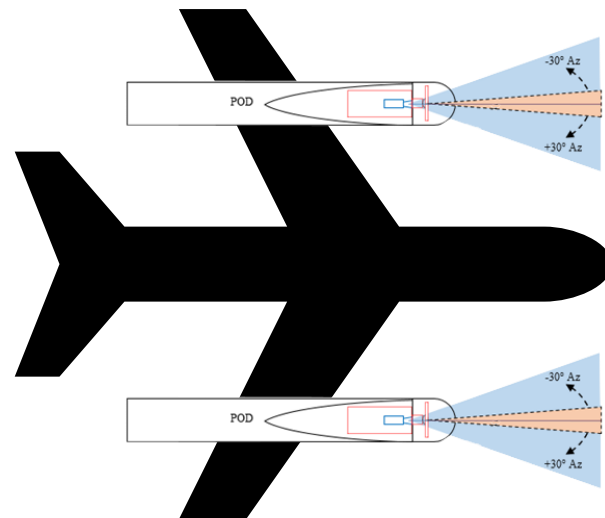
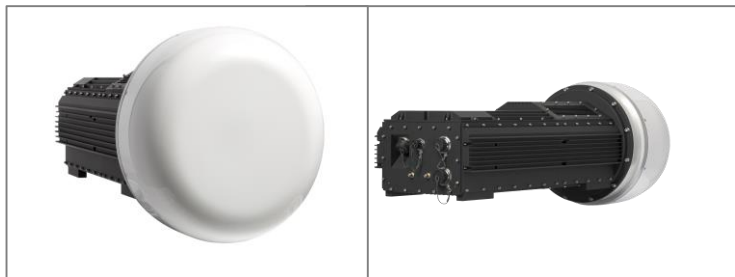
Clockwise: Clockwise

Buttons: Add, Delete, Add Logic, Delete Logic, Add Step, Delete Step, Import..., Export, Save, Cancel

The implementation – “Provide solution in a pod-mounted format”



- The solution is “**simply**” the use of the existing **SEEKER EMULATOR**, re-engineered for the airborne environment and installed inside the POD.
- Pod-mounted adds **real-time dynamic capabilities**.
- All the **performances** of existing solution have to be preserved in “podded version”.
- With multiple version it is possible to cover: **I-band, J-band and K-band**.
- One aircraft can carry **multiple PODs**.



➤ Addressed topics:

- Reviewed the requirements of **Ship's ASMD testing**.
- Reviewed existing technology for **programmable Seeker Emulator**.
- Proposed a solution for **dynamic field-testing** using **Pod-Mounted Seeker Emulator** aircraft carried.
- The proposed solution is **low risk** because it is based on existing technology and systems.

➤ Expected benefits of podded solution:

- Very accurate **assessment of SHIP's SK** in operational scenario.
- Effective **training of SHIP's EW crews** in operational scenario.
- In general: **improve the quality of ASM Defence**.

➤ Next steps:

- Review the design and optimize the technology for installing also on **low-cost platforms**: e.g., **small civil aircrafts and/or drones**.

Thank You for Your Attention

Questions?

**For further information and demonstrations
please visit us at **Stand D7****