



# **The F-35 Cockpit: Enabling the Pilot as a Tactical Decision Maker**

**[http://www.slideshare.net/  
robbinlaird/the-f35-cockpit](http://www.slideshare.net/robbinlaird/the-f35-cockpit)**

**Michael L. Skaff**  
**F-35 Pilot Vehicle Interface**



# F-35 Cockpit



*8- by 20-inch Contiguous Display*  
**with Portal Formatting Concept to Improve Information Cognition, System Control, and Flexibility**

*Wide FOV HMD w/ Virtual HUD*  
**Spherical IR & low light Imagery to Improve SA in All Weather and Night Operations**

*Stereo Audio & Voice Control*  
**Increase Information Quantity and Quality While Decreasing Pilot Workload**

*Novel STOVL Controls*  
**Reduce Training Requirements Provides Controllability with Fewer Inceptors**

*Maximized Accommodation*  
**For Higher Utility & Safety**

- Active Inceptors
- Compound Rudder Adjustment
- Data Bus Communication for Ejection Seat
- Tilting Seat (adjustment Limited for ejection safety)

*Integrated Life Support System*

*Next-Generation Escape System*  
• **Auto-ejection**

**New Technologies and an Innovative Approach to Pilot Vehicle Interface  
Produce a Capable and Flexible Cockpit**



# Cockpit Philosophy



- Let the Pilot be the Tactician By
  - *Managing Workload*
    - Automation Of Tasks
    - Let Computers Do What Computers Do Best
    - Let the Pilot Do What Pilots Do Best
  - *Providing Tools That Build And Maintain Situation Awareness (SA) pursuant to Information Dominance*
    - Concise Information
    - Timely Information
    - Quickly Interpreted Information
- Realize That All Design Efforts Are Based On Combat Value Added:

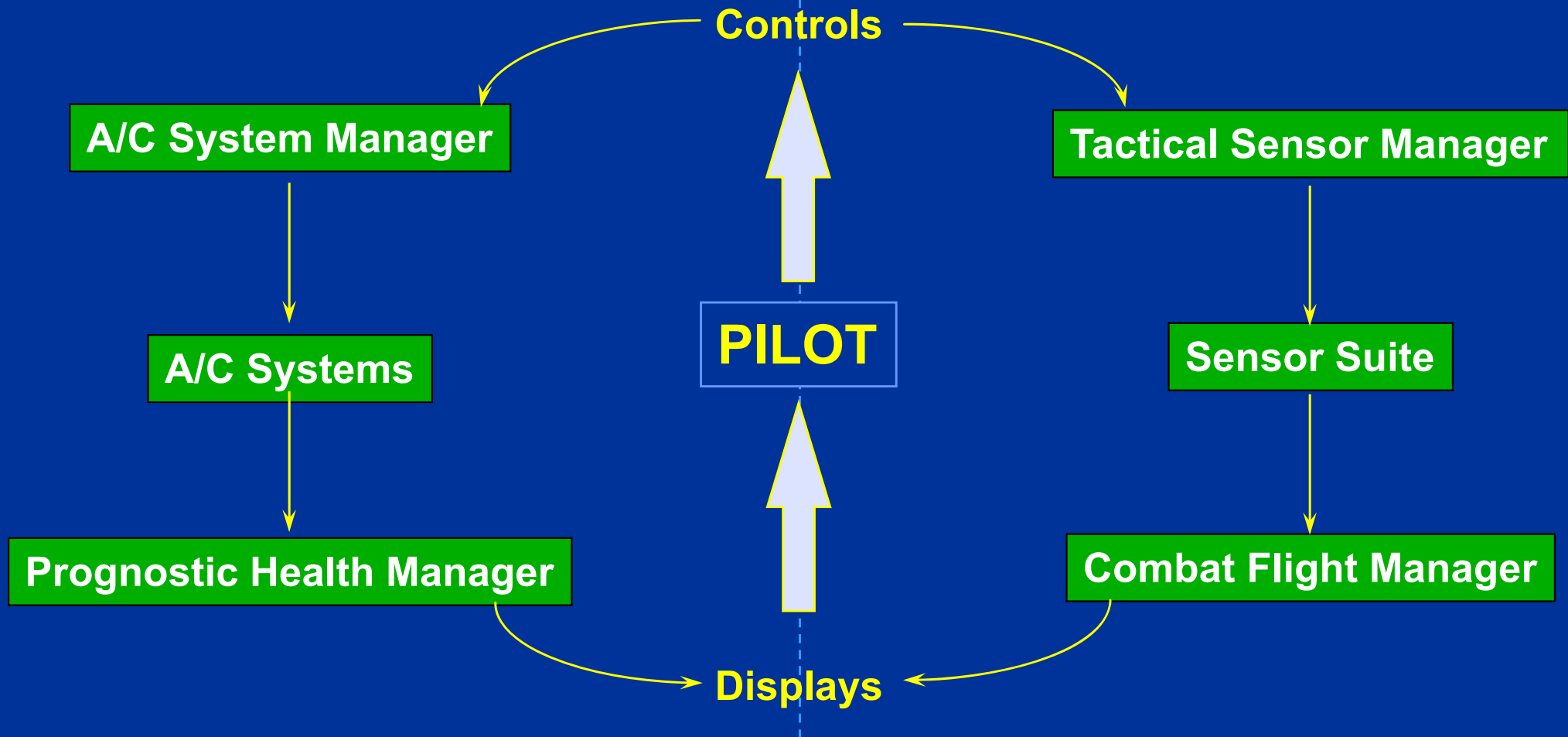
***The Requirement is to Increase  
Lethality and Survivability Beyond that of Current Aircraft***



# Controls & Displays



Internal Environment  $\longleftrightarrow$  External Environment



***Pilot Centered Design Approach***

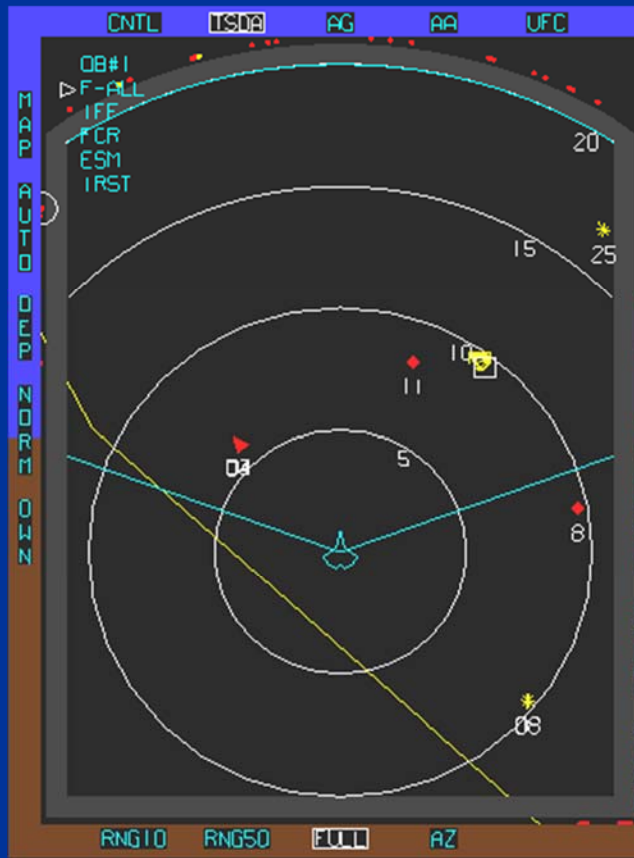


# F-35 Cockpit Display

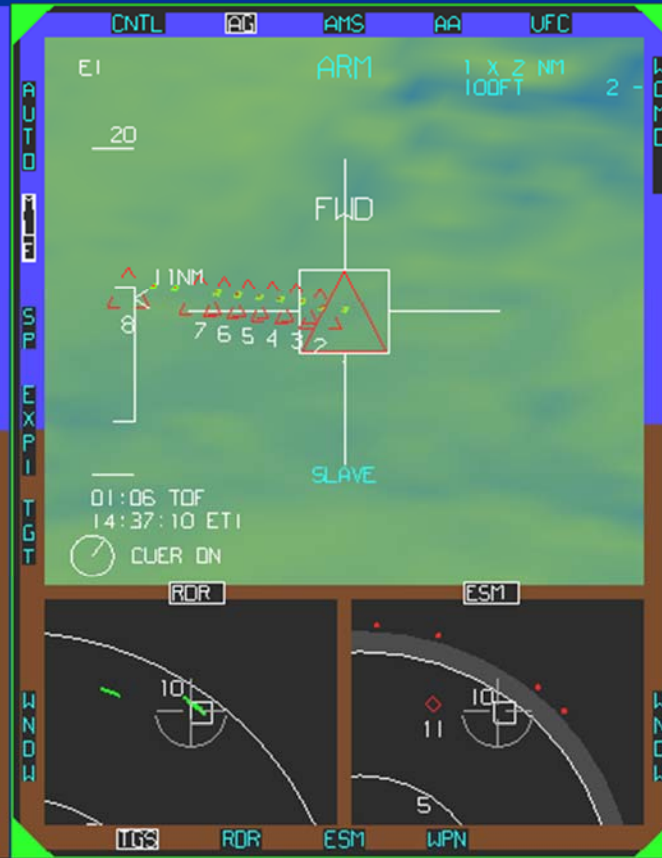




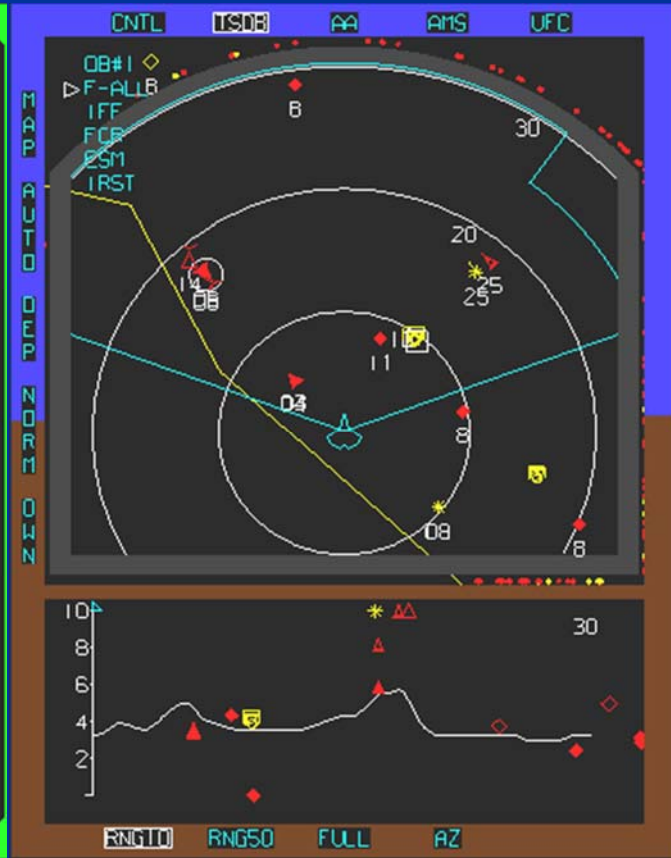
# JSF Conceptual Displays



**Air to Ground TSD**



**Mission Tailorable**



**Air to Air TSD**

Information Dominance -vs- Information Overload



# F-35 Panoramic Cockpit Display



Tactical Situation Display

Targeting FLIR



Stores Management Display

Synthetic Aperture Radar



# F-35 Panoramic Cockpit Display



Tactical Situation Display  
(double wide)

Targeting FLIR



Synthetic Aperture  
Radar (ground  
movers)



# Mission Reconfigurable Cockpit



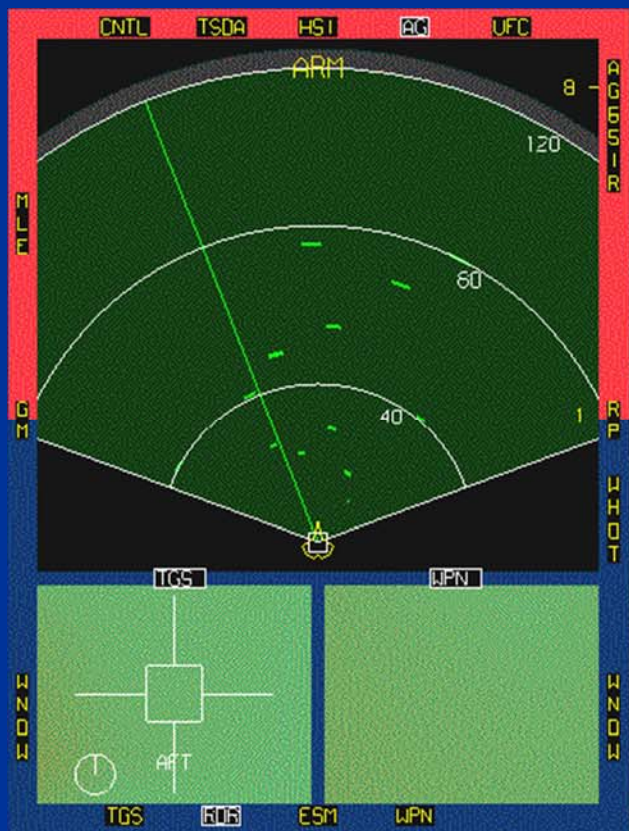


# Mission Reconfigurable Cockpit

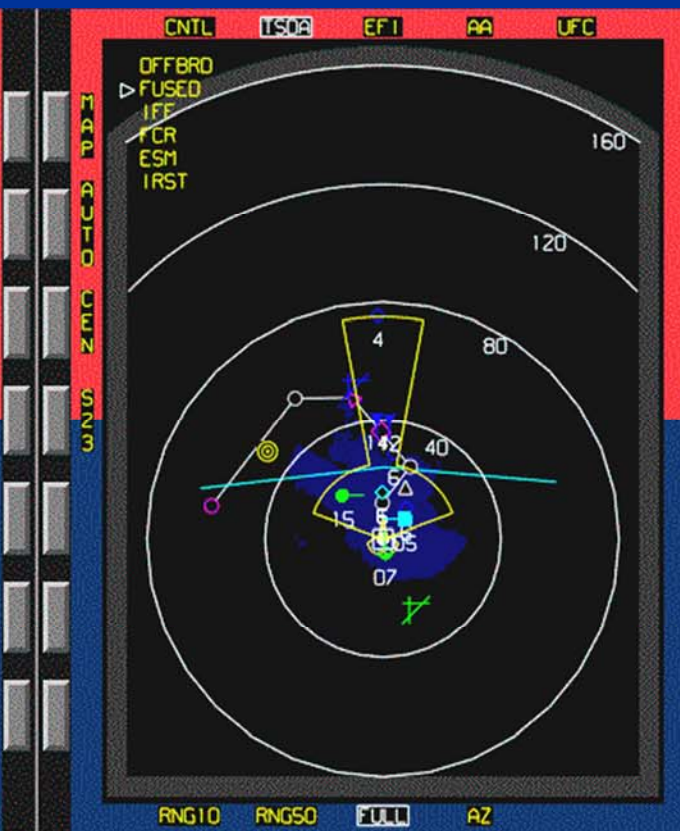


Primary concepts:

- Master-Modeless
- Rule based Tactical Sensor Manager
- Mission Integrated Flight Controls
- Auto Target Cueing



**Air to Ground Format**



**Tactical Situation Display**



**Air to Air Format**



# Joint Attack Strike Technology



Primary concepts:

- System of Systems
- Advanced Information Management System
- Sensor measurement errors “not a perfect world”



**Air to Ground Format**

**Tactical Situation Display**

**Air to Air Format**



# F-35 Helmet Mounted Display



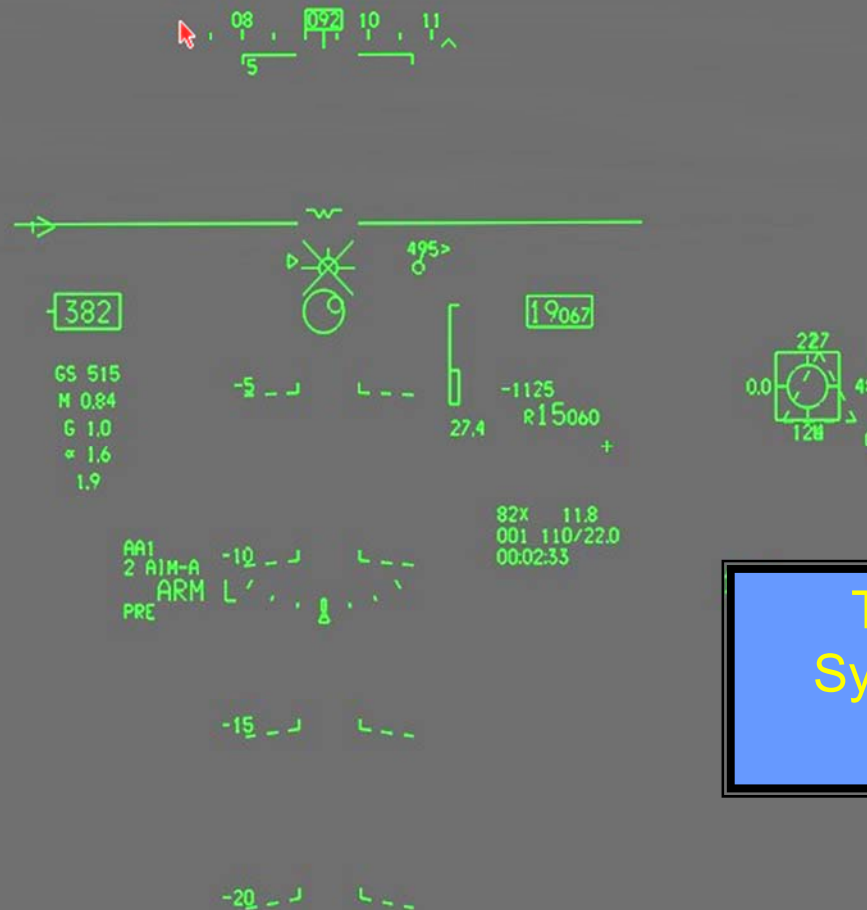
Virtual Head-up Display, no Physical HUD in Jet



# F-35 Helmet Mounted Display



Virtual HUD Looking  
Forward



Target Designation  
Symbology at Edge of  
Field of View

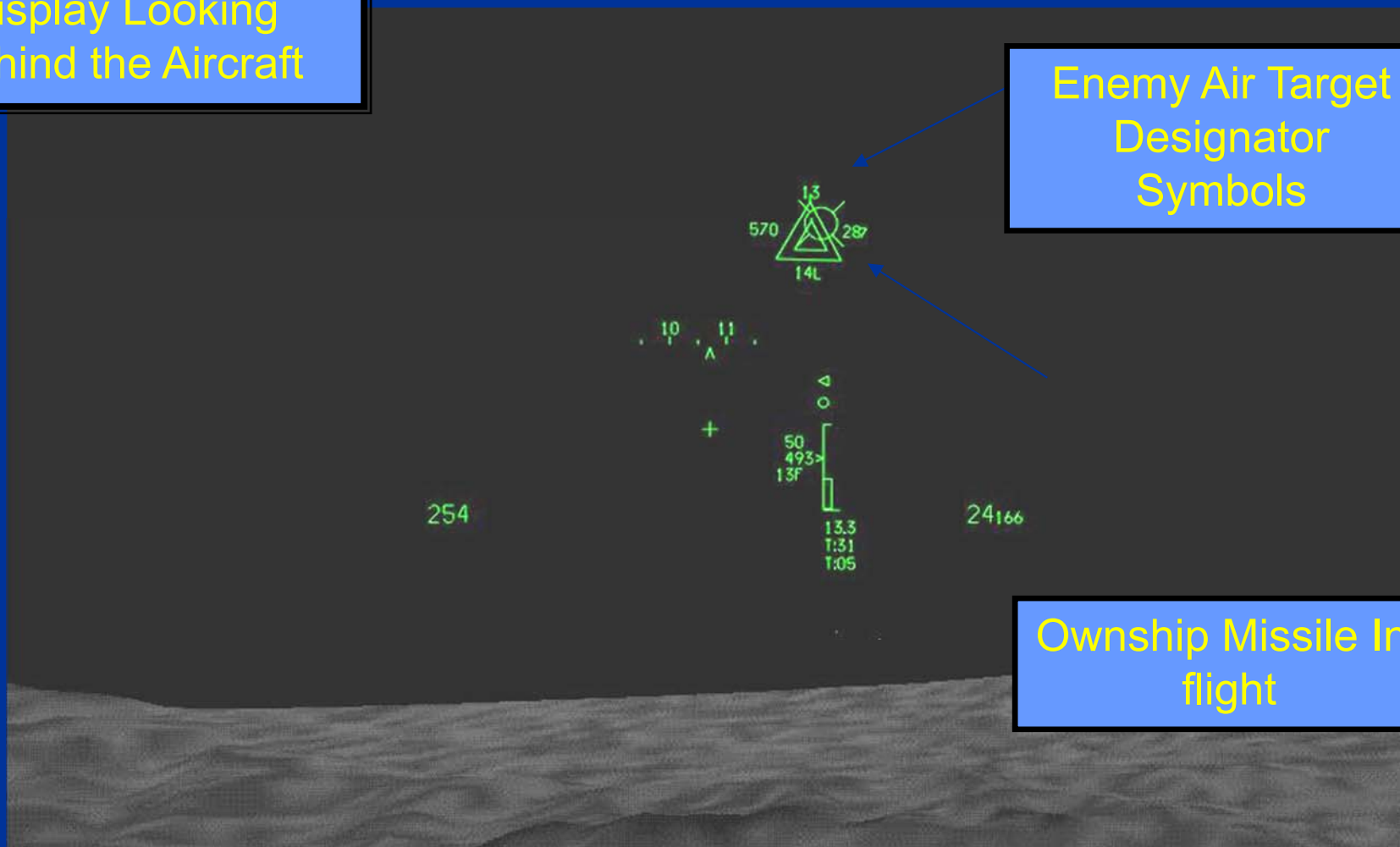


# F-35 Helmet Mounted Display



Helmet Mounted  
Display Looking  
Behind the Aircraft

Enemy Air Target  
Designator  
Symbols



Ownship Missile In-  
flight