Hovering Precision Weapons: Enabling Precise Surgical Strike and Collocated Close Air Support from Tactical to Strategic Distances

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AAL ...Backroom for the Innovation-Driven Aerospace Organizations of the world...

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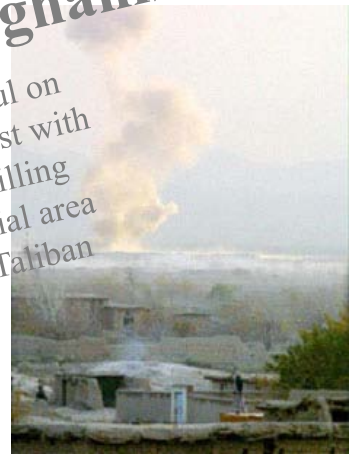
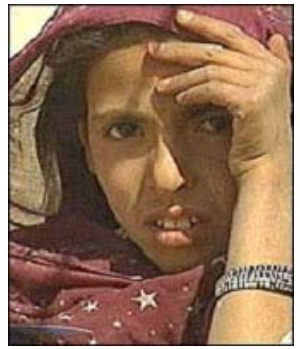
Motivation:

- *Current tactics and weapon systems often induce unacceptable levels of collateral damage and Coalition casualties*

Costly collateral damage in Afghanistan

"a US bomb flattened a flimsy mud-brick home in Kabul on Sunday blowing apart seven children as they ate breakfast with their father. The blast shattered a neighbour's house killing another two children …..the houses were in a residential area called Qalaye Khatir near a hill where the hard-line Taliban militia had placed an anti-aircraft gun."[18]

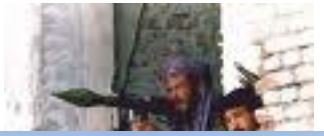




Paradigm Shift:

Now…

Hmmm…



Outline:

I. Hovering Precision Weapon History

II. Current Platform Configuration & Performance

III. The Paradigm Shift…

New Systems with New Capabilities

Conventional UAV "Challenges"

Operation Allied Force
Kosovo 1999
(source: Yugoslav armed forces)

UAVs Lost in Kosovo:

Britain: 14 (14 Phoenix)

United States: 17 (3 Predators, 9 Hunters, 4 Pioneers, 1 UAV of undetermined type)

Germany: 7 (presumably all CL-289 turbojet drones)

France: 5 (3 Crecerelle, 2 CL-289)

By Jan. 2003, 30 of 70 RQ-1 Predators crashed or were shot down
(source: Mike Mount CNN Washington Bureau)

4 UAVs of undetermined origin (possibly U.S., German, or Italian)

Advanced Convertible UAVs: Why??

"2/3 of eligible targets went undetected, let alone unengaged because of our reconnaissance deficiencies."

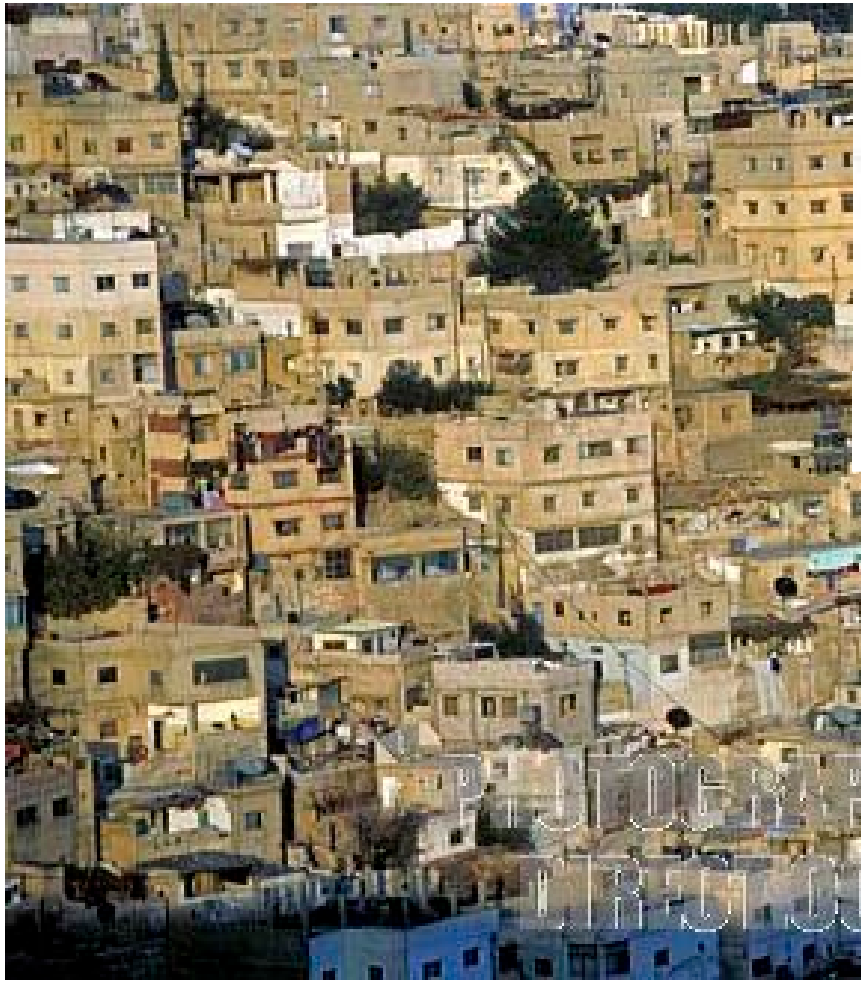
"Folks… it's going to take something new to fix this problem."

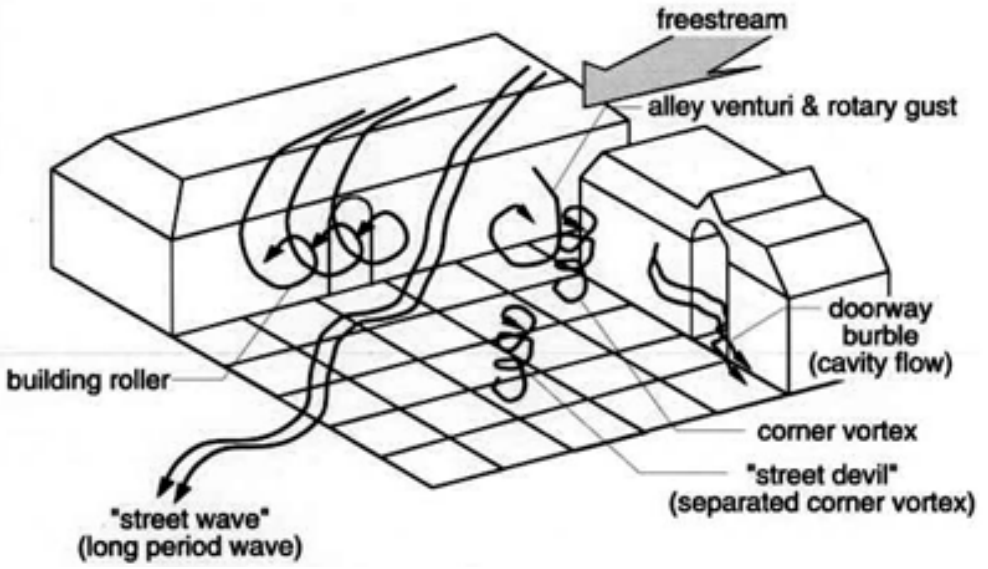
-Lt. Gen. Bruce Knutson, USMC

Low-Level Operations:

Serious trouble for UAVs…

DARPA Urban & Sub-Canopy Atmospherics Survey 1998





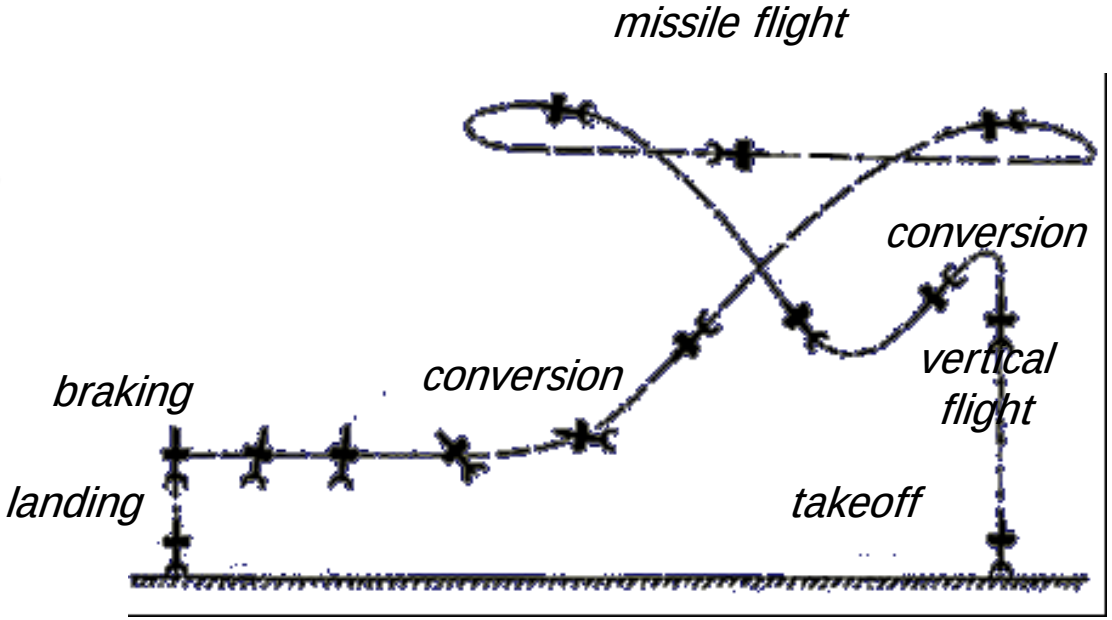
α >90° is a common event

Paradigm Shift...
Hypermaneuverable UAVs

Hover in more places than a helicopter

Fly as fast as a missile

Convertible Coleopter Configurations

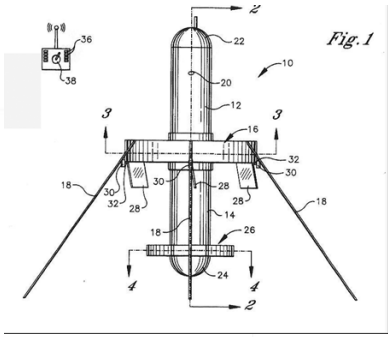


Heinkel Wespe 1944
(concept only, never built)

Heinkel Lerche 1944 (concept only, never built)

US Pat. 6,502,787

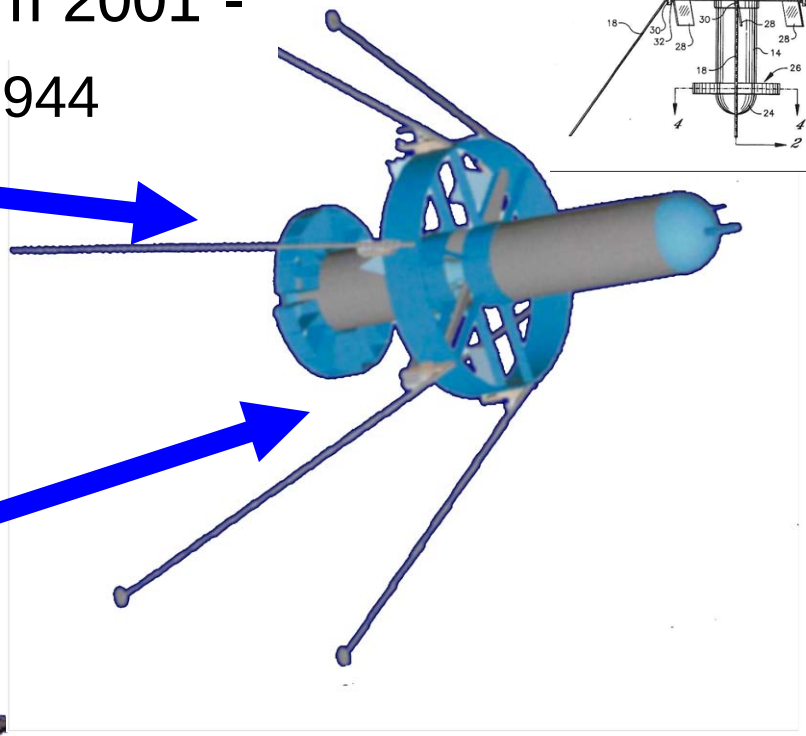
Hypermaneuverable UAVs



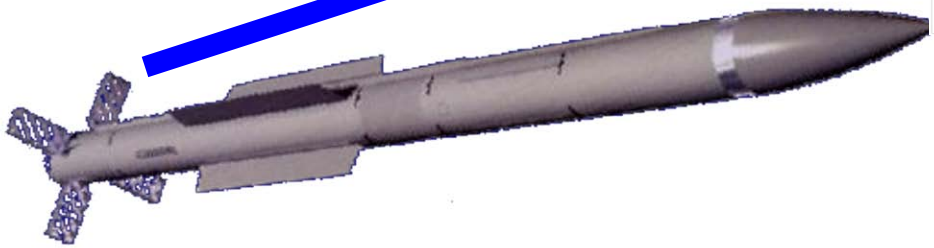
XQ-138 Program 2001 -

Heinkel Wespe 1944

more control authority
needed for MOUT environment



AA-12 (R-77)
(Aamraamski)

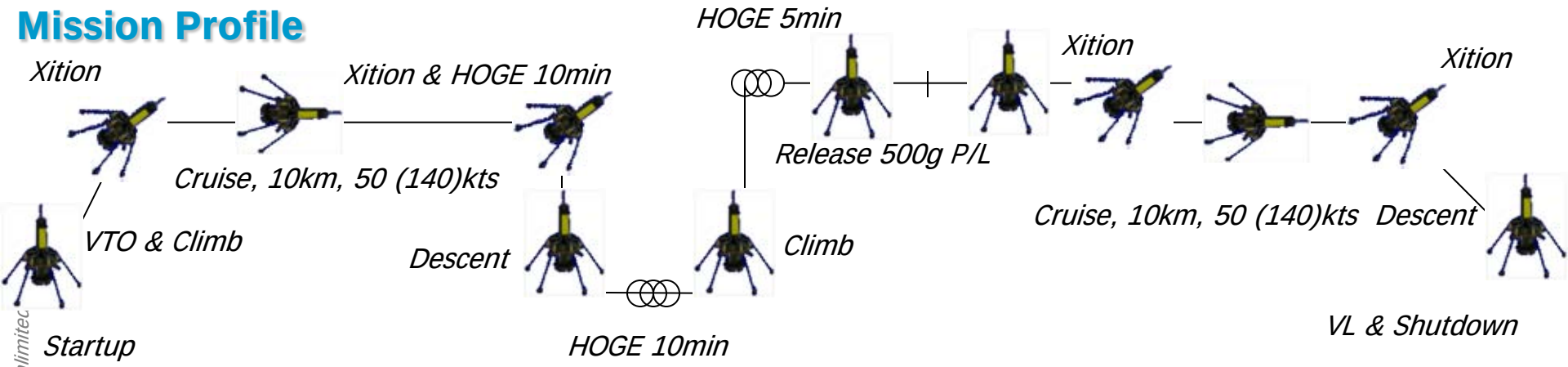


high control authority grid/lattice fins

Singapore Technologies Aerospace

XQ-138 Hypermaneuverable UAV

Mission Profile



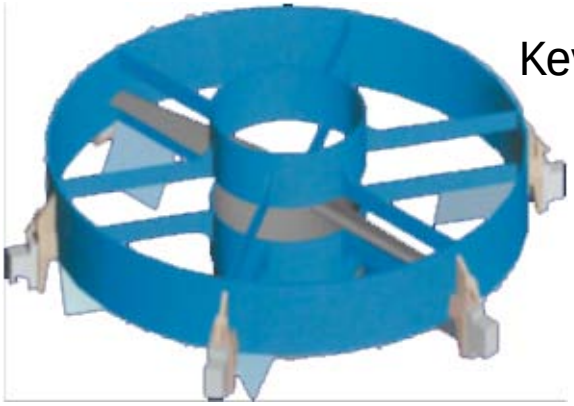
Mission Specification:

- Max. gross weight: 6.8lb (3.1kg)
- Max.payload weight: 2.2 lb (1kg)
- All weather capable
- 12”/hr (31cm/hr) rain
- 25+ kt gust penetration
- Sensors: B/W 0.001 lux, Color 0.1 lux,FLIR
- Flight modes: 1st, 3rd person, fully autonomous w/waypoint nav.
- Sandstorm capable to 100kts
- Vmax 140kts for 1hr (blue sky)
- -40/100˚ F (38˚ C), 100% humidity
- Combat shotgun resistant @5m
- 15g MOUT wall strike
- Land + autostart

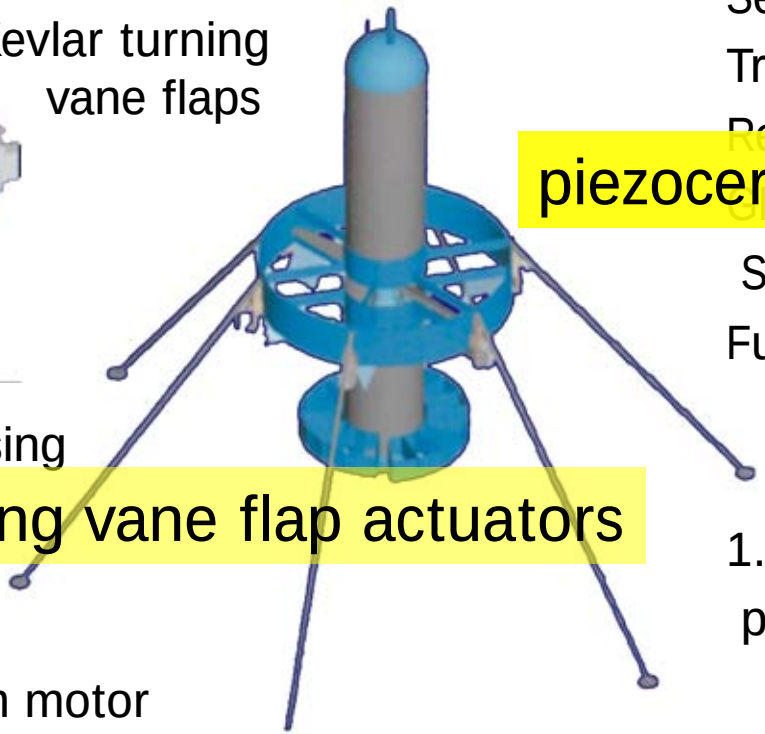
XQ-138

MDO using best currently available technology

ballistic graphite & boron structure



Kevlar turning vane flaps



Sensor
Transmitter
Receiver
GPS Navigator
piezoceramic gyros
SAS system
Fuel tank

titanium powerplant housing

piezoceramic turning vane flap actuators

1.3hp (970W) powerplant

magnesium motor mount/fuselage coupler flight control actuators

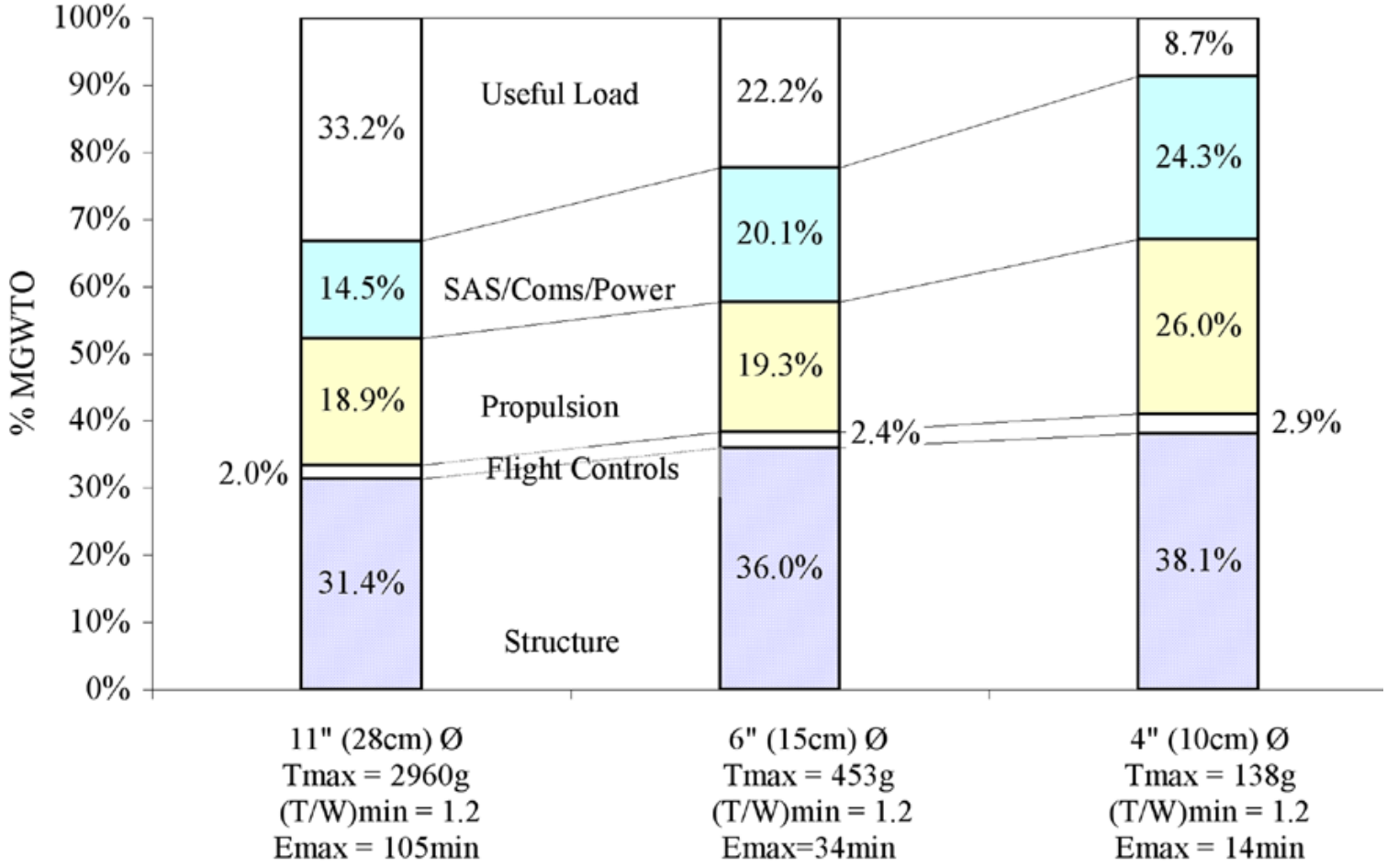
Muffler ass'y

graphite racking grid fins

piezoceramic grid fin actuators

XO-138 Weight Fraction Trends…

Adaptive FCS

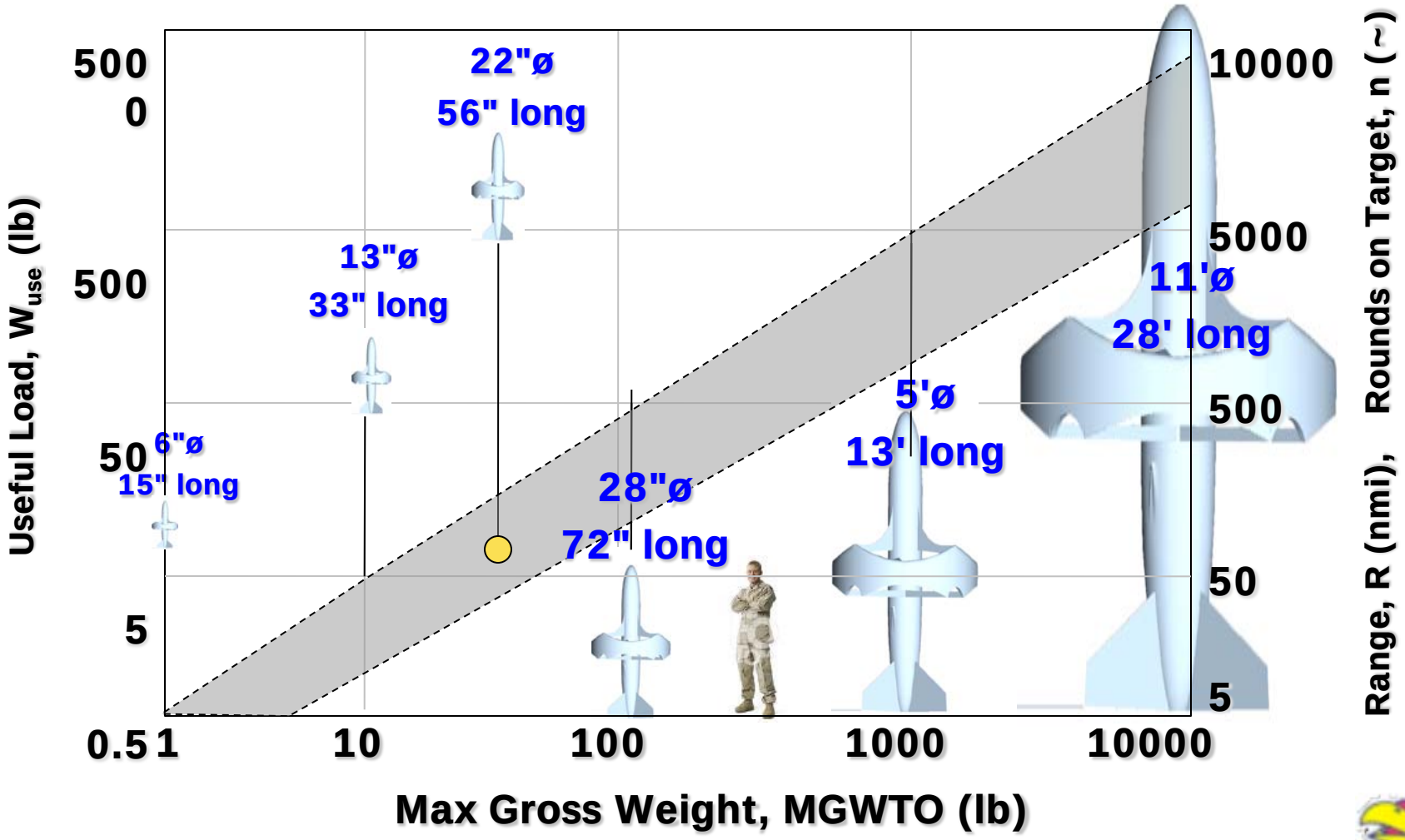


What's Next???

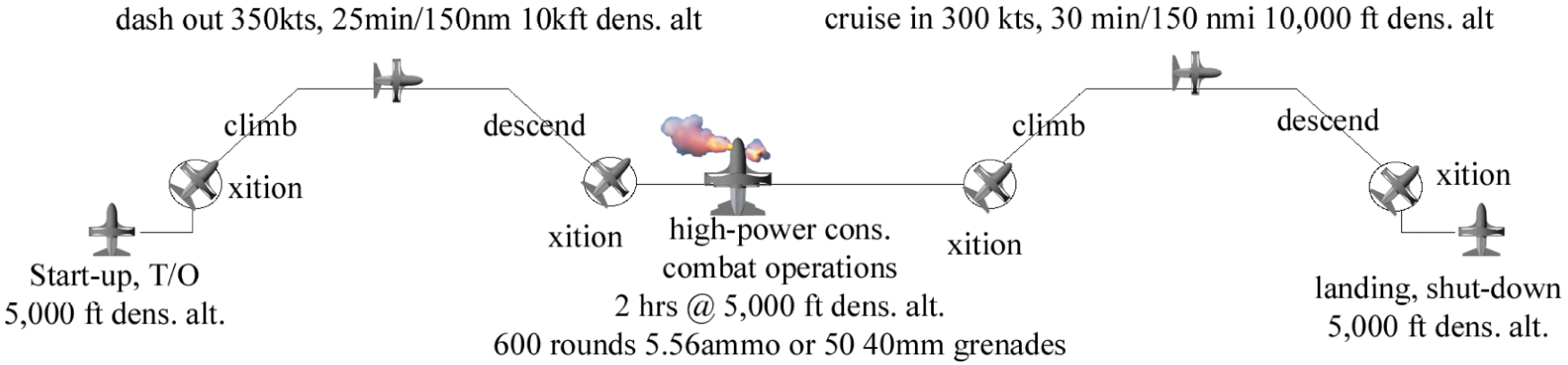
FAQ-381

Collocated Close Air Support (CCAS) Hovering Precision Weapon (HPW)

XQ-381 Rubber Design General Sketch Growth, Range, Payload

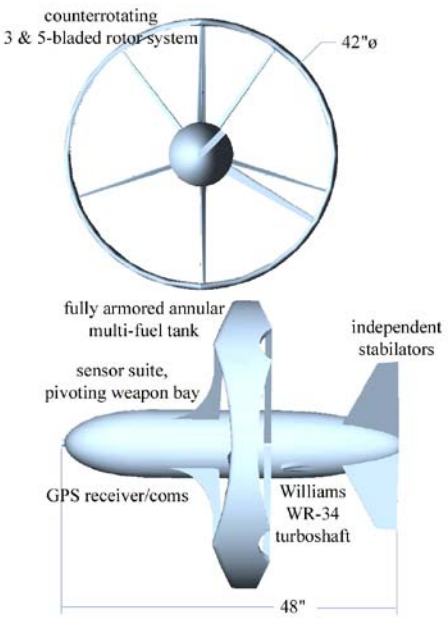


FAQ-381 Design Point 1

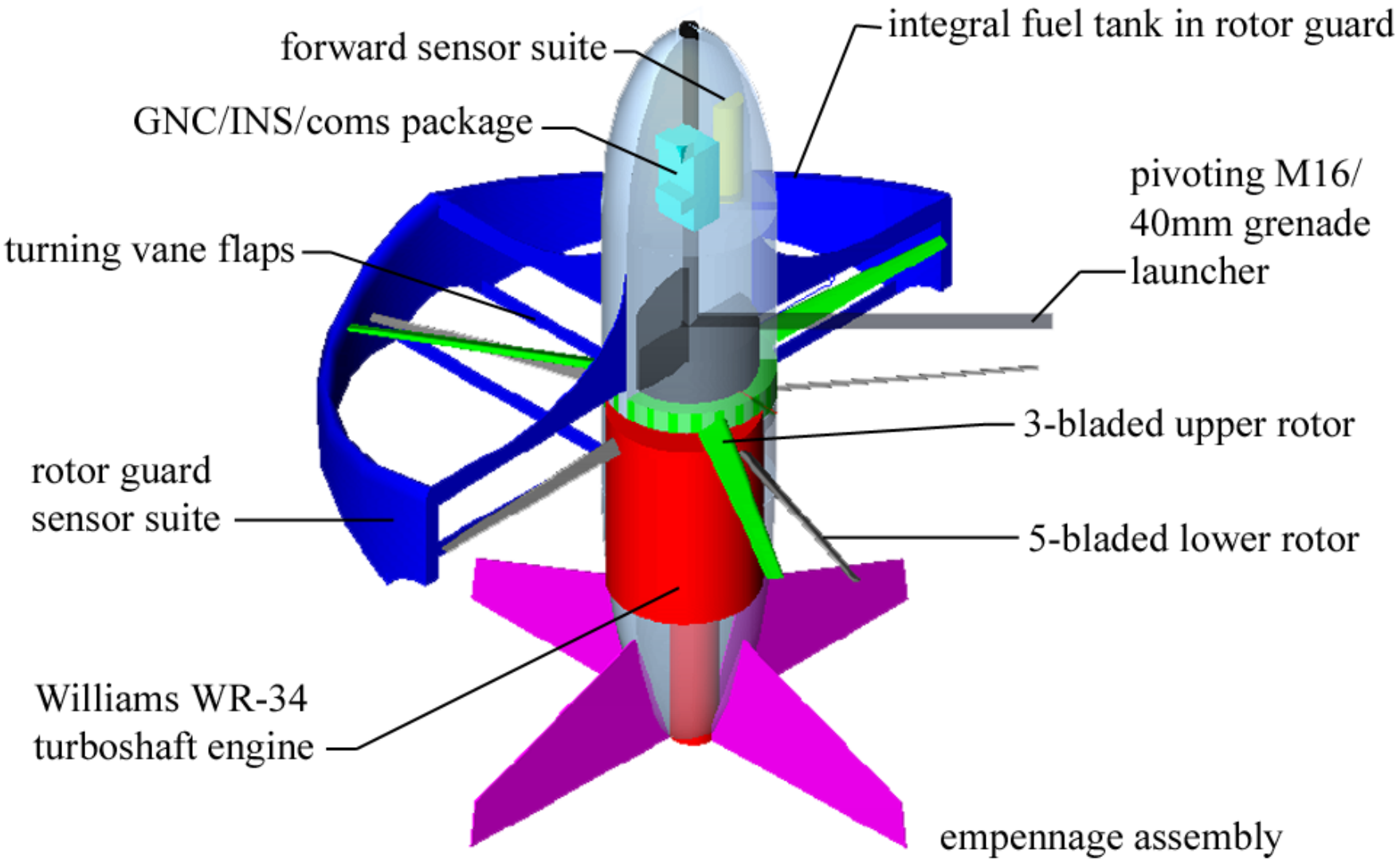


Enhanced Mission Specs:

- MGWTO ~50 lb
- Vmax >380kts
- >3hr HOGE
- >5hr Vbr Loiter
- Large Sector Coverage
- Full sensor & coms suites
- Collocated Close Air Support
- Combat resistant



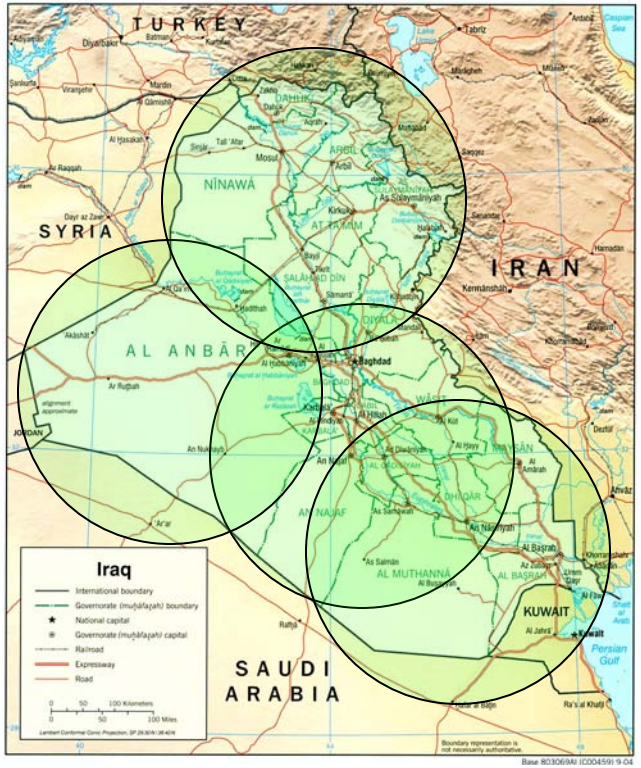
The Next Generation: FAQ-381$_{DP1}$



FAQ-381$_{DP1}$ CCAS 20 min Response

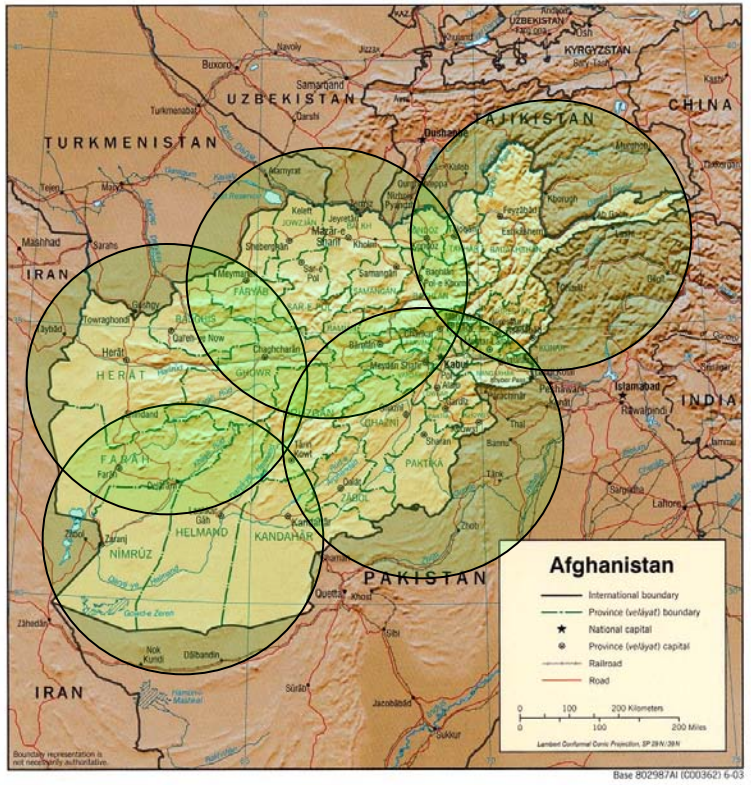
Iraq:

4 Base Coverage for 20min Response



Afghanistan:

5 Base Coverage for 20 min Response

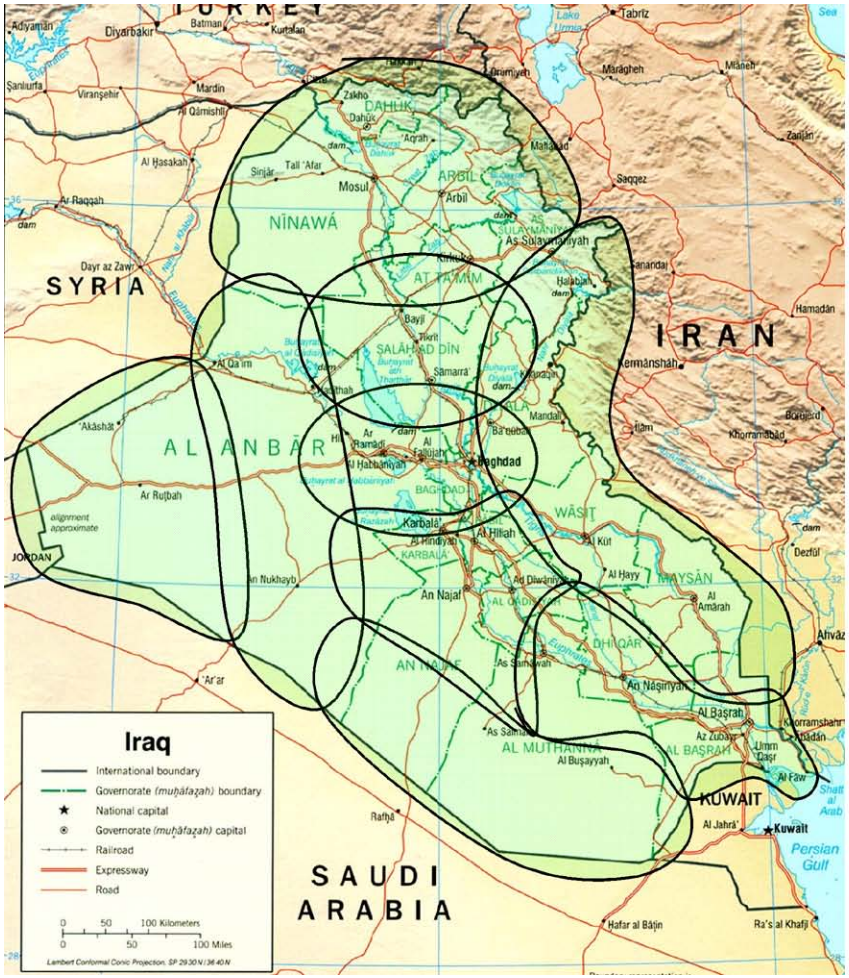


FAQ-381$_{DP1}$ CCAS Refueling Concept

Tankers enable "indefinite" loiter/orbit

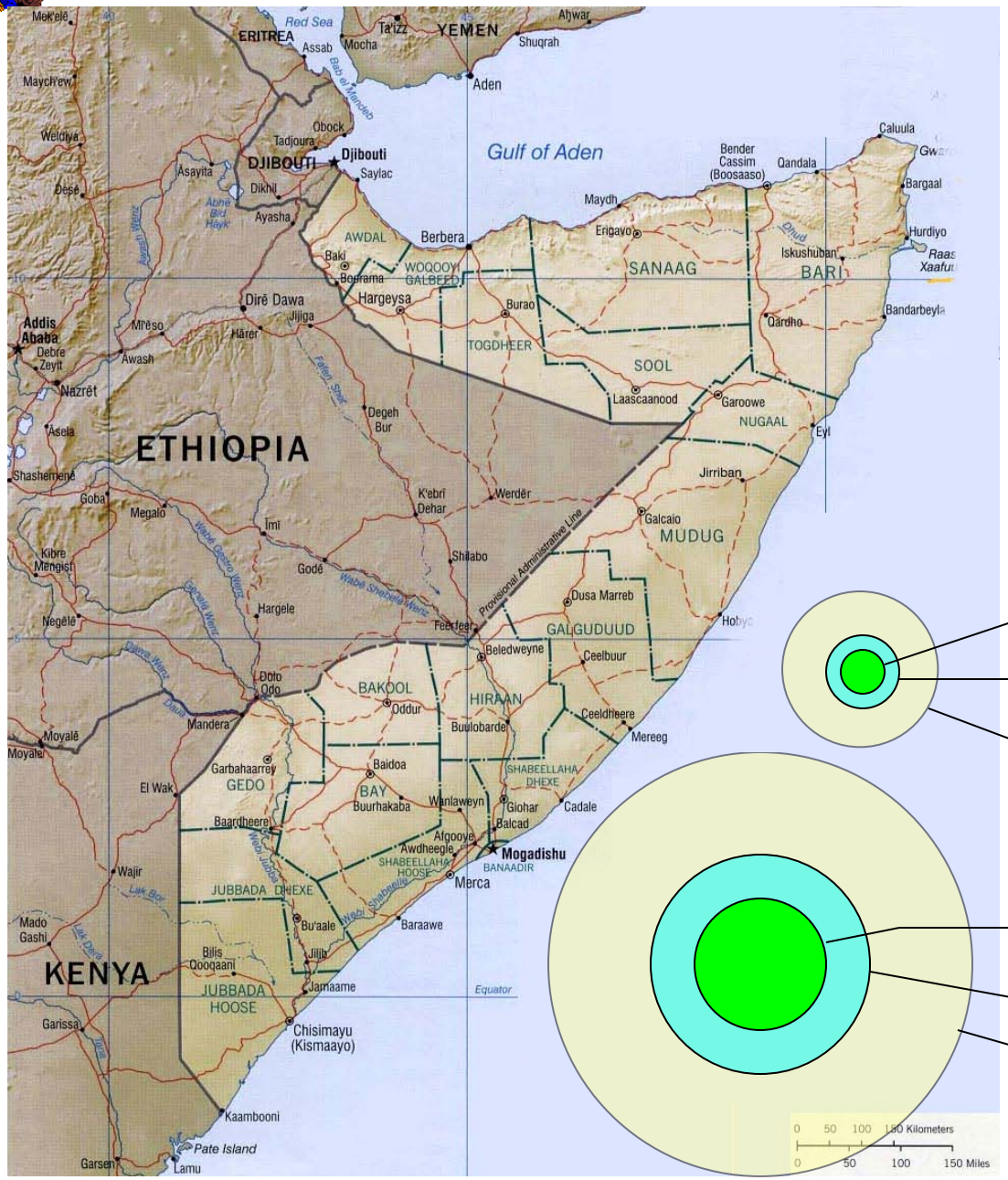
FAQ-381$_{DP1}$ 5 min CCAS

9 Track Coverage for Iraq



10 Track Coverage for Afghanistan

The Next Generation: FAQ-381$_{DP1}$ Counterpiracy



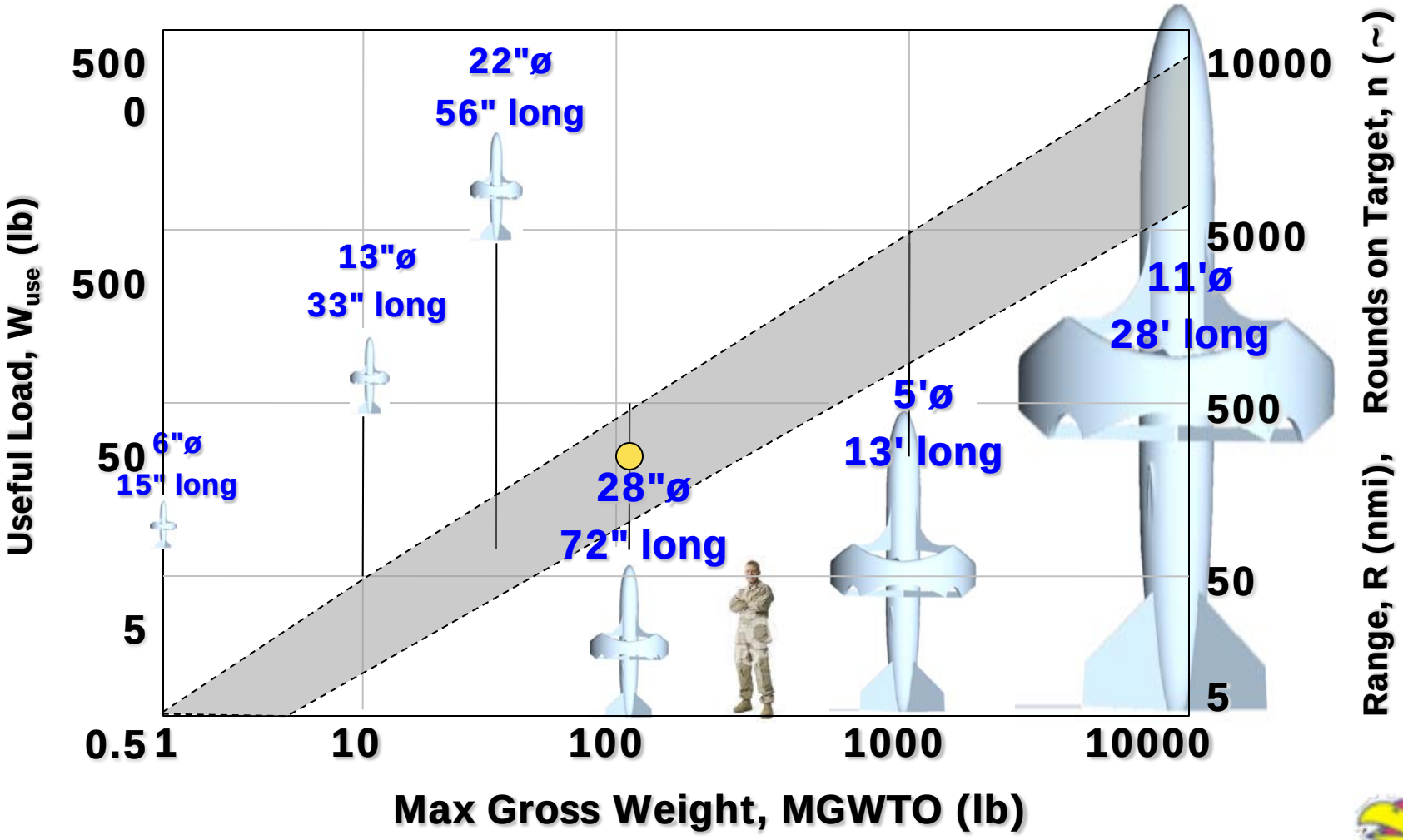
SH-60 Intercept Range

- 15 min
- 30 min
- 1 hr

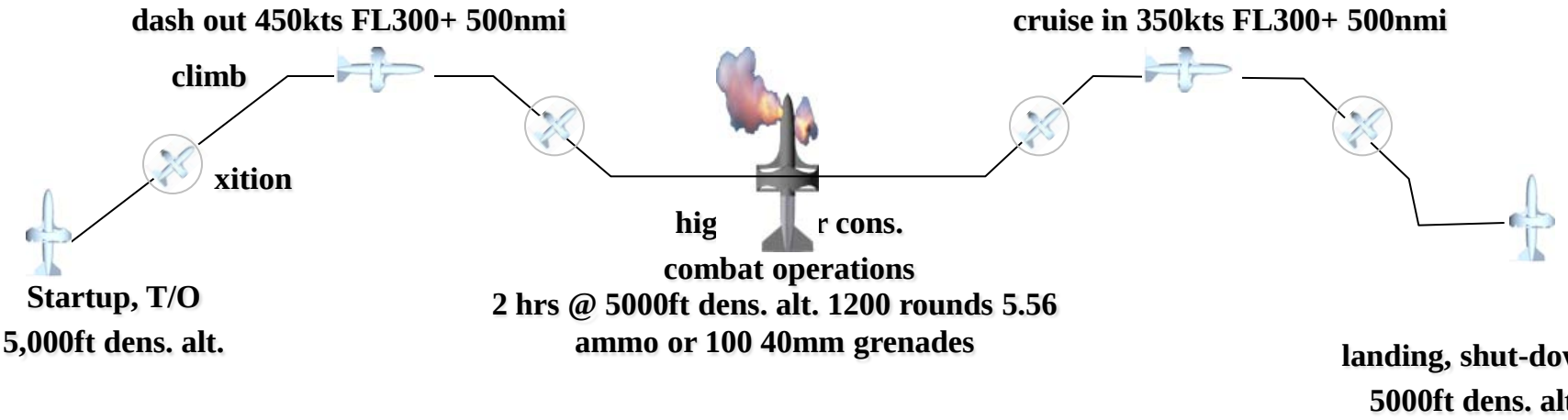
FAQ-381 Intercept Range

- 15 min
- 30 min
- 1 hr

XQ-381 Rubber Design General Sketch Growth, Range, Payload



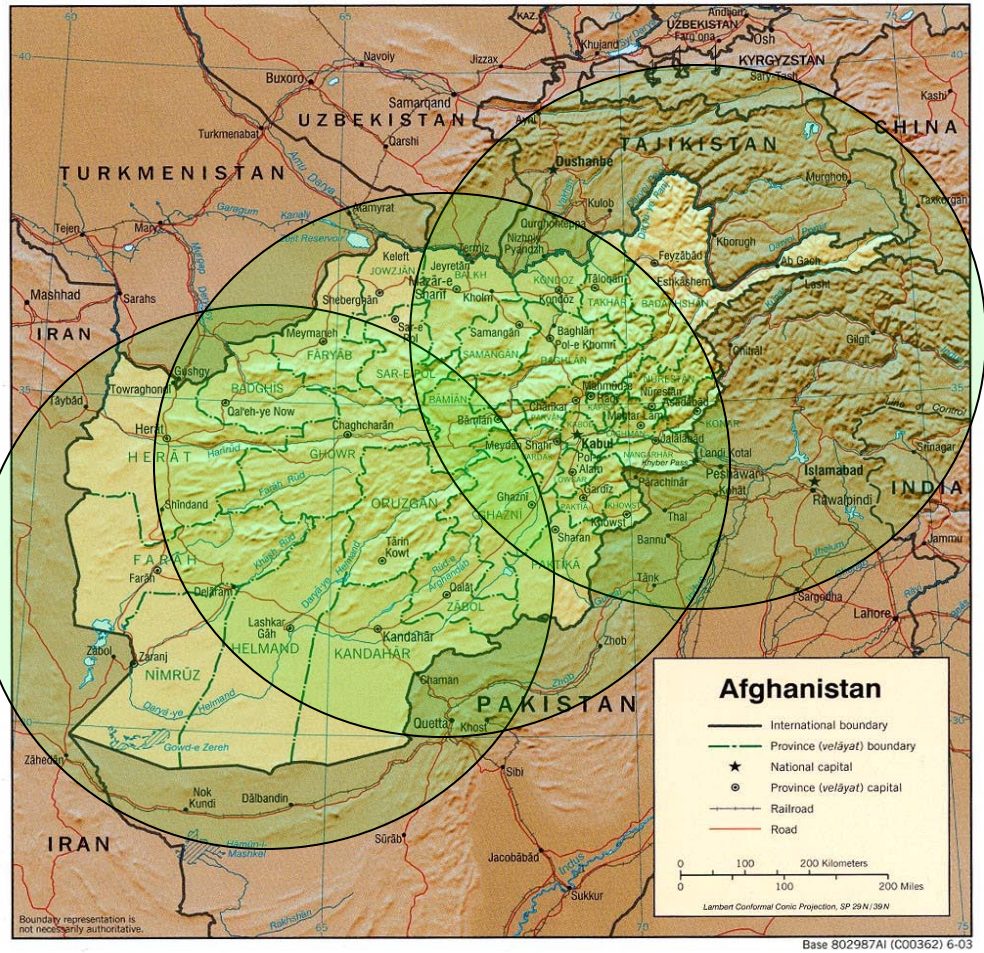
FAQ-381 Design Point 2 – 100lb MGWTO



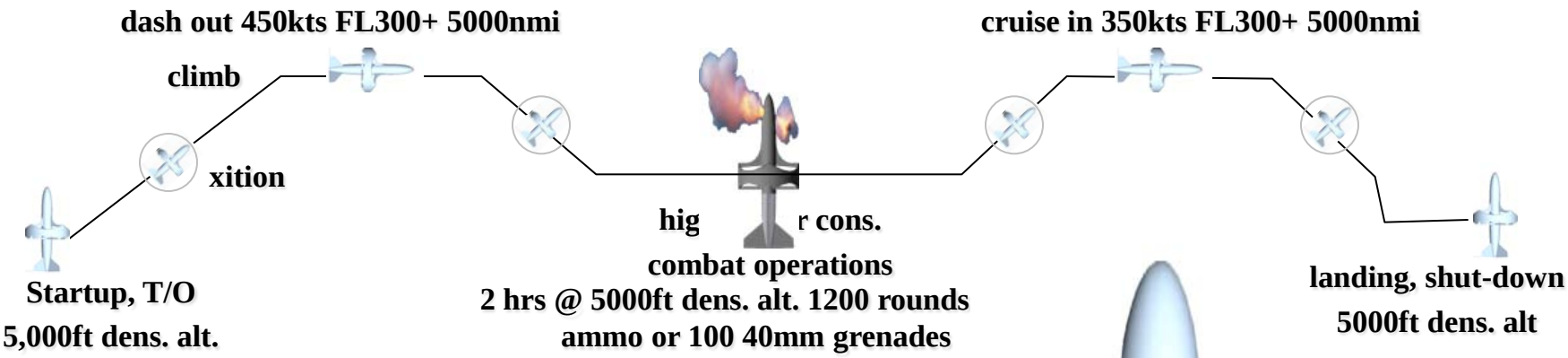
Enhanced Mission Specs:

- MGWTO ~100 lb
- Vmax >450kts
- >3hr HOGE
- >5hr Vbr Loiter
- 500nmi radius @ V_{BR}
- Large Sector Coverage
- Full sensor & coms suites
- Collocated Close Air Support
- Combat resistant

FAQ-381 Design Point 2 – 100lb MGWTO

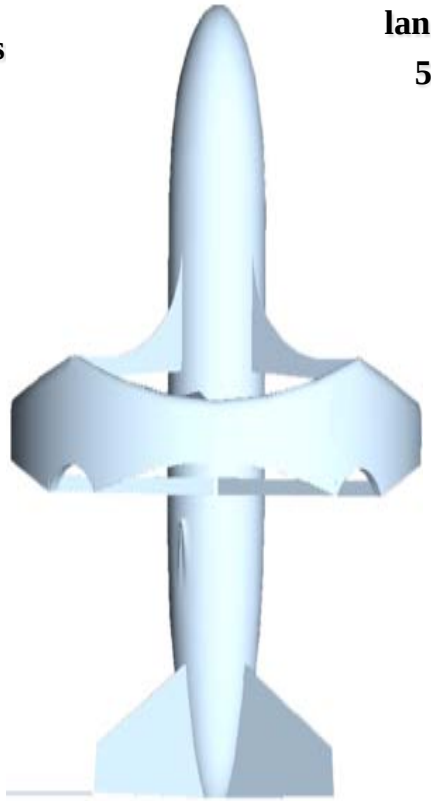


FAQ-381 Design Point 3 – 1000lb MGWTO



Enhanced Mission Specs:

- MGWTO ~1000 lb
- Vmax >450kts
- >3hr HOGE
- >5hr Vbr Loiter
- 5000nmi radius @ V_{BR}
- Large Sector Coverage
- Full sensor & coms suites
- Collocated Close Air Support
- Combat resistant



FAQ-381 Design Point 3 – 1000lb MGWTO

Now where…

- **Battle Labs**
- **Brief Decision Makers**
- **Industry Consortium**

Questions?