

<http://www.nps.edu/Academics/Institutes/Meyer/docs/V22%20Easterly%20presentation%20Oct%2014%202004.pdf>

OR

<https://docs.google.com/viewer?url=http://www.nps.edu/Academics/Institutes/Meyer/docs/V22%2520Easterly%2520presentation%2520Oct%252014%25202004.pdf&chrome=true>



Navy V-22

Concept of Employment

January 2004

Presented to US Naval War College
14 October, 2004
By Arnie Easterly
V22 Business Development
Bell Helicopter Textron

<http://www.lombook.net/view/426908-navy-v22-concept-of-employment-naval-postgraduate-school/>



Developed for Bell/Boeing
by
Whitney, Bradley & Brown, Inc.
1604 Spring Hill Rd. Suite-200
Vienna, VA 22182
(703) 448-6081

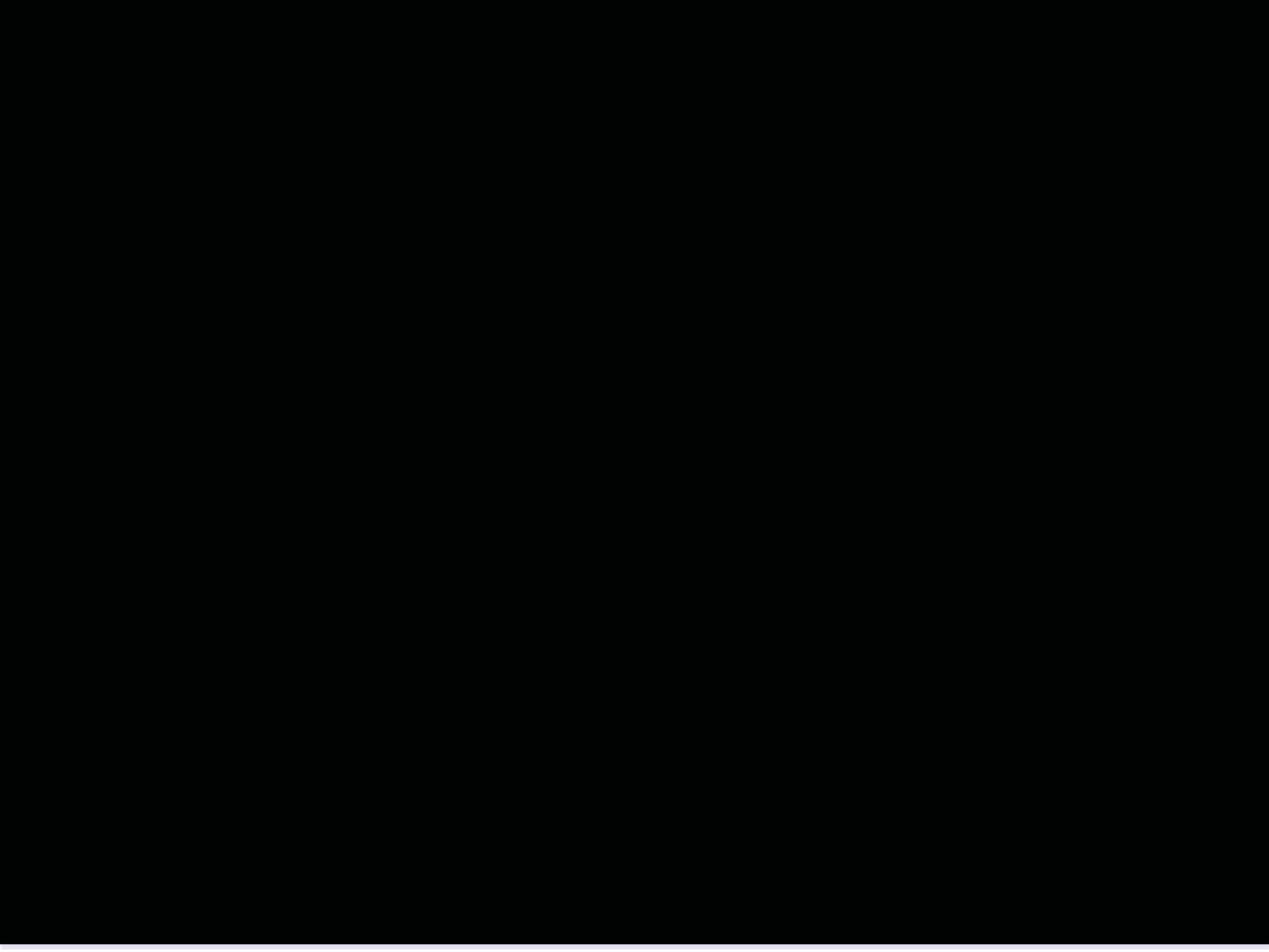


Navy V-22 COE



Purpose

- Depict the enhanced multi-mission capabilities of the Navy V-22 Osprey in support of the Carrier Strike Group (CSG) or Expeditionary Strike Force (ESF) commander operating in the 21st century
- The COE is intended to be used as a baseline document to stimulate discussions regarding the role of the Navy V-22, and its "value-added," during expeditionary operations in the 21st century



A large aircraft carrier deck is shown from a low angle, looking down the runway. A helicopter is in flight, hovering over the deck. A person in a yellow safety vest stands on the deck, looking up at the helicopter. The carrier's superstructure is visible on the left side of the frame.

Background

System Description

Employment Scenarios

Summary

Background





Planned Aircraft Allocation



- **Marine Corps: 360 Aircraft**

- **US Special Operations Command: 50 Aircraft**





Planned Aircraft Allocation (Navy)



- The table below reflects the planned allocation of Navy V-22 aircraft, as of December, 1995.
- The fielding plan at that time called for basing one squadron of 16 aircraft on each Coast.

Function	No. AC
2 x Operational Squadrons	32
Training Squadron	5
RDT&E	0
Total PAA	37
Maintenance Pipeline	7
Attrition Reserve	4
<i>Total Procurement</i>	<i>48</i>

System Description

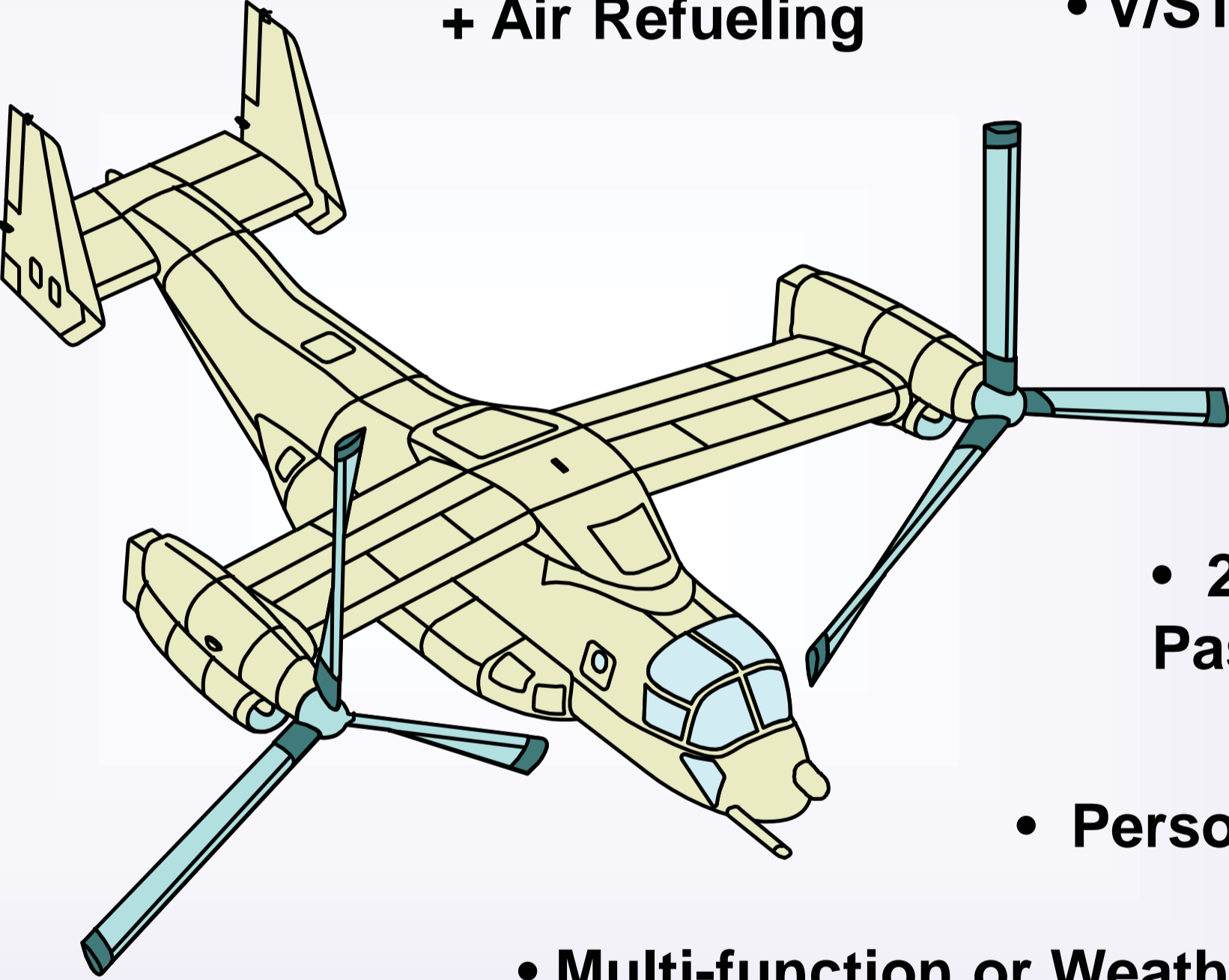




Fleet Logistics Support (COD / VOD) Features:



Navy V-22 Systems Description

- Rear Cargo Ramp
 - 2,038 gal. Mission Fuel + Air Refueling
 - V/STOL Capable
 - 6'x6'x24' Cabin
 - 739 cu. ft. usable cabin volume
 - Dual External Cargo Hooks
 - Passenger Door
 - Flush Roller Rails
 - 24 Crashworthy Passenger (troop) Seats
 - 2,000 lb capacity Cargo Winch
 - Personnel Hoist
 - Multi-function or Weather Radar
 - 5,000 & 10,000 lb Cargo Tiedowns
- 



Navy V-22 System Description

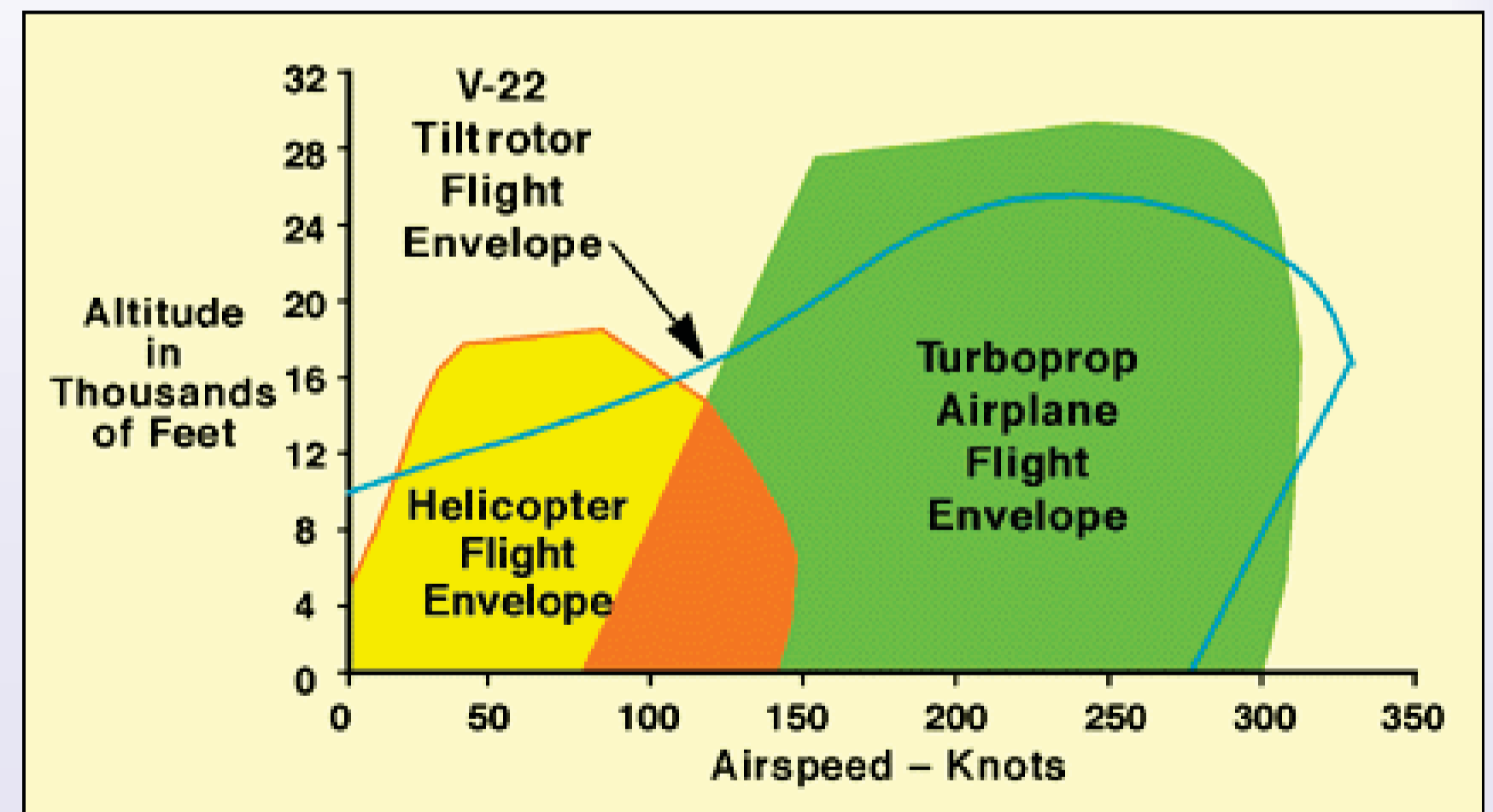


Navy V-22 Systems Description



• Navy V-22 Performance

- Tilt-rotor design
- VTOL
- Speed/Range/Ceiling of Turboprop
- Nominal Cruise 240Kts
- Mission Radius 350nm
- Service Ceiling 25,000ft
- Normal Altitude w/pax 10,000ft
- Ferry Range 2100nm w/ 1 refuel



Versatility of a Helicopter Speed/Range of a Turboprop

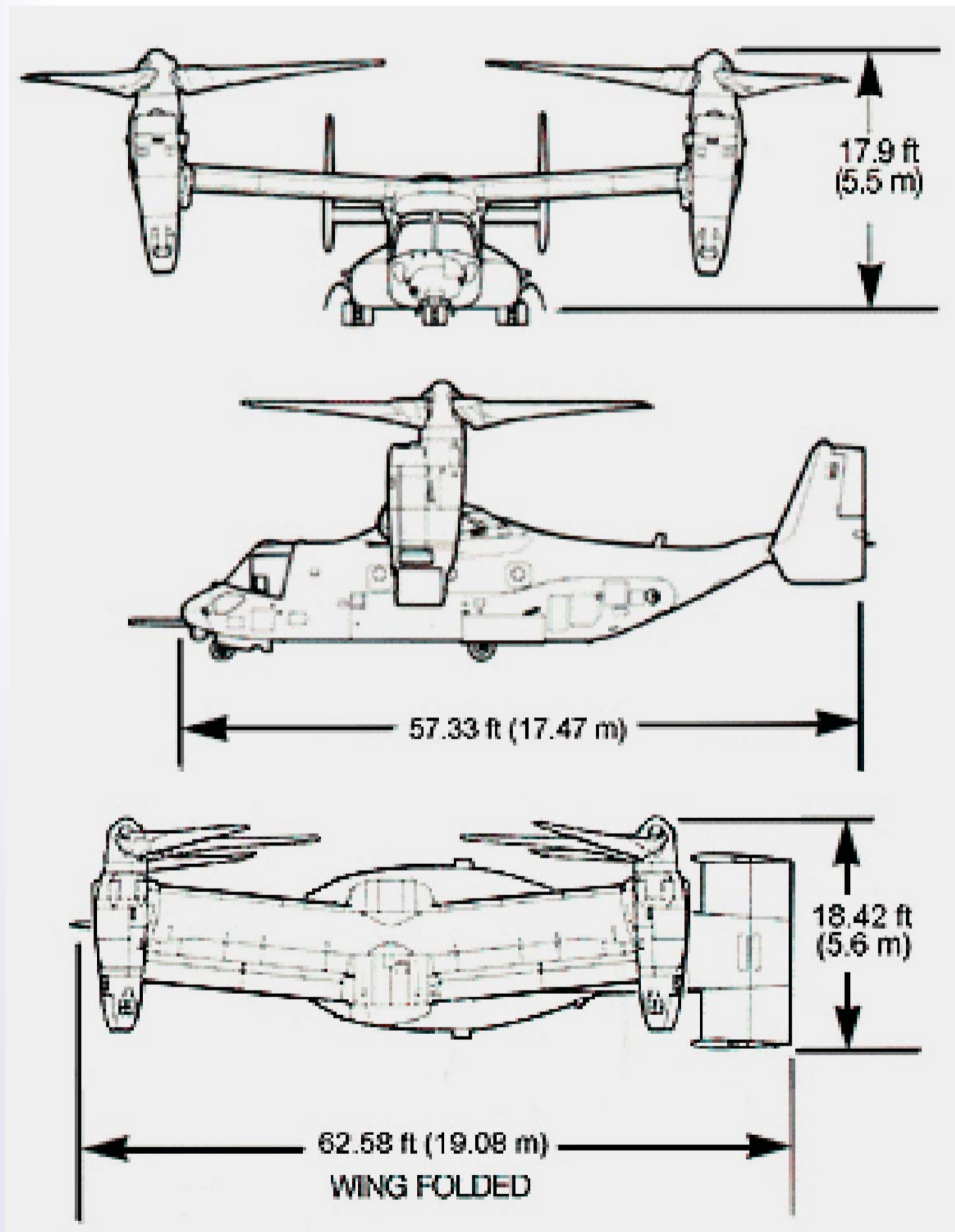


Navy V-22 Shipboard Compatibility



Navy V-22 Systems Description

- Designed for Shipboard Operations
- 90sec Wing and Blade Fold
- Certified for Ops:
 - **All Logistics Ships**
 - **Carriers**
 - **Amphibious Assault**
- To be Certified (current list expanded 2005-2006 by Lakehurst):
 - **Destroyer Class**
 - **Cruiser Class**



Designed for Naval Operations



Navy V-22 System Description



Navy V-22 Systems Description

- **Cargo-Lift Capacities**

- Internal Cargo Capacity

- **20,000# Internal**
 - **739ft³ Usable volume**
 - **20.8ft Pallet/Container Length**
 - **24 Combat Troops**
 - **(4) 40x48in Warehouse Pallets**
 - **(2) 463L Half-Pallets**
 - **Roller Conveyor**
 - **Winch**

- External Cargo Capacity

- **Two retractable external cargo hooks**
 - **10,000# single hook**
 - **15,000# dual hook**
 - **130kts**



Internal capacity of COD with External Lift / VOD Capability



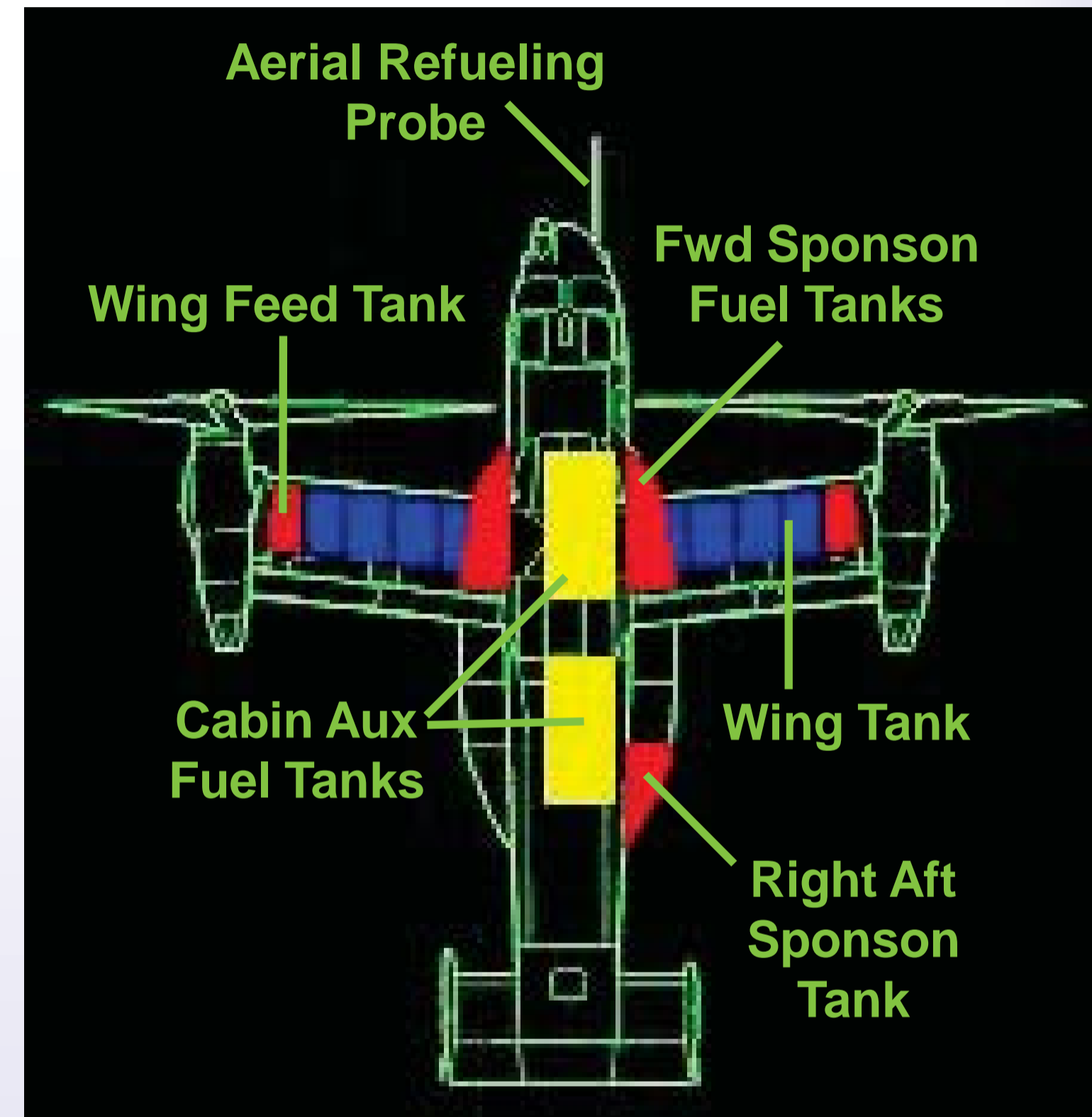
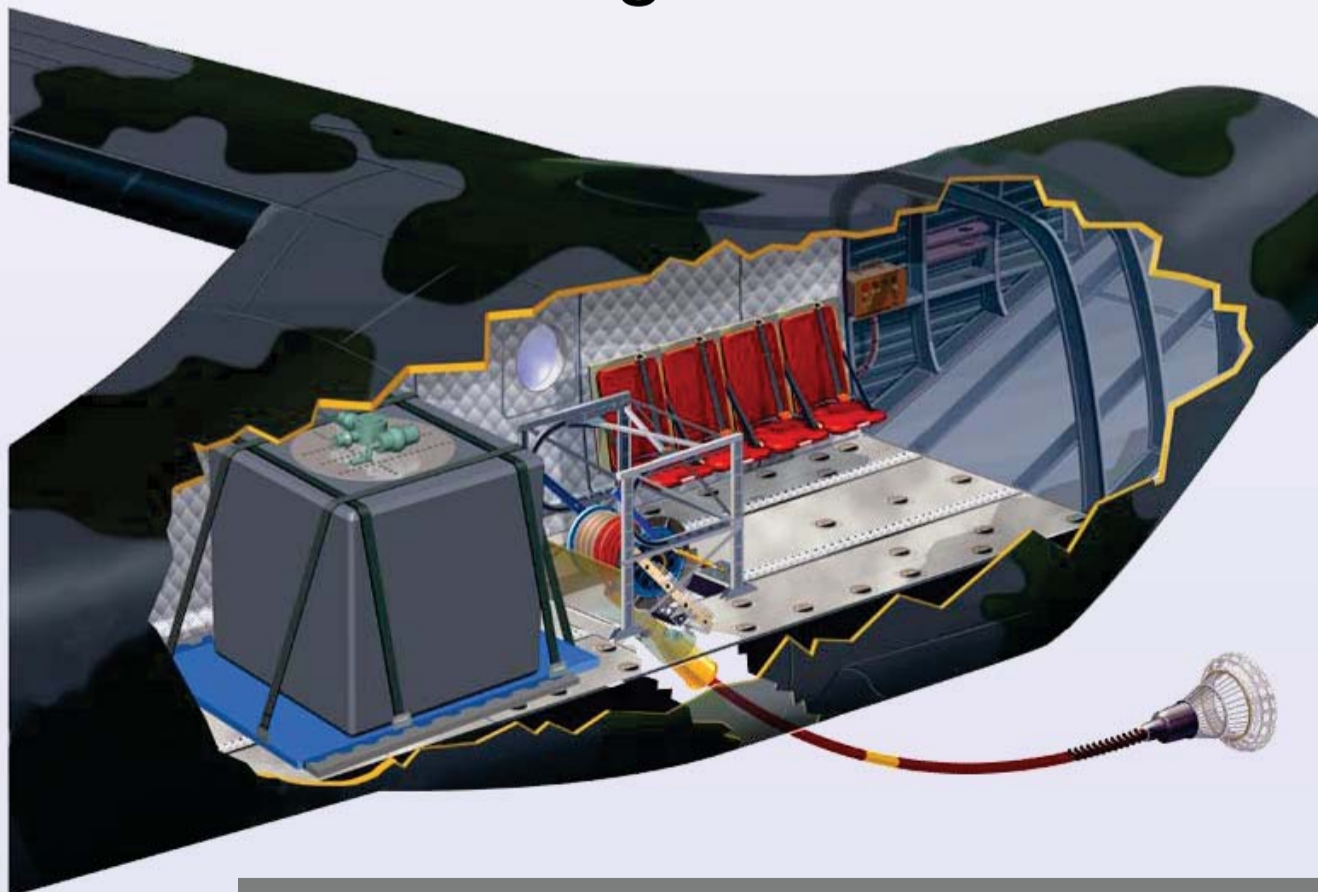
Navy V-22 System Description



Navy V-22 Systems Description

- **Navy V-22 Aerial Refueling**

- Auxiliary Tanks: 2 x 430 gal (5590 lbs.)
- Internal Fuel: 11,700 lb/1720 gal
- Fuel Giveaway: Auxiliary + Internal (17,290 lbs.)
- Kit Weight: 660 lbs
- Fuel rate: 120gpm
- Reconfigure time: < 1.5 hours
- V-22, CH-53E, AV-8, F/A-18, JSF, etc.
- 230kts
- 80-91 ft hose length



Aerial Refueling provides warfighting flexibility



Navy V-22 System Description

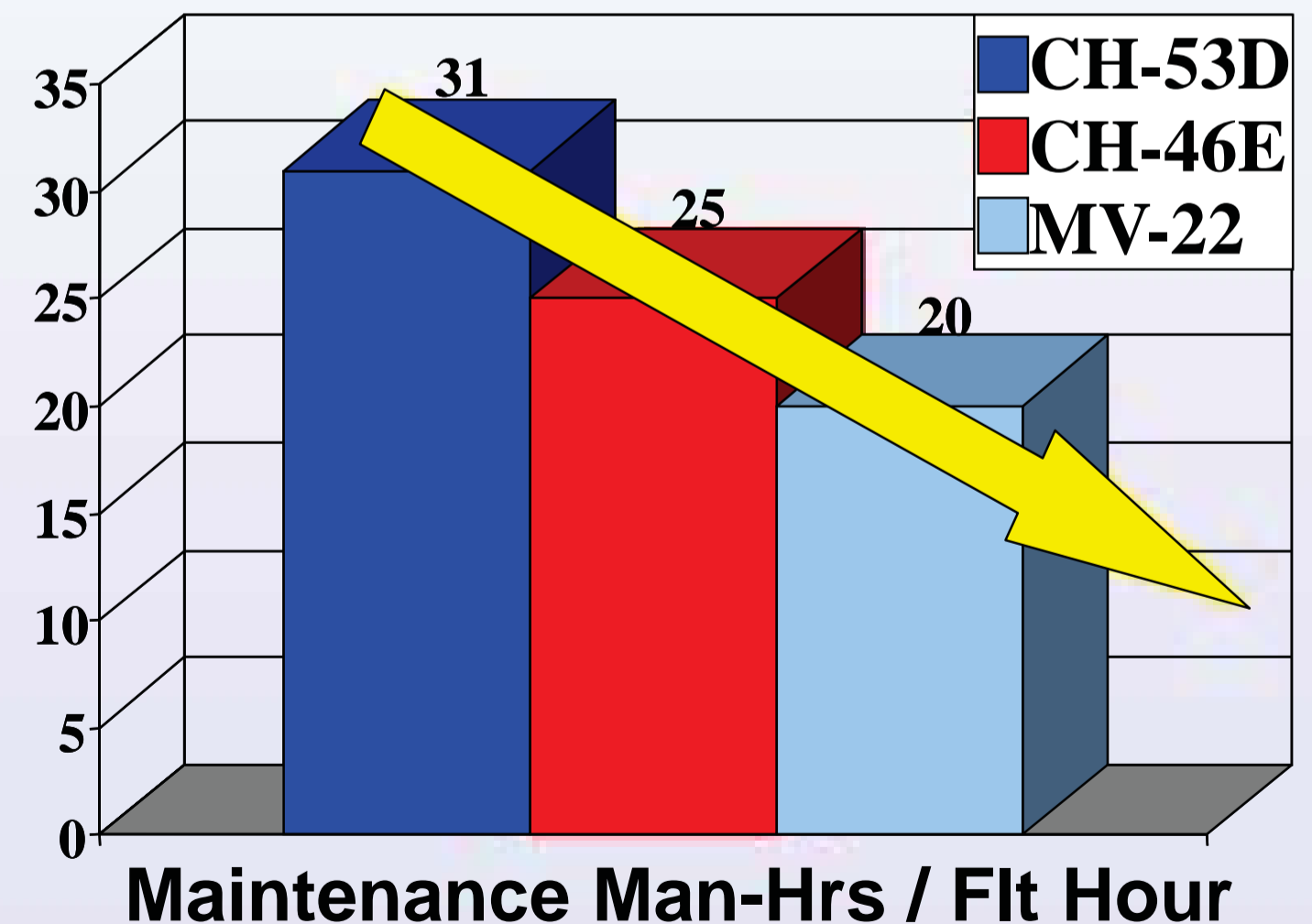


Navy V-22 Systems Description

- **Navy V-22 Supportability**

- **Improved design for maintainability:**

- **Extensive use of composites**
 - **Central, Integrated Systems Testability**
 - **Improved Maintenance Accessibility**
 - **T-406 Engine commonality**
 - C-130J
 - Commercial Aircraft –(Saab 340)



Increased Availability

Employment Scenarios





Navy V-22 COE Assumptions



- Set in the 2015 timeframe
- Services have developed their force structure according to the capabilities based approach articulated in the 2004 Defense Planning Guidance
- Operational adjustments by the Navy to reflect the tenets of Sea Power 21 have been successfully implemented
- The Navy V-22 will be operating with emerging platforms such as the High Speed Vessel, Littoral Combat Ship, and ships in the Maritime Pre-positioning Force (Future)



V-22 Mission Areas-2015



–Sea Strike

Combat Search and Rescue (CSAR)

Aerial Refueling

Special Operations Forces Support

–Sea Shield

Maritime Intercept Operations (MIO)

ASuW, ASW, MIW force multiplier

–Sea Basing

SAR/MEDEVAC

VOD/COD

LCS/SAG Reconstitution



Multi-Mission capabilities across a diverse set of operational tasks



Navy V-22 COE Naval Expeditionary Forces



Themes

- Changing threat requires new capabilities
- Multi-mission utility across Sea Power 21 pillars
- Speed, Range, Payload combinations unique
- Flexible Basing Options enable innovative solutions

Navy V-22 is a Transformational Force Multiplier

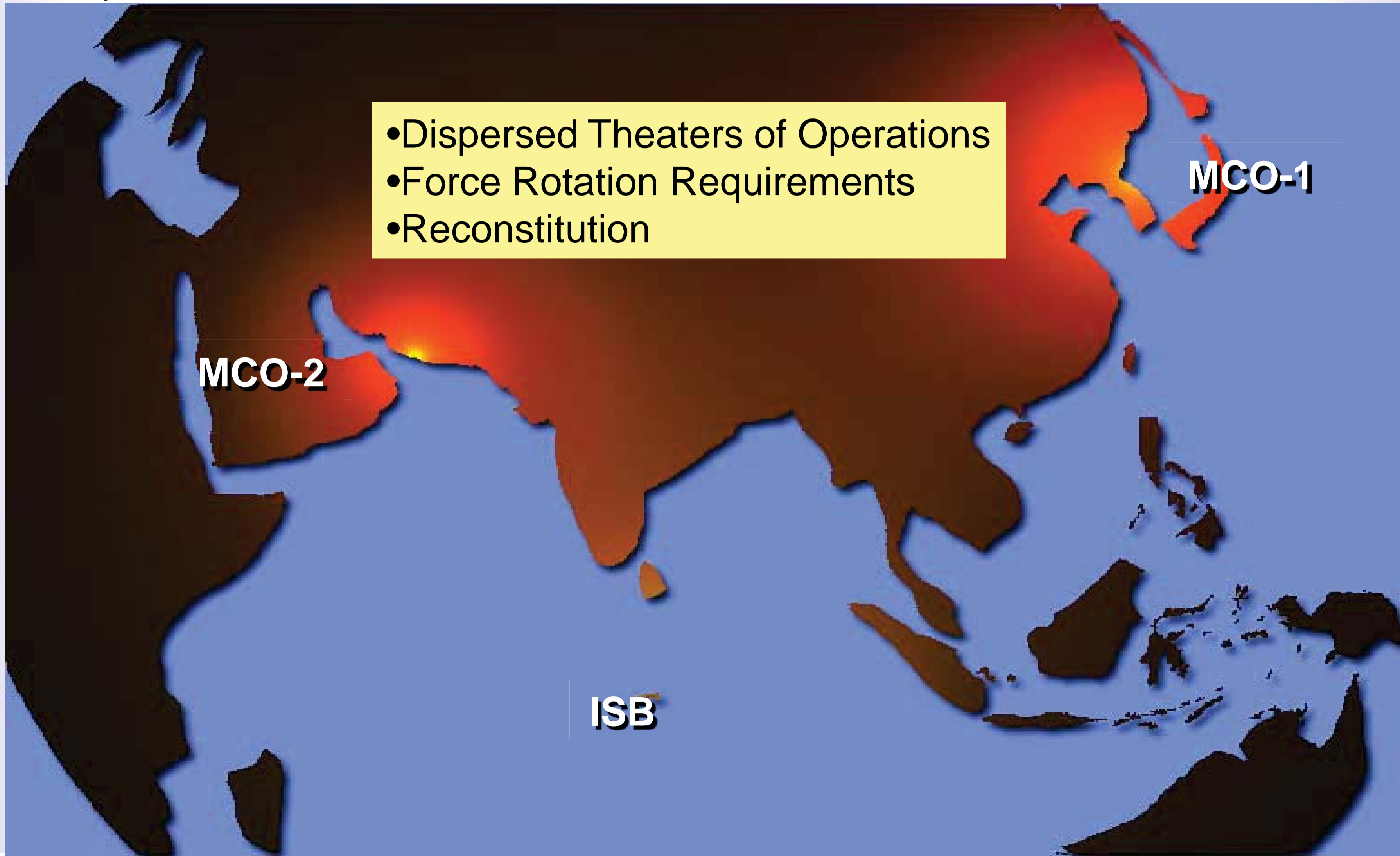


Navy V-22 COE Naval Expeditionary Forces



Naval Expeditionary Forces

- Operational Environment 2015 Overview



- Dispersed Theaters of Operations
- Force Rotation Requirements
- Reconstitution

MCO-1

MCO-2

ISB



2015- MCO 1



MCO-1

• Situation

- US and coalition forces conducting combat operations for months vs. Orange.
- The aggressor's combat power has been significantly reduced
- The allies have gained the initiative and have forced the aggressor to retreat.

• Threat

- Two armored and three mechanized infantry divisions
- 4th generation fighter-attack aircraft
- fixed / rotary wing transports and attack helicopters.

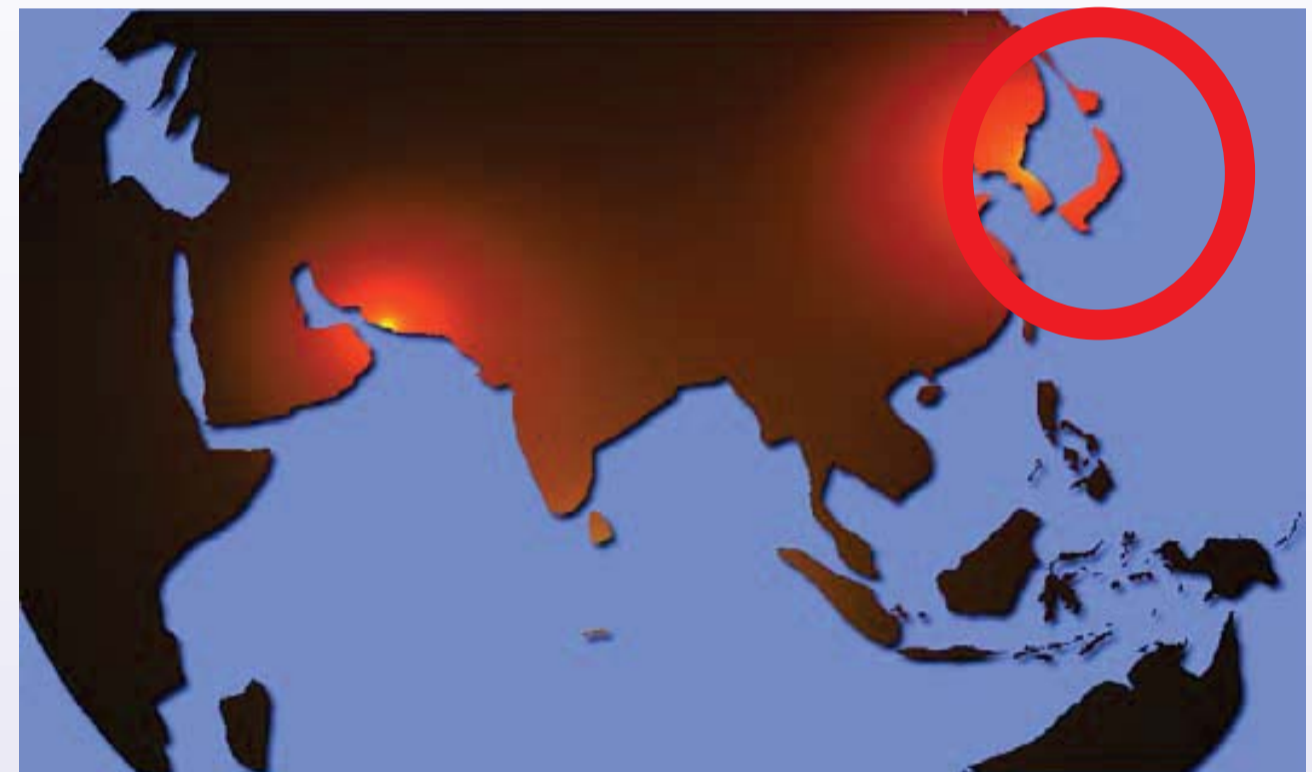
• Forces

- Three Air Expeditionary Forces
- Four Army divisions organized and equipped per the Future Combat System.
- Four CSGs, 4 MEB* level ESGs*, and two MPGs*.

- *Marine Exp Group / Exp Strike Group / Maritime Prepo Group

• Mission

Continue to assist Orange in ejecting invading forces and be prepared to return to CONUS.



Vignettes

- Recovery Tanker
- Search and Rescue



Navy V-22 Recovery Tanker Mission

MCO-1

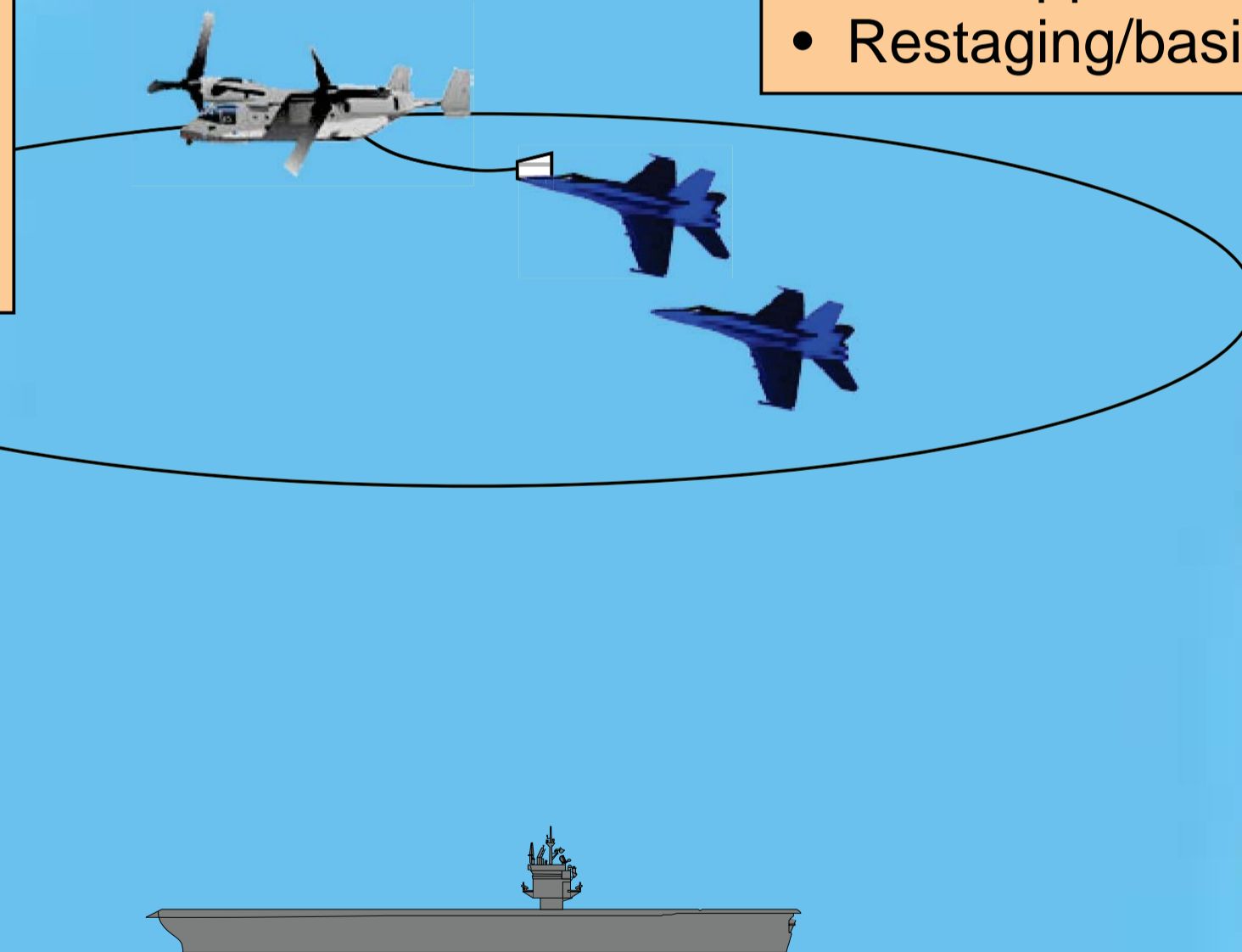


Situation

- Launches last, climbs to 10K
- Consolidates w/ YoYo Tanker
- Meets strike group ovhd “Red Crown” as egress tanker
- Return overhead as Recovery Tanker for 2nd cycle
- Recovers last in second recovery
- Relieves F/A-18E/F for strike/enroute tanking
- 1+30 cycles

Attributes

- 15,000# give
- **120 gal/min**@ 50psi
- Efficient Delivery- economical
- Speed, altitude fit tanking role
- Low O&S cost
- Can support fixed or RW
- Restaging/basing options



Sea Strike Enabler
Releases Recovery F/A-18E/F Tanker for Strike Missions



Navy V-22 SAR Mission



MCO-1

Situation

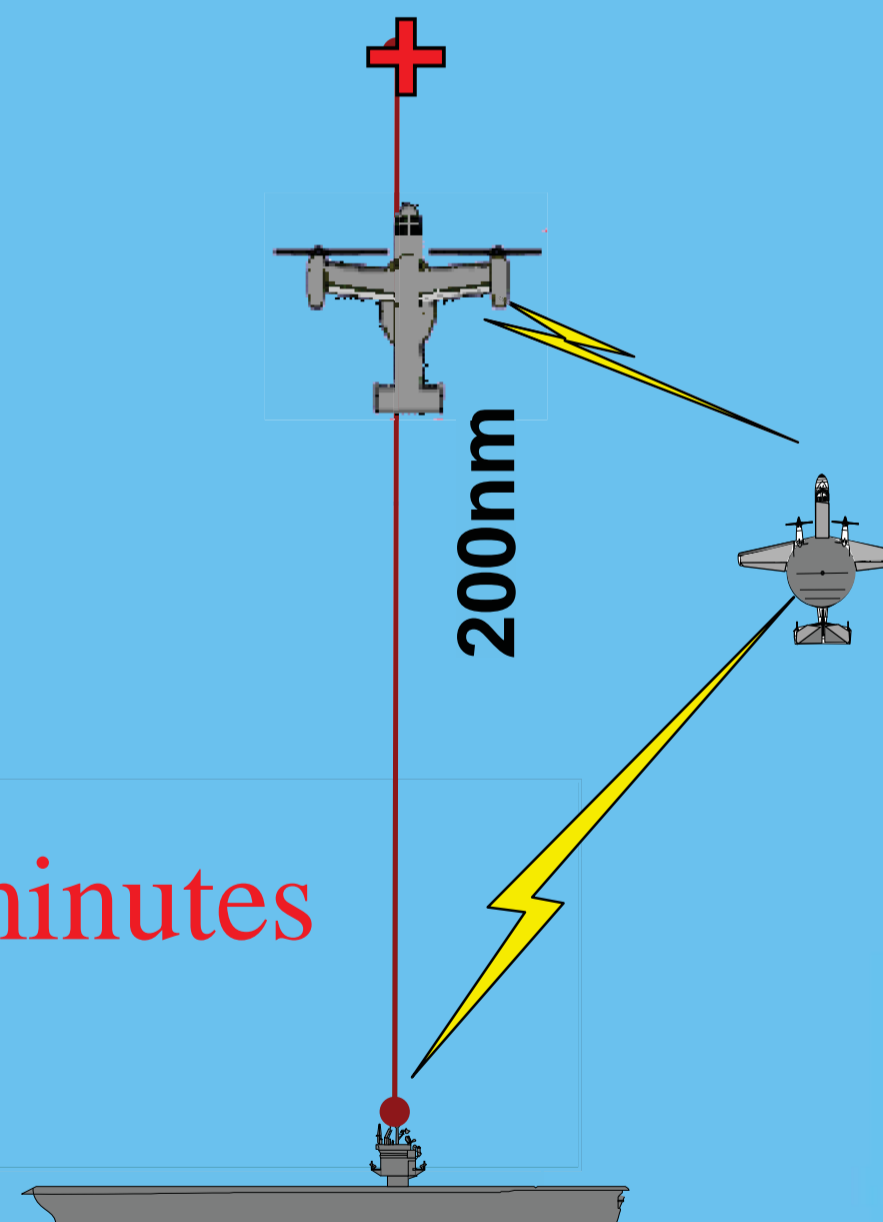
- F/A-18 suffers engine fire at 200 nm
- Pilot ejects; At “Bingo” state, Wingman returns to CVN
- Environmental
 - Night (2230 Local)
 - Water Temp 46°F
 - Air Temp 38°F
 - Sea State 4
 - Wind: 15-20 knots
- Range exceeds Plane Guard Helo
- Alert 15 Navy V-22 launched for SAR

Attributes

- Speed: 250 kts
- Range: 400+ nm
- Comm suite: Data link, UHF/ VHF voice
- Sensor suite: FLIR, NVD, GPS
- Medical personnel & equipment fit

Pilot rescued in 65 minutes

TIME	15	30	45	60	75	90	105	120	135	150
Survivability	TOC					SURVIVAL DOUBTFUL				
MH60S	2+00 To Survivor With Lily Pad In Place									
Navy V-22	1+05 To Survivor									



Sea Base Enabler
Aircrew Survivability increases as exposure decreases



2015- Reconstitution



Reconstitution

• Situation

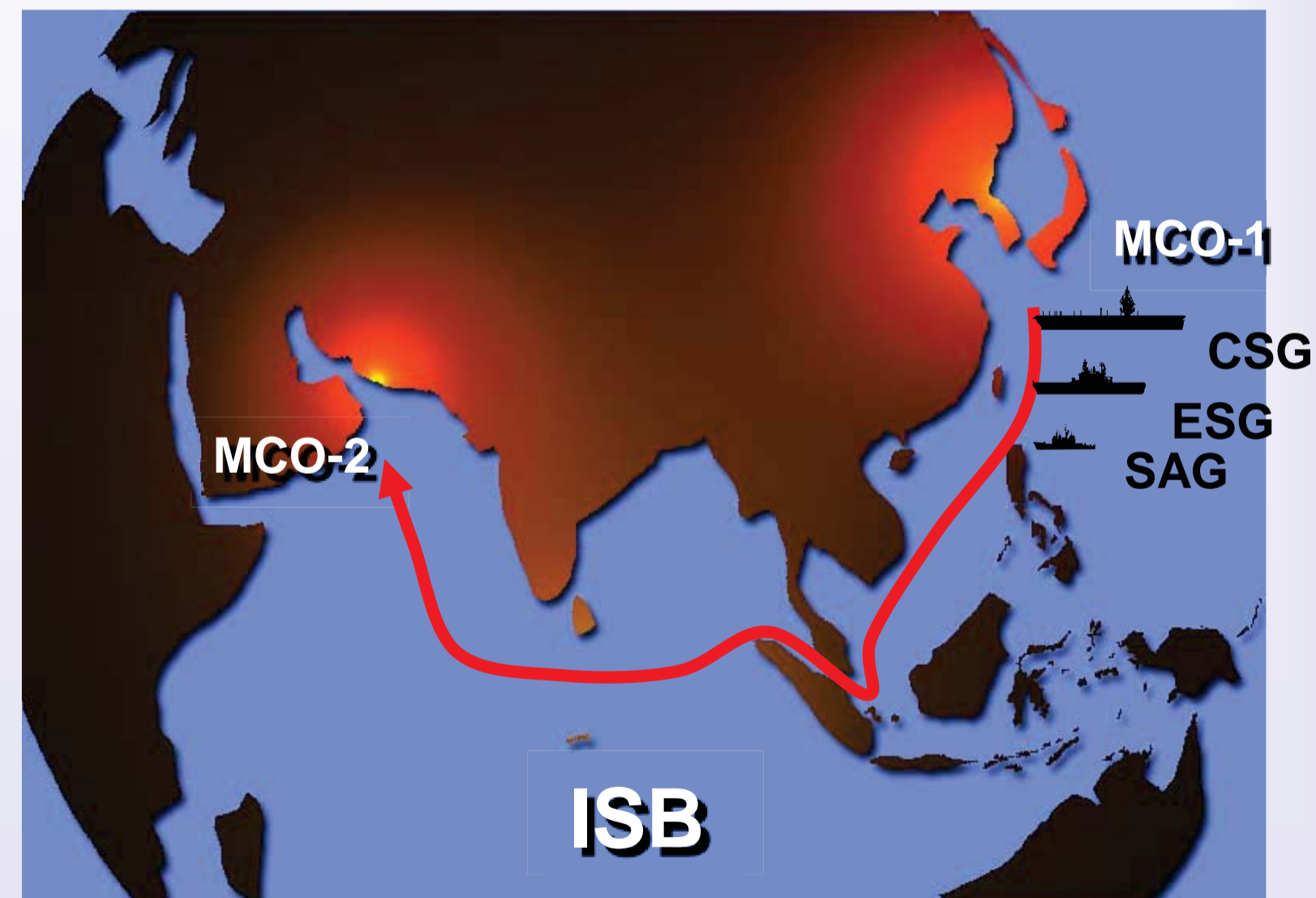
- REAGAN CSG & Bon Homme Richard ESG diverted from homeward transit to MCO-2
- ESG & MPG back load/reconstitution commences in MCO-1
- CSG sprints ahead of ESG
 - MCO 2 Combatant Commander directs ESG to delay at ISB until further notice
- Maintain 15 knot SOA

• Forces

- One CSG , ESG & SAG
- MV-22 not available to CSG

• Mission

- Take most direct route to MCO-2
- Resupply from ISB at ranges that optimize reporting to MCO-2 in shortest time
- Move high priority cargo, parts & pax between CSG, SAG & ISB



Vignettes

Reconstitution

MEDEVAC

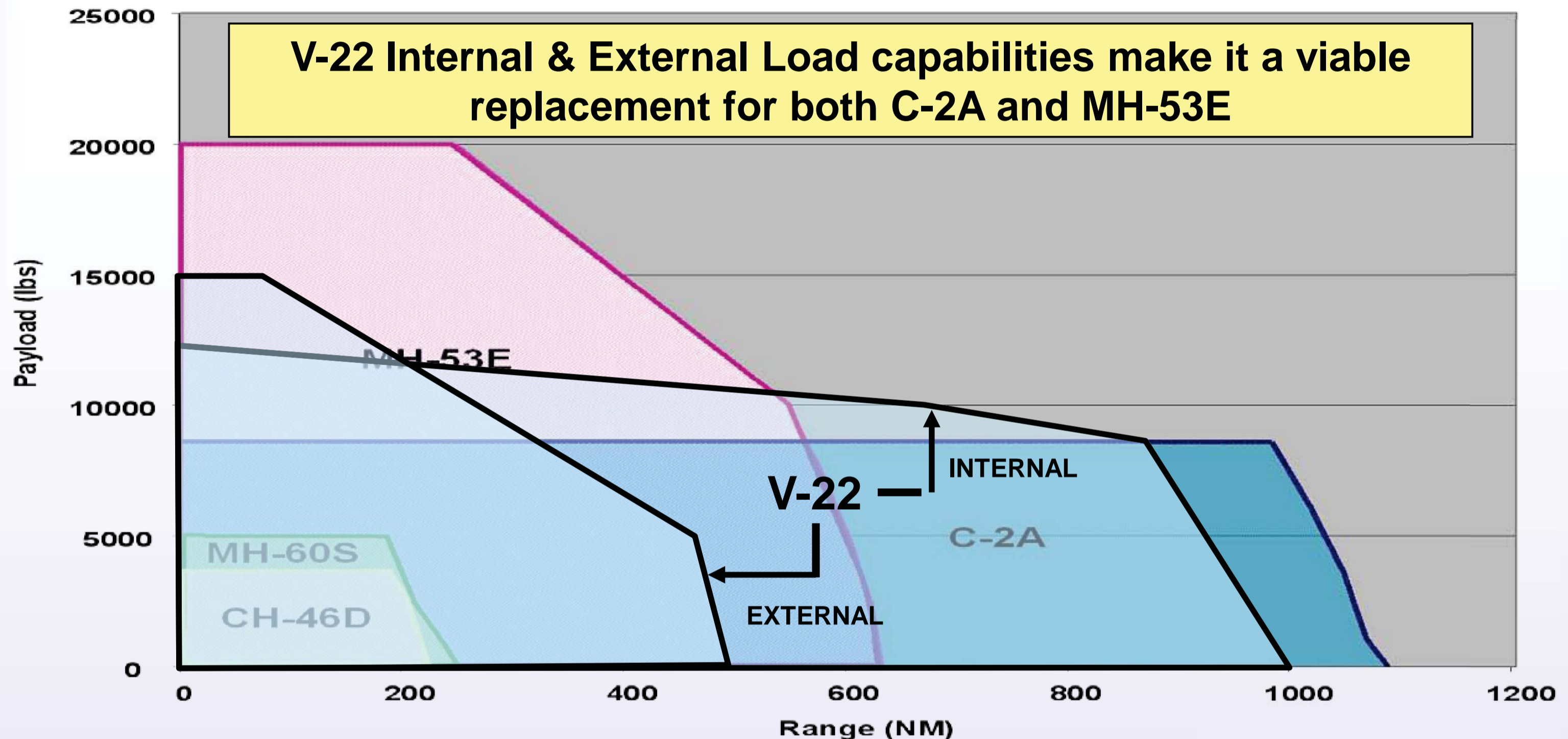


Air Logistics Range vs. Payload Trade-Offs

Utility Role of V-22



Reconstitution



- V-22 enhances the family of small to medium lift capability with greater ranges than helos
- Heavy, over-sized cargo capacity at medium ranges to meet operational readiness needs of aircraft and ships remains H-53 mission (not projected to be in service in 2015)
- Long range cargo and passenger movement necessary to overcome lack of intermediate support base opportunities in several areas of world's oceans
 - V-22 capability comparable to C-2A (projected to leave USN inventory by 2020)
- Short to medium range external lift necessary to meet intra-strike group ship-to-ship logistics
 - MH-60s remain preferred VERTREP platform but Navy V-22 also has that capability



Navy V-22 COE for Reconstitution



Reconstitution

• Situation

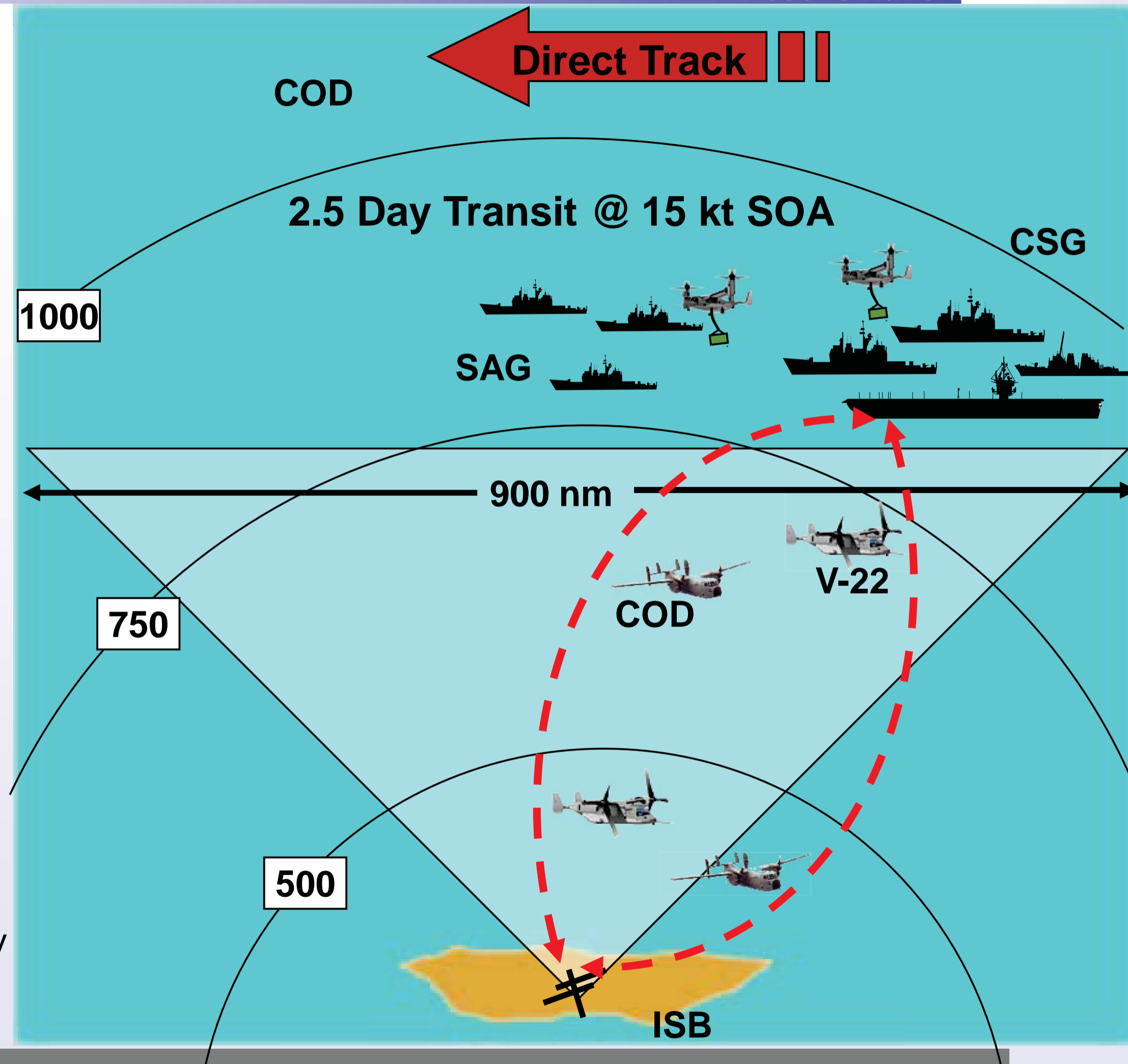
- Navy V-22 (2) and C-2 (2) operate between CVN and ISB
- Re-supply effort via point-to-point mode commences at 750- 850 nm along CSG/SAG track
- Redistribution between CSG & SAG units via V-22 and MH-60S

• Movement Metrics

- Based on equal sorties, V-22 moves comparable payloads to C-2A
 - ~ 7% fewer pax
 - ~ 4% more cargo

• Navy V-22

- Can deliver direct to escorts & CVN
 - Internal & External load options
 - VTOL and STOL capabilities
- Affords greater fixed wing vs non-fixed wing deck configuration flexibility for CVN



Versatile Sea Basing Enabler

Navy V22 Provides a Long Range Option Comparable to C-2A Plus...



Navy V-22 COE for Medevac



Medevac

• Situation

- Collision at sea during underway replenishment results in significant injuries to 12 sailors. All require medevac to shore facility.

- Both CSG and ISB are out of helo range. COD not accessible unless carrier strike group closes SAG to 200 nm

- V-22 launches off carrier with 12 litter configuration and medical team

- 4 litter max for helos will require 3 helos

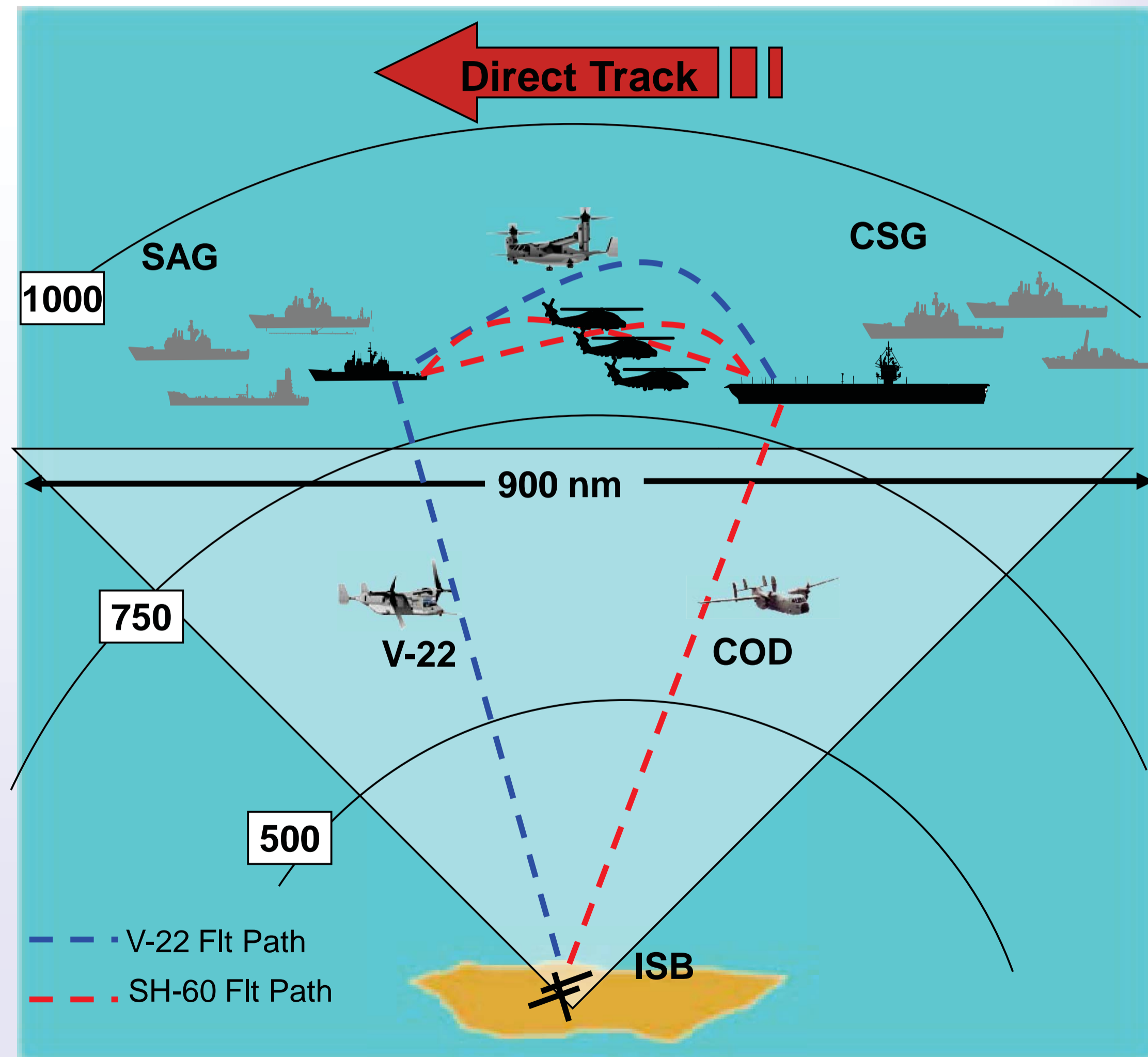
• Movement Metrics

- C-2A + (3)MH-60's

Pax (3 H-60 w/ 4 each)	12
Load Pax (twice)	2 Hrs
Ships close	10 Hrs
4 Sorties (3 Helo, 1 COD)	8 Hrs
Total Time	20 Hrs

- V-22 (1 A/C)

Pax (1 V-22)	12
Load Pax (once)	1 Hr
2 Sorties	5 Hrs
Total Time	6 Hr





2015- MCO 2



MCO-2

• Situation

- Red has successfully pressured its neighbors to deny the US access to bases
- Red deployed minefields in nearby straits and littoral areas, followed by a similar “seeding” in Green’s major ports.
- Red then attacks on a multi-axis front with the strategic objective of achieving hegemony over Green and compelling the US to substantially reduce its presence in the theater.

• Threat

- Five diesel submarines
- Several flotillas of patrol craft with 70mm cannon and surface to air / surface to surface missiles, as well as a paramilitary organization based aboard numerous, armed, small boats.
- Red's tactical ballistic missiles can be fitted with conventional, chemical, or biological warheads and are protected by a formidable air defense system..

• Forces

- One CSG, SAG and LCS sqd
- Three CSGs and two ESGs enroute
- Two AEFs on standby

• Mission

- Establish Q route through straits
- Establish air supremacy and sea superiority
- Combat air operations ashore



Vignettes

LCS/SAG Sustainment

SOF Support

CAS Tanking

Combat Search and Rescue



Navy V-22 Sustainment –MCO2



MCO-2

SITUATION

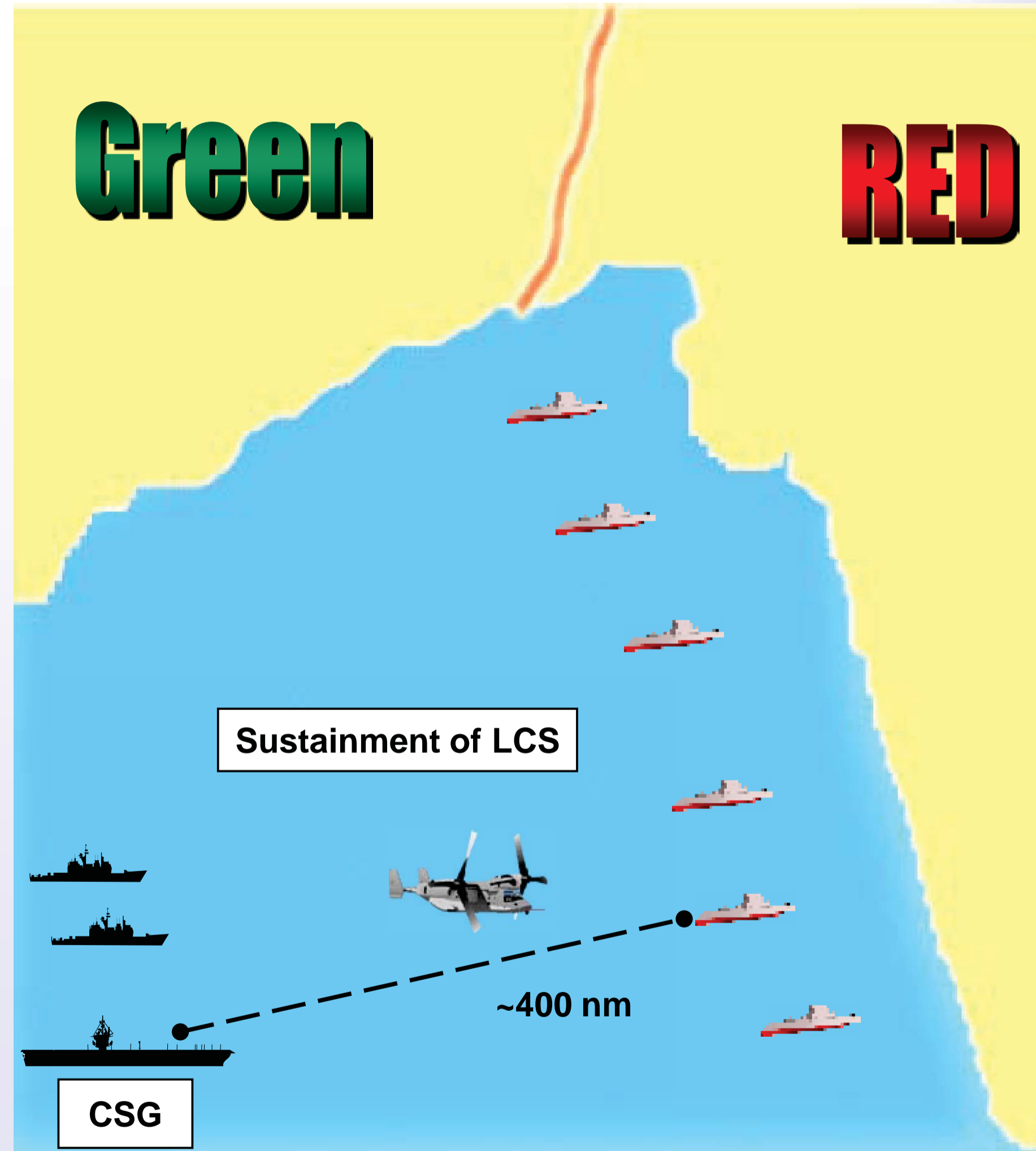
- 2 Divisions of LCS ships patrolling RED littorals
- Intelligence reports RED submarine force unexpectedly sorties
- Replacement part critical to ASW operations
- A replacement part is within the CSG
- CSG lead elements currently 24hrs from op area when one LCS reports Underwater Vehicle (UUV) malfunction

SOLUTION

- Use Navy V-22 to fly the UUV replacement part from the CNV to the LCS

ATTRIBUTES

- Navy V-22 able to make the 400nm delivery within 7hrs from initial distress call
- Internal Carriage of asset
- Hoist used to lower replacement part to LCS



Sea Shield - Maintaining Combat Capability On-station



Navy V-22 SOF Mission



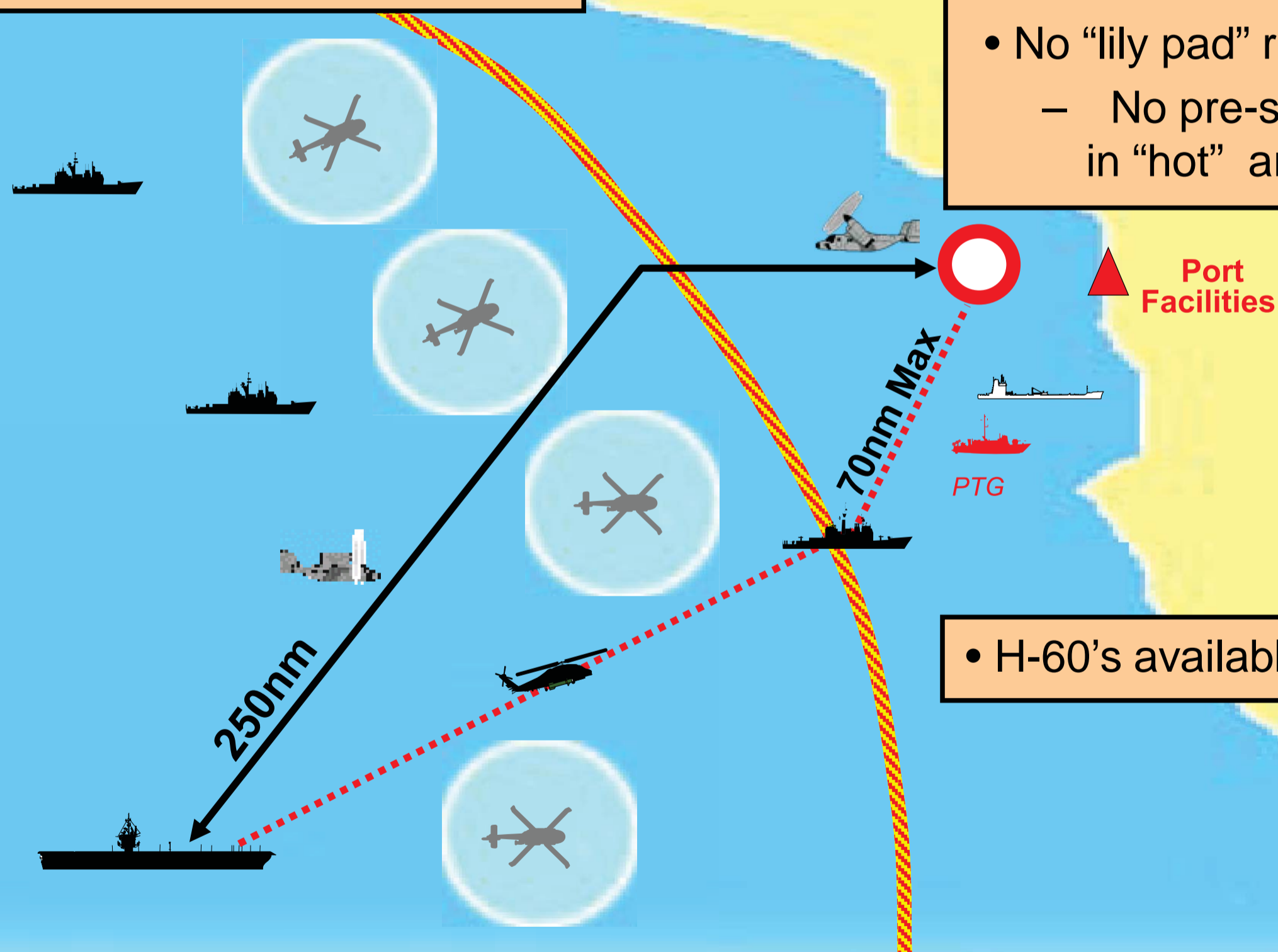
MCO-2

SITUATION

- Insert Seals 5 nm off beach for recon mission
- 500 nm round trip
- Carry 8 Seals + Soft duck (inflatable boat)
- Recover Seals at drop point prior to sunrise

ATTRIBUTES

- V-22 carries Seals directly from CVN
 - Off axis course to avoid PTGs
 - “Soft duck” carried internally
 - Entire mission at night
- No “lily pad” required
 - No pre-staging of a surface ship in “hot” areas



- H-60's available for SUW & USW

Increased mission effectiveness with fewer assets



Navy V-22 CAS Tanking Mission

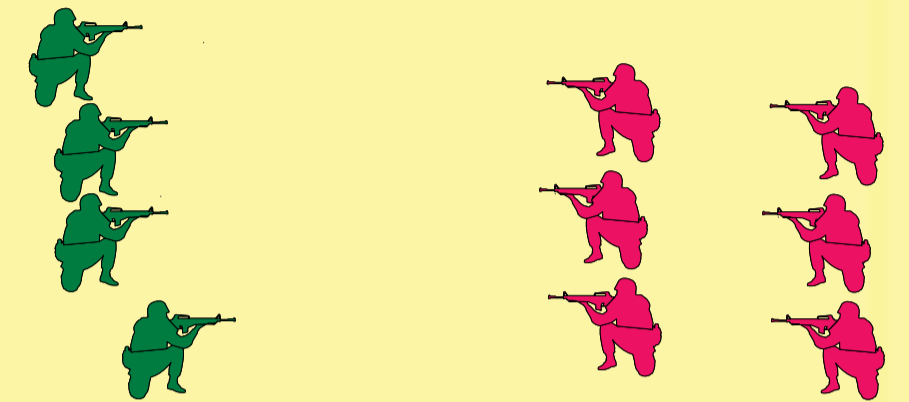
MCO-2



RED

SITUATION

- Support on call CAS
- Increase Time On Station / Responsiveness
- Altitude 10,000 ft; 50nm from CAS orbits



**CAS
Tanker**

200 nm



Attributes

- Speed: 250 kts
- Range: 200 nm
- 10,000 lbs give
- 120 gal/min
- On Station time 1+00

Provides Division of Hornets with 20-25 minutes additional time on station



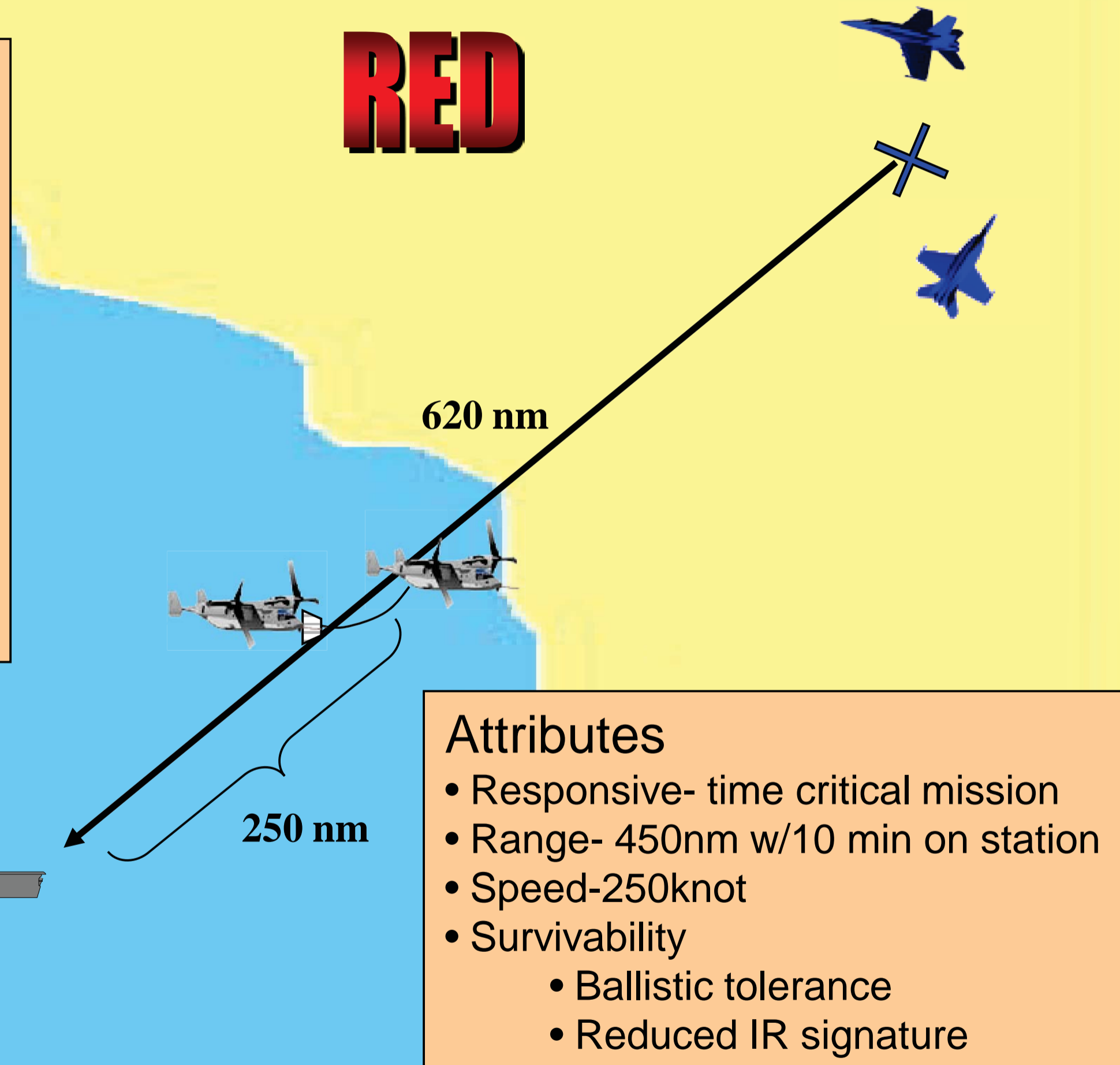
CSAR Mission

MCO-2



Situation

- Regan CSG conducting night air ops in support of SOF in RED
- F/A 18 hit by SAM and ejects in safe area
- CSAR mission tasked
 - V-22 Overhead tanker refuels mission
 - V-22 enroute at 250nm
- Threat updates from F/A-18s via data link, uses GPS to skirt threat envelopes, reach pick-up point, pick up survivor, exit threat environment.
- V-22 airborne tanker joins CSAR at 250 nm



Attributes

- Responsive- time critical mission
- Range- 450nm w/10 min on station
- Speed-250knot
- Survivability
 - Ballistic tolerance
 - Reduced IR signature

**Enhanced CSAR Mission Capability
Provides Force Commander Options not available today**



Navy V-22 vs MH-60S

CSAR



MCO-2

Navy
V-22

485 nm
radius

MH-60S

201 nm
radius



Navy V-22

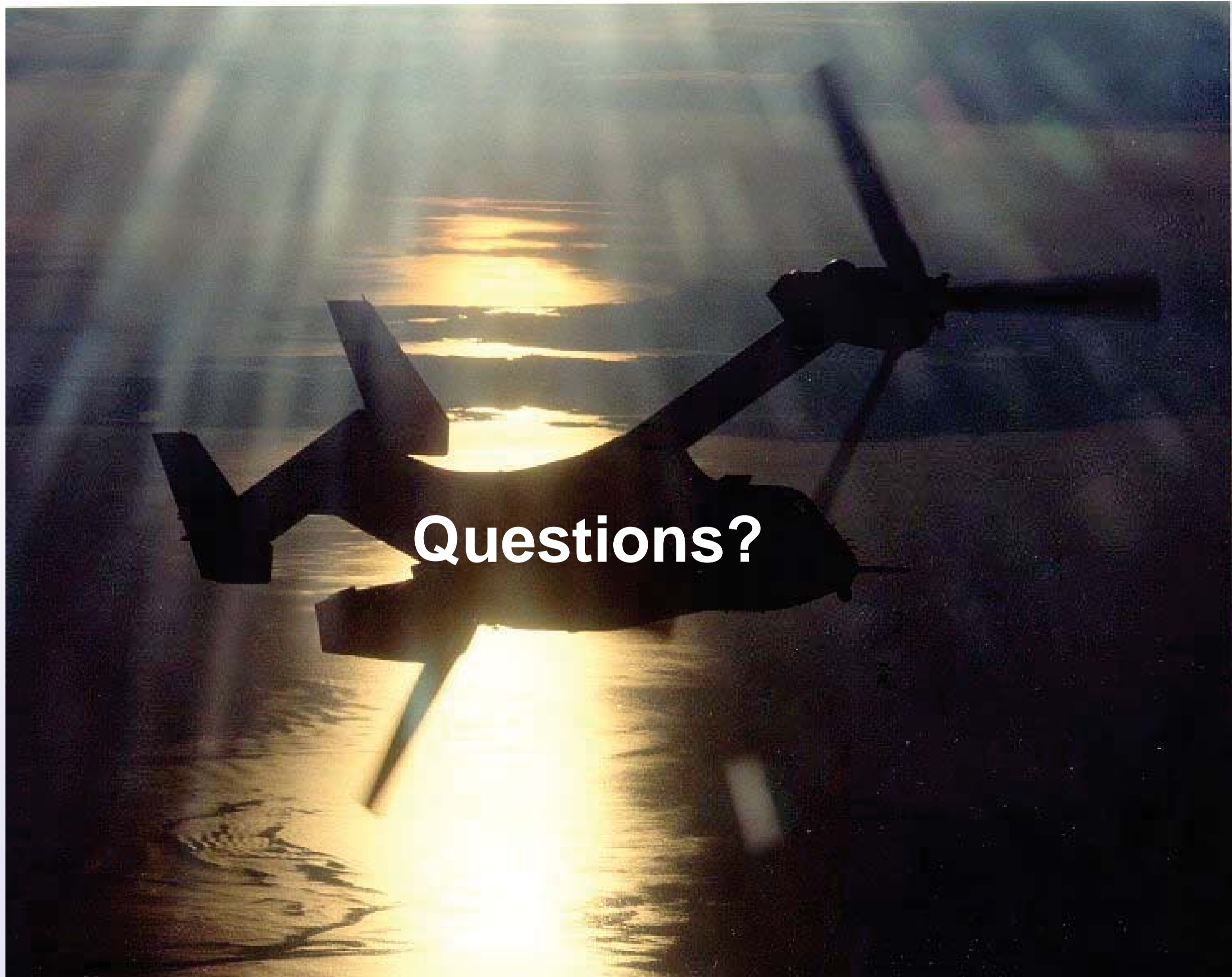
- 485 nm radius w/ 1 add'l 430 gal internal tank
- 261 Kts, 1.9 hrs to 485 nm
- Room for multiple survivors
- Increase range with higher altitude transit
- Max alt 25,000 ft; can fly over high mountains
- Can carry security team
- Loiter in flight near target area for standby
- Second 430 tank or Inflight refuel to extend range

MH-60S

- 201 nm radius with 2 add'l 195 gal aux tanks
- 125 kts, 1.6 hrs to 201 nm
- Max of 2 survivors
- No increase in range with higher alt transit
- Max alt 10,000 ft; cannot fly over high mountains
- Cannot carry security team
- Alert on deck for standby
- Inflight refuel can extend range



Navy V-22 COE



Summary





Sea Strike, Sea Shield, Sea Basing Enabler



- Multi-Role Utility
 - V-22 provides 85% mission utility across four other platforms (H-53, C2, H-60, H-46)
- V-22 provides the Navy with across the board mission utility without introducing a new TMS
- Greatly extends operational lift capability and flexibility
 - Pacific theater stressors
- Provides force commander with SAR/CSAR unique capability
- Future Operational Requirements
 - H-53 and COD replacement not currently identified







Backup Slides



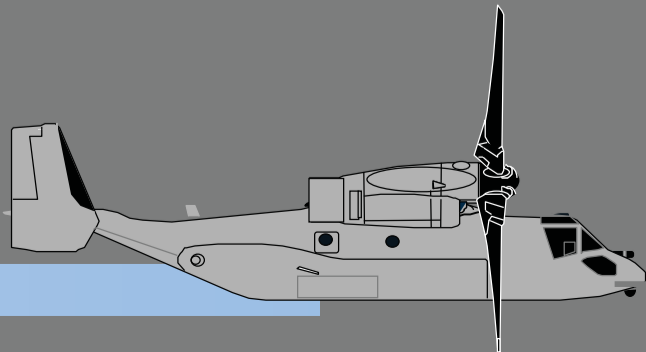
V-22 Ship Compatibility



Ship Class	Number in Class	Obstruction Clearance	Deck Strength		Servicing		Ship Motion & Stability
			Land & Park in SS 5	Land & Storm Park (SS 8)	Fuel	Hangaring	
DD 963	25			Minor Mod		NO	
DDG 51	57	Minor Mod		Minor Mod		NO	
CG 47	27			Minor Mod		NO	
AOE 1	4			Minor Mod		Major Mod	
AOE 6	4					Major Mod	
LPD 4	11					NO	
LPD 17	12						
LSD 41	12					NO	
LHA 1	5						
LHD 1	7						
MCS 8	1						

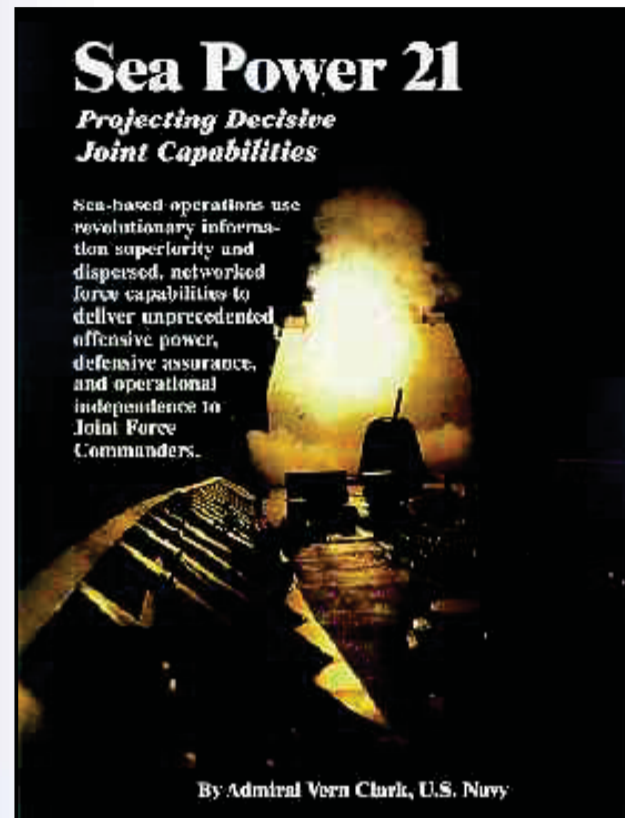
163

Sources: 1. Naval Sea Systems Command Ship Design and Engineering Directorate: SV-22 Staging Shipboard Compatibility Study, 9 Sept 1987
2. NKF Engineering, Inc.: V-22 ASW Variant Shipboard Compatibility Study, 15 August 1986



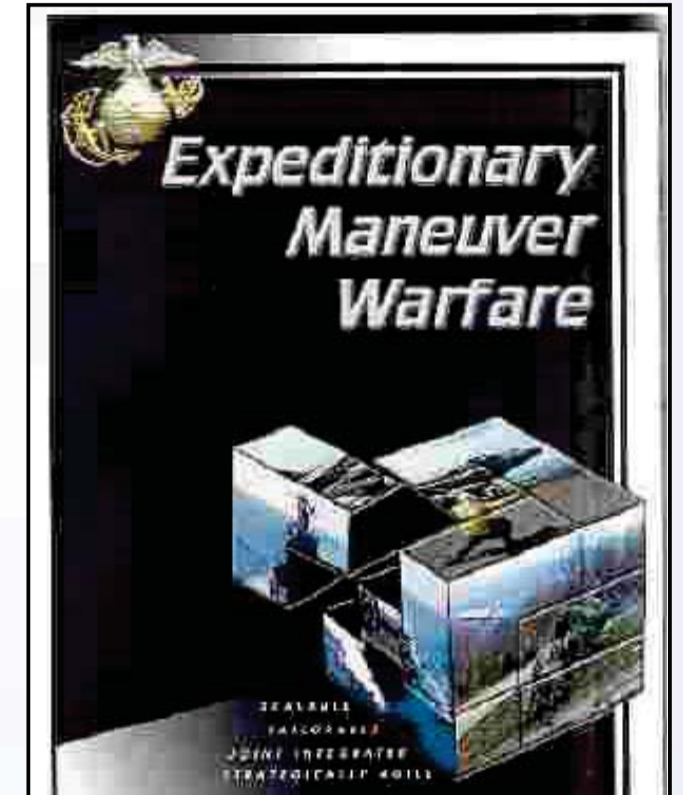


Naval Warfighting Concepts



Naval Operational Concept

Driving closer ties, increased synergies



The Navy Operational Concept

- Continuum of Forward Operations
- Littorals: a starting point – a destination
- Maritime Superiority – defense projected ashore
 - Sea Shield (Joint TAMD)
 - Self sustaining
- Project Power to influence events ashore
 - Sea Strike
 - Sea Basing
- FORCEnet – the “enabler”

Operational Maneuver From the Sea

- Forward deployed enabling forces
- Sea and land as a maneuver space
- Full spectrum of conflict
- Extended littoral operating area
- Exploit enemy gaps/vulnerabilities
- Operate at night and adverse weather
- Decisive actions with massed fires
- Sea-based C2, Fires and Logistics



Sea Power 21

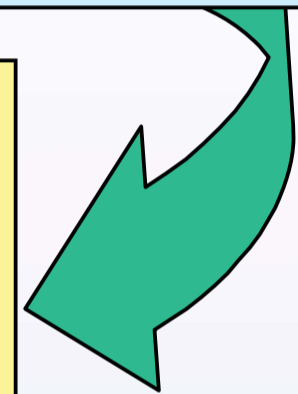
Strategy

- National Security Strategy
- Defense Planning Guidance
- Joint Vision 2020
- Sea Power 21



Sea Power 21 Mission

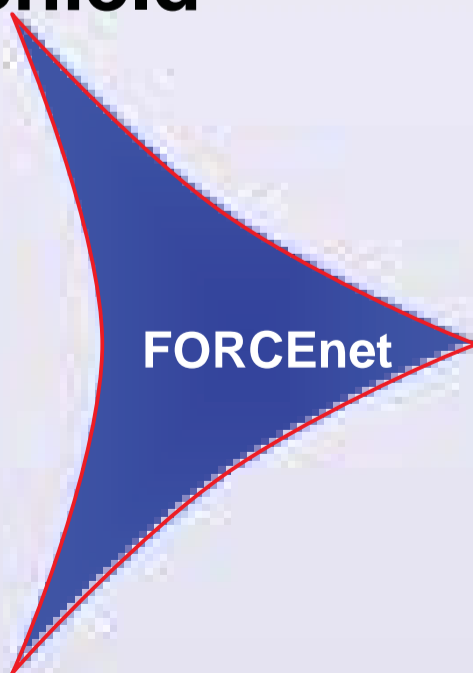
Deliver unprecedented offensive power, defensive assurance, and operational independence to Joint Force Commanders



Sea Power 21 Tasks

- Project layered, defensive power
- Extend homeland security with forward presence
- Sustain access via littoral dominance
- Protect joint forces and allies ashore
 - Extend defensive umbrella deep inland
 - Strengthen strategic stability
 - Provide operational security
- Project Precise and Persistent Offensive Power

Sea Shield



Sea Strike

Sea Basing

Projecting Decisive Joint Capabilities



Navy V-22 Issues



Issues

- **Issues**

- Over Water Night Hover Capability

- GPS/INS system capability vs. Doppler

- Lack Of Pressurization

- Long range passenger carriage

- Force Structure For 48 Aircraft

- Push to decrease manning
 - Carrier/Air Wing manning getting close scrutiny

- **Navy V-22 and High Speed Vessel**



Navy V-22 Issues



Issues

- **Issues**

- Platform Configuration Definition

- Navy V-22 needs to be close to MV-22 configuration
 - Same TMS
 - CV-22 cost
 - MV-22 configuration can fill the Navy's needs

- Flight Deck Operations

- Destroyer class / Small decks yet to be validated
 - Spotting factor, (larger than H-53, longer than E-2)

- Aerial Refueling Capability

- Need more data on pkg. configuration and basket stabilization

- Rotor Downwash

- Over water



Trade Studies



Issues

•Navy V-22 COE As A Building Block

- Requirements Gaps
- Platform Configuration
- Flight Deck Operations
- Force Structure
- Re-Supply / Re-Constitution

