Adapting AAVs to Changing Threats

Submersible Amphibious Assault Vehicles (SAAVs)

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Amphibious Assault Vehicle (AAV) Brief History

- 1972 - AAV7 hull first used
- 1980s - Upgraded and renamed to AAV7
- Long-planned replacement by the EFV
- 2011 - EFV program cancelled
- 2012 - Advanced Combat Vehicle (ACV)
AAV7s Approaching The Beach
Changing Threats in the Water

• Surface-to-surface missiles move horizon
  • Extend trip from ship to shore
  • May target AAVs in the water

• Required design responses
  • Extended Range
  • Stealth
  • The Element of Surprise
Changing Threats on Land

• Land threats gain sophistication
  ▪ Rocket-propelled Grenades (RPGs)
  ▪ Improvised Explosive Devices (IUDs)
  ▪ To be determined

• Require more versatile armor
  ▪ Modular bolt-on packages
  ▪ Heavier AAVs
Expeditionary Fighting Vehicle (EFV)
AAV7 Marine Operation
EFV Low-speed Marine Ops
Amphibious Assault Vehicle (AAV) Limitations in the Water

• High drag limits speed and range
• High visibility limits stealth and surprise
• Exposure to missile and canon fire
• An uncomfortable ride in moderate seas
• Danger of being rolled in the surf on the beach
AAV Limitations on Land

- Barge hull design limits deflection angles
- Need for buoyancy limits weight and armor
SAAV Propulsion Efficiency

• All AAVs use marine jet propulsion
• Space for pump/jet diameter is limited, which limits propulsion efficiency
• Increased submergence allows increased propulsion efficiency
• SAAV jets have increased submergence
SAAV Design Features

✓ Hull shape ideal for both marine and land ops
  ▪ Balanced hydrodynamic shape
  ▪ Effective ballistic deflection angles
✓ Jets vertically directed for vertical steering
✓ Jets also be used for horizontal steering
✓ Uses modern periscope and snorkel
Submersible AAV (SAAV)
SAAV Design Benefits in Water

- Reduced drag = higher speed, longer range, reduced fuel use
- More submergence = better propulsion
- Stealth & the element of surprise
- Operation in higher sea states
- Less debilitating ride
- Reduced exposure to wave action on beach
Surface Ops/Landing

- Bow Flap
- Surface
- Bottom
SAAV Design Benefits on Land

• Improved ballistic deflection angles
• More armor carrying capacity
• No compromises due to sub capability
Making Use of Bolt-on Armor

- Armor modules to address expected threats
- May incorporate drag reduction contours
- To increase speed/range
Auxiliary Fuel Tank Extends Range

- Composite tail may include fuel bladder along with drag reduction contours
- Auxiliary tank dropped approaching beach
Radii Reduce Drag and Keep Deflection Angles
SAAV Minimizes Time and Money

• Maximum use of existing technologies
  ▪ Submersibles, submarines, & USVs
  ▪ Periscopes, snorkels, ballasting
  ▪ Composite components and bolt-on armor
  ▪ Low pressure sealing

• Facilitates modular design of subsystems, like armor, ballasting, and payload.
SAAV Benefit Summary

- Tactical advantages getting to the beach
  - Stealth, surprise, range, sea states, ride, etc.
- Better deflection angles on land
- Modular mission packages to meet threats
- Economic and timely development
  - Uses well understood design concepts
  - Uses existing component designs
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