The Need to Modernize the Air Breathing Leg of the Triad

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Challenge: Most USAF triad systems were developed for Cold War-era threat environments

- **Minuteman ICBM Silos**
  - First built in 1962
  - Delivered 1960s

- **Minuteman III**
  - Delivered 1970 - 1977
  - Delivered 1970s

- **ALCM**
  - Delivered 1984 - 1988
  - Delivered 1980s

- **B-2**
  - Delivered 1993 - 2000
  - Delivered 1990s

- **B-52**
  - Delivered 1954 - 1962
  - Delivered 1950s

- **B-1B**
  - Delivered 1980 - 1986
  - Delivered 1980s

- **B-52H**
  - Originally designed to penetrate, now standoff strikes into contested areas
  - B-1s conventional missions only
  - 20 B-2s: our nation’s only stealth long-range strike force

- **1954 Chevy Bel Air**
- **1962 Ford Fusion**
- **1970 Ford Pinto**
- **1980 Oldsmobile Cutlass**
- **1984 Ford Escort**
- **1993 Ford Probe**
Another challenge: the growing bomber inventory shortfall

Inventory will not recover to FY2020 level until the mid-2030s

Bomber bathtub

B-21 estimated procurement ramp (Mitchell Institute estimate)
Why force cuts and failure to modernize? Triad seen as a billpayer for decades

DOD Major Force Program-1 funding for nuclear forces

- FY62: $104.6B in FY21 dollars, or about 20.5% of DoD’s TOA
- FY62 to FY90: $50.1B in FY21 dollars, averaged 9.3% of DoD’s annual TOA
- FY92 to FY21: $14.2B in FY21 dollars, averaged 2.3% of DoD’s annual TOA
Challenge: Advanced air defenses are increasingly capable against U.S. legacy aircraft and weapons

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<th>Highly Contested Airspace</th>
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<td>Non-stealth aircraft must launch long-range stand-off attacks</td>
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### Direct Attack Weapons
- ALCM, JASSM-ER, etc.
- Ranges more than 400 nm
- Typically powered to extend range
- Enable attacks by non-stealth aircraft from outside contested areas

### Short-Range Stand-off Weapons
- Joint Standoff Weapon, SDB, etc.
- Ranges up to 400 nm
- Winged/glide capable, may also be powered to extend range
- Enables attacks from beyond the most lethal ranges of some point defenses

### Long-Range Stand-off Weapons
- Gravity bombs, JDAMs, etc.
- Ranges of single digit to low 10s of nm
- Weapons are typically unpowered
- Must be released close to targets
Challenge: Must plan for target sets that will be very different than in the past

- Target sets will be much larger and more distributed than in the past
- Enemy high-value weapon systems are increasingly mobile or relocatable
- Other targets are hardened or very deeply buried
- Also covered by active and passive air and missile defenses
One reason penetrating bombers are needed: Non-stealth bomber stand-off ranges can affect targets they can attack

If a bomber must stand off 550 nm

60% of aimpoints in range of JASSM-ER-like weapons

If a bomber must stand off 800 nm

No aimpoints in range of JASSM-ER-like weapons

Potential targets not covered:
• Interior C2 nodes
• Ballistic missile sites, bomber bases
• Anti-satellite threats
• Military aerospace industry, etc.

Longer range weapons would help but...
• Increasing weapons range increases weapon size
• Larger weapons = fewer carried per sortie and greater unit costs
• Longer ranges also increases weapon flight times
Another reason for penetrators: Enemy countermeasures can reduce the effectiveness of long-range standoff strikes

60% of potential air targets within range of JASSM-ER-like weapons

If exclude targets that are hardened, deeply buried, mobile, or relocatable

• As a rule of thumb, standoff weapons can’t carry conventional warheads big enough to penetrate and kill very hard/deeply buried targets

• Kill chain latency can also reduce standoff weapon effectiveness against mobile/relocatable targets
Hypersonic weapons are needed, but kill chain latency will still be a challenge for mobile/relocatable targets.

- **Low Subsonic** (e.g., SDB)
- **High Subsonic** (e.g., JASSM)
- **Mach 2 Supersonic** (e.g., Advanced Anti-Radiation Guided Missile)

Diagonal lines = flight times for weapons to reach a target from various ranges.

- **Mach 5 Hypersonic**

S-300 SAM could begin to relocate within about 5 minutes.
Long Range Standoff weapon (LRSO) critical to maintaining an effective airborne leg of the triad

- **LRSOs will begin replacing AGM-86B ALCMs around 2030**
  - ALCMs originally designed for a ten-year operational life

- **LRSOs are designed to penetrate advanced IADS, operate in GPS denied environments, and hold high-value targets at risk from significant standoff ranges**

- **Not a redundant capability**
  - Cruise missiles enable long-range attacks from multiple azimuths, complicating an enemy’s defensive challenges
  - The LRSO will ensure B-52Hs remain a viable part of the triad throughout the bomber’s projected service life
  - LRSOs will give B-21s the ability to strike without overflying targets
Cruise missiles are not “destabilizing”

- There is little evidence that cruise missiles were destabilizing during the Cold War.

- Bombers with cruise missiles and gravity weapons may be the most stabilizing element of the triad:
  - Visible means to send signals in crises; for instance, can generate bombers to alert status, disperse the force to other locations.
  - Bombers have longer flight times relative to ballistic missiles and can be recalled after launch.
  - Cruise missiles can be withheld or retargeted.

- China’s and Russia’s acquisition of modern, dual-capable air-launched cruise missiles suggest they may not share this concern.