Background Data:
Nuclear Weapons, Missiles, and the Cuban Crisis

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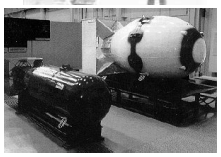
The Atomic Bomb



- "The A-bomb ended the war, but radar won it."
- Aug. 1945: Single bomb destroys an entire city
  - Little Boy
    - Uranium bomb dropped on Hiroshima
    - 8900 lbs, 16 Ktons TNT
  - Fat Man
    - Plutonium bomb dropped on Nagasaki
    - 10300 lbs, 21 Ktons TNT

Offensive and Defensive Responses

- Longer Range, Faster, Higher Flying Bombers to deliver the bombs
  - March 1946: Strategic Air Command formed
  - B-52 first flies in 1954
- Bigger Hydrogen (Fusion vs. Fission) Bomb
  - Aug. 1949: First Soviet Atomic Bomb
  - Nov. 1952: First US H-bomb test (10 Mtons)
  - Nov. 1955: Soviet Union explodes their first H-Bomb
- O-T-H Radars and Defensive Lines
  - 1957-9: DEW (Distant Early Warning) Line
- Anti-Aircraft Missiles to intercept bombers
  - 1944: Design of Nike Ajax system

Ballistic Missiles:
Germany's V-2 Rocket

- Over 1000 fired at London towards end of WW 2
- Could destroy a city block—but very inaccurate
- 2700 killed, 6500 injured
- Psychological effect: Essentially no warning and no defense, other than to destroy the launching sites
- What if you marry a nuclear warhead to a rocket?

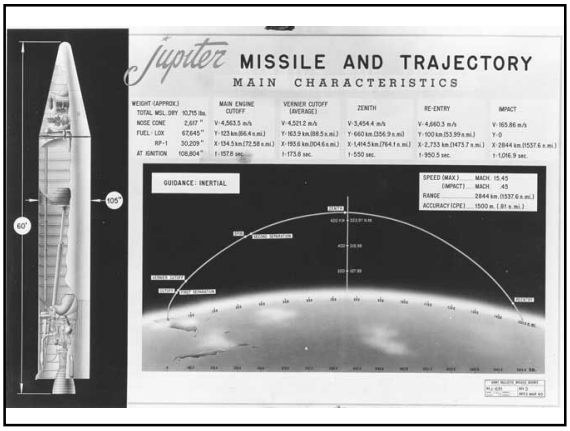
Ballistic Missiles:
How to Intercept?

- Most vulnerable during boost phase
- Hard to intercept during terminal phase: "bullet hitting a bullet"!
- Also consider effects of nuclear air burst caused by interception—must be 20 mi up or more

Midcourse Phase
800 mi up
20 minutes

Terminal Phase
5 minutes

Boost Phase
200 mi up
15000 mph
300 s



Weird Logic of Nuclear Deterence

- Massive Retaliation: Invade a little country, and we will destroy you—only works as a deterrent if the other guy has no nuclear weapons
- Mutually Assured Destruction (MAD): "Whoever shoots first, dies second"
  - Sufficient counterforce that no matter what the aggressor does—even if he destroys a considerable number of the defender's missiles on the ground—missiles will likely survive to still threaten his cities with utter destruction
  - U.S.: No first use policy
- Strategic Triad/Flexible Response
  - Ground-based Missiles (ICBMs): arrive in 20-30 minutes
  - Strategic Bombers: time on target 12 hours
  - Nuclear Submarines (SLBMs): can lay in wait for days or even months—assuming subs remain invisible and know that their home country has been destroyed

Cuban Missile Crisis

- Cold War: Great power politics in Asia, Middle East, Africa, Latin America
  - Communist insurgencies and Soviet-leaning governments in N. Korea, N. Vietnam, Cuba
  - E.g., U.S. response: CIA-supported Bay of Pigs invasion of Cuba (1961)
- Soviet fears of U.S. "Massive Retaliation" — How to reach parity with the Americans when USSR is so technologically far behind?
  - Soviet missiles of the time could only reach European cities from their launching sites
  - U.S. deploys medium range missiles in Turkey in a highly provocative move (April 1962)—Soviets now fear a first strike!
- Soviet response: deploy own missiles into Cuba (September 1962)

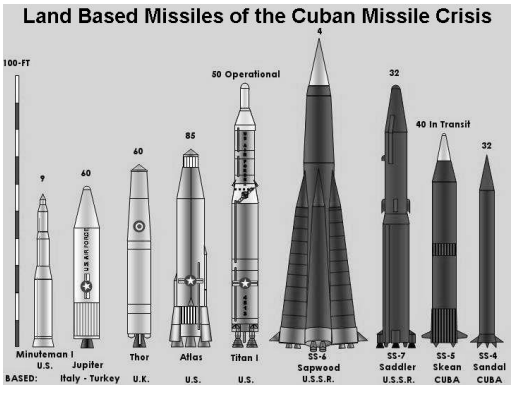
Soviet-Cuban Friendship

Castro declares his country "Communist" after the Bay of Pigs

Seeks protection from U.S. aggression through support of Soviet Union

Cuban Missile Crisis

- Medium range missiles could reach Dallas or DC in 5 minutes
- Longer range missiles could reach virtually any major U.S. city
- Soviets: restores the MAD equation
- U.S.: what if their missiles could "decapitate" our ability to strike back? Mitigates MAD

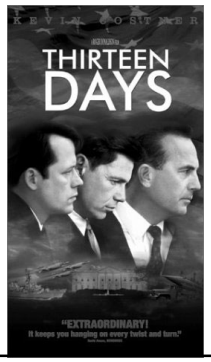


Cuban Missile Crisis

U-2 Reconnaissance Plane

Reconnaissance Photo

Thirteen Days



The Missile Game