

## Kinetic Energy Interceptors

Protection for the Homeland, Coalition, and Forward-Deployed Troops



The Kinetic Energy Interceptors complementary capability fulfills the objective for a layered ballistic missile defense.

### Benefits

- Affords system advantages not previously available with pre-ABM Treaty systems
- Provides kinetic boost phase intercept layer
- Mobile land- and sea-based modes for homeland, coalition and deployed forces defense
- Strategic deployability and tactical mobility
- Early battlespace engagement
- Can destroy medium-range, intermediate-range and intercontinental ballistic missiles in the boost, ascent or early midcourse phases of their flight
- Provides wide-area asymmetric missile defense system

### Ballistic Missile Defense

The Missile Defense Agency (MDA) is developing an integrated Ballistic Missile Defense System (BMDS) to defend the United States, its deployed forces, friends and coalition forces from ballistic missiles of all ranges and in all phases of flight. KEI is one weapon element of the BMDS designed to defeat the medium-range, intermediate-range and intercontinental ballistic missile threats in their boost and early ascent/midcourse phases of flight. MDA is initially developing KEI as a land-based element which may evolve to a sea-based element.

Raytheon is the interceptor Integrated Product Team (IPT) lead for KEI under subcontract to Northrop Grumman. Northrop Grumman is the prime integrating contractor to develop and test the overall KEI element: the KEI fire control/communications (KFC/C); launchers and interceptors.

### KEI Operation

Once the KEI element is deployed in an operational theater, a commander can engage a threat missile early in its flight by having the KFC/C tied directly, in real-time, into overhead space-based sensors. KEI's high acceleration, combined with basing flexibility, allows for early battlespace engagement and provides commanders with an increased probability of engagement success by enabling shoot-look-shoot strategies for both KEI and the BMDS.

### Real Capability

The KEI program team has made significant progress toward a missile defense capability demonstrated by completion of major hardware and proof-of-concept milestones. Using high technology readiness levels at the assembly level enables an achievable Block 14 capability.

The initial KEI kill vehicle design leverages the liquid

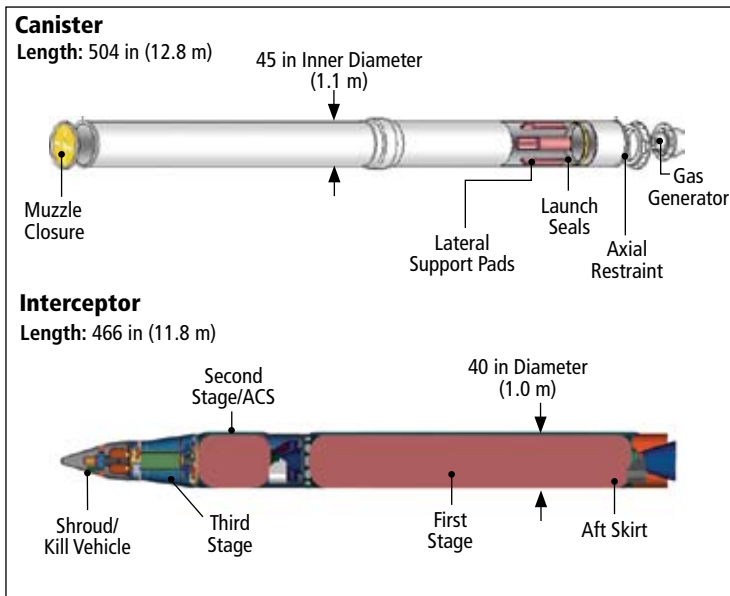
divert and attitude control system based on the proven Exoatmospheric Kill Vehicle (EKV) program. The infrared seeker is based on proven Standard Missile-3 (SM-3) kinetic warhead seeker technology.

Extensive software reuse is made possible throughout the entire interceptor by using software from EKV and SM-3.

The KEI interceptor design is being developed to be compatible with various payloads. This multiple payload capability, combined with the early battlespace engagement capability, provides MDA with flexibility in mitigating threat system countermeasures.



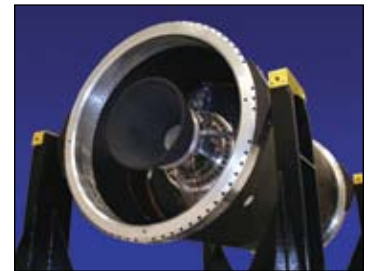
# Kinetic Energy Interceptors



Proposed All Up Round architecture.



ATK successfully tests first stage on Sept. 14, 2006.



ATK's second stage subsystem ready for test.



ATK's second stage successfully tested Jan. 17, 2006.

## Solid Interceptor Team

Raytheon has assembled an industry team that is making KEI a reality. Orbital Sciences is responsible for propulsion integration. Alliant Techsystems (ATK) provides the booster propulsion stages. Aerojet furnishes the kill vehicle attitude control system. Rockwell Collins supplies the interceptor in-flight communications system. Northrop Grumman provides the all-up-round canister.

## Key Operating Tenets

Mission Success is clearly the driving objective for the KEI development and test bed deployment. KEI has made good technical progress to date, evidenced by both hardware built and successful risk

reduction testing. The Industry team embraces Mission Assurance as the No. 1 priority, where Raytheon's collective focus includes collaborative development, Raytheon Six Sigma™ design methodology, a solid quality and program management foundation and a NoDoubt™ mindset. Raytheon is committed to executing the upcoming fiscal year 2008 boost flight "Knowledge Point" and ultimately deploying a capability that meets warfighter performance and affordability requirements.

## Missile Defense Heritage

Raytheon's heritage is a proud legacy of more than 60 years of technological firsts achieved in partnership with the U.S. government, armed forces and

international coalitions around the world. Today, with a rich and successful heritage in missile defense technologies, Raytheon is a key player in numerous missile defense-related programs involving the fundamental elements of a missile defense system: sensors, interceptors, and command and control. These include the EKV, KEI, Sea-Based X-band radar (SBX), and upgraded early warning radar; the Terminal High Altitude Area Defense (THAAD) radar; the Patriot Air and Missile Defense System; the ground-based radar prototype on Kwajalein Island; the SM-3; and a wide variety of advanced technology and research programs covering virtually all aspects of radar, optics, missiles and seekers. Raytheon products

are demonstrating in successful tests that intercepting ballistic missiles in flight can be achieved. Raytheon's strategy matches its commitment to continue providing proven technologies and system solutions that will help the MDA achieve its objectives for the BMDS as efficiently and effectively as possible.

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*Customer Success Is Our Mission*