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### Targets Overview

Northrop Grumman Corporation's aerial targets legacy stretches back to 1935 when the first subscale target drone, a radio-controlled balsa and plywood air vehicle, was demonstrated in the United States for Army observers. This flight gave birth to the Radioplane Company, which subsequently became the Ventura division of Northrop Grumman.

Since then, Northrop Grumman has become the undisputed world leader in the design, development, production, modification and support of high performance subsonic, subscale aerial targets, delivering more than 100,000 aerial targets to all branches of the U.S. military and its allies. Company products are continually evolving to keep pace with advances in the performance of modern aircraft and missile threats.

Bolstered by incorporation of the latest developments in supportability, navigation, and control, Northrop Grumman targets still provide both U.S. and international military customers the ultimate test for weapons systems and personnel.

Aerial targets are the U.S. Navy's most realistic means of training sailors and airmen against airborne threats and testing an array of weapon systems, and the avionics upgrade supports the service's aerial targets transformation plan.

#### BQM-34 Firebee

The BQM-34 Firebee is the most capable and reliable high performance aerial target system. The primary mission of Firebee is to simulate tactical threats by enemy aircraft and missiles for defense readiness training, air-to-air combat training and the development and evaluation of weapons systems. It can fly as fast as Mach 0.97, at levels as low as 10 feet above the sea surface, or at altitudes as high as 60,000 feet. It is capable of performing seven-g turns while maintaining high airspeeds for realistic threat presentations.

With its high-thrust engine, advanced microprocessor flight control system, rugged airframe, and wide assortment of mission augmentation systems, the BQM-34 Firebee is the premier high performance aerial target system in use today. It can be readily modified to meet other special tactical unmanned aerial vehicle (UAV) mission needs. Such performance, with the ability to survive the hits and near misses of repeated missions and return to fly again, explains why the Firebee has been in constant use by three American military services for more than five decades.

Today, the BQM-34 Firebee remains “the user’s choice,” successfully meeting the most challenging training and test and evaluation mission requirements while continually demonstrating new tactical versatility.

The BQM-34 Firebee is also in service with the U.S. Air Force and international military services. In addition to serving as an aerial target, the Firebee can also support a variety of operational scenarios including unique payload delivery missions. Most notably, it supported allied operational requirements during Operation Iraqi Freedom.

On Aug. 17, 2005, Northrop Grumman reached another milestone for its BQM-34 Firebee with the latest version’s successful first flight featuring an enhanced integrated avionics unit as the vehicle’s autopilot. The flight took place at the Naval Air Warfare Center at Point Mugu, Calif., following a Navy-funded 18-month development program.

#### BQM-34 Technical Specifications

|                     |                                                                                                                                                                                                     |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Length              | 22.9 ft (6.9 m)                                                                                                                                                                                     |
| Wingspan            | 12.9 ft (3.9 m)                                                                                                                                                                                     |
| Height              | 6.7 ft (2.1 m)                                                                                                                                                                                      |
| Normal Gross Weight | 2,150 lbs (1,406.2 kg)                                                                                                                                                                              |
| Max Gross Weight    | 3,100 lbs (1,406.2 kg)                                                                                                                                                                              |
| Speed (Max)         | Mach 0.97 (Dependent on Configuration)                                                                                                                                                              |
| Service Ceiling     | 60,000 ft (18.3 km) (Dependent on Configuration)                                                                                                                                                    |
| Endurance           | Up to 115 Minutes (Dependent on Configuration)                                                                                                                                                      |
| Engine              | GE J-85-100, 2,850 lbs (1,292.7 kg) Thrust                                                                                                                                                          |
| Payloads            | Wing Tip Infrared or 100 Pound ECM Pods<br>Vector Scoring with Telemetry<br>Chaff Dispensing (Internal/Underwing Capabilities)<br>IFF and Locator Beacons<br>Internal / External Radar Augmentation |
| Special Operations  | Easily modified to support unique payload and mission requirements. Capable of autonomous waypoint navigation in both air and ground launch configurations.                                         |

## BQM-74E

The BQM-74E is a turbojet-powered aerial target with high performance capabilities. While emulation of enemy anti-ship cruise missiles is the primary mission; others include simulation of aircraft for training naval aviators in air-to-air combat and support of the test and evaluation of new weapon systems. The BQM-74E and its ground support system are highly portable. This attribute enables shipboard operations in support of deployed naval combatants where maximum flexibility and rapid turnaround are required.

The BQM-74E can carry a variety of internal and wing tip-mounted payloads in support of mission requirements. Payloads include passive and active radar augmentation, infrared (IR) flares, electronic countermeasures (ECM), seeker simulators, scoring, IFF, and dual wing tip-mounted tow bodies. The integrated avionics unit, with its integral inertial measurement unit (IMU), air data computer, and global position system (GPS), provides a highly accurate navigation solution. Recently incorporated low altitude control enhancement (LACE II) software allows the vehicle to perform complex, programmable, three-dimensional maneuvers and operate down to altitudes of seven feet.

The BQM-74E can be used with multiple command and control systems, including the integrated target control system (ITCS), multiple aircraft GPS integrated command control (MAGIC2), Vega, and system for naval target control (SNTC). It can be employed in either a manual mode or a pre-programmed (hands off) mode. Since 1968, the MQM/BQM-74 series of aerial targets has been the workhorse of the Navy's subsonic aerial target inventory. Due to its exceptional performance and mission reliability, the BQM-74E has provided over 80 percent of all U.S. Navy target presentations.

First introduced in 1966, the BQM-74 series is the mainstay of the Navy's subsonic, subscale aerial target fleet. The BQM-74E, first fielded by the Navy in 1993, is used to replicate enemy cruise missiles and aircraft for fleet training and to test and evaluate anti-ship and anti-aircraft weapon systems.

In April, 2005, Northrop Grumman was awarded a \$48.2 million fixed-price contract to provide BQM-74E aerial target systems to the U.S. Navy. BQM-74E targets delivered under this contract will include upgraded avionics units developed and tested with company funds.

In April, 2007, Northrop Grumman was awarded a \$25 million contract to purchase 80 BQM-74E Aerial Targets. Seventy-eight targets are designated for the Navy and two for the government of the Netherlands under the Foreign Military Sales Program. The BQM-74Es developed under this contract are scheduled to be delivered before January 2009.

## BQM-74E Technical Specifications

|               |                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Length        | 12.95 ft (4.0 m)                                                                                                                                         |
| Wingspan      | 5.78 ft (1.8 m)                                                                                                                                          |
| Range         | > 350 nm (648.6 km)                                                                                                                                      |
| Altitude Low  | 7 ft (2.1 m)                                                                                                                                             |
| Altitude High | 40,000 ft (12.2 km)                                                                                                                                      |
| Speed         | > 515 Knots at Sea Level                                                                                                                                 |
| Weight        | 455 lbs (206.4 kg)                                                                                                                                       |
| Endurance     | 78 Minutes                                                                                                                                               |
| Navigation    | GPS/IMU                                                                                                                                                  |
| Fuel          | Jet Fuel (JP-5, JP-8 or Jet A-1)                                                                                                                         |
| Payloads      | Passive or Active Radar Augmentation<br>Seeker Simulators<br>Infrared Augmentation<br>Tow System<br>Scoring Systems<br>IFF<br>Electronic Countermeasures |

## BQM-74F

The BQM-74F is being developed by Northrop Grumman under a U.S. Navy System Development and Demonstration (SDD) contract. Building on the proven success of the BQM-74E, the BQM-74F improves the speed, range, maneuverability, and endurance, increases the payload capability, modernizes the support equipment and retains the utility of a portable, deployable system.

A new airframe with swept wings and tails coupled with an upgrade to the thrust of the BQM-74 engine from 240 to 300 pounds pushes the speed to 0.92M at sea level and increases maneuverability to eight-g instantaneous (five-g sustained). Aggressive all-axis weave maneuvers down to seven feet provide threat representative ingress maneuvers. Waypoint navigation is a standard operating mode for the BQM-74F using the integrated IMU/GPS avionics system. Mission planning capability integrated into the PC based support equipment provides detailed mission plans verified with imbedded 6-DOF simulation capability for pre-flight verification. Six missions of up to 70 waypoints are pre-programmable and selected both pre and post launch. Mission profile may be adjusted via the command and control data link.

The weave capability includes pre-programmed fixed circular and flat weave maneuvers and user programmable weaves. PC based field test equipment provides real time simulation of programmable weaves prior to download into the air vehicle avionics, and pre-loaded weave maneuvers may be selected after launch. All these features make the BQM-74F the foremost cruise missile replicator available.

Work on this contract began in March 2002, with the first F model unveiled Aug. 22, 2005. The BQM-74F can fly 70 percent farther than the E model. It is also 15 percent faster and offers a 75 percent increase in endurance.

First flight was completed Aug. 29, 2005, at the Naval Air Warfare Center Weapons Division sea range at Point Mugu, Calif. Once the target was launched, it flew nearly an hour, meeting all of the test objectives, and was successfully recovered for reuse.

## BQM-74F Technical Specifications

|               |                                                                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Length        | 15 ft (4.5 m)                                                                                                                                            |
| Wingspan      | 7 ft (2.1 m)                                                                                                                                             |
| Range         | > 500 nm (926 km)                                                                                                                                        |
| Altitude Low  | 7 ft (2.1 m)                                                                                                                                             |
| Altitude High | 40,000 ft (12.2 km)                                                                                                                                      |
| Speed         | > 600 Knots at Sea Level                                                                                                                                 |
| Weight        | 260 lbs (281 kg)                                                                                                                                         |
| Endurance     | 120 Minutes                                                                                                                                              |
| Navigation    | GPS/IMU                                                                                                                                                  |
| Fuel          | Jet Fuel (JP-5, JP-8 or Jet A-1)                                                                                                                         |
| Payloads      | Passive or Active Radar Augmentation<br>Seeker Simulators<br>Infrared Augmentation<br>Tow System<br>Scoring Systems<br>IFF<br>Electronic Countermeasures |

## Chukar III

The Chukar III is a turbojet-powered aerial target with high performance capabilities. Used by multiple customers for realistic aerial defense exercises, the target and its ground support system are highly portable. This enables the Chukar III to be operated from remote land sites or deployed for shipboard operations where maximum flexibility and rapid turnaround are required.

The primary mission of the Chukar III aerial target is to emulate enemy tactical cruise missiles or fighter/strike aircraft. It can be fitted with a variety of augmentation devices to enhance its use as a threat simulator for weapons training. Systems employed against the Chukar III include anti-aircraft guns, surface-to-air missiles, and air-to-air missiles employing active or semi-active radar homing, IR seekers, and visual guidance systems. Flying as low as fifteen feet (five meters) and at speeds up to 525 knots, the Chukar III can execute six-g maneuvers, pop-up profiles, and high-g escape, either autonomously or manually.

The Chukar III target system includes all of the elements necessary to provide a total training solution. The command and control system enables simultaneous multiple target engagements using waypoint navigation with GPS accuracy. Target payloads include passive and active augmentation, IR flares and plumers, chaff, scoring, and dual deployable tow bodies. Tow body payloads include active augmentation, IR flares, and scoring.

Fielded in eleven countries around the world, the Chukar III is based on the U.S. Navy's BQM-74 which has been used for more 80 percent of the Navy's target missions since 1978. With a high degree of operational availability and demonstrated reliability, the Chukar III provides a cost effective system solution unrivalled by other products.

## Chukar III Technical Specifications

|               |                                                                                                                                                   |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Length        | 12.95 ft (4.0 m)                                                                                                                                  |
| Wingspan      | 5.78 ft (1.8 m)                                                                                                                                   |
| Range         | > 350 nm (648.6 km)                                                                                                                               |
| Altitude Low  | 15 ft (4.6 m)                                                                                                                                     |
| Altitude High | 40,000 ft (12.2 km)                                                                                                                               |
| Speed         | > 525 Knots at Sea Level                                                                                                                          |
| Weight        | 455 lbs (206.4 kg)                                                                                                                                |
| Endurance     | 78 Minutes                                                                                                                                        |
| Navigation    | GPS Way Point                                                                                                                                     |
| Fuel          | Jet Fuel (JP-4, JP-5 or JP-8)                                                                                                                     |
| Payloads      | Passive or Active Radar Augmentation<br>Seeker Simulators<br>Infrared Augmentation<br>Tow Systems<br>Scoring Systems<br>Decoy<br>Chaff Dispensers |