Standard Aircraft Characteristics

BQM34A FIREBEE

RYAN

1 FEBRUARY 1968
NAVAIR 00-110AHD50-4

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**Mission and Description**

The BQM-34A is a high-speed, subsonic, remotely-controlled drone. Its principal mission is to serve as a target in the evaluation of weapon systems employing surface-to-air and air-to-air missiles, at altitudes from 500 to 55,000 feet above sea level. The BQM-34A has provisions for scoring, Low Altitude (RURACS), Increased Maneuverability (IMR), tow target capability (Towboe), infrared augmentation, visual identification, and broadband, active augmentation systems in the S-, C-, and X-band frequency ranges to provide variable radar reflectivity area to simulate interceptor or bomber aircraft.

The airframe features a 49" swept-back, constant-chord wing with horizontal tail surfaces. The engine nacelles, fin, and rudder assemblies are each attached to the fuselage by four bolts. Wing tips have structural provisions for pods. The parachute container is attached to the fuselage by explosive type bolts. The nose accommodates a Continental J-60-29 turbojet engine. Retractable fittings to engage B-3, B-4 or MD-3 type bomb shackles are located on the top of the fuselage to permit air launching from a suitably-modified launch aircraft. Short-rail, type launcher and rato thruster provide ground launching. The drone is recovered by a two-stage parachute recovery system. Recovery is initiated at the command of the remote control operator or automatically due to generator failure, power plant failure or loss of command transmitter carrier signal for a pre-selected period of approximately 10, 20, or 30 seconds. The recovery system includes a glide feature to permit return of the drone to a favorable recovery area in the event of termination of powered flight at altitudes above 15,000 feet MSL, either because of engine failure or fuel depletion. For recoveries below 15,000 feet MSL, a special power-off glide function is incorporated to use the kinetic energy available in the drone to gain altitude and to decelerate the drone to a safe speed for main parachute deployment.

**Development**

Prototype: XQM-34C
Letter Contract: ..... 26 Sep 56
Design Initiated: ..... 5 May 59
Definitive Contract: ..... 4 Dec 59
CCTC: ..... 10 Feb 60
First Acceptance: ..... Jan 60
First Flight: ..... Mar 60
First Service Use: ..... Mar 60
Production Completion: ..... OPEN

**DIMENSIONS**

<table>
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<tr>
<th>Element</th>
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<tbody>
<tr>
<td>Wing Span</td>
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</tr>
<tr>
<td>Incidence</td>
<td>304 chord - 65'</td>
</tr>
<tr>
<td>Leading edge to 264 chord - 65'</td>
<td></td>
</tr>
<tr>
<td>Dihedral</td>
<td>0'</td>
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<tr>
<td>Sweepback (LE)</td>
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</tr>
<tr>
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<tr>
<td>Height</td>
<td>6'6&quot;</td>
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<td>Body Width</td>
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<td>Body Depth</td>
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**WEIGHTS**

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<td>LB.</td>
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<tr>
<td>Recovery</td>
<td>Minimum 1385.0</td>
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<td>Empty Weight</td>
<td>&quot;A&quot; 1485.0</td>
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<tr>
<td>Design Gross Weight</td>
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**M/Q T.O. WEIGHTS**

Gross weights per mission in Ryan Report 1244-37 Ref. Page 1

<table>
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<tr>
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<td>1C &amp; 3</td>
<td>2274.5</td>
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<td>2272.0</td>
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<tr>
<td>2B</td>
<td>2282.0</td>
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<td>3</td>
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<td>10</td>
<td>2256.4</td>
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<tr>
<td>11</td>
<td>2260.5</td>
</tr>
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</table>

**FUEL**

Location No., Gal.
Fuselage: 1 100
Grade: 0.54 or JP8
Specification: MIL-F-20410

**OIL**

Nose Cowl: 1 1.5
Grade: 1010
Specification: MIL-L-7808 or MIL-C-12188

**GUIDANCE**

**CONTROL TRACKING**

Type: Radar Beacon
Kit Provisions: Coded Pulse
Nom.: AN/APN-132, AN/APX-71

The drone is radio controlled by remote commands which are received by an FM receiver and passed through an audio decoder to a demultiplexer and flight control box which applies signals to actuators for throttle, rudder trim, elevator, and aileron control. An FM transmitter in the drone transmits telemetry data on airspeed, altitude, engine rpm, and selected special devices.
RECOGNITION
Provisions for installation of a high altitude and a low altitude smoke generator system. Characteristics of these systems are:

LOW ALTITUDE (below 20,000 feet)
1. Equipment Description - Small cylindrical tank with associated plumbing and composite valve for filling and dispensing smoke producing agents.
2. Type - Smoke (petroleum)
3. Size - Capacity sufficient for 1,500 gals. of smoke producing agent plus required dry nitrogen for fluid expulsion at operating pressures up to 500 psi.
4. Weight - 20.8 lbs.
5. Power requirements - 28 VDC
6. Duration (approximate) 60 seconds
7. Location in drone - Aft end of nacelle above tailpipe shroud.

HIGH ALTITUDE (above 20,000 feet)
1. Solenoid valve added to discharge side of fuel boost pump and external of sump
2. Power requirements - 28 VDC
3. Duration - powered flight time (as commanded)
4. Weight 2.7 pounds

MISSILE SCORING EQUIPMENT
Provisions for installing scoring equipment as follows:
AN/DBQ-3, 3A, and/or AN/USQ-11A
Type Electronic Nomenclature - Miss Distance Measuring System
Weight Approx. 22 pounds
Power Requirements - 28 VDC at 3.0 Amp
Installation provisions and kits for FEI camera pods.

INFRARED AUGMENTATION
Provisions for installation of flares.
Type - Infrared Flares
Quantity - Four (two each wing tip)

SUPPLEMENTAL STABILIZATION & CONTROL
Autopilot Manufacturer: Lear, Inc.
Autopilot Model Number: A/AS7G-3B
*Performance and accuracy per Ryan Specification 12453-2C

Longitudinal System
Type: Pitch stabilization and control displacement type, sensing pitch angle, pitch rate, altitude, airspeed and altitude increment
Equipment
Roll and Pitch Gyro: Lear Model 1080M
Rate Gyro: Lear Model 2157-60AP
Attitude Control: Lear P/N 190252
Attitude and Airspeed Transducer: Lear P/N 402128
Synchr. Proc.: Lear P/N 130179
Amplifier: Lear P/N 130309

Lateral-Directional System
Type: Roll stabilization and control, displacement type, sensing roll angle, roll rate and airspeed
Equipment
Roll Rate Gyro: Lear Model 2157-60AP
Roll and Pitch Gyro: Lear Model 1080M
Servo Actuator and Follow-Up: Lear Model 3079E-2
Servo Actuator: Lear P/N 130252
Power Supply: Lear P/N 402416

INSTRUMENTATION
Telemetry Type: FM/RE
Size: 13 x 5 x 5, 25 in. (500 cu. in. (approx.)
Weight: 23 pounds (approx.)
Power Output: 20 watts
Power Input: 28 VDC at 7 amps

CHANNELS: Equipment Compt.
Channels: 4 used (provisions for 10)
Over-all accuracy: 3 percent
Manufacturer's Part Number: TM-4-31A

FLotation
Fuel compartments of the fuselage structure shall be sufficiently water-tight to allow 60 minutes of flotation at 25% fuel load after landing in salt water. The fuel expansion valves dump remaining fuel during recovery sequence to provide total fuel tank volume for flotation.

RADAR AUGMENTATION
Provisions for installing the following augmenting devices:
Beacons
X-Band (GFE) AN/AFP-132, D/PN-78
C-Band (GFE) AN/DPR-77
L-Band (GFE) AN/AJP-71

Traveling Wave Tube Amplifiers
S-Band Ryan 90366-1
X-C/Band Ryan 90022-3 or -5

Location: Equipment Compartment

Comparable Radar: Adjustable radar areas at X-, S-, and C-band frequencies for TWT amplifiers.

FORMATION FLYING
The feasibility of flying more than one BQM-34A in formation, approximately 500 ft. apart, each individually controlled by radio command, has been successfully demonstrated. This capability is dependent on ground radar tracking accuracies.

SAFETY DEVICES
Type: Flight Termination Method
(1) Normal command, emergency command, loss of carrier, loss of power and loss of battery initiates recovery
(2) Electrical from direct control box in launch aircraft.

Weights: (1) 2 lbs. (2) 1/4 lb
Size: (1) 30 cu in. (2) 10 cu in

Power Requirements... No additional power required

Manufacturer: Ryan design

BQM34A
1 FEBRUARY 1968
# Loading and Performance—Typical Mission

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<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Initial Weight (Typical) (lb)</td>
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<td>2150</td>
<td>2150</td>
<td>2150</td>
<td>2150</td>
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<tr>
<td>Launch Weight (Typical) (lb)</td>
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<td>2105</td>
<td>2105</td>
<td>2105</td>
<td>2105</td>
<td>2105</td>
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<tr>
<td>Fuel at 6.5 lb/gal (grade JP-4) (lb)</td>
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<td>650</td>
<td>650</td>
<td>650</td>
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<tr>
<td>Payload (lb)</td>
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<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
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<tr>
<td>Wing Loading (lb/sq ft)</td>
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<td>59.7</td>
<td>59.7</td>
<td>59.7</td>
<td>59.7</td>
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<tr>
<td>Launch Altitude (ft)</td>
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<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
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<tr>
<td>Stall Speed (Power-off) (kts)</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
<td>177</td>
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<tr>
<td>Rate of Climb (fpm)</td>
<td>11,300</td>
<td>11,300</td>
<td>11,300</td>
<td>11,300</td>
<td>11,300</td>
<td>Dive</td>
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<tr>
<td>Time: Launch Altitude to 50,000 ft (min)</td>
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<td>8.03</td>
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<td>13.96</td>
<td>13.96</td>
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<td>Service Ceiling (100 fpm) (ft)</td>
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<td>53,500</td>
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<td>---</td>
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<tr>
<td>Time On Station (hr)</td>
<td>1.46</td>
<td>1.49</td>
<td>2.07</td>
<td>1.21</td>
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<td>Average Speed for Cruise (kts)</td>
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<td>500</td>
<td>343</td>
<td>500</td>
<td>477</td>
<td>610</td>
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<tr>
<td>Cruise Distance (nmi)</td>
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<td>844</td>
<td>709</td>
<td>648</td>
<td>759</td>
<td>137</td>
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<td>Final Cruising Altitude (ft)</td>
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<td>41,200</td>
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<td>1.54</td>
<td>2.11</td>
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<td>907</td>
<td>736</td>
<td>681</td>
<td>868</td>
<td>156</td>
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### Notes

1. Military power
2. Detailed description of Missions is given under NOTES
3. A potential rate of climb of at least 1000 fpm is maintained
4. A potential rate of climb of 300 fpm is maintained
5. Maximum endurance altitude
6. Corrected for Kinetic energy
7. At launch altitude
8. At Initial Weight
9. Acceleration time to cruise speed not included

1 February 1968

BQM34A
## Loading and Performance — Typical Mission

<table>
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<td>Initial Weight (Typical)</td>
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<td>2124</td>
<td>2147</td>
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<td>2181</td>
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<td>650</td>
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<td>Wing Loading</td>
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<td>S. L.</td>
<td>S. L.</td>
<td>S. L.</td>
<td>S. L.</td>
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<td>145</td>
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<td>14,500</td>
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<td>9.14</td>
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<td>55,000</td>
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<td>545</td>
<td>555</td>
<td>534</td>
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<td>618</td>
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<td>591</td>
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<td>50,000</td>
<td>41,200</td>
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<td>41,200</td>
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<tr>
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<td>1.20</td>
<td>1.18</td>
<td>1.18</td>
<td>1.56</td>
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<td>677</td>
<td>663</td>
<td>646</td>
<td>653</td>
<td>637</td>
<td>629</td>
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### Notes
- ① Military power
- ② Detailed description of Missions is given under notes
- ③ A potential rate of climb of at least 1000 fpm is maintained
- ④ A potential rate of climb of 500 fpm is maintained
- ⑤ At launch altitude
- ⑥ At Initial Weight
- ⑦ Maximum endurance altitude
- ⑧ Corrected for kinetic energy
- ⑨ Acceleration time to cruise speed not included
## Loading and Performance—Typical Mission

<table>
<thead>
<tr>
<th>CONDITIONS</th>
<th>FLARES &amp; KDB PODS</th>
<th>FLARES &amp; KDB PODS</th>
<th>RALACS &amp; KDB PODS ON,</th>
<th>RALACS &amp; KDB PODS ON,</th>
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<tr>
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<td>MAXIMUM ENDURANCE</td>
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<td>MISSION N</td>
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<td>CRUISE AIRSPEED</td>
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<td>MISSION P</td>
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<td>(lb)</td>
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<td>2208</td>
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<td>(lb)</td>
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<td>(lb)</td>
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<tr>
<td>Payload</td>
<td>(lb)</td>
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<td>None</td>
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<tr>
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<td>(ft)</td>
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<tr>
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<td>(kn)</td>
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<td>145</td>
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<tr>
<td>Rate of Climb</td>
<td>(fpm)</td>
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<td>Time: Launch Altitude to 40,000 ft</td>
<td>(min)</td>
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<td>---</td>
</tr>
<tr>
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<td>(min)</td>
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<td>16.24</td>
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<tr>
<td>Service Ceiling (100 fpm)</td>
<td>(ft)</td>
<td></td>
<td>53,500</td>
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<tr>
<td>TIME ON STATION</td>
<td>(hr)</td>
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<td>1.44</td>
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<td>Average Speed for Cruise</td>
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<td>Cruise Distance</td>
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<tr>
<td>Initial Cruising Altitude</td>
<td>(ft)</td>
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<tr>
<td>Final Cruising Altitude</td>
<td>(ft)</td>
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<tr>
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<td>(nm)</td>
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<td>607</td>
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### Notes

1. Military power
2. Detailed description of Missions is given under NOTES
3. A potential rate of climb of at least 1000 fpm is maintained
4. A potential rate of climb of 300 fpm is maintained
5. Maximum endurance altitude
6. Corrected for Kinetic energy
7. At launch altitude
8. At Initial Weight
9. Acceleration time to cruise speed not included

1 FEBRUARY 1966

BQM34A
TYPICAL MISSION FORMULA:

DESIGN MISSION A

Warm-up, air launch, accelerate to climb speed, climb on course to 50,000 feet with military power, accelerate to 500 knots with military power maintaining a potential rate of climb of 1000 feet per minute, and cruise at partial power setting to maintain 500 knots at 50,000 feet with a potential rate of climb of 1000 feet per minute to fuel depletion. Range free allowance is four minutes with military power for warm-up, launch and accelerate to climb speed.

CRUISE-CLIMB MISSION B

Warm-up, air launch, accelerate to climb speed, climb on course to 50,000 feet with military power, accelerate to 500 knots with military power maintaining a potential rate of climb of 1000 feet per minute, and cruise-climb maintaining a potential rate of climb of 1000 feet per minute at 500 knots with military power to fuel depletion. Range free allowance is four minutes with military power for warm-up, launch and accelerate to climb speed.

MAXIMUM ENDURANCE MISSION C

Warm-up, air launch, accelerate to climb speed, climb on course to maximum endurance altitude with military power, and cruise at altitude, speed, and power setting for maximum endurance to fuel depletion. Range free allowance is four minutes with military power for warm-up, launch and accelerate to climb speed.

CRUISE-CLIMB MISSION D

Warm-up, air launch, accelerate to climb speed, climb on course to maximum endurance altitude with military power, and cruise-climb at initial cruise power setting and speed until fuel depletion. Range free allowance is four minutes with military power for warm-up, launch and accelerate to climb speed.

ALTITUDE MISSION E

Warm-up, air launch, accelerate to climb speed, climb on course with military power to altitude where a potential rate of climb of 300 feet per minute is available, and cruise-climb with military power maintaining a potential rate of climb of 300 feet per minute at the speed obtained at end of climb until fuel depletion. Range free allowance is four minutes with military power for warm-up, launch and accelerate to climb speed.

LOW ALTITUDE MISSION F

Warm-up, air launch, descend to cruise altitude, accelerate to cruise speed with military power, and cruise at maximum speed until fuel depletion. Range free allowance is four minutes with military power for warm-up, launch, descend to cruise altitude, no time or distance credited for descent.

AIR LAUNCH MAXIMUM AIRSPEED MISSION G

Warm-up, air launch, accelerate to climb speed, climb on course to 50,000 feet. Accelerate to maximum airspeed with 100 percent RPM. Cruise at 100 percent RPM until fuel is expended. Range free allowance is four minutes with military power for warm-up, launch and accelerate to climb speed.

NOTE S

GROUND LAUNCH MAXIMUM AIRSPEED MISSION H

Warm-up, ground launch, accelerate to climb speed, climb on course to 50,000 feet. Accelerate to maximum airspeed with 100 percent RPM. Cruise at 100 percent RPM until fuel is expended. Range free allowance is three minutes at idle power and 0.2 minutes at military power for warm-up, launch and accelerate to climb speed.

KDB PODS ON, MAXIMUM AIRSPEED MISSION I

Warm-up, ground launch, accelerate to climb speed, climb on course to 50,000 feet. Accelerate to maximum airspeed with 100 percent RPM. Cruise at 100 percent RPM until fuel is expended. Range free allowance is three minutes at idle power and 0.2 minutes at military power for warm-up, launch and accelerate to climb speed.

KDB PODS ON, MAXIMUM ENDURANCE MISSION J

Warm-up, ground launch, accelerate to climb speed, climb on course to 30,000 feet. Cruise climb at speeds and altitudes for endurance to a final altitude of 41,200 feet (Variable RPM). Range free allowance is three minutes at idle power and 0.2 minutes at military power for warm-up, launch and accelerate to climb power.

FLARES ON, MAXIMUM AIRSPEED MISSION K

Warm-up, ground launch, accelerate to climb speed, climb on course to 50,000 feet. Accelerate to maximum airspeed with 100 percent RPM. Cruise at 100 percent RPM until fuel is expended. Range free allowance is three minutes at idle power and 0.2 minutes at military power for warm-up, launch and accelerate to climb power.

FLARES ON, MAXIMUM ENDURANCE MISSION L

Warm-up, ground launch, accelerate to climb speed, climb on course to 30,000 feet. Cruise climb at speeds and altitudes for endurance to a final altitude of 41,200 feet (Variable RPM). Range free allowance is three minutes at idle power and 0.2 minutes at military power for warm-up, launch and accelerate to climb power.

FLARES AND KDB PODS ON, MAXIMUM AIRSPEED MISSION M

Warm-up, ground launch, accelerate to climb speed, climb on course to 50,000 feet. Accelerate to maximum airspeed with 100 percent RPM. Cruise at 100 percent RPM until fuel is expended. Range free allowance is three minutes at idle power and 0.2 minutes at military power for warm-up, launch and accelerate to climb power.

FLARES AND KDB PODS ON, MAXIMUM ENDURANCE MISSION N

Warm-up, ground launch, accelerate to climb speed, climb on course to 39,000 feet. Cruise climb on course at speeds and altitudes for endurance to a final altitude of 41,200 feet (Variable RPM). Range free allowance is three minutes at idle power and 0.2 minutes at military power for warm-up, launch and accelerate to climb power.

RALACS AND KDB PODS ON, LOW ALTITUDE MAXIMUM AIRSPEED MISSION O

Warm-up, ground launch, accelerate to climb speed, climb on course to 3,700 feet at 100 percent RPM. Dive at average maximum speed of 575 knots to cruise altitude of 50 feet. (Maximum rate of sink, 1,200 RPM.) Cruise at 100 percent RPM until fuel is expended. Range free allowance is three minutes at idle power and 0.2 minutes at military power for warm-up, launch and accelerate to climb power.
RALACS AND KDB PODS ON, LOW ALTITUDE CRUISE AIRSPEED MISSION P

Warm-up, ground launch, accelerate to climb speed, climb on course to 3,700 feet at 100 percent RPM. Dive at a speed of 460 knots to cruise altitude of 60 feet. (Maximum rate of sink 1,200 RPM.) Cruise at 400 knots until fuel is expended (Variable RPM). Range free allowance is three minutes at military power for warm-up, launch and accelerate to climb power.

GENERAL DATA:

(a) Thrust Ratings: Ratings shown under ENGINE RATINGS are manufacturers ratings. Installed thrust values used for performance calculations are:

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>S. L. STATIC</td>
<td>LB</td>
<td>RPM</td>
</tr>
<tr>
<td>Military</td>
<td>1398</td>
<td>22,000</td>
</tr>
<tr>
<td>Normal</td>
<td>1182</td>
<td>20,780</td>
</tr>
</tbody>
</table>

*Military rating per Specification MIL-E-5009A. In-flight operations not limited to this minimum rating.

(c) Revision Basis: To reflect additional actual flight test performance data for the U.S. Navy BQM34A target configuration.
(d) Performance Basis: Estimated by wind-tunnel tests, substantiated by flight tests of the BQM34A target drone.

FUEL DATA: Fuel used for range free allowance of four minutes with military power is approximately equal to five minutes with normal power.
AIRSPEED VS. ALTITUDE ENVELOPE

Rate of Climb: Zero Feet Per Minute
Engine: One J69-T-29
RPM: 100 Percent
Atmosphere: 1962 U.S. Standard Day
Configuration: Basic

RATE OF CLIMB VS. ALTITUDE

Rate of Climb: 1000 Feet Per Minute
Engine: One J69-T-29
RPM: 100 Percent
Atmosphere: 1962 U.S. Standard Day
Configuration: Basic Corrected for Kinetic Energy

Engine: One J69-T-29
RPM: 100 Percent
Atmosphere: 1962 U.S. Standard Day
Configuration: Basic Corrected for Kinetic Energy
SPECIFIC ENDURANCE VS. TRUE AIRSPEED

Altitude: Sea Level
Engine: One J69-T-29
RPM: Variable
Atmosphere: 1962 U.S. Standard Day
Configuration: Basic

Altitude: 10,000 Feet
Engine: One J69-T-29
RPM: Variable
Atmosphere: 1962 U.S. Standard Day
Configuration: Basic

Altitude: 20,000 Feet
Engine: One J69-T-29
RPM: Variable
Atmosphere: 1962 U.S. Standard Day
Configuration: Basic