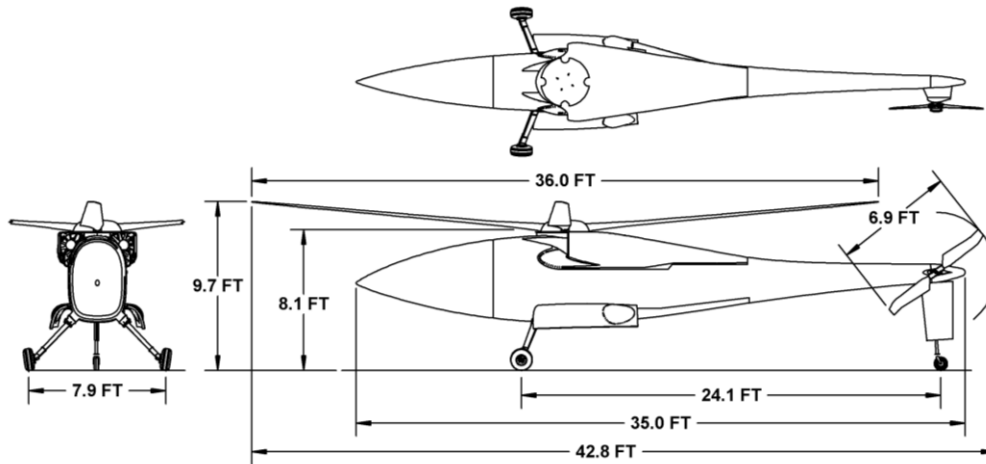
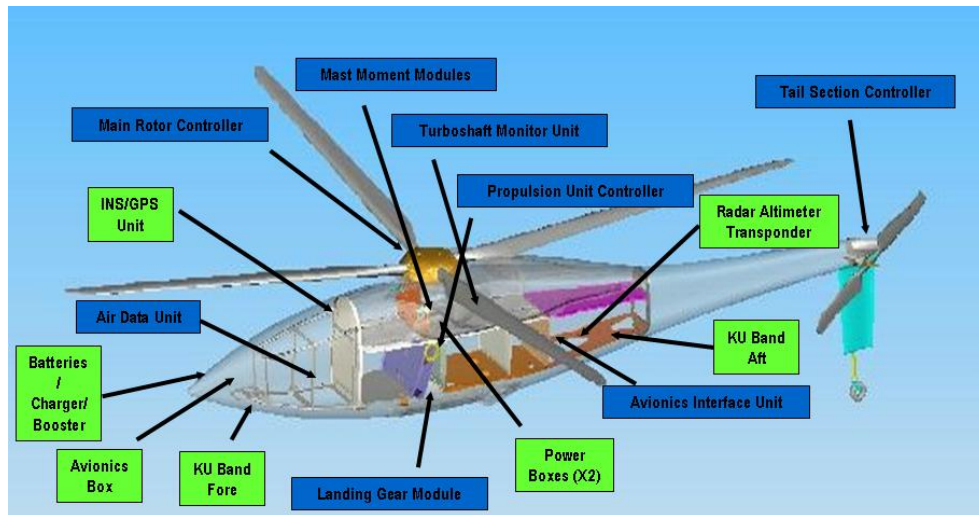


## Attachment #1: Description of A160T Aircraft System

1. **Physical Characteristics.** A160 Hummingbird is a vertical takeoff and landing (VTOL), long endurance UAS that is 35 ft long with a 36 ft rotor diameter and a potential maximum gross weight of 6500 lbs.



2. **Engine.** Propulsion of the A160T is with a Pratt & Whitney PW207D turboshaft engine rated to 572 MCP. This engine is FAA certified, Type Certificate Data Sheet E42NE, dated April 29, 2002.
3. **Fuel.** A160T has four fuel tanks with a total combined load of 375 gals, uses individual intake valves on each tank, and has a common fuel boost pump. The low pressure fuel system has the ability to transfer fuel between tanks or dump fuel overboard. The engine is rated for multiple heavy fuels including Jet A and JP-8.
4. **Flight Control.** The aircraft has a distributed, digital avionics system with redundant electrical power supply. Fault tolerant flight controls are accomplished using dual flight computer switching and FC and NSU fail-over systems. Aircraft uses dual BAE INS/GPS integrated navigation sensor to provide air data calculations. Physical control is generated by electromechanical actuators.
5. **Data Links.** Communication with the aircraft is provided by dual-redundant, two-way data links. A Ku-band data link is used with the current A160T series of aircraft, and current frequencies are authorized by the Army Frequency Management Office (AFMO). This data link continues to be used successfully for the uplink of aircraft and payload control commands, and for the downlink of aircraft sensor (including camera video) and payload data. The A160 UAS uses uplinks centered on 14.695 and 14.620 GHz and downlink frequencies centered on 15.250 and 15.180 GHz.



6. **Drive Train.** The main rotor gear box is 700 hp capable and contains a 26 KVA alternator. A160T has a two-speed transmission with gear ratios 15.7 and 19.53 to enable rotor RPM from 240 to 397. .
7. **Rotors.** The rotor system consists of a stiff in-plane, 4-bladed, hingeless main rotor and a 2-bladed teetering tail rotor. The optimum speed rotor (OSR) varies rotor speed to operate at the most efficient condition for given flight speeds, vehicle weight and air density.
8. **Electrical.** Long term power system allows for simultaneous running of both alternators and the ability to use generators to max capacity. Flight critical systems are protected from payload faults by using two power boxes. Includes built in test and health monitoring capabilities.
9. **Payloads.** A160T is configured with the weight, space and power capability to carry multiple payloads. Most communications payloads are carried internally with antennas mounted to the aircraft exterior. EO/IR and radar may also be carried. Payloads may also be carried on stub wings.
10. **Method of pilotage.** The A160 uses a global positioning system (GPS) to navigate using Ground Control Station (GCS) operator input routing or pre-programmed mission plans. The GCS provides real-time command, flight monitoring and mission re-tasking to the UAS. The GCS operator console provides for manual routing of the vehicle. The UAS operator can respond in real-time to ATC instructions in the same manner as manned aircraft.
11. **Launch and recovery methods.** The A160 Hummingbird takeoff and landing is commanded from the GCS and can be done manually or automatically. It performs takeoffs and landings similar to standard, manned rotorcraft.
12. **Route and altitude procedures.** After launch, the A160 follows a preprogrammed waypoint mission plan or follows position and velocity command inputs by an operator in the GCS. The GCS maintains a constant uplink/downlink with the A160. If the link signal is not received for a specified length of time, the aircraft performs its lost link protocol, including returning to land at a pre-designated position.
13. **Flight Performance.** The A160 cruises at 50-100 kts, has a maximum level speed of 165 kts. and maximum altitude of 20,000 feet.

