

MQ-8B Fire Scout Description

General

The RQ-8A/MQ-8B UAS is an unmanned helicopter, based upon a Schweizer Aircraft Company (SAC) FAA certified production model 333 helicopter. The MQ-8B VTUAS is an upgraded RQ-8A system and is designed to provide the ability to conduct unmanned reconnaissance operations from all ships capable of conducting helicopter operations including amphibious ships as well as cruisers and destroyers.

Figure 1 provides a three-view of the UAS with significant vehicle characteristics and dimensions.

The UAS is designed to have a maximum gross weight of 3150 pounds, a top speed of 125 knots at sea level, to remain on station for over 5 hours at distance of 110 nm, and to operate at a maximum altitude of 20K ft MSL.

Between 2002 and 2007, a total of 253 flights and 216 flight hours were accumulated with the RQ-8A and MQ-8B systems during the course of the land-based and shipboard test program.

Airframe

The Fire Scout is a modular designed vehicle comprised of many commercial man-rated helicopter components with an extensive service history.

The flight vehicle structure is composed of the following main structural components:

- The tubular steel space frame is manufactured from 4130 steel with investment cast 4130 cluster fittings. This structure supports the engine, transmission and landing gear and is the “backbone” of the helicopter. All other structures attach to this space frame.
- The MQ-8B tail cone/tail boom assembly utilizes the monocoque tail design from the commercial Model 333, with a shorter section of extruded aluminum tubing supporting the tail rotor and empennage.
- The horizontal and vertical stabilizers are typical aluminum skeleton sub-structures with clad sheet metal skins riveted to the sub-structure.
- The tail assembly is mechanically fastened to cast aluminum end fittings on the tail boom that also acts as a mounting flange for the tail rotor gearbox.
- The replaceable tail rotor guard "stinger" is identical to that used on the man-rated helicopters.
- The landing gear skids are thick-wall aluminum alloy tubes, with replaceable skid wear plates, and weight-on-skids switches to detect landing.
- The landing gear structural assembly is designed to absorb high impact loads during shipboard landings and to be durable under normal service conditions.

Similar to the man-rated vehicles, the aluminum structural fabrication of the forward avionics and payload support-structure of the Model 393 is mechanically fastened to the tubular welded frame assembly.

Propulsion and Power

The combined propulsion and lift system is based on the FAA approved man-rated system. The Allison 250-C20W free-turbine engine is FAA approved. Engine output shaft power is transmitted through a webbed V-belt drive reduction unit to the transmission. A Sprague-type clutch provides rotor free wheel in the event of a power loss to facilitate auto-rotation. The drive train and most components of the rotor system come from man-rated helicopters with over 20 million flight hours of experience (excluding main rotor transmission and actuators/control surface rigging).

SAC re-designed the RQ-8A transmission for the MQ-8B to take advantage of the new advanced four-blade main rotor system and the available engine horsepower. The MQ-8B transmission upgrade focused on (1) bearing materials and retention, (2) tooth stress reduction, (3) lubrication improvements, and (4) retention of the current RQ-8A transmission 2500 hour overhaul cycle.

The new MQ-8B transmission is rated at 320 SHP continuous with a five-minute take-off rating of 340 SHP. The total drive train weight increase over the RQ-8A design is approximately 8.7 lbs. Schweizer confirmed the new design and above ratings during transmission endurance testing conducted with their manned Model 333 test helicopter in July 2005.

The electrical power system consists of independent primary and secondary power busses. Primary power is generated by a 150-amp starter/generator driven directly by the engine, and is backed up by a 17 amp-hour sealed lead-acid battery. A 130-amp alternator that is belt-driven by the tail rotor shaft, and backed up by a 17 amp-hour sealed lead acid battery provides secondary power.

During ground operation for system maintenance, training or operational preparations, both the primary and secondary power busses are powered by an external +28 VDC source. The MQ-8B rotor system is designed to provide more lift capacity with more efficiency, that when combined with increased available power from the engine and transmission provides more endurance, range and payload capacity. The new four-bladed main rotor system evolved from the RQ-8A three-blade heritage design, which in turn came directly from the FAA man-rated Schweizer 333 helicopter. All parts are identical to the three-blade system except for the hub, droop stop and upper swash plate.

The new titanium hub is designed to the same criteria and employs the same lead-lag dampers and swash plate arrangement as before except for the added blade hub for the fourth added blade.

(b) (3) (A)

