

Payload Description

Onboard Sensor Package

A sensor package and supporting hardware have been designed for flight aboard the Bergen helicopter. This sensor package includes a FLIR Photon 320 infrared camera, an RHPC-2000 micro high-resolution camera, a Hokuyo UTM-30LX line-scan LIDAR unit, a Microstrain 3DM-GX2 orientation sensor, a Trimble BD970 GPS receiver, and other associated communications hardware. Some of these sensors are pictured in Figure 1. The integrated sensor package occupies a 10.5" x 7.3" x 3.75" volume and weighs 6.6 lbs. The power draw of the system under full load is 24W, and the integrated 5000 mAh lithium-polymer battery allows for greater than 4.5 hours of continuous run time. Figures 2 and 3 provide photographs of the assembled package.



Figure 1: Onboard Sensors.



Figure 2: External View of Sensor Package.



Figure 3: Antennas and Internal View of Sensor Package. Battery has been Removed to Facilitate Viewing Internal Components.

Payload Carrier

A customized payload carrier has been constructed in order to accommodate the sensor package described above. This payload carrier, which is pictured in Figure 4, has been attached to the original helicopter landing gear using a method recommended by Bergen Helicopter to ensure that payload will not induce undesirable resonances on the helicopter. This technique entails encasing the top portion of the payload carrier, the portion that is attached to the original landing gear, in foam and using bungee cable to secure the carrier to the landing gear. This provides suitable vibration isolation of the payload carrier from the body of the helicopter. Similarly, in order to provide vibration isolation for the sensor package, the package has been secured to the carrier using bungee cables and the carrier has been encased in foam where the sensor package has been mounted.



Figure 4: Payload Carrier and Sensor Payload Mounted to the Bergen Helicopter.

The total weight of the Bergen Intrepid Gasser EB helicopter and the payload is summarized in Table 1. The sensor payload and vibration mount has been attached to the helicopter so that the center of gravity (CG) will not be significantly altered in the longitudinal or lateral axes. The sensor payload does result in a downward shift of the CG. These configuration changes to the original Bergen helicopter have been approved by Dr. Alex Leonessa of Virginia Tech, and they have been performed in consultation with the helicopter manufacturer.

Table 1: Total Weight of the Bergen Helicopter and Payload.

Bergen Helicopter Empty Weight	13 lbs
Full 16-oz Tank of Fuel	1 lb
Sensor Payload	6.6 lbs
Vibration Mount for Sensor Payload	2.2 lbs
Autopilot Components	1 lb
Total Anticipated Weight	23.8 lbs
Maximum Weight Capacity	25 lbs