

Attachment 7 Launch/Recovery

Insitu Insight A-20 Launch and Recovery General Overview

Launch:

The Insitu Insight A-20 is launched via the SuperWedge, a pneumatic catapult system. The small, low pressure, launcher gives the Insight A-20 its initial velocity and climb rate. The aircraft is propelled upward at an angle of 25 degrees in a 12g acceleration. This trajectory is beneficial as it gives the aircraft a rapid increase of altitude, minimizing risk factors associated with operating an unmanned aircraft extremely close to the ground.



The launch sequence is fully automated. The Insight A-20 climbs on course until it reaches a pre-designated safe altitude, at which point it automatically turns to its next projected waypoint.

Recovery:

The SkyHook retrieval system captures the Insight A-20 which provides runway-independent operations. The SkyHook includes a differential GPS unit and antenna, used to calculate the aircraft's relative position to within a few centimeters. The Insight A-20's wing is snagged by flying into a rope, which is strung vertically from the top of the Skyhook approximately 40-feet above the ground. A clip on the wingtip intersects the line and quickly stops the aircraft. The Insight A-20 senses the yaw and deceleration rate and cuts the engine. The aircraft then hangs suspended from the rope, until lowered to the ground by the SkyHook operator.



The entire approach and recovery process is fully automated. Thus, the aircraft is not placed at risk by the performance of an external pilot flying the plane in a manner similar to a remote control model, as is typically done with other UAS.

A Ground Observer (GO) activates a spring-loaded, dead man trigger, "clear-to-land switch", when she/he and the Pilot-In-Charge (PIC) at the control station are ready for the aircraft to begin its approach. When the A-20 is in the correct position, altitude and airspeed, the UAS begins the approach automatically. The UAS self-initiates a wave-off or missed approach whenever it determines that its approach has fallen out of its tight tolerances. Likewise the GO or PIC can initiate a wave-off for any safety or performance-related issues, simply by releasing the clear-to-land switch.

Unique Maritime Launch and Recovery Description

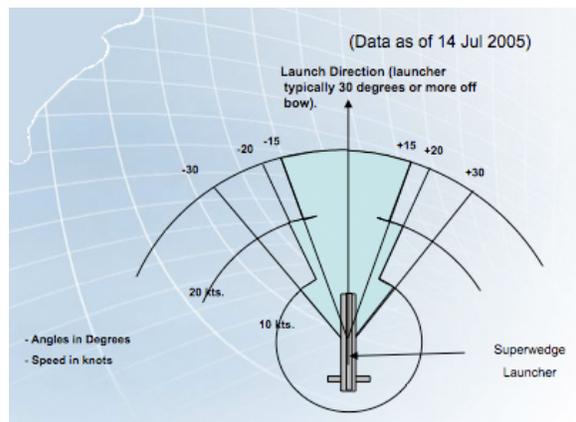
Launch:

The Insitu Insight A-20 is launched via the SuperWedge, a pneumatic catapult system. The small, low pressure, launcher gives the Insight A-20 its initial velocity and rate of climb. The launcher propels the aircraft upward at an angle of 25 degrees in a 12g acceleration. This trajectory is beneficial in that it gives the aircraft a rapid increase of altitude, minimizing the risk factors associated with operating an unmanned aircraft extremely close to the ground or surface.



The launch sequence is fully automated. The Insight A-20 climbs on course until it reaches a pre-designated safe altitude, at which point it automatically turns to its next projected waypoint.

Aboard ship the ship is maneuvered in such a manner to minimize crosswind during launch unless further testing confirms deck motion is limited to 2 degrees of pitch and 4 degrees of roll for the launch.



Recovery:

The SkyHook retrieval system captures the Insight A-20 providing runway-independent operations. The SkyHook includes a differential GPS unit and antenna, used to calculate the aircraft's exact position to within a few centimeters. The Insight A-20's wing is *snagged* on contact, by flying into the SkyHook's vertical rope, which is strung approximately 40-feet above the surface. A hook on the wingtip intersects the line and quickly stops the aircraft. The Insight A-20 senses the yaw and deceleration and cuts the engine. The aircraft then hangs suspended from the rope, until lowered to the ship deck.



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A Ground Observer (GO) activates a spring-loaded, dead man trigger, “clear-to-land switch”, when she/he and the Pilot-In-Charge (PIC) at the control station are ready for the aircraft to commence its approach. When in position, at the correct altitude and airspeed, the UAS begins the approach automatically. The UAS self-initiates a wave-off or missed approach whenever it determines that its approach has fallen out of tight tolerances. Likewise the GO or PIC can initiate a wave-off for any safety or performance-related issues, simply by releasing the clear-to-land switch.

Aboard ship the ship is maneuvered in such a manner to minimize crosswind during recovery. The approach angle is typically 3-5 degrees away from the ship’s heading and deck motion is limited to 2 degrees of pitch and 4 degrees of roll.

