

## **LOST LINK/MISSION PROCEDURES**

### **Capabilities and Procedures**

#### **Capabilities:**

There are two radio frequency (RF) control up-links, UHF and C-Band, between the Ground Control Station (GCS) and the Aerostar. In order for there to be a total loss of uplink between the GCS and the Aerostar both of these links must be out of service simultaneously. The Aerostar's on board flight control computer has the ability to store two Return Home Points and/or Routes with one selected as the primary. During normal flight, the Aerostar pilot can change between the two routes as the mission objectives change and also has the option of creating a new route. If Aerostar does not receive uplink command, the Aerostar will enter a "lost link" or return home mode flight. Return Home mode flight is autonomous flight using the designated Return Home Point (RHP) or Route procedure. The purpose of the RHP or Route is to put the Aerostar in a safe position close to the GCS so the crew can attempt to regain uplink via the CGS or other available equipment (Launch and Recovery System). The RHP is also planned so that it is close enough to a back up short range omni antenna that may be capable of re-establishing the communication link. Normally, the maximum distance for reception of the omni system's signal is two miles.

If only a Return Home Point is designated, the Aerostar will make a turn towards the RHP and initiate a climb of 1200' above the current altitude. The Aerostar will fly direct to the RHP at the new altitude.

If a Return Home Route is designated, the Aerostar will make a turn and proceed directly to the return home route (not waypoint) via the shortest distance, at the current altitude. After intercepting the return home route, if the altitude specified for that segment of the return route differs from the current altitude the Aerostar will change altitude to operate at the programmed altitude. Up to 32 waypoints can be defined in the return home route and a change of altitude can be applied to each of these waypoints. The final waypoint in the route is the Return Home Point.

When the Aerostar arrives at the RHP, it will enter a figure-eight holding pattern with a north south axis. The northern and southern points of this holding pattern are 1400m apart. The width of the holding pattern is affected by winds, but is normally about 500m wide. If the Aerostar arrives at the RHP above the defined altitude, it will descend to the defined final altitude. Conversely, if it reached the RHP below the defined altitude, the Aerostar will climb until reaching the defined final altitude.

If the crew is unable to reestablish uplink commands, the Aerostar will continue to fly the figure-eight pattern. At fuel exhaustion, the Aerostar would continue the figure-eight pattern while gliding to the ground.

#### **Procedures:**

The Aerostar crew considers all factors during mission planning and selects an appropriate Return Home methodology for the proposed flight. For flights that will remain at or near the airport, a single RHP is used. For flights that will operate away from the airport a Return Home Route that avoids populated areas, other airports, victor airways (to the greatest extent possible) and Special Use Airspace (SUA) will be used. Altitudes for the return home routes are selected to insure obstacle avoidance and compliance with appropriate cruising

altitudes. One exception to the Return Home Route criteria is for flights that will operate within an active restricted area during its mission. For these flights, the Return Home Route is programmed so that if the loss of link occurs while the flight is within the restricted area it will remain within the restricted area until the control link is reestablished or the flight expends its fuel and glides to the ground...

The final waypoint for the loss of link procedure for the three airports and the final altitude at the waypoint are.

Las Cruces NM (LRU): 32-18-07N/106-55-15W – 7,000 feet MSL

Lordsburg, NM (LSB): 32-19-24N/108-41-35W – 7,000 feet MSL

Playas, NM (NM86): 31-56-19N/108-31-42W – 7,000 feet MSL

The figure-eight holding pattern for each of these airports is located only over sparsely populated surface areas and the final altitude is well above the normal traffic pattern of the associated airport. In addition, at Las Cruces, the altitude is away from instrument approach procedures, including missed approach. There are no published instrument procedures for the Lordsburg and Playas Airports.