The GLORIA I experiment [redacted] 25X1 its first target signal intercepted [redacted] The primary mission was a general search for pulsed emitters in the 30-38 GHz frequency region. The vehicle was also the first of a series of vehicles designed to test the feasibility of low-cost, quick reaction satellites. The experiment has successfully achieved these goals.

Over the past 16 months G-I has had 510 intercepts. These intercepts were comprised of 17 different signals-7 known, 10 unknown. All of the signals fall into three main catagories of radars: target measurement and detection, aircraft landing, and weather/mapping. [redacted] 25X1 25X1 25X1 From these intercepts, new PRI modes and a new RF were discovered. [redacted] 25X1 25X1 25X1 Other collection highlights included the interception of a new RF associated with the [redacted] 25X1 25X1

Although all of G-I's findings were significant, they did not show any new or unusual uses for this RF region when compared to the last overhead survey completed ten years ago. G-I has characterized a relative lack of change in pulse emitter exploitation of this RF region during those ten years. This experiment has given the intelligence community a high degree of confidence that another overhead survey of pulsed emitters in this RF range will not be needed for another 10 years.

The GLORIA experiment was designed to use inexpensive, commercially available parts. This worked extremely well in the selection of batteries. The power supplied allowed the vehicle to achieve two times more tasking minutes per day than orginally planned. The design goal of G-I was to achieve 80 minutes of tasking per day throughout a year of operations. This goal was reached only 8 months into the mission through a gradual increase in daily tasking. The batteries continue at almost full capacity [redacted] 25X1

The [redacted] parts selected for the solid state 25X1 memory did not perform as well. G-I contained one of the densest

(2)

memories ever flown in its Mass Memory Controller (MMC). The MMC is used to store both commands and payload data. G-I was launched into one of the highest levels of solar activity on record. This severely damaged the MMC causing it to lose half of its storage capacity. It also made the memory highly susceptible to latch-ups and caused a slow but continual degradation of its capacity throughout the mission. G-I has proven that [redacted] memory is a must for a fully operational spacecraft. [redacted] 25X1

During its mission G-I provided 180 minutes of tasking per day with an average of 10 intercepts per week. There have been short intervals when tasking has not been possible due to latching in the MMC. Although these periods slowly increased the overall damage to the MMC, they did not effect normal operations for more than a week. However, towards the end of October 90 the increases in the overall damage became great enough to cause the loss of 16% of the MMC's remaining storage capacity. The areas that remained appeared usable, but in November the occurance of latch-ups increased and payload data was being corrupted. Because of the high occurance of latch-ups, the vehicle was only available for tasking 67% of the month of October. This was reduced to 37% in November. G-I had been averaging 85% availability up to this time.

A normal tasking period will fill up 16-33% of the MMC. It is rare that more than 33% is filled. Starting in October, the MMC was regularly filling more than 48% of its storage capacity with no corresponding change to the tasking scenario or intercepts reported. The degradation to the MMC has caused the pointer, which indicates the amount of data that has been read into the MMC, to move without data being read in. This causes it to appear that a greater amount of data is being intercepted and it surrounds the real intercept data with false data. It has become increasingly difficult to differentiate between real intercepts and false ones. Only man-intensive analysis can recover the real intercept data. During a two week tasking period in December, only one real signal was intercepted even though 33-48% of the MMC was being readout. This one intercept had corrupted time information, another artifact of the MMC degradation, and had to be specially processed.

It is believed that the level of effort that now needs to be expended both to keep the vehicle collecting and to analyze the data far outweighs any gains left to be made. The GLORIA I experiment

has successfully completed its survey of the 30-38 GHz RF region and has provided lessons learned for the design and operation of GLORIA II, [redacted] 25X1 It is recommended that the status of G-I be changed to red and efforts concentrated on the success of G-II.

(4)