Exhibit 1, FCC Form 442

Application for New or Modified Radio Station Authorization
Under Part 5 of FCC Rules - Experimental Radio Service
File No. 0102-EX-ST-1999; Call Sign: WA9XBX

Frequency	RF Output Power at Transmitter Terminals	Effective Radiated Power from Antenna	Mean or Peak	Emission	Modulating Signal	Necessary Bandwidth* (Khz)	Communications Function
151.625 Mhz	40 Watts	40 Watts	Peak	F3E	5 Khz	16	Ground Voice Communication
151.625 Mhz	40 Watts	400 Watts	Peak	F1D	9600 Baud	20	Uplink: Ground Control
153.50 Mhz	40 Watts	40 Watts	Peak	F3E	5 Khz	16	Ground Voice Communication
153.50 Mhz	40 Watts	400 Watts	Peak	F15	9600 Baud	20	Uplink: Ground Control
433.92 Mhz	3 Watts	3 Watts	Peak	F3W	NTSC Video	6,000	Downlink: Payload Experiment
464.55 Mhz	3 Watts	3 Watts	Peak	F1D	9600 Baud	5.0	Downlink: Vehicle Telemetry
915.00 Mhz	3 Watts	3 Watts	Peak	F3W	NTSC Video	6,000	Downlink: Payload Experiment
1,255.0 Mhz	3 Watts	3 Watts	Peak	F3W	NTSC Video	6,000	Downlink: Payload Experiment
2,418.0 Mhz	3 Watts	3 Watts	Peak	F3W	NTSC Video	6,000	Downlink: Payload Experiment

Note: *Necessary bandwidth calculated in accordance with the formula in the FCC Rule Part 2, Section 2.202.

Exhibit 2, FCC Form 442

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A. Description of research project

The High Altitude Research Corporation (HARC) utilizes balloon-launched rockets called "rockoons" to launch payloads to high altitudes or into space. The rocket, suspended from a specially designed balloon, is ignited at an altitude of over 80,000 feet and flies much higher. Since a vacuum exists at that altitude, the nozzle of the rocket can be increased to the maximum expansion ratio yielding greater performance of the rocket engine. Additionally, by propelling the rocket above the dense atmosphere, the first stage of a conventional launch, where failure usually occurs, is eliminated. HARC is planning to develop the Corvus orbital launch system, a balloon assisted, 3-stage rocket for inserting small payloads into low earth orbit. This expendable launch capability can substantially increase performance and reduce cost. Thus, it is ideal for launching microsatellites. Since the rockoon method requires no fixed ground support facilities, HARC launches from a boat in the Gulf of Mexico thus avoiding flight over populated areas or within high-cost space launch ranges.

B. Showing that the requested communications facilities are necessary for the project

The rockoons require radios for communicating control, navigation, and payload functions and status to the ground. A counterpart ground station receives these radio communications to enable launch-crew monitoring and control of the vehicle operation. Communications between the vehicle and ground include:

- Receipt of frequency modulated signals of short duration for event commands (such as igniting the rocket motor)
- Continuous FM broadcasts of status data such as temperature and pressure
- Continuous FM broadcasts of position (a down link of GPS receiver output)
- Video that is used to watch balloon expansion as the vehicle rises from the Earth's surface to rocket-launch altitude, view rocket-motor ignition, and observe the Earth's surface.

A three-year radio station authorization is needed to permit the development and testing of the radio system that provides these functions reliably within the operating environment of both the avionics and ground station conditions.

C. Showing that existing communications facilities are inadequate

HARC built and flew a prototype rockoon on a flight test over the Gulf of Mexico that was only partially successful. This rockoon used a one-time design of electronic circuits for the airborne avionics and ground station. These circuits were a combination of hand-built and commercial-off-the-shelf circuits, radios, and antennas. Receivers and transmitters were FCC-type approved. The resulting system was functional to a limited extent but required extensive manual tweaking to support the flight operation. This was to a large extent due to the several communication links required. Even though HARC subjected the electronics/radio systems to substantial laboratory and field testing in the Hunstville, Alabama area, the RF communication between the flight avionics and ground station was barely adequate. It is clear that for long-term effective commercial operations, substantial overall system performance must be improved. Consequently, further experimental engineering and production work is necessary to develop and produce the proper, robust design of the flight avionics and ground station. Furthermore, HARC has the laboratory resources necessary to ensure that the resulting radio equipment meets the authorized frequency stability, emission and bandwidth requirements. This approach is needed to assure reliable, competitive low-cost launch services that use radio communications as a fundamental part of the launch system.

This research and development program is expected to take approximately three years to achieve a fully operational commercial launch system. However, the duration of the program depends on timely success in solving technical problems. Consequently, the actual program duration could last more than three years.