

EXHIBIT

Name and Address: The Aerospace Corporation, 2350 E. El Segundo Blvd., Mail Station M1-111, El Segundo, CA 90245

Need for Special Action (explain why an STA is required): The effort is part of a research experiment on the development of miniature space-based communication systems (known as PicoSats), and the use of microelectromechanical systems (MEMS) and associated microelectronic technologies in space. An STA is required due to the non-commercial, unique research-oriented and short-term nature of the operation. The experiment will be conducted over a two-month period.

Type of Operation to be Conducted: Direct Sequence Spread Spectrum communications on earth-to-space, space-to-earth, and space-to-space digital radio communication links.

Purpose of Operation: The purpose of the operation is to conduct a program of research regarding the space application of integrated radio frequency MEMS components and related microelectronics technologies. The operation includes demonstration of principles of the physics of the low-earth-orbit space environment and effects on microelectronic circuits, constellations of miniature satellite space stations, crosslink and earth-space link combinations, local wireless networks, emulated formation flying of miniature satellites, and the tethering of very small end masses in space.

This operation is part of a collaborative effort between the following organizations:

The Aerospace Corporation, El Segundo, CA (California non-profit corporation that operates a Federally Funded Research and Development Center)

Rockwell Science Center, Thousand Oaks, CA

Stanford University, Palo Alto, CA

University of California-Los Angeles, Los Angeles, CA

Defense Advanced Research Projects Agency, Arlington, VA

SRI, International, Palo Alto, CA

The experiment operation is diagrammed in the attached Figure 1: Proposed PicoSat Experiment Configuration. Students at Stanford University's Space Systems Development Laboratory (SSDL) have built an experimental satellite, the Orbiting PicoSat Automated Launcher (OPAL). OPAL itself is placed into orbit by a larger launch vehicle. Two PicoSat miniature space stations are installed in a release cartridge aboard this student-built satellite for launch and eventual ejection at an altitude of 750 km. A schematic diagram of a PicoSat is shown in the attached Figure 2: Space Station (PicoSat) Schematic Layout. The PicoSat space stations each occupy a 3 in x 4 in x 1 in space in volume. The PicoSat space stations are tethered together in order to constrain their separation distance after release. The tether also serves as a surrogate for formation flying of a small constellation of miniature space stations.

The experiment plan calls for ejection of the two PicoSats from OPAL. Once in orbit, the PicoSat space stations will communicate with each other and with a third PicoSat mounted at the focal point of a 150-foot diameter, 45 dB-gain reflector antenna at an earth station located at SRI, International. During most of the approximately 100-minute orbit, the PicoSat space stations will be in "sleep mode" to conserve power, and PicoSat sensor systems will gather and store data from an on-board suite of sensor and switch experiments. When the PicoSats enter the field of view of the earth station, a communications link will be initiated via a beacon from the earth station and data will be downloaded from the PicoSats to a PC at the earth station.

Hopping communications will address certain constellation operations and the set of experimental MEMS radio frequency (RF) switches, being developed as part of a DARPA research contract, will help characterize performance of MEMS components in the space environment. A three-axis magnetometer and sun sensor arrays will also be incorporated as part of the experiment to study specific aspects of the low-orbit space environment. The radios aboard the PicoSats, operating in the 902-928 MHz band, have been engineered by Rockwell Science Center and are based on standard digital cordless phone technology. The radios are capable of emitting a maximum of 100 mW. These direct sequence spread spectrum radios are interfaced to small instrument boards which contain the sensor and switch experiments. Two patch antennas, with approximately 0 dB of gain, will be mounted on opposite faces of each PicoSat space station.

The Aerospace Corporation will design, build, test, integrate and deliver the two PicoSat space stations and one PicoSat earth station to Stanford University for installation in their respective locations aboard OPAL and the SRI, International earth station antenna.

Points of contact at The Aerospace Corporation regarding this request for Special Temporary Authority are:
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Time and Date of Proposed Operation: 0900 hrs, 1 September, 1999 through 2100 hrs, 1 November, 1999.

Class of Station, Call Sign of Station: Not applicable

Nature of Service: Satellite direct sequence spread spectrum communications over earth-space, space-earth and space-space links

Location of Proposed Operation: PicoSats will fly at an altitude of 750 km, orbit inclination=100 deg, right ascension=265 deg, inclination= ± 0.15 deg, injection apse= ± 10 km, non-injection apse= ± 50 km, orbit period= ~ 100 minutes

Equipment to be Used, Including Name of Manufacturer, Model and Number of Units:
Rockwell, 915 DCT digital spread spectrum radio, quantity three (two in space stations, one in earth station)

Frequency(ies) to be used: 902-915 MHz

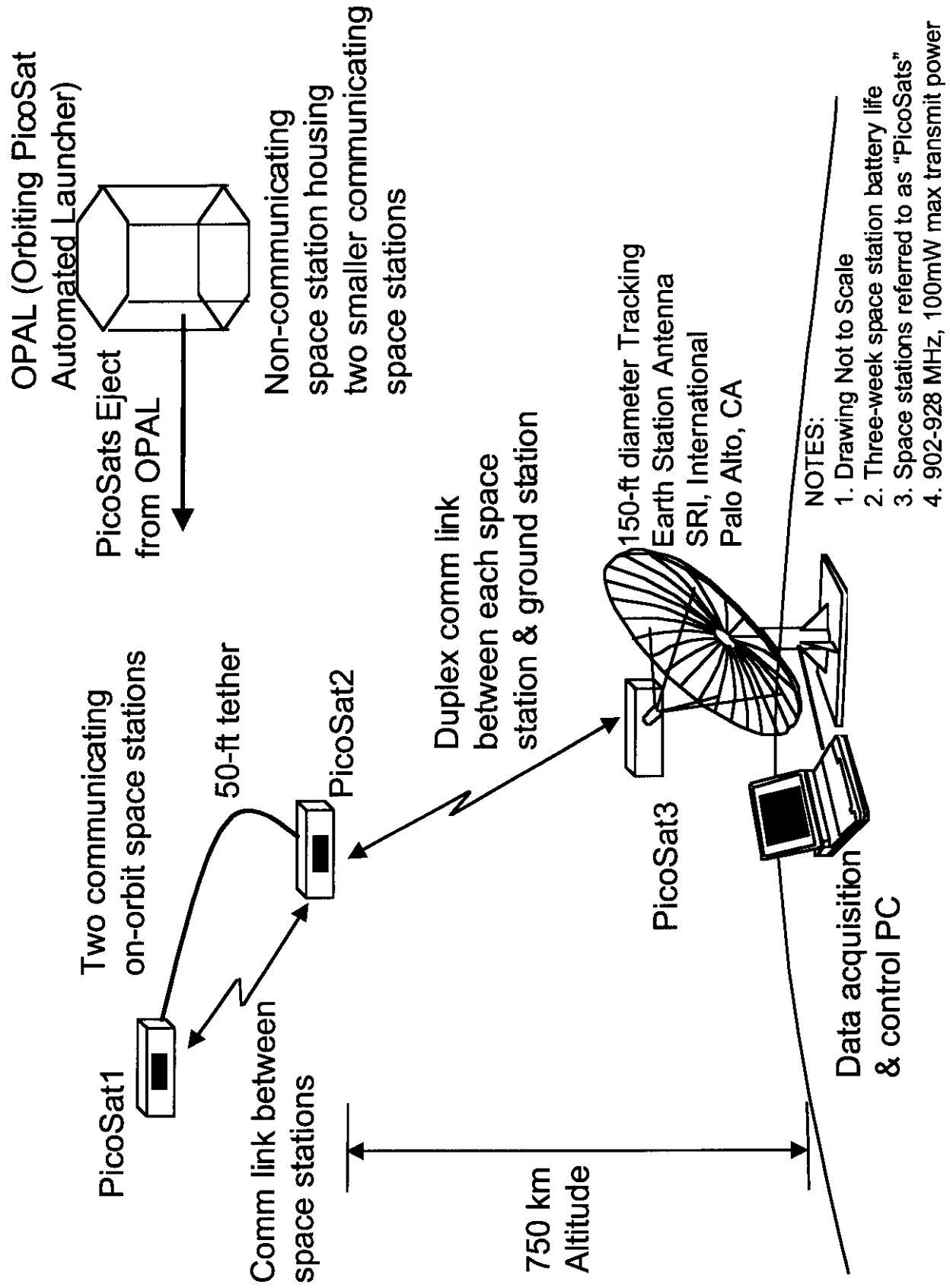
Effective Radiated Power: 100 mW

Emission Type: Direct Sequence Spread Spectrum

Overall Height Above Ground of Antenna Structure: Not applicable. 150-ft diameter reflector antenna at earth station in Palo Alto, California; patch antennas on two PicoSat space stations at 750 km altitude.

STA Request-Figure 1

Proposed PicoSat Experiment Configuration



STA Request-Figure 2

Space Station (PicoSat) Schematic Layout

