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Thiokol

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12. DISTRIBUTION / AVAILABILITY STATEMENT

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

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10/100 UA

MEMORANDUM FOR PRR (Contractor Publication)

FROM: PROI (TI) (STINFO) 31 January 2000

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-AB-2000-025** Lester., et al. (Thiokol), "Solar Thermal IHPRPT Demonstration Program"

AIAA Space 2000 **(Statement A)**
(Long Beach CA, 19 Sep 2000) (Deadline: 08 Feb 00)

1. This request has been reviewed by the Foreign Disclosure Office for: a.) appropriateness of distribution statement, b.) military/national critical technology, c.) export controls or distribution restrictions, d.) appropriateness for release to a foreign nation, and e.) technical sensitivity and/or economic sensitivity.
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_____

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Solar Thermal Propulsion IHPRPT Demonstration Program

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Abstract

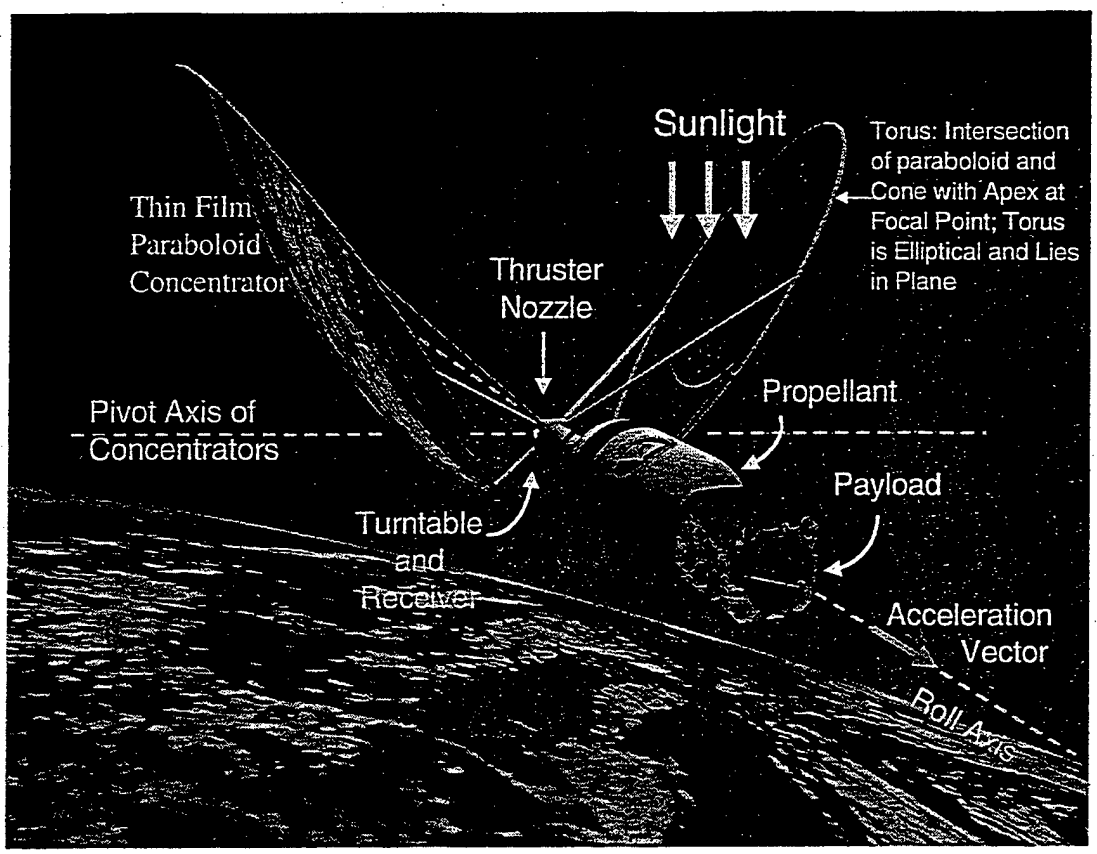
Spacecraft powered by solar thermal propulsion engines will be able to provide the velocity change required to economically maneuver large payloads from one orbit to another or to perform interplanetary missions. This innovative concept, when applied, will double the efficiency of currently used LH2 – LO2 chemical upper stages. Solar thermal propulsion uses the sun's energy to heat a low molecular weight working fluid such as hydrogen to very high temperatures (3,000 K). The stored thermal energy is then converted to kinetic energy as the working fluid exits a diverging nozzle.

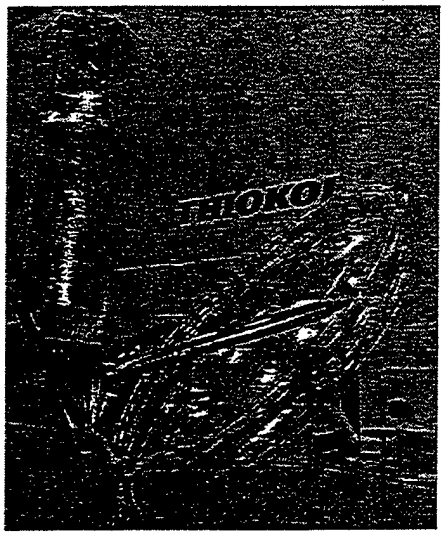
define

Under IHPRPT funding, The Air Force Research Lab (AFRL) has sponsored the team of Thiokol Propulsion and SRS Technologies to demonstrate the technological readiness and performance of an inflatable solar thermal propulsion system. This paper will address the current status of this program, which includes the following accomplishments:

- Component trade studies completed for struts, torus, lenticular
- Rapid prototyping and hardware-in-the-loop system installed and verified
- Inflation control system designed, fabricated, and tested in both ambient and space environments
- Integrated system fabricated and deployed in space environment
- Sun sensors for focus control system fabricated and tested
- Conceptual design and 3-D dynamic model made of focus control system
- Modal testing of inflatable concentrator completed in ambient conditions

The program will culminate in a full-up integrated proof-of-concept ground test. This will demonstrate that the technology is ready for development of the flight hardware for the AFRL Solar Orbital Transfer Vehicle (SOTV) program.


Sunlight
Torus: Intersection of paraboloid and Cone with Apex at Focal Point; Torus is Elliptical and Lies in Plane
Thin Film Paraboloid Concentrator
Thruster Nozzle
Propellant
Pivot Axis of Concentrators
Payload
Turntable and Receiver
Acceleration Vector
Roll Axis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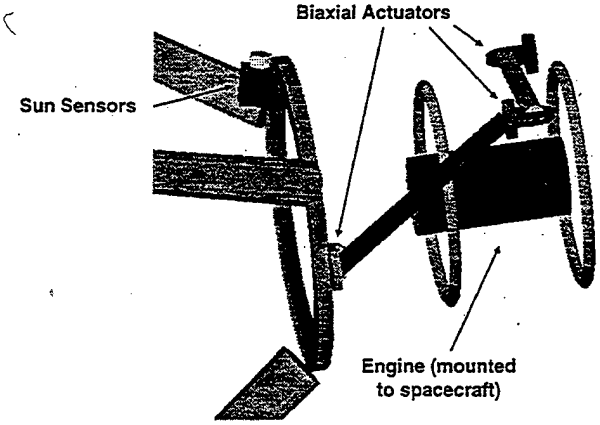
Biaxial Actuators
Sun Sensors
Engine (mounted to spacecraft)