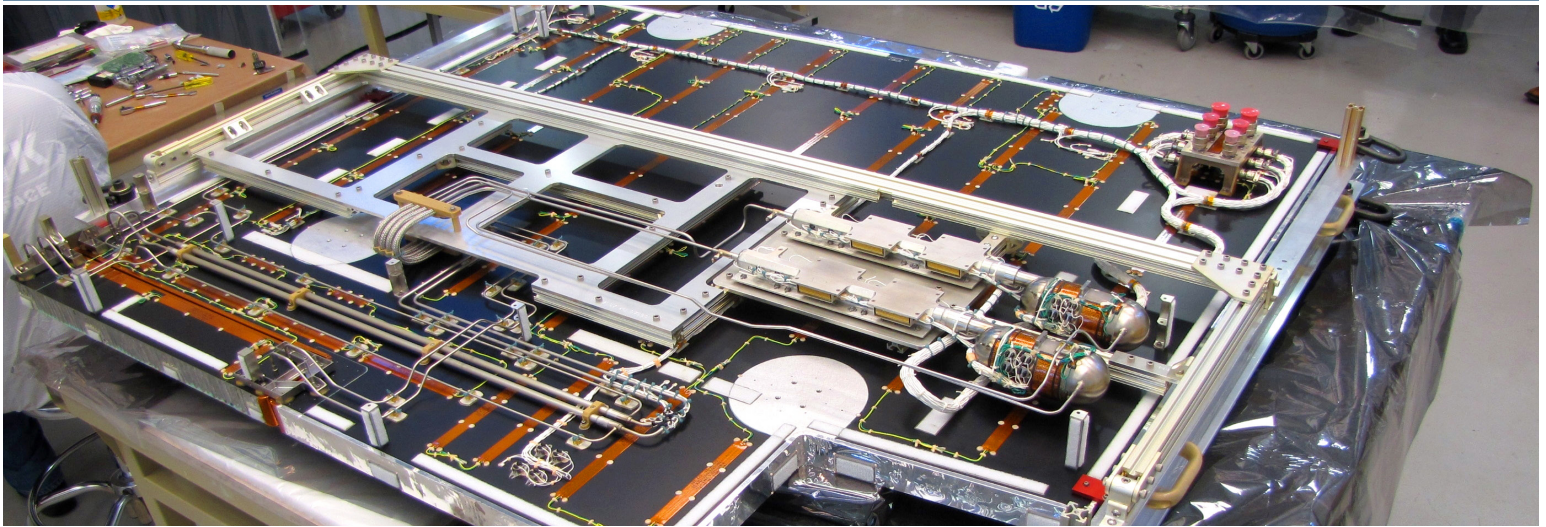


Loop Heat Pipes

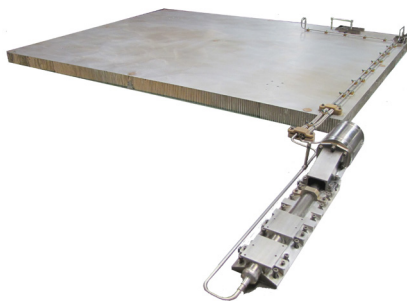
FACT SHEET



Background

The Orbital ATK Loop Heat Pipe (LHP) was first flight demonstrated in 1997 with STS-83 and STS-94. Currently, there are over 400 LHPs operating in space with 100% mission success. Several hundred more Orbital ATK LHPs are solving terrestrial thermal challenges.

LHPs provide high heat transport capability in 0-G and at several meters of adverse elevation in 1-G. They exhibit robust and reliable performance.



FACTS AT A GLANCE

- 100% mission success; no flight failures.
- High capacity heat transport applications moving kWatts of heat across several meters.
- High local heat flux capacity for Electronics and Payload cooling applications.
- Various evaporator sizes ranging from .375 to 1.25 inch diameters and 1 to 24 inch lengths.
- Wide operational temperature range from cryogenic to 130°C.
- LHP capability has made it an important, often enabling, two-phase heat transport device for emerging spacecraft and terrestrial thermal control applications.

Loop Heat Pipes

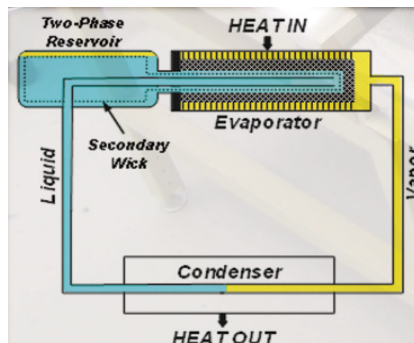
Operation

Loop Heat Pipes (LHPs) solve difficult thermal challenges for heat acquisition, transport, and rejection. With several meters of pressure head and small diameter tubing, the LHP can provide unique 0-G thermal management and system integration capability and 1-G testability with greater orientation independence.

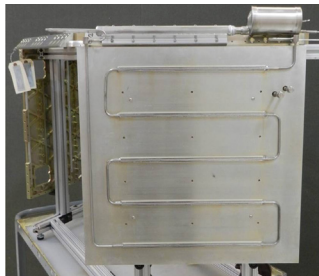
Orbital ATK Space provides Loop Heat Pipes with deployable radiators to significantly enhance heat rejection of high power spacecraft. Other large GEO spacecraft employ LHPs to cool specific high power components and transport heat to body mounted heat pipe radiators. Unique payloads, such as phase arrays, laser, and CCDs— take advantage of LHP heat transport capability, small diameter and flexible lines for routing, integration, mechanical isolation, and variable conductance operation for temperature control.

Features

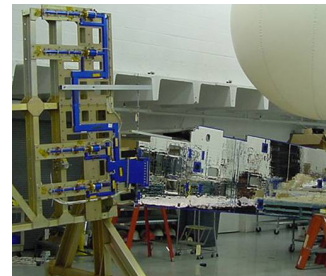
- LHP Features
- Evaporator with fine wick properties providing high capillary pumping.
- Co-located reservoir for fluid management, start-up and operating robustness.
- Secondary wick to couple the reservoir and evaporator.
- Small diameter, routable flexible transport lines.
- Direct condensation or heat exchanger condensers.
- High thermal transport and conductance.
- Variable conductance.
- Lightweight design.
- Wide temperature range from cryogenic temperatures to 130°C.
- LHP capability has made it an important, often enabling, two-phase heat transport device for emerging spacecraft and terrestrial thermal control applications permitting:
 - Flexible coupling to deployable radiators.
 - Thermal control of instruments, optical benches, and small satellites.
 - Complex routing or configurations not amenable to integrated system level tests.
 - Cooling densely packaged electronics with high heat flux dissipation.
 - High capacity heat transport and interface conductance.



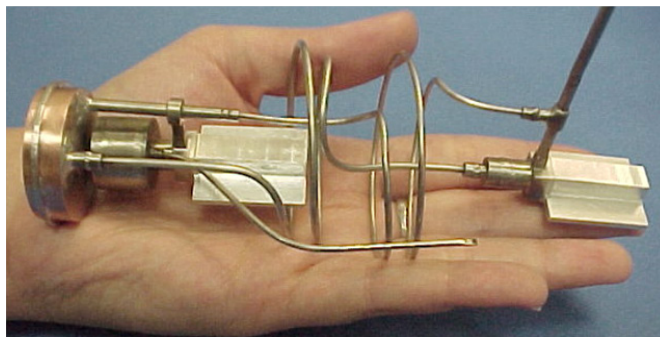
LHP Operation



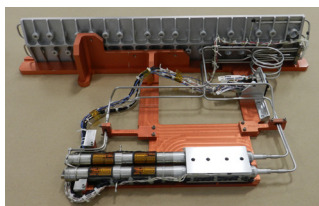
LHP Radiator System



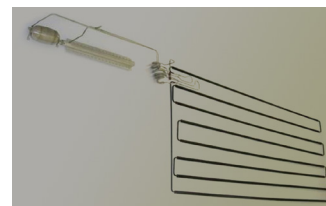
Deployable Radiator



Miniature LHP



Instrument Miniature LHP



Deployable Radiator LHP

Key Contact

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