

Innovation

Air Force SBIR/STTR Innovation Story

SBIR Topic Number:
AF02-033

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR technology that met topic requirements and has outstanding potential for Air Force and DOD.

Title:
Power Efficient
Space Computer

AF Contract Number:
F29601-02-C-0065
and
F29601-03-C-0071

SBIR Company Name:
Space Micro Inc.
San Diego, CA

**Technical
Project Office:**
AFRL/VSEE
Kirtland AFB, NM



Proton 100k™, ISS Version



Proton 200k™

Power Efficient Space Computer Developed

- The Air Force requires high performance, low cost, on-board satellite computers for work in space
- The technology developed through the Air Force SBIR Program is being used today in several satellite programs
- SBIR contracts assisted in development of a fast, cost effective computer requiring lower power to operate in space

VS06-0765

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DISTRIBUTION A:
Approved for public
release; distribution
unlimited.

Air Force Requirement

The Air Force requires high performance, low cost, on-board satellite computers which can withstand the radiation hazards in space. A complication arises for new smaller size satellites where power sources are limited. Available computers designed for space had been too power hungry, too slow, too hard to program and too expensive. The Air Force needs computers with a short design cycle for short launch cycles, computers that are nimble while retaining high performance characteristics.

SBIR Technology

The founders of Space Micro used SBIR contracts to refine Triple Modular Redundancy (TMR). TMR enables common commercial computer processors to be used in a way that masks errors due to data "upsets" resulting from space radiations such as inside the famous Van Allen Radiation Belts surrounding the Earth. However, use of three processors imposed triple the normal power requirement. The new innovation developed by Space Micro is Time-Triple Modular Redundancy Technology (TTMR), which instructs a special type of extra fast processor to do its own radiation "upset" mitigation. The significance is that only one processor is needed, and this is a commercially available processor. Other Space Micro proprietary technologies are also used in concert with TTMR to permit the use of low-cost commercial components throughout the company's space computers. The result is greater speed and lower power requirements delivered at a lower cost than any other radiation hardened computers in the marketplace.

Potential Air Force Application

This technology will let the Air Force build satellites with high functionality and speed at low cost. Specifically, even very small satellites can afford the power to operate the highest speed on-board computer to process advanced payloads. The bonus is the low cost made possible by the use of commercial off-the-shelf components.

Company Impact

"Space Micro wants to thank the Air Force for the series of SBIR awards relating to this TTMR Technology. The Space community now embraces our Proton Space Computers with this key technology. Specifically, our Proton 100k™ has been chosen for an Air Force experimental flight; and two others were chosen for the International Space Station (for Medical Emergency and a European payload). Our second Generation Proton 200k™ has now been selected to power a second Air Force experimental payload. It is gratifying that it has only been four years since this concept was submitted for the initial Air Force SBIR!"

David Strobel
President and CEO of Space Micro Inc.



U.S. AIR FORCE

SBIR/STTR

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