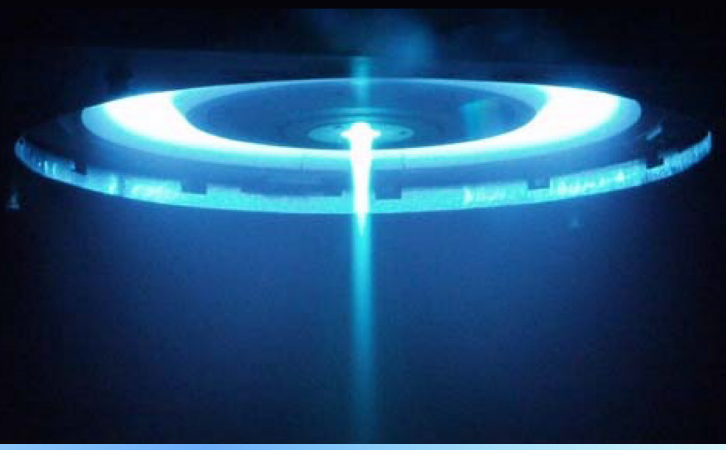
BUSEK
Space Propulsion and Systems

BHT-20K

Hall Effect Thruster

Our highest power thruster to date.



Designed for high power space missions. 1 Newton of thrust.

With over 100 times the power of our first Hall thruster, the BHT-20K is a massive step forward in Hall Thruster technology. Using an innovative 2.8 cm center mounted cathode and a highly mass-efficient magnetic circuit design, the BHT-20K offers outstanding specific impulse and thrust in a lightweight and compact package.

Tested at the Arnold Engineering Development Center (AEDC) and the NASA Glenn Research Center (GRC), the BHT-20K has demonstrated throttling over a range of input power from 5kW to 22 kW. For destinations including the moon, Mars, Venus, or beyond, the BHT-20K is ready to deliver high power space propulsion.

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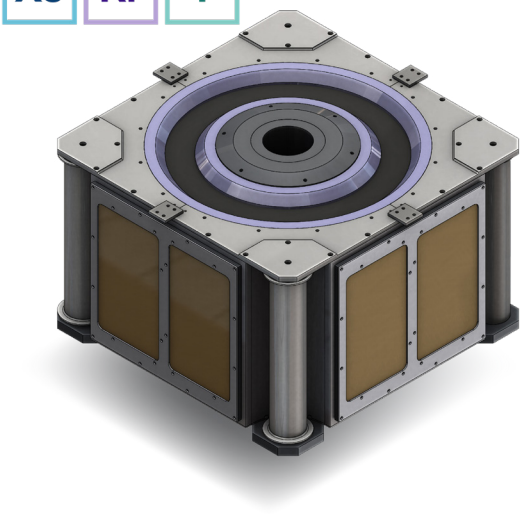

Table: Standard Specifications

Discharge Power:	20,000 W	**Assembly Mass:**	45 kg
Voltage:	450 V DC	**Demonstrated Impulse:**	Pending
Nominal Thrust:	1006 mN	**Predicted Total Impulse:**	> 35 MN-s
Nominal Specific Impulse:	2515 seconds		
Propellants:	Xenon, Krypton, Iodine		

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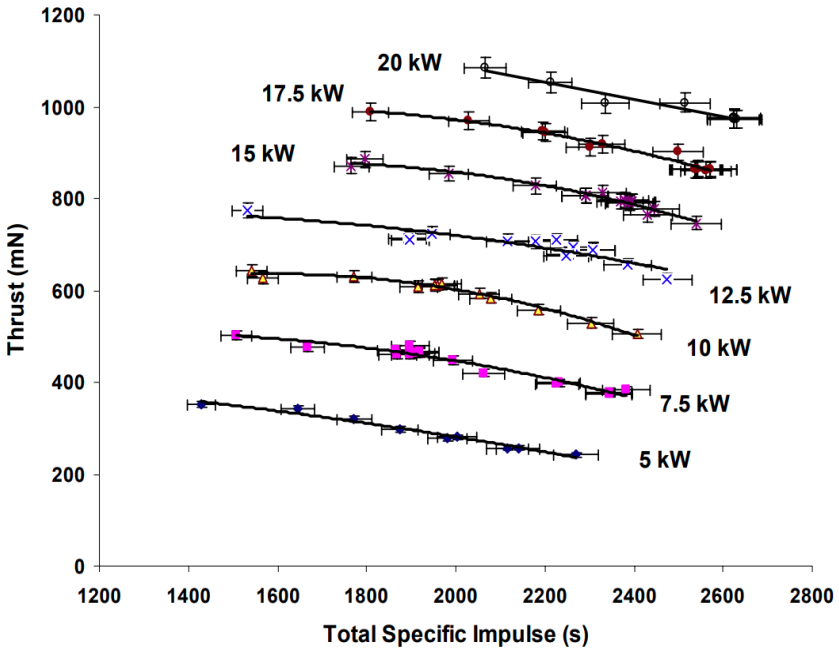
Thruster

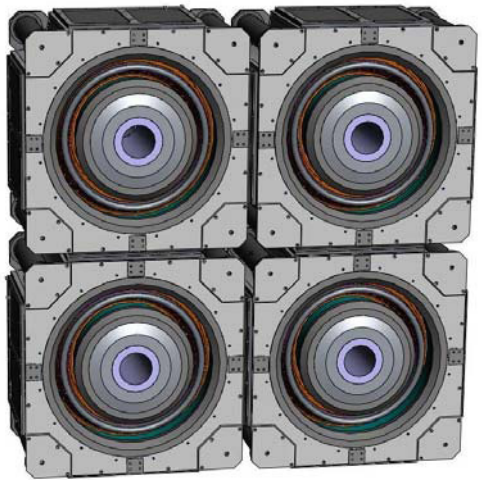
Thruster Performance Details

The BHT-20K is a Hall Effect thruster designed to operate at power levels of 5 to 20 kW and discharge potentials up to 700 V. The anode assembly passively shunts a portion of the magnetic field, creating a magnetic lens with a sharp drop in B close to the anode, which results in a desirable electric field. Propellant throughput much greater than 1000 kg is estimated. The initial build, shown in Figure 3, took place in 2003 under Phase I SBIR contract managed by the United States Air Force Research Laboratory. The present breadboard thruster is a direct evolution of the early hardware.

There are many potential applications for the BHT-20K, starting with orbit raising and interplanetary transfers. The demonstrated throttling ability is important for a singular thruster that might be called upon to propel a spacecraft from Earth to Mars or Venus. Mars orbits at 1.52 AU, which reduces the solar constant to 43% of the value at Earth. Venus orbits at 0.72 AU, which increases the solar constant to 190% of the value at Earth. As a result the output power of a nominal 10 kW array varies between 4.3 and 19.1 kW as a spacecraft travels between these planets.



Thrust measured at GRC plotted against total specific impulse for discharge power levels ranging from 5 to 20 kW, including uncertainties and polynomial curve fits.



80-kW Cluster based on BHT-20K.

A full writeup of the most recent BHT-20K characterization tests are available at the following paper:

Szabo, J., Pote, B., Hruby, V., Byrne, L., Tedrake, R., Kolencik, G., Kamhawi, H., Haag, T., "A Commercial One Newton Hall Effect Thruster for High Power In-Space Missions," 47th AIAA/ASME/SEA/ASEE Joint Propulsion Conference, AIAA Paper 2011-6152, San Diego, CA, 31 July – 3 August 2011.