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PRESS RELEASE 072221, JULY 22, 2021: VASIMR® VX-200SS PLASMA ROCKET COMPLETES RECORD 88-HOUR HIGH POWER ENDURANCE TEST.

[Webster, Texas – for immediate release] Ad Astra Rocket Company's VASIMR® VX-200SS Plasma Rocket has completed 88 hours of continuous operation at 80 kW at the company's Texas laboratory near Houston. In doing so, the company establishes a new high-power world endurance record in electric propulsion. The test also demonstrates the maturity of the VASIMR® engine technology as a competitive option for high-power in-space electric propulsion with either solar or nuclear electric power. Electric rockets operating above 50 kW/thruster are considered "high-power."

The test began at 12:50 pm (CST) last Monday July 12 and ended Friday, July 16 at 4:55 am (CST). The firing stopped only 12 hours shy of its intended duration of 100 hours due to a spurious temperature sensor located in the test support equipment and not on the rocket structure. The rocket, however, was performing normally and all indications were that, were it not for this faulty sensor, it would have met and exceeded the 100-hour goal. Ad Astra believes the 88-hr test provides objective and sufficient evidence that the VASIMR® engine has met the intent of the high-power endurance goal set by NASA.

"The test is a major success, the culmination of years of trial-and-error testing and painstaking attention to detail and a handsome reward for the team's tenacity and dedication," said Franklin R. Chang Díaz, Ad Astra's chairman and CEO and a decorated former NASA astronaut. "With a new set of engine modifications already in the manufacturing stage, we'll now move to demonstrate thermal steady state at 100 kW in the second half of 2021," he added.

The VASIMR® engine is unique in that it retains the high power of a chemical rocket but with ten times the fuel efficiency. As such, it is an excellent candidate for a host of applications, ranging from high-payload solar-electric robotic commercial cargo and resupply missions in cis-lunar space, to fast human missions to Mars and beyond with nuclear-electric propulsion (NEP).

The growing importance of NEP missions for which VASIMR® is ideally suited is reflected in the language of the 2022 Bill submitted by the Committee on Appropriations for Commerce, Justice, Science and Related Agencies of the US House of Representatives, which states that "…at least $10,000,000 shall be utilized to begin a systematic approach to Nuclear Electric Propulsion…", and "Within 180 days of the enactment of this Act, NASA, in coordination with other relevant Federal departments and agencies such as the Department of Energy, shall submit a multi-year plan for in-space propulsion-system demonstration for NEP."

"It is absolutely inspiring to see how much Franklin Chang Díaz and the Ad Astra team have been able to accomplish and advance in the years that I have known them. This technology has major potential to revolutionize the space industry," said U.S. Congressman Brian Babin, Ranking Member of the House Space and Aeronautics Subcommittee. "Ad Astra's small but dedicated team is a true testament of perseverance and continuing to invest in advanced technologies such as VASIMR® is critical if we want to remain a country that leads in space exploration," he added.

The company's main goal is for the VASIMR® engine to demonstrate thermal steady-state operation at increasingly higher power levels. This condition calls for all the temperatures of the engine's critical components to be stably maintained by the engine's thermal management system.

"The ability to operate continuously at 80 kW is exciting because we are so close to our 100-kW design goal and needing to focus on upgrading just a few components," said Dr. Matthew Giambusso, Ad Astra Senior Research Scientist, and leader of experiment operations. "The rapid

sequence of successful tests of the last few weeks have been thrilling," he added.

Major advances in the design of this system have been achieved in experimental campaigns lasting days to weeks, each followed by a period of inspection, disassembly, and improvement. This rapid prototyping is the basis for Ad Astra's approach to mature the VASIMR® technology quickly and provide a competitive high-power electric propulsion option for both public and private customers.

The thermal management of the VASIMR® engine is uniquely challenging, as temperatures from millions of degrees in the rocket's plasma core to near absolute zero in the superconducting magnet, located a few tens of centimeters away, must be carefully controlled. This, of course, in the vacuum environment where the engine must operate. These stringent requirements have required Ad Astra to develop innovative manufacturing and assembly techniques to meet unusual thermal and electromagnetic constraints within the available engine envelope. "Getting the great diversity of materials to work in harmony in the environment we subject the engine to has presented major manufacturing challenges we have had to overcome," said Mr. Lawrence "DJ" Dean, Ad Astra's head of manufacturing.

About the technology: Short for Variable Specific Impulse Magnetoplasma Rocket, VASIMR® works with plasma, an electrically charged gas, heated to extreme temperatures by radio frequency (RF) waves, and controlled and guided by strong magnetic fields, which also provide insulation. Plasma rockets, such as VASIMR®, have an extremely low fuel consumption and much higher power and/or performance as compared to other electric or chemical rockets. VASIMR® offers economic and operational advantages in satellite deployment, re-boost, refurbishment, and end-of-life disposal. With the proper nuclear-electric power source, VASIMR® could enable much faster and safer human and robotic transportation in deep-space where solar power is insufficient.

About Ad Astra: A US Delaware corporation established in 2005, Ad Astra Rocket Company is the developer of the VASIMR® engine, an advanced plasma space propulsion system aimed at the emerging in-space transportation market. Ad Astra has its main laboratory and corporate headquarters at 141 W. Bay Area Blvd in Webster, Texas, USA, near NASA's Johnson Space Center.