



BAE Systems and Reaction Engines to develop a ground breaking new aerospace engine

2 November 2015 – BAE Systems plc and Reaction Engines Limited ('Reaction Engines') today announced a strategic investment by BAE Systems and a working collaboration to accelerate Reaction Engines' development of SABRE™ – a new aerospace engine class that combines both jet and rocket technologies with the potential to revolutionise hypersonic flight and the economics of space access. The transaction is subject to the approval of Reaction Engines' shareholders.

Under the terms of the agreement, BAE Systems will invest £20.6 million in Reaction Engines to acquire 20 per cent of its share capital and also enter into a working partner relationship. The working partnership will draw on BAE Systems' extensive aerospace technology development and project management expertise and will provide Reaction Engines with access to critical industrial, technical and capital resources to progress towards the demonstration of a ground based engine – a key milestone in the development of the technology. Under the agreement BAE Systems will enter into a preferred supplier relationship with Reaction Engines in certain agreed areas and will have representation on the board of Reaction Engines.

Reaction Engines is a privately held company based in the United Kingdom developing the technologies needed for an advanced combined cycle air-breathing rocket engine called SABRE (Synergetic Air-Breathing Rocket Engine). This new class of aerospace engine is designed to enable aircraft to operate from standstill on the runway to speeds of over five times the speed of sound in the atmosphere. SABRE can then transition to a rocket mode of operation, allowing spaceflight at speeds up to orbital velocity, equivalent to twenty five times the speed of sound. Reaction Engines' technology has undergone extensive independent technical assessments which have confirmed its viability and potential vehicle applications.

The UK Government is expected to confirm grant funding of £60 million for Reaction Engines to further SABRE's development towards a ground based test engine and to investigate its applications for space access vehicles. Together with BAE Systems' investment, this significant injection of capital will support Reaction Engines' transition from a successful research phase into development and testing of the engine, including plans to expand its workforce of skilled engineers.

Mark Thomas, Managing Director, Reaction Engines Limited said:

"Today's announcement represents an important landmark in the transition of Reaction Engines from a company that has been focused on the research and testing of enabling technologies for the SABRE engine to one that is now focused on the development and testing of the world's first SABRE engine. BAE Systems brings industry leading capabilities in programme delivery and wider engineering systems integration that will accelerate the

development of SABRE as a new engine class and its vehicle applications. This partnership builds on the outstanding technical breakthroughs that Reaction Engines has made and the positive assessments received on the potential of the technology from experts at the European Space Agency and the United States' Air Force Research Laboratory ('AFRL')¹."

Nigel Whitehead, Group Managing Director, Programmes & Support, BAE Systems said:

"Reaction Engines is a highly innovative UK company and our collaboration gives BAE Systems a strategic interest in a breakthrough air and space technology with significant future potential. Our partnership with Reaction Engines is part of our sustained commitment to investing in and developing prospective emerging technologies. BAE Systems' considerable engineering and development expertise will help support the delivery of the first demonstrator for the SABRE engine."

Jo Johnson MP, Minister for Universities and Science said:

"This investment by BAE Systems reflects the strength of British engineering and technology and our ambitions as a leading space nation. I am sure that this partnership will strengthen both organisations - helping to create more jobs in the UK's growing space sector and ultimately to make the SABRE engine a reality."

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Notes to editors:

About Reaction Engines

Reaction Engines is a privately held company located in the United Kingdom and formed in 1989, employing a staff of highly skilled engineers to develop the technologies needed for an advanced combined cycle air-breathing rocket engine class called SABRE (Synergetic Air-Breathing Rocket Engine).

SABRE is an innovative, new class of aerospace propulsion that has the potential to provide efficient air-breathing thrust from standstill on the runway to speeds above five times the speed of sound in the atmosphere. The SABRE engine can then transition to a rocket mode of operation allowing spaceflight at up to orbital velocity, equivalent to twenty five times the speed of sound. Through its ability to 'breathe' air from the atmosphere, SABRE offers a significant reduction in propellant consumption and weight compared to conventional rocket engines which have to carry their own oxygen.

A key element of the SABRE engine is a breakthrough in aerospace engine technology Reaction Engines has achieved by developing ultra-lightweight heat exchangers that allow the cooling of very hot airstreams from over 1,000 °C to minus 150 °C in less than 1/100th of a second whilst preventing the formation of ice at sub-zero temperatures.

Reaction Engines Ltd.'s press release dated 15 April 2015 provides details of the AFRL assessment.

Reaction Engines Ltd has an ongoing SABRE engine technology development programme and in 2013 the UK Government announced a £60m commitment to aid preparations for the design, manufacture and testing of SABRE demonstrator engines.

The viability of the SABRE engine has been independently validated by the European Space Agency during a review undertaken at the request of the UK government.

SABRE is an unregistered trade mark of Reaction Engines Ltd.

About BAE Systems

BAE Systems provides some of the world's most advanced, technology-led defence, aerospace and security solutions and employs a skilled workforce of some 83,400 people in over 40 countries. Working with customers and local partners, BAE Systems develops technology that helps to save lives, protect borders and people, strengthen nations, and keep critical information and infrastructure secure.

BAE Systems' programmes help drive economic growth through vibrant local supply chains, the transfer of technology and skills, investment in education and training, including apprenticeships, and graduate opportunities for the next generation of highly skilled engineers. BAE Systems also sustains research and technology funding through both a substantial commitment to focussed investment of BAE Systems' own funded R&D expenditure and through the extensive high-technology activities funded by BAE Systems' customers.

In 2013, BAE Systems' operations made a £7.9 billion contribution to the UK economy. The Company's supply chain comprises 7,000 companies, three quarters of which are in the UK, and bought £3.9 billion worth of goods and services from UK suppliers in 2013. The Company is also the sixth highest patent applicant in the UK and has around 1,200 granted patents in various territories, with a further 2,100 pending patent applications.

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For imagery, please see: https://resources.baesystems.com/?c=18040&k=29477be65c

For more information, please contact:

Ben Gallagher, Reaction Engines Tel: +44 (0)1865 520 299 press.enquiries@reactionengines.co.uk

Richard Webster-Smith, BAE Systems

Tel: +44 (0)1252 383 777; Mob: +44 (0)7796 708 551

richard.webster-smith@baesystems.com