

***Performance Testing of a 2K
Joule-Thomson Closed-Cycle Cryocooler***

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The Rutherford Appleton Laboratory (RAL) have developed a 2K Joule-Thomson cooler for future space missions requiring low temperatures, such as the ESA's Athena X-ray telescope. The design, modelling and heat exchanger testing of the cooler was presented in Cryocoolers 19. In this follow-on paper, we describe the assembly of the compressors and ancillary panel, and we present the results of thermal and mechanical testing. The cooler demonstrated 20 mW of cooling at 2 K, with a pre-cooler temperature of 12 K, and 14 mW of cooling at 2 K, with a pre-cooler temperature of 15 K. The total input power to the compressors to achieve these performances was 90 W. The compressors and ancillary panel successfully passed mechanical testing comprising a 25-g high sine test and an 11.7-gRMS random test in all axes. These units also completed thermal cycling between -20°C and +50°C (operating) and 35°C and +70°C (non-operating). The lessons learnt from this development are summarised and we discuss how they are being applied to the Engineering Model 2K cooler that is currently under development at RAL as part of an ESA Core Technology Programme.