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C3Or4C-06: BAE Modular Advanced Cryocooler Control Electronics (MACCE)

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Over the past four years BAE Systems Inc. has been developing the Modular Advanced Cryocooler Control Electronics (MACCE). This new cryocooler control electronics architecture leverages modularity and scalability in performance supporting a wide range of cryocoolers including 4K Hybrid Systems (J-T + Pre-Cooler), Pulse Tube Cryocoolers, and Stirling Cryocoolers. The MACCE design includes the primary CCE box and an Accelerometer Pre-Amp (APA) box that can be remote mounted. The MACCE architecture is scalable across all mission classes and includes four high power drive channels and two low power channels supporting >500W of output power, three independent accelerometer feedback control loops for vibration cancellation, high efficiency using GaN FET technology, and a combination of six thermistors and six precision RTD circuits for telemetry. An initial flight model of MACCE has been completed and has been through successful flight qualification. MACCE performance coupled with improvements from a previously discussed engineering model are discussed along with immediate applications.

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