S1.09-5165 - Cryocooler Exported Vibration Reduction Subsystem (CEVRS)

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NON-PROPRIETARY DATA

IDENTIFICATION AND SIGNIFICANCE OF INNOVATION

1. Reduces vibration at the cryocooler source through active cancellation, resulting in a quiet, easy-to-integrate cryocooler subsystem
2. Broadens the range of cryocooler technologies for high-sensitivity optical payloads
3. Applicable to any cryocooler and any payload
4. Baseline actuators come out of SmallSat Stirling Cryocooler design, which reduces development cost and risk
5. Specific system concept designs utilizing Lockheed Martin 4-stage cryocooler to be developed, providing a relevant proof of concept in Phase I
6. Reuses cryocooler vibration reduction algorithms and firmware being developed on MCCE Program, again reducing development cost and risk

TECHNICAL OBJECTIVES AND PROPOSED DELIVERABLES

TO1 - Establish the base vibrations to be compensated using the LM Space Mega compressor as the reference
TO2 - Define and address the common integration challenges associated with vibration shunting in the context of relevant of payloads, such as Lynx and/or OST
TO3 - Capture the results of TO1 and TO2 into a concept-level Requirements Document, and report the findings in a System Requirements Review
TO4 - Perform a detailed trade study supported by MATLAB simulations to down select between two competing concepts: 1) Electromechanical Vibration Cancellation (EVC) and 2) Piezoelectric Vibration Decoupling (PVD)
TO5 - Perform exported force and torque measurements for the selected actuator

TRL

Estimated

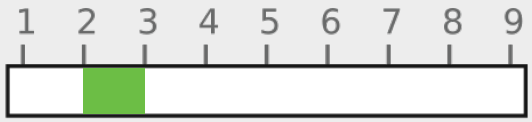
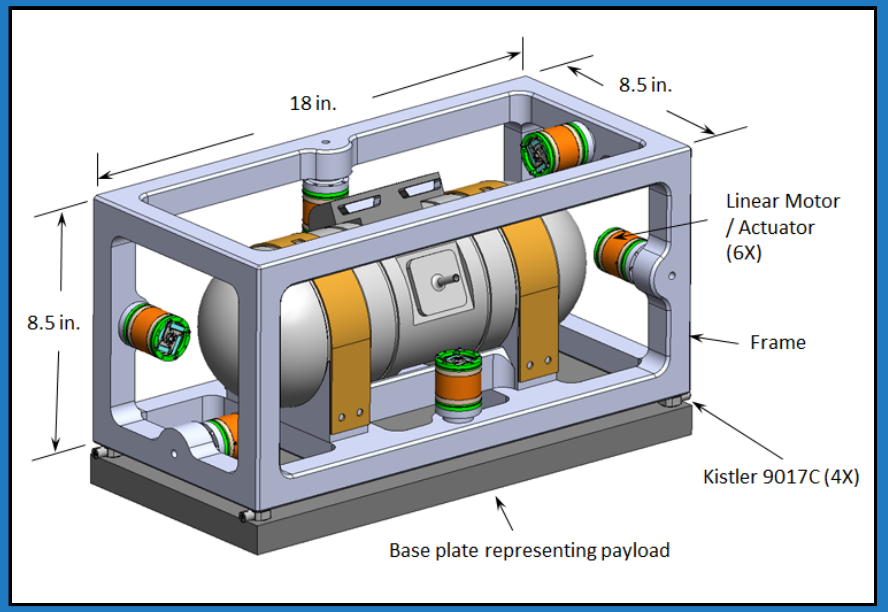


IMAGE TITLE: CEVRS - EVC Concept



NASA APPLICATIONS

The early involvement of LM Space makes practical the near term targeting of the Lynx and OST opportunities, which enhances our confidence in the transition prospects for CEVRS. Cryocooler jitter is a constant challenge across the space IR imaging industry going far beyond Lynx and OST. By ensuring that the requirements are well informed by LM Space and the Lynx and OST program offices, we expect the successful completion through Phase II to lead directly into one of more program opportunities.

NON-NASA APPLICATIONS

Ballistic missile defense, intelligence, surveillance, and reconnaissance (ISR), and other non-NASA US Government missions have similar jitter requirements. These programs would generally require a larger constellation, so the expected market opportunities are larger, perhaps by a factor of three.

FIRM CONTACTS

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