NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

REQUEST FOR INFORMATION (RFI)

Seeking partnership opportunities

for utilization of Mass Spectrometer observing lunar

operations (MSolo) Gas Analysis Instrument

Notice ID: RFI-KSC-MSOLO GAS ANALYSIS INSTRUMENT-2026

Due Date: August 3, 2026

Agency: National Aeronautics and Space Administration

Initiating Installation: Kennedy Space Center, Florida

Center Organization: NASA Engineering

Title: Request for Information –MSolo Gas Analysis Instrument

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1. Introduction & Background

1.1 Purpose & Scope

The National Aeronautics and Space Administration (NASA) Kennedy Space Center (KSC) is soliciting information to identify potential partners and innovative applications for the Mass Spectrometer observing lunar operations (MSolo) instrument. NASA is looking for opportunities for rapid infusion into upcoming lunar missions. This RFI seeks to assess the breadth of technical solutions, operational concepts, and commercial models that could maximize the instrument's scientific and commercial value.

1.2 Overview of MSolo

MSolo is a modified commercial-off-the-shelf (COTS) quadrupole mass spectrometer ruggedized for spaceflight. It is designed to identify and quantify volatiles, such as water, methane, and helium, in the lunar environment.

- **Heritage:** Demonstrated full functionality on the lunar surface during the **IM-2/PRIME-1** mission (March 2025).
- **Capabilities:** Measures gas species up to 100 m/z with unit mass resolution.
- **Interface:** Features standardized interfaces (28 Vdc power, RS-422 communication) for integration into landers or rovers.
- **Calibration:** Includes an onboard Calibration Gas System (CGS) for in-situ health checks.

2. Information Requested

NASA is seeking capability statements and expressions of interest from industry, academia, and other stakeholders. Responses should include:

2.1 Vision for Instrument Infusion

Describe your proposed mission concept (lander, rover, or orbital platform) and how MSolo fits the mission's goals.

- Identify the target lunar region (e.g., South Pole) and the specific volatiles of interest for your investigation.
- Describe concept of operations, platform or mobility integrations, environmental constraints, operational timelines, and anticipated measurement requirements.

2.2 Technical Integration

NASA requests information that will help evaluate feasibility of integrating MSolo with partner platforms.

- Payload Accommodation Information (general categories):
    a. Mass, volume, and center-of-gravity envelope
    b. Electrical power availability
    c. Thermal environment and management approach
    d. Mechanical mounting provisions
    e. Data and command interfaces

f. Environmental exposure constraints

- Interface Documentation
  a. Partners may provide Interface Control Document (ICD) or similar interface details.

- Required Modifications
  a. Partners may identify needed mechanical, thermal, harness, or software adaptations.

2.3 Operational Strategy

Proposed "Concept of Operations" (ConOps), including anticipated scan rates and mission duration.

- Interest in utilizing MSolo's real-time data streaming capabilities for reactive mission adjustments.

2.4 Partnership and Commercial Models

Identify beneficial terms and conditions for a potential partnership (e.g., cost-sharing, Cooperative Research and Development Agreement (CRADA), Non-Reimbursable Space Act Agreement (SAA)).

- Indicate interest in participating in a technical workshop to discuss detailed hardware specifications.

3. Potential Areas of NASA Support

NASA may provide the following types of support under future reimbursable or collaborative agreements (non-binding, illustrative only):

- Furnishing of MSolo Units
  - Operational instrument for integration with a partner's platform
  - Access to technical documentation, operational parameters, and calibration data

- Technical & Integration Support
  - Modifications to MSolo for partner platform integration
  - Mechanical, electrical, thermal, and data-interface adaptations
  - Design/fabrication of brackets, harnesses, or insulation components

- Verification & Validation (V&V) and Environmental Testing Capabilities
  - Vibration Testing
  - Thermal vacuum (TVAC) testing
  - Engineering support for test planning and execution

- Integration & Test Support
  - Instrument integration and functional testing
  - Mission simulations

    - Laboratory research supporting performance evaluation

- Operational Collaboration
    - Pre-mission preparation
    - Mission operations observation/support
    - System engineering, avionics, software, and mission ops expertise

- Data & Knowledge Exchange
    - Sharing of technical capabilities and operational parameters
    - Collaborative scientific analysis discussions

- Documentation & Communication
    - Regular coordination meetings or teleconferences

4. Instructions for Responding

4.1 Who May Respond

NASA invites for-profit and non-profit companies, academic institutions, and small businesses to respond. Potential prime contractors for future lunar services are highly encouraged to provide input.

4.2 Submission Guidelines

- **Submit to:** Christina.L.Williams@nasa.gov.
- **Format:** PDF format, not to exceed 10 pages.
- **Content:** Must include company name, point of contact, and socioeconomic status.
- **Markings:** Proprietary or Confidential information must be clearly labeled; NASA will protect such data to the extent permitted by law.

4.3 No Reimbursement

This RFI is for planning purposes only and does not constitute an Announcement for Proposal (AFP). NASA will not pay for information submitted or reimburse costs incurred in the preparation of responses.

Appendix A

MSolo – Mass Spectrometer for Volatile Gas Analysis

MSolo (Mass Spectrometer observing lunar operations) is a modified, commercial off-the-shelf (COTS) quadrupole mass spectrometer, ready for flight.

Project Manager: Janine Captain

Project Scientist: Roberto Aguilar Ayala NASA KSC

Key Features	
Mass Range	0-100 m/z
Mass Resolution	1 amu
Communication Rate	≤16 kbps
Power	Nominal 36W
Mass	Instrument: 5.0 kg Radiator Bracket Assembly: 2-3 kg Total: 8 kg
Instrument Size	15.5cm x 20cm x 46cm
Power Requirement	28 VDC +6/-4 VDC
Daily Data Volume	0.67 Gb
Capabilities	• Limited isotopic analysis • Quantitative measurement of isotopic abundances for sufficient samples In-situ calibration through a calibration gas system (CGS)

Table 1 MSolo Key Features

Mechanical and Thermal **-** Mechanical mounting of MSolo is dependent on thermal design. Previous designs that include the bracket/radiator have an approximate volume envelope of ~ 50x25x40 cm3. The radiator with a view to deep space dissipates sufficient heat to keep the instrument within operational temperature limits.

Configuration Options **-** MSolo may be configured to either an Open Ion Source (OIS) or Cross Beam (XB) configuration (Figure 2). In the OIS configuration, a semicircular filament is used to ionize gas molecules coming from all directions. Whereas the XB configuration has a preferred directional sensitivity to a point of source (such as drilling operations).

Electrical **-** MSolo uses two 28V power connections, one for the survival heater (~16W) and one for instrument power. Data is transferred via RS-422 serial communication with Preferred Point-to-Point (PPP) communication protocol. The physical connection to MSolo is a 30-pin connector (Glenair Part Number: 233-206-G6-ME-15-35-P-N).

I&T and Ground-Calibration **-** The MSolo team has access to all the necessary facilities for assembly, environmental testing, and calibration of MSolo, including EMI/EMC, vibration, thermal vacuum cycling and balance testing, which have been used for all previous MSolo instruments built at KSC.

Ops and Calibration – Real time commanding is desired for operations of MSolo (required for calibration/tuning activities), but some automation is available to minimize commanding. Data rates can be varied based on science data required. It is preferable to adjust MSolo operational settings to reduce data rates rather than turn MSolo off/on, as post-power activation requires a warm-up and calibration. Calibration includes mass tuning (ensuring the mass peaks are at the right m/z value), measuring the instrument sensitivity, and quantifying the electron multiplier gain.

Supplemental Information

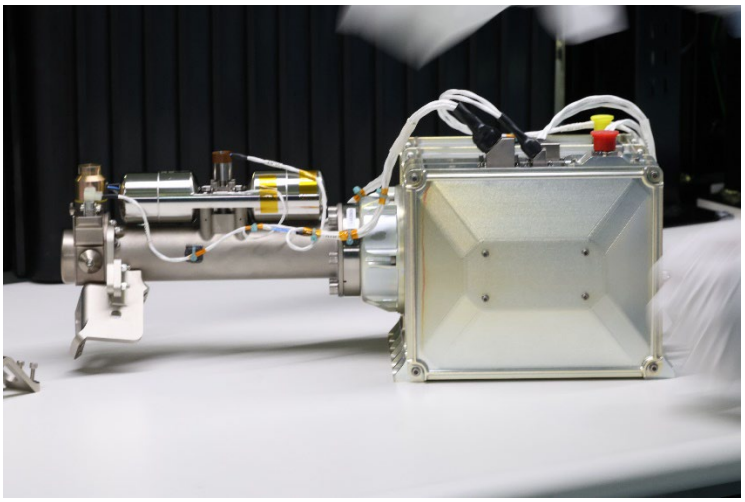

Figure 1- MSolo Instrument (VIPER Configuration)

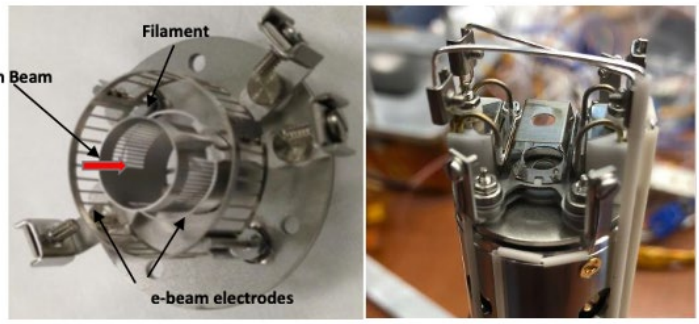

Figure 2- OIS ion source (left) and XB ion source (right)

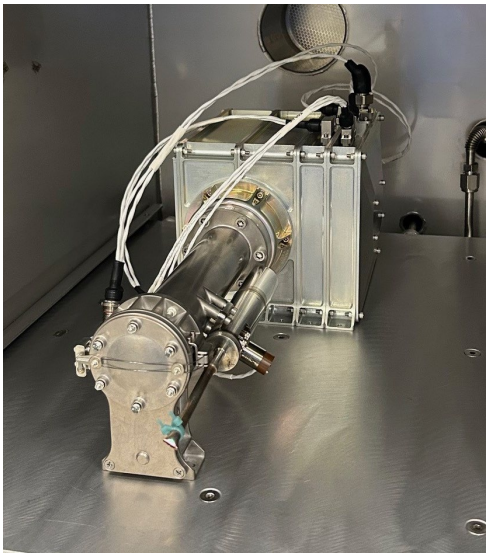

Figure 4- MSolo instrument (OIS configuration) in bonded storage.

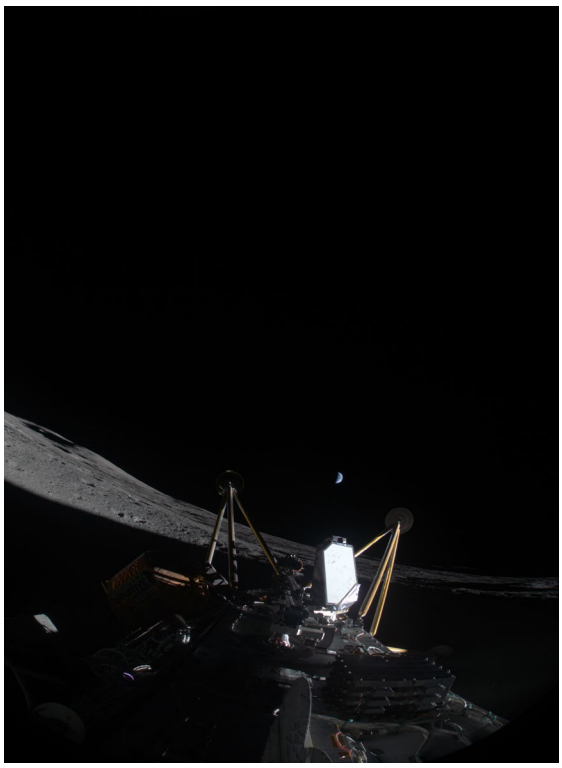
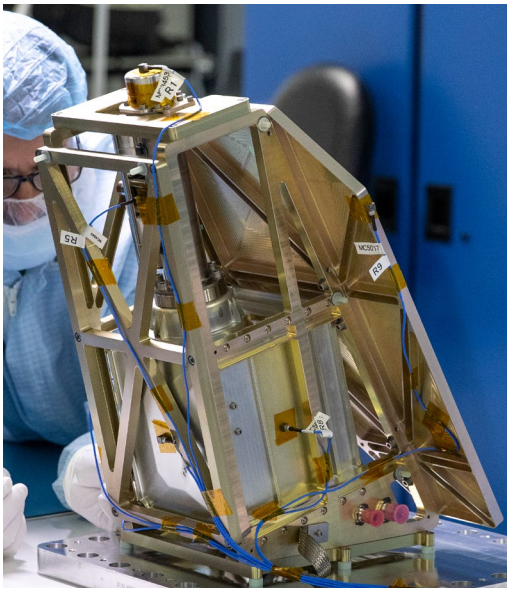
Figure 3 – Image captured by IM of PRIME-1 on the surface of the Moon (top). PRIME-1 MSolo configuration with bracket and no MLI (bottom).