

## STATEMENT OF WORK

### Hazardous Area Floor Scale with Intrinsically Safe Display Unit April 26, 2013

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#### 1. Background

The Magnetospheric Multiscale (MMS) mission is the fourth mission of the Solar Terrestrial Probe (STP) program of the National Aeronautics and Space Administration (NASA). The MMS mission will use four identically instrumented observatories to perform the first definitive study of magnetic reconnection in space and will test critical hypotheses about reconnection. Magnetic reconnection is the primary process by which energy is transferred from the solar wind to the Earth's magnetosphere and is also fundamental to the explosive release of energy during substorms and solar flares.

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The Propulsion Team for the Magnetospheric Multiscale (MMS) Project has been tasked with loading propellant into each of the four MMS Observatories. The total propellant load will be 410 kg per Observatory for a total of 1640 kg (3415.6 lbm).

The propellant will be contained in a Generic Propellant Transfer Unit (GPTU). This cylindrical container is 94.75" high with a base diameter of 64". It has dry mass of 2594.4 kg (5720 lbm), whereas, its loaded wet mass is 4499.6 kg (9920 lbm). At the time of operations, a loaded GPTU will be placed onto the floor scale. Flexible hoses will be connected to ports at the top of the GPTU and the propellant will be off-loaded. The decreasing mass of the GPTU will be tracked via the digital display within the hazardous environment as well as non-hazardous control room.

#### 2. Scope

- This document defines requirements for a floor scale that **shall** operate in a Class I, Division II hazardous environment.
- This document defines requirements for a display unit that **shall** operate in a Class I, Division II hazardous environment and is powered by either a battery or 120 VAC from a non-hazardous environment.

### 3. Technical Requirements

#### 3.1. Floor Scale

##### 3.1.1. Operating Environment

3.1.1.1. The floor scale **shall** be capable of operating in a Class I, Division II hazardous environment.

##### 3.1.2. Floor Scale Footprint

3.1.2.1. The minimum footprint of the floor scale **shall** be 64" x 64".

##### 3.1.3. Capacity/Resolution

3.1.3.1. The maximum capacity of the floor scale **shall** be 6000 kg.

3.1.3.2. The resolution of the floor scale **shall** be 0.1 kg over the entire range of 0 – 6000 kg.

#### 3.2. Digital Display

##### 3.2.1. Operating Environment

3.2.1.1. The digital display **shall** be intrinsically safe such that it is capable of operating in a Class I, Division II hazardous environment.

##### 3.2.2. Power

3.2.2.1. The digital display **can** be powered by battery or 120 VAC powered within a non-hazardous environment.

##### 3.2.2.1.1. Battery Power

3.2.2.1.1.1. The battery **shall** be capable of operating within the Class I, Division II hazardous environment.

3.2.2.1.1.2. The battery **shall** be capable of being charged in a non-hazardous environment.

##### 3.2.2.1.2. AC power

3.2.2.1.2.1. The AC power cord **shall** be grounded.

3.2.2.1.2.2. The AC power cord **shall** be 15 meters in length such that it plugs into a 120 VAC outlet within a non-hazardous environment.

##### 3.2.3. Data Output

3.2.3.1. The digital display **shall** be capable of outputting a 0 – 10 VDC analog signal in order to provide scale measurement data to a LabView<sup>®</sup> VI program via a data acquisition system. There is no requirement to control the display from the VI program.

3.2.3.2. Data cable from the digital display to LabView<sup>®</sup> terminal **shall** be 15 meters (50 ft.) in length.

3.2.3.3. The data/power cable between the digital display and the floor scale **shall** be, at least, 15 meters (50 ft.) in length.

#### 3.3. Digital Display Floor Stand

3.3.1. The digital display stand **shall** be capable of holding the digital display outlined in Section 3.2.

3.3.2. The minimum height for the digital display stand **shall** be 42".

### 4. Deliverables or Delivery Schedule

4.1. Floor scale in accordance with Section 3.1.

4.2. Digital display in accordance with Section 3.2.

- 4.2.1. If applicable, two (2) digital display battery packs in accordance with Section 3.2.2.1.1.
- 4.3. Digital display floor stand in accordance with Section 3.3.
- 4.4. Service upon delivery
  - 4.4.1. Initial setup of floor scale and digital display.
  - 4.4.2. Calibration of floor scale.
- 4.5. Documentation
  - 4.5.1. User manuals for floor scale, digital display, and any other accessories.
  - 4.5.2. Vendor supplied calibration certificate/report.