



MICRO AEROSPACE SOLUTIONS, INC.

- ▲ Propulsion System Engineering
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A Bi-Prop Propulsion Module

Micro Aerospace Solutions, Inc. (MAS) of Melbourne, Florida has created a bi-propellant propulsion module utilizing hydrogen peroxide (HTP) and kerosene or RP-1. An ablative chamber is used for the main engine. The engine dimensions are shown below.

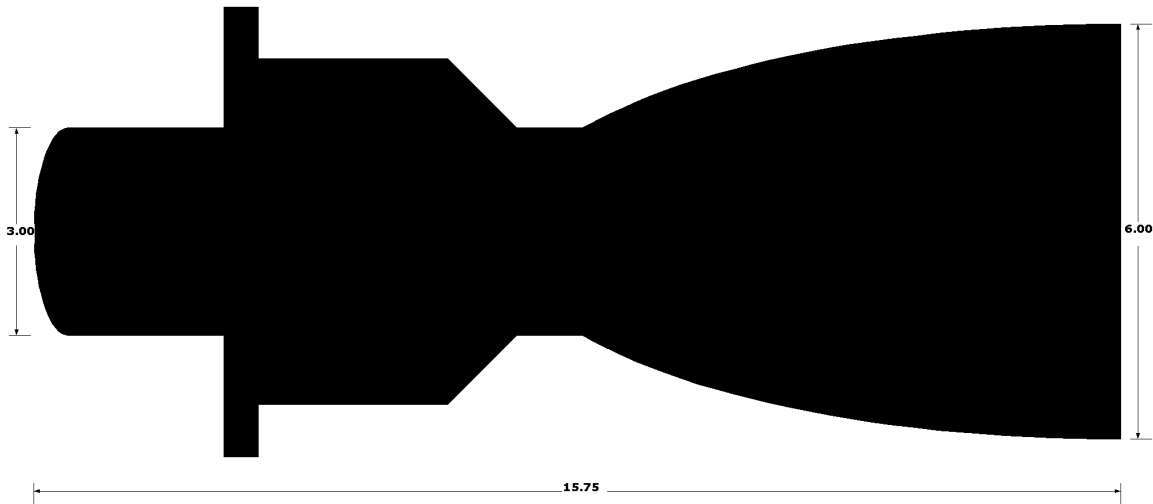


Figure 1 Bi-Prop Main Engine (dimensions in inches)

The propellants for this system are HTP (85% hydrogen peroxide with the rest water) as the oxidizer and RP-1 (a form of kerosene) as the fuel. The rocket chamber consists of a catalyst bed which decomposes the hydrogen peroxide when it passes over the catalyst generating high temperature water vapor and oxygen. The temperature of this decomposition is high enough that the RP-1 autoignites. This provides a very simple bi-propellant propulsion system with performance over 300 seconds in a vacuum. This engine can be used as a low-cost upper stage to boost a spacecraft to a higher orbit such as a trajectory to the moon.

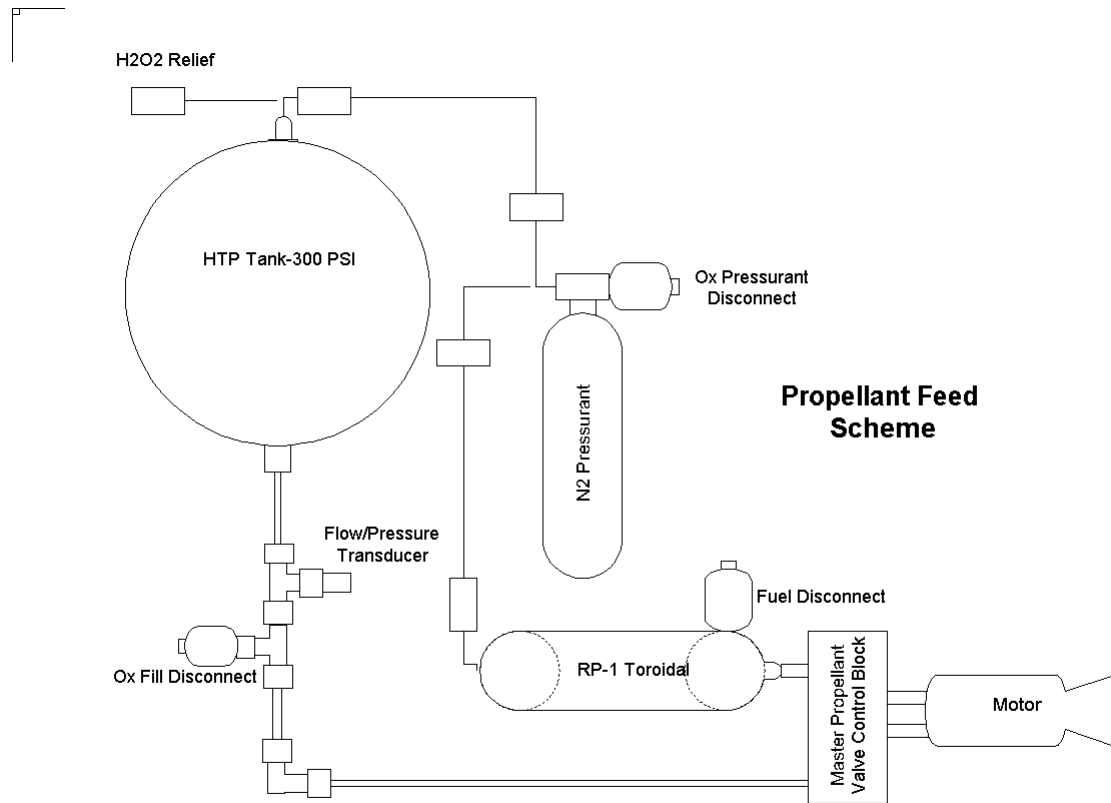
HTP and RP-1 are relatively benign as far as rocket propellants are concerned. HTP is not toxic and can be diluted with water in the event of a spill. Its major concern is that it decomposes rapidly and exothermically upon contact with many materials including many metals and organics. This decomposition can cause a rapid overpressurization. The remedy for this is to passivate all materials that will come into contact with HTP and to provide venting on tankage. RP-1 is a kerosene and all precautions for handling gasoline should be followed for RP-1.

Below is a typical system configuration as well as a prototype ablative chamber. The baseline engine ablation system will be rated to at least 200 seconds burn time. System testing may qualify the engine to longer operating time.



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Figure 2 Bi-Prop Hydrogen Peroxide-Kerosene (RP1) Propulsion Module Configuration



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Figure 3 A Prototype Ablative Chamber