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Author: Mr. Christophe Rothmund
Snecma, France, christophe.rothmund@airbusafran-launchers.com

THE DIAMANT-A LAUNCH VEHICLE FIRST STAGE PROPULSION SYSTEM

Abstract

On November 26, 1965, France became the third country able to launch its own satellites using its own launch vehicles (the Diamant A). Relying upon a mix of liquid propellants for its first stage and solid motors for the upper stages, Diamant A differed from its Soviet and American counterparts and predecessors in relying solely on tank pressurisation for feeding the first stage engine with its propellants (Nitric Acid and Turpentine). This made France the only country to achieve satellization using a liquid-propellant launch vehicle first stage not fitted with a turbopump.

The first stage itself, named Émeraude and developed by LRBA and Nord-Aviation, was very similar to the Véronique and Vesta sounding rockets but much larger and slightly more sophisticated : as the launch vehicle was to be fully guided, the engine was gimballed and actuated by two hydraulic jacks.

Its Vexin engine , designed at LRBA, developed a thrust of about 28 metric tons. Its gas generator had a unique characteristic as it used a block of solid propellant that burnt slowly, its gases being mixed with water in order to increase their volume and decrease their temperature. This uniqueness required the expertise of SNECMA's solid propellant rocket group as well as some unusual testing.

This paper will recount the development of this unique technology.