

## SPACE PROPULSION SYMPOSIUM (C4)

## Propulsion System (1) (1)

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DEVELOPMENT OF AN UP-RATED VERSION OF EARTH STORABLE PUMP FED LIQUID  
ENGINE FOR ISRO LAUNCH VEHICLES.

**Abstract**

Details of the work done to develop an up-ratable version earth storable pump fed liquid engine named as High Thrust VIKAS engine to enhance the payload capability of ISRO launch vehicles for GTO missions are presented in this paper. Performance parameters of this high thrust engine and its subsystems were worked out for thrust up-rating capability. Mechanical control systems makes this engine a rugged engine which when trimmed to deliver required propellants flow rates by sizing the orifices through simple water calibration can deliver assured performance in up-rated condition also. Thrust up rating possibility exists due to this compact system architecture. Engine operational sequence modified to alleviate the chance of combustion instability problem during start transient with high chamber pressure. The engine starts in the nominal chamber pressure of 5.85 MPa and up-rating is done by control of command pressure after the chamber pressure has crossed the start transients. The thrust up-rating is achieved by modifications in the command system module and thrust control system. Compact system architecture is maintained and engine configuration is finalized by considering the hardware modifications of thrust control regulator, operating position variation of regulators in the mixture ratio and thrust control loop and design modifications in high temperature areas such as gas generator,turbine casing etc.This paper further discusses the details of the development program,engine demonstration hot tests carried out to verify the operating parameters and the performance of the modified thrust control system.