December 1969

Brief 69-10671

NASA TECH BRIEF

Control Jet Placement on Spacecraft

The information contained in this Tech Brief describes a method for the efficient operation and configuration design of multi-jet spacecraft control systems. Methods of linear programming are applied to the jet-select-logic problem; i.e., choosing combinations of individual jet burn-times which produce the desired impulses. Minimum-fuel and fuel-time solutions are found.

Methods were developed for evaluating system failure probability and related statistical performance indices. The basic mathematical model is the discrete-state, continuous-time Markov process. A distinction was made between single-efficiency (non-fuel limited system) and multi-efficiency systems (fuel limited system) which expend fuel at different rates in different working states. The single-efficiency systems are represented by a set of linear ordinary differential equations, the multi-efficiency systems by linear partial differential equations. Redundancy capability is built into the system.

Note:

1. The information contained in this Tech Brief may be of interest to designers and manufacturers of process control systems and equipment.
2. Requests for further information may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center, Code BM7
   Houston, Texas 77058
   Reference: TSP69-10671

Patent status:

No patent action is contemplated by NASA.

Source: Bard S. Crawford of
Massachusetts Institute of Technology
under contract to
Manned Spacecraft Center
(MSC-13365)

Category 01