

# NASA TECH BRIEF

## *Manned Spacecraft Center*



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### Propellant Feed Systems Transients

#### The problem:

This program was written to assist in the analysis of fluid feed line transients initiated by operation of the valves.

#### The solution:

The program output consists of printout of the transient pressures and velocities through the feed system as a function of time. An optional CRT plot output provides for the display of transient pressures and velocities as a function of time at any desired location in the feed system. Bipropellant configurations require separate cases for each feed system.

#### How it's done:

The main program reads the input, determines what type of calculation is needed, then calls the proper subroutine that is used to simulate the feed system component required. Subroutines within the program will simulate fluid feed lines, line dead ends, fluid tanks, orifices, engines, branch connections, valves, and accumulators. The effects of trapped gas can be included by use of the accumulator subroutine and adjustment of the fluid acoustic velocity for gas bubbles dispersed through the liquid.

This program uses the method-of-characteristics to analyze the data and produce the proper output. It is limited to monopropellant feed systems, if analysis on a bipropellant configuration is desired then separate cases are required for each feed system. Correlation of the program output and actual test data have shown that the program accurately predicts feed system transients.

#### Notes:

1. This program was written in FORTRAN IV for use on an IBM-360
2. Inquiries concerning this program should be directed to:

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