

NASA TECH BRIEF

Lewis Research Center



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A Computer Program for Calculating Design and Off-Design Performance of Two- and Three-Spool Turbofans with as Many as Three Nozzles

A computer program, GENENG II, has been developed which calculates the performance of two- or three-spool turbofan engines with as many as three nozzles (or airstreams). The program uses component performance maps to enable the user to do analytical engine cycle calculations. Through a sealing procedure, each of the component maps can be used to represent a family of maps (different design values of pressure ratios, efficiency, weight flow, etc.). Either convergent or convergent-divergent nozzles may be used.

Notes:

1. The program is written in FORTRAN IV for the IBM 7094 Mod 2 computer. With modifications, the program can be used on all machines that have a FORTRAN compiler.
2. An antecedent program, GENENG, calculates steady-state design and off-design performance for turbofan and one- and two-spool turbojet engines, Reference: LEW-12010.
3. Inquiries concerning these programs should be directed to:

COSMIC
Information Services
112 Barrow Hall
University of Georgia
Athens, Georgia 30602
Reference: LEW-12011

Source: L.H. Fishbach and R.W. Koenig
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(LEW-12011)

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Development of Two-Stage Thrust Chamber with a Thrust Vector Control System

Development of Two-Stage Thrust Chamber with a Thrust Vector Control System

The development of a two-stage thrust chamber with a thrust vector control system is described. The chamber is designed to operate at a chamber pressure of 1000 psia and a throat area of 1.0 in². The chamber is divided into two stages by a diaphragm. The first stage is a convergent-divergent nozzle with a throat area of 0.5 in² and an exit area of 1.0 in². The second stage is a convergent-divergent nozzle with a throat area of 0.5 in² and an exit area of 1.0 in². The chamber is equipped with a thrust vector control system consisting of a gas generator, a control valve, and a thrust vector control nozzle. The gas generator produces a gas flow which is used to actuate the control valve. The control valve is used to vary the thrust vector control nozzle exit area, thereby varying the thrust vector control nozzle exit angle. The thrust vector control nozzle exit angle is varied from 0 to 15 degrees.

The chamber is tested in a test cell. The test cell consists of a gas supply, a chamber, and a thrust vector control nozzle. The gas supply is a high-pressure gas cylinder. The chamber is connected to the gas supply by a pipe. The thrust vector control nozzle is connected to the chamber by a pipe. The chamber is tested at a chamber pressure of 1000 psia and a throat area of 1.0 in². The thrust vector control nozzle is tested at a thrust vector control nozzle exit area of 1.0 in² and a thrust vector control nozzle exit angle of 0 to 15 degrees. The chamber is tested for a period of 1000 hours. The chamber is tested at a chamber pressure of 1000 psia and a throat area of 1.0 in². The thrust vector control nozzle is tested at a thrust vector control nozzle exit area of 1.0 in² and a thrust vector control nozzle exit angle of 0 to 15 degrees. The chamber is tested for a period of 1000 hours.

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