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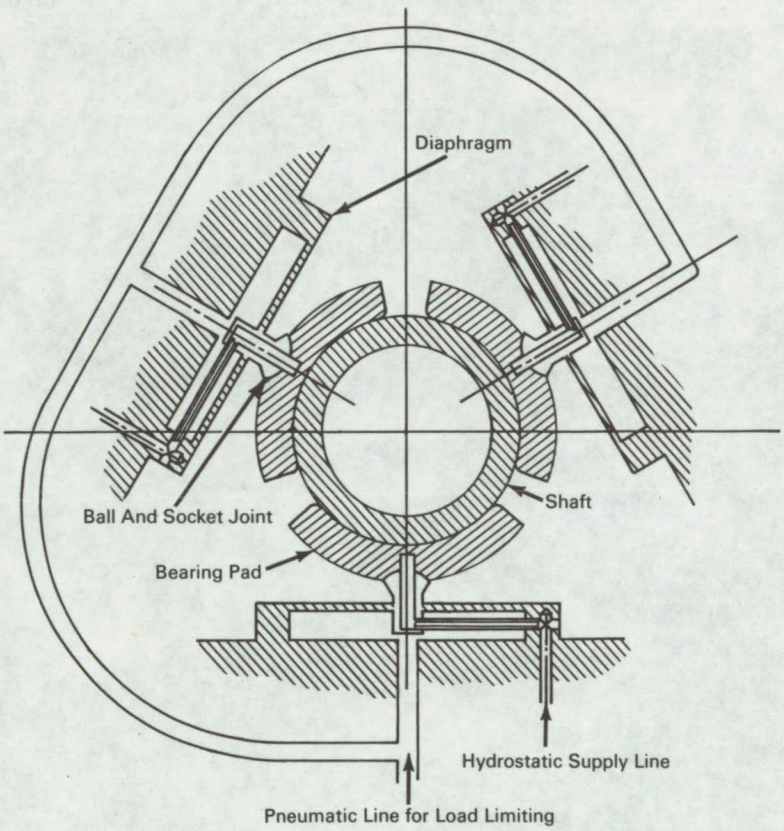
NASA TECH BRIEF

Resilient Bearing Supports Are Gas Controlled



The problem:

In the operation of a radial flow gas generator where shaft speeds are on the order of 38,500 rpm, rotor dynamic stability requirements place a high premium on bearing performance. Conventional cylindrical journal bearings cannot accommodate even the slightest rotor radial misalignment at such speed.

The solution:

Self-acting, partial-arc, pivoted-pad bearings in which the bearing-to-journal applied load is pneumatically controlled. A hydrostatic pad lift-off flotation system assists in starting and stopping.

How it's done:

Each bearing consists of three bearing pads encompassing 100 degrees of arc per pad. The pads are

(continued overleaf)

supported by ball and socket joints riding in control members equipped with flexible diaphragms. The control member diaphragms are exposed at their rear surfaces to a source of pneumatic pressure. A hydrostatic source is connected to each ball and socket joint and to each pad bearing surface through drilled passages.

Air pressure through the pneumatic line to the control member diaphragms applies an effective force to the bearing pads. When bearing loads increase due to shaft growth from thermal and centrifugal effects, bearing loading is reduced by means of a feedback loop involving capacitance probes mounted in quadrature, with respect to the rotor axis, on each bearing member. The hydrostatic lift-off system operates during starting and stopping to unload the pads and is automatically released when the rotor reaches operating speed.

Note:

This system is further described in NASA CR-706, "Design and Fabrication of a High-Performance Brayton Cycle Radial-Flow Gas Generator," February 1967, available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151; price: $3.00. Inquiries may also be directed to:

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Patent status:

No patent action is contemplated by NASA.

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