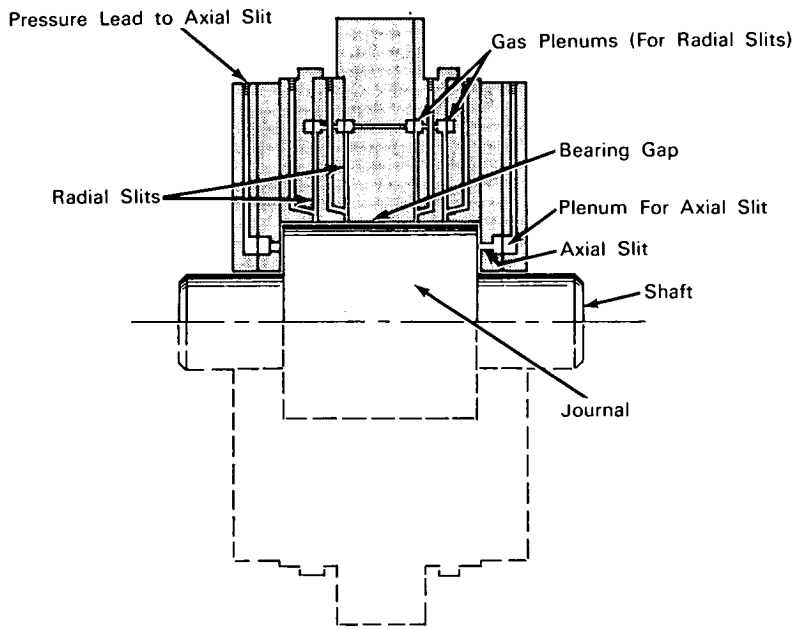
NASA TECH BRIEF

Slit Feeds Reduce Unbalanced Torques in Gas-Lubricated Bearings



The problem: Multiple radial orifices, which have been used to regulate gas flow into gas-regulated journal bearings in precision instruments (e.g., gyros), must be positioned to very close tolerances in order to prevent asymmetrical flow patterns and unbalanced torques. Because of the high accuracy requirement, journal bearings with this type of orifice are difficult to produce.

The solution: A gas-lubricated journal bearing in which the rows of radial orifices are replaced by narrow radial slits forming circumferential gas-feed passages into the bearing gap.

How it's done: The bearing is provided with four 0.0005-inch-wide radial slits extending circumferentially around the bearing. The slits are connected at one end to plenums into which the pressurized gas is fed (pressure leads into these plenums are not shown in the illustration). Gas flows through the slit openings into the bearing gap. Axial movement is prevented by supplying gas to axial slits on each end of the journal.

Tests on the slit-feed gas bearing have shown that it has less tendency to produce unbalanced torques than a multiple-orifice bearing with the same shaft and bore dimensions and plenum gas pressure. Although the slit-type bearing has a lower load-carrying capacity than the multiple-orifice type, it exhibits a much greater stiffness. The latter characteristic is more important than load-carrying capacity for small precision instruments. Gas consumption (which is an important factor where closed-cycle systems must be used, such as on spacecraft) in the slit-type bearing is

(continued overleaf)

approximately one-fifth of that in the multiple-orifice type.

Note:

Related innovations are described in NASA Tech Briefs B63-10123, June 1964 and B64-10050, August 1964. Inquiries may also be directed to:

Technology Utilization Officer
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California, 91103
Reference: B65-10099

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: John H. Laub and Frank F. Batsch
(JPL-264)