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SCIENCE NEWS LETTER

®

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Cracking Up at -320° F

See Page 309

A SCIENCE SERVICE PUBLICATION

One of a series

Catching the Drift of Gyro Bearings

The fantastic accuracies needed by inertial guidance systems for space flight depend on the suppression of gyro drift, the tendency of a gyro to precess from minutely occurring internal torques. Particularly puzzling has been the problem of "jogs," or sudden axial shifts, within gyro spin-axis bearings. Shifts of but one ten-millionth of an inch can cause serious steering error.

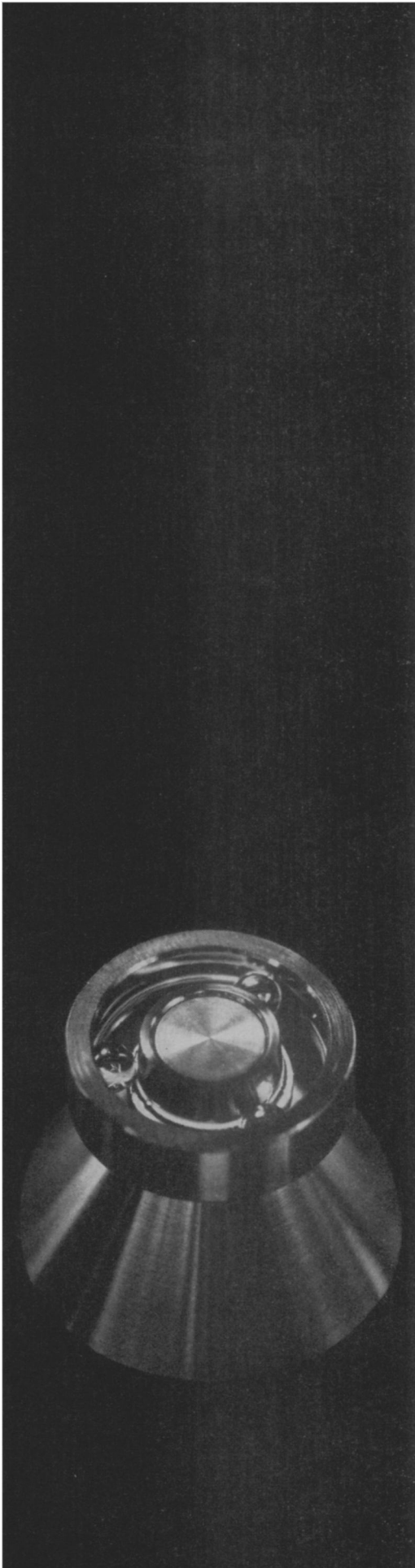
Specialists at the GM Research Laboratories have found that the real key to drift lies in the thickness and distribution patterns of bearing lubricating films. Only a tenth of a milligram of oil — equivalent in volume to less than two-thousandths of a drop of water — is required in a gyro bearing, but even this amount unevenly distributed may cause jogs.

Conducting unique studies of single bearings apart from rotor assemblies, GM Researchers use a hydrostatic spindle and special instrumentation to take film-thickness measurements they compare with hydrodynamic theory. Jogs, due to excess oil supply, have been analyzed in relation to surface oil transfer and separator feed control, ball spin orientation, displacement, and differential heating and ball wander.

This experimental and analytical approach is achieving progress toward jog-free, stably distributed, and suitably thick oil films required in high-precision bearings. It is a further example of the critical and advanced research General Motors carries out in seeking "more and better things for more people."

General Motors Research Laboratories
Warren, Michigan

The fluoresced streaks show the disturbed "wake" of the lubricating film during bearing operation. The active part of the film, too thin to fluoresce visibly, averages ten-millionths of an inch in thickness.



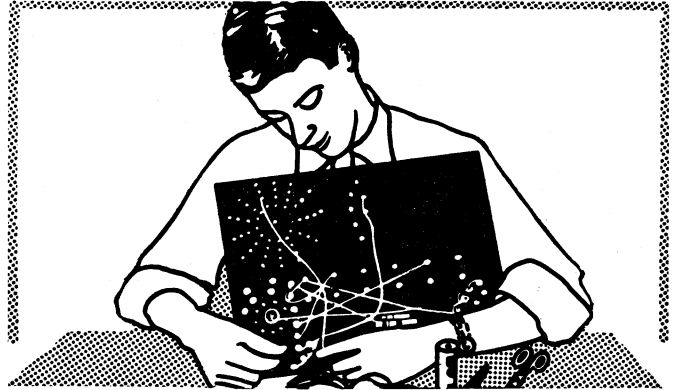
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- "Introduction to Boolean Algebra for Circuits and Switching" by Edmund C. Berkeley.
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- List of references to computer literature including "Minds and Machines" by W. Sluckin, published by Penguin Books (Baltimore), 1954, 233 pages, and other references.

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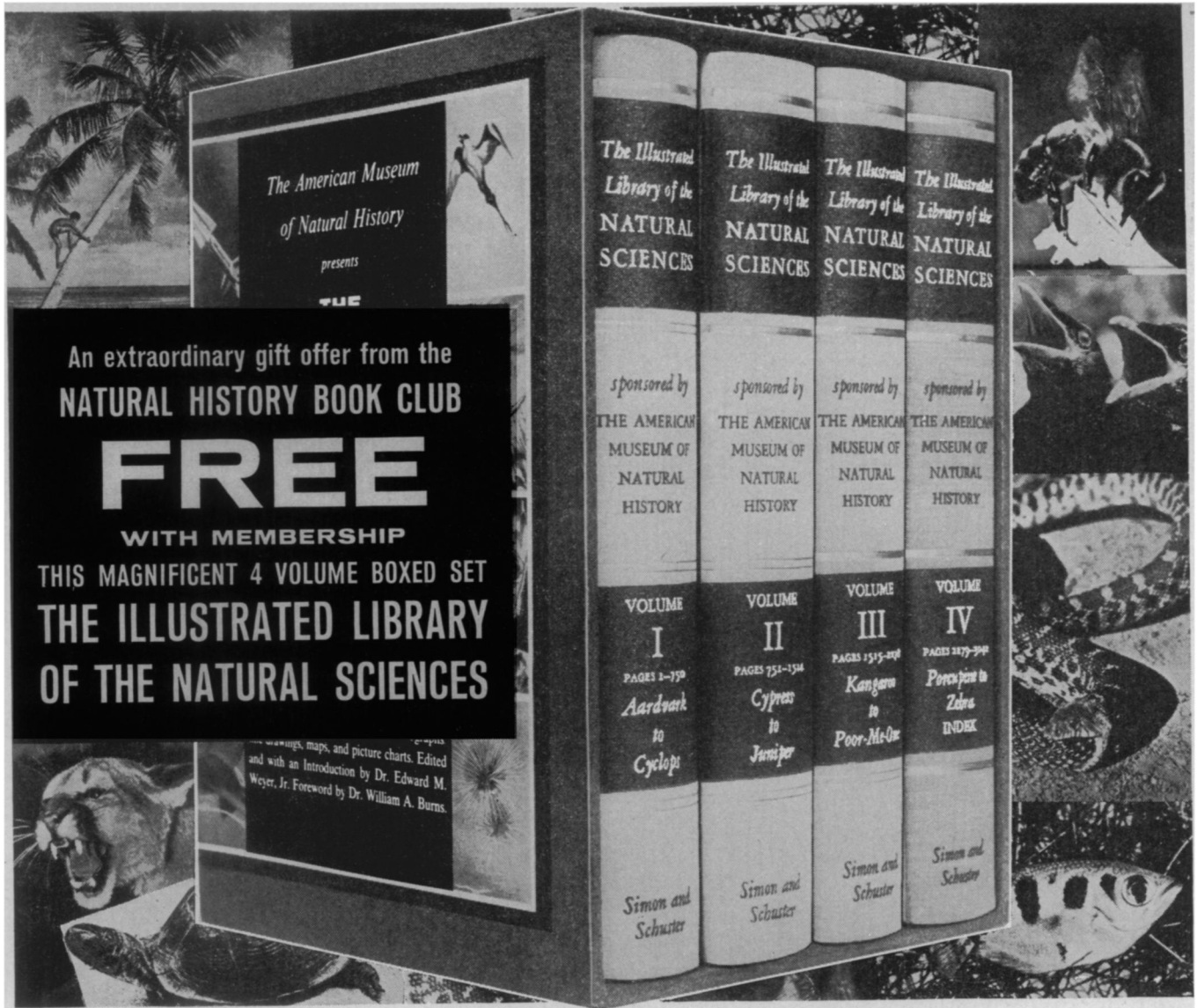
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