October 1969

Brief 69-10504

NASA TECH BRIEF

Report on a Cryogenic Gyroscope

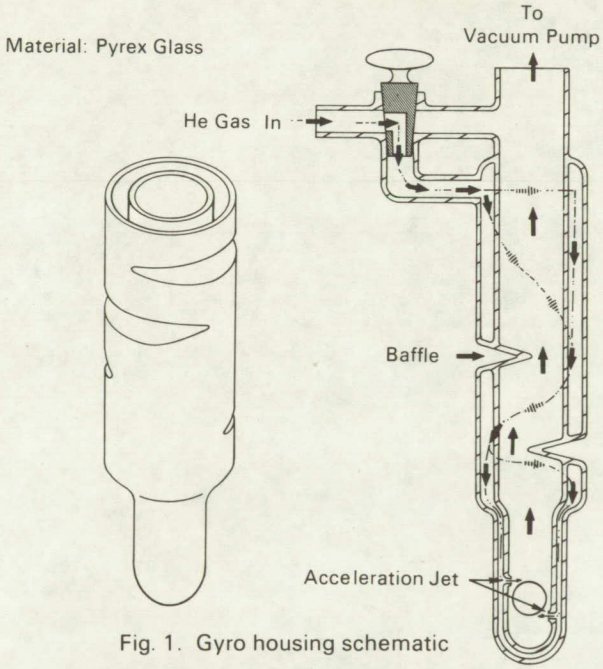

Fig. 1. Gyro housing schematic

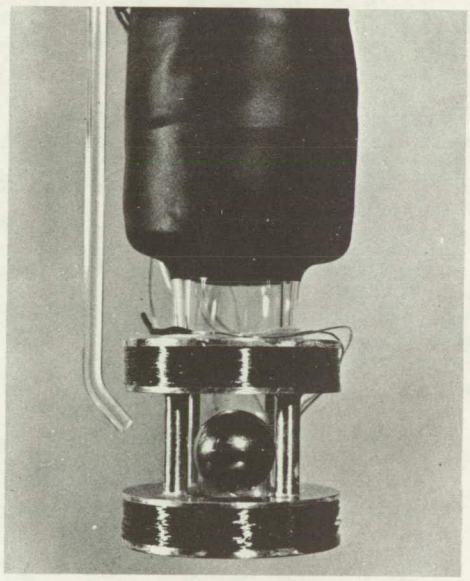

Fig. 2. Glass housing, detailed

An investigation has been made to determine the feasibility of a superconducting gyroscope, primarily considering the restrictions imposed by the physical phenomena employed.

The gyro designed for this project is a superconducting niobium sphere suspended in a vacuum by a magnetic field using the Meissner effect. It is accelerated by jets of helium gas directed against the sphere tangentially. Figure 1 is a schematic drawing of the gyro housing showing the gas flow paths for accelerating the sphere. Figure 2 shows the gyro housing assembled with the electromagnetic field coils.

The report summarizes the principal problems encountered in the areas of sphere fabrication, magnetic field losses in superconductors, configurations for the supporting field, damping of oscillations, refrigeration, techniques for accelerating the sphere, readout, and testing of the stability of the gyro. Subsequent to this report, gyro drift rate data have been published together with a mathematical analysis of the sources of torque.

The appendix to the report presents detailed documents which substantiate the concise text.

Notes:

1. This report may be of use to persons interested in gyroscope research, cryogenics, electromagnetic suspensions, and related areas.

(continued overleaf)

2. The following documentation may be obtained from:

Clearinghouse for Federal Scientific and Technical Information
Springfield, Virginia 22151
Single document price $3.00
(or microfiche $0.65)

Reference: NASA CR-74194 (N66-22923), Phonon-Drag Thermopower in Dilute Copper Alloys

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Dr. John T. Harding of Caltech/JPL under contract to NASA Pasadena Office (NPO-11200)