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Gravity Probe B Relativity Mission

**PROCEDURE FOR FLUX FLUSHING THE GYROSCOPE IN THE
GYROSCOPE COMMISSIONING PROBE
(Gyroscope Acceptance Test)**

GP-B P0276 Rev -B

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PROCEDURE FOR FLUX FLUSHING THE GYROSCOPE IN THE GYROSCOPE COMMISSIONING PROBE

This procedure is to be performed only by persons listed as certified operators of the gyroscope acceptance facilities.

Purpose:

To determine if there is any magnetic contamination and to measure the quality of the rotor.

Experimental Conditions:

Liquid Helium temperature
3 axis suspension
DDC Suspension system
Completed P0204, P0273, P0299
Temperature must be adjustable from 4.2 K to 16 K
He pressure in the vacuum can must be controllable between 1 mtorr and 0.1 μ torr
Ultra low magnetic field, < 3 μ gauss

Auxilliary Equipment:

Trapped flux magnetic readout system from 3 Helmholtz coils
SQUID control electronics
Data acquisition system

Procedure:

I Levitate the gyroscope and spin it to approximately 0.5 Hz. Observe the amplitude of the trapped flux signal from the SQUID readout and calculate roughly the amount of trapped flux in the rotor. Record this in table **LT-Op #7**. If trapped flux amplitude is less than 3.0 microGauss record this in **LT-Op #7** under Thermal Cycle 1 and proceed to Step V.

II. Perform a thermal cycle of the gyroscope by applying 20 volts dc to the gyroscope heater resistor for as long as it takes the gyroscope GRT to read 8.5 K. Record the start time in **LT-Op #7**. At this point, slowly decrease the voltage back to zero to stop heating the gyroscope. Record the stop time in **LT-Op #7**. The temperature should reach at least 12 K before beginning to cool again. Record the maximum gyroscope temperature in **LT-Op #7**. Add 20 μ torr of helium exchange gas to the vacuum can.

III. Once the rotor transitions back into its superconducting state measure the trapped flux level again. Record the trapped flux level and the elapsed cooling time in **LT-Op #7**.

IV. Repeat this process if necessary in order to achieve a trapped flux level below 3.0 μ gauss.

V. Once the final trapped flux level is attained let the gyroscope spin slowly overnight and collect the trapped flux data to be examined the next day using the MAIN2 data acquisition program. This is done to insure that we haven't based our estimate of the trapped flux level on some preferred orientation of the flux distribution in the rotor with respect to the pickup loops. Record the data filename* in **LT-Op#7** and the **Data File Log**.

VI. Record the final trapped flux level in **section III. of FGT #3**.

* Use filenames with the following convention; **TFfqh471** where **TF** designates trapped flux, **fqh47** identifies the gyro and **1** tells you that this is test #1