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Gravity Probe B Relativity Mission

AUTOMATED BETASCOPE ROTOR UNIFORMITY MEASUREMENTS

GP-B P0056 A

May 23, 1997

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AUTOMATED BETASCOPE ROTOR UNIFORMITY MEASUREMENTS

SCOPE:

This procedure describes the operation of the automated Betascope measurement apparatus for the measurement of niobium coating thickness on quartz rotors. It also covers the analysis of these coating thickness measurements for coating variation statistics, mass unbalance and Δ/I properties of the coating.

EQUIPMENT:

Betascope TC2000 with separate GM tube.
IBM PC (w/5 1/4" floppy drive Ultracomp B132
Multi I/O Card (RS232 and Parallel ports)
Compumotor Sx-6 Stepper Motor Indexer/Drivers (2)
Betascope Rotor Manipulator
HP Printer, QuietJet
Note: Sealed radioactive source required for this procedure

MATERIALS:

Floppy Disk, 5 1/4" Double sided, Double Density
Software (Betstand.exe, Manpbeta.exe, Pt40c.map, Reportb.exe)
Bare Rotor Standard
Saturated Niobium Standard

PROCEDURE:

1. Connect separate GM tube and remote trigger cable from SX-6 to Betascope, be sure to turn off Betascope while disconnecting other GM tube and connecting alternate GM tube. Turn on and allow system to stabilize for 30 minutes.
2. Verify that Betascope Manipulator sliding stage is in its HOME position. It should be in contact with the lower limit switch, but the lower limit switch should not be opened. Adjust position manually as necessary.

3. Insert floppy disk with operating programs (Betstand.exe, Manpbeta.exe, Pt40c.map, Rebornb.exe, Inertia4.exe) in the drive. Turn on IBM PC. Be sure to enter the correct date and time.
4. Verify that the floppy has at least 2000 bytes free. Type dir a: to check.

PROCEDURE (Continued)

5. Turn on HP printer and SAX-6's.
6. Run program DECAY to calculate new XO and Xs values to compensate for the source decay. If instructed by the DECAY program proceed to step 7, otherwise proceed to step 8.
7. Run program BETSTAND. Type BETSTAND enter and follow instructions.
NOTE: To install rotors on manipulator, release nylon thumb screw holding GM tube and raise GM tube. Carefully lower GM tube against its height stops. After Standardization: Be sure and log Xo and Xs in the Betascope Log Book. Set Betascope to THICKNESS mode. press Betascope CLEARSTAT key.
8. Install rotor to be measured on manipulator. Be sure rotor is not bound by the GM tube.
9. Run program MANPBETA.

Type MANPBETA enter and follow instructions.

Example file names include, uni86H3.

Observe first couple of measurement/motion cycles to verify correct operation. If there is a problem, type CTRL BREAK to halt the program and turn off the S.

After the program completes the measurement sequence, verify by observation that the stage has physically returned to the HOME position.

10. For analysis of coating uniformity, run program INERTIA4.

Type INERTIA4 enter and follow instructions.

If analysis is not obviously in error, print out hard copy.