

Mag-03 for Payload Attitude Control on Sounding Rockets

Objectives

To contribute to payload attitude control on board sounding rockets by providing accurate data on the Earth's magnetic field.

Instrumentation

Mag-03MS70 precision three-axis fluxgate magnetometer.

Application

Attitude control on board sounding rockets.

Background

Sounding rockets are used for sub-orbital scientific investigations such as aeronomy research and for studying interactions with charged particles in the upper atmosphere.

Their key advantages are their significantly reduced lead times and prices compared to satellites, and their higher altitude capabilities compared to balloons or UAVs.

Sounding rockets are also used in X-ray and ultraviolet astronomy. The Earth's atmosphere blocks out most UV and X-ray radiation, so the instruments need to be at a high enough altitude in order to make observations.

Method

The average flight time of a sounding rocket is less than 30 minutes. The measurement window is thus very small so it is important that the instruments are oriented correctly.

The Mag-03MS70 is used to sense the payload's attitude, relative to the Earth's magnetic field, and relative angular displacement from the local magnetic field line. Data from the Mag-03MS70 is combined with data from horizon sensors, or solar/lunar sensors as well as star trackers and inertial attitude sensors, to give absolute payload attitude information. This information is fed into the control systems, which can make small adjustments to the attitude, if required. To ensure that the readings from the Mag-03MS70 are accurate, the magnetic cleanliness of the other instruments¹ and the position of the Mag-03 within the payload are carefully considered.

Reference

NASA Sounding Rocket Program Handbook, Sounding Rockets Program Office, Suborbital & Special Orbital Projects Directorate, 810-HB-SRP.

¹ See e.g. ['Low cost magnetic signature measurement system'](#).

