RAL

DESIGN & DISCOVERY

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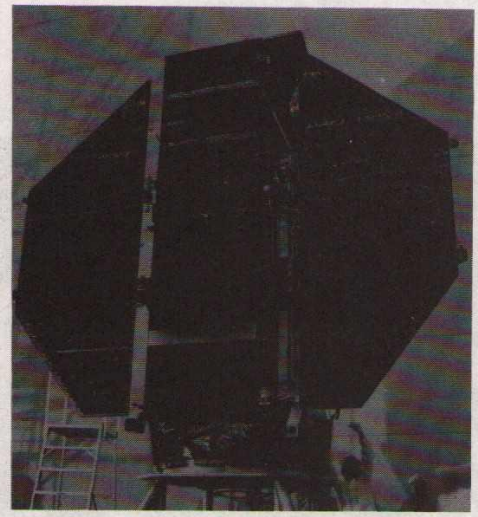
RUTHERFORD APPLETON LABORATORY

SCIENCE AND ENGINEERING RESEARCH COUNCIL

ROSAT

Introduction

On 1 June 1990, the West German X-ray satellite, ROSAT (Röntgensatellit), was launched from Cape Canaveral by a Delta rocket. On board is the main X-ray telescope (XRT), an extreme ultraviolet (XUV) Wide Field Camera (WFC) and a High Resolution Imager (HRI), an X-ray detector. The main object of the mission is to perform the first all-sky survey of X-ray sources, extending into the XUV region of the electromagnetic spectrum.



The nominal duration of the ROSAT mission is 1.5 years. The first 6 months will be dedicated to the survey phase. The remainder of the mission will be used for looking at specific X-ray sources.

Involvement

Three countries are involved in ROSAT. West Germany is supplying the XRT, the largest imaging X-ray telescope ever built, the scientific management of the project and the German Space Operations Centre (GSOC), at Oberpfaffenhofen. The United Kingdom, through a consortium of British Institutes, led by Leicester University and including the Rutherford Appleton Laboratory (RAL), is supplying the WFC, and the United States of America, through NASA, is contributing the HRI and the launch vehicle.

RAL is also responsible for the ROSAT programme management within the UK, liaison with the German and US project offices and the co-ordination of the UK part of the data processing and operations software.

Scientific Objectives

ROSAT is a scientific satellite designed to investigate X-ray emissions from celestial objects, from normal stars, quasars, and galaxies to black holes.

The main objectives of the mission are to perform all-sky surveys with the XRT (to study wavelengths between 0.6 and 8 nm) and the WFC (for wavelengths between 7 and 70 nm). This combination of instruments should increase the number of detected X-ray sources ten-fold, leading to exciting discoveries and advancing the understanding of these phenomena. This mission is the first to make a survey of XUV sources.

After completion of the survey, ROSAT will be used, as a space observatory, to make detailed observations of specific sources. The sensitivity during this "pointed" phase will be at least two times greater than that of previous missions. Locations of sources will be extremely accurate.

Operations

ROSAT will orbit the earth approximately 15 times a day, at a height of 580 km, and at an inclination of 53 degrees. During each day, the spacecraft will be in contact with the Ground Station, at Weilheim, for part of 5 orbits, a total of about 40 minutes. During this time, data stored onboard the spacecraft will be transmitted to the Ground Station and around 2000 commands will be sent to the spacecraft for the following 24 hours' operations.

By scanning through 360 degrees on the celestial sphere each orbit, and precessing in the orbit by 1 degree per day, so that the solar array can continually face the Sun, the sky survey will be completed in 6 months.

During both the survey and pointed phases, all control of ROSAT will be through GSOC. The telecommunications link is via an S-band antenna to the Ground Station. Data processing and display, instrument performance analysis, orbit attitude determination and control will all take place at GSOC. The scientific data received will be sent to the Science Data Centre at the Max Planck Institut für Extraterrestrische Physik (MPE) in Garching for analysis, from where it is sent to the Science Data Centres in the participating countries.

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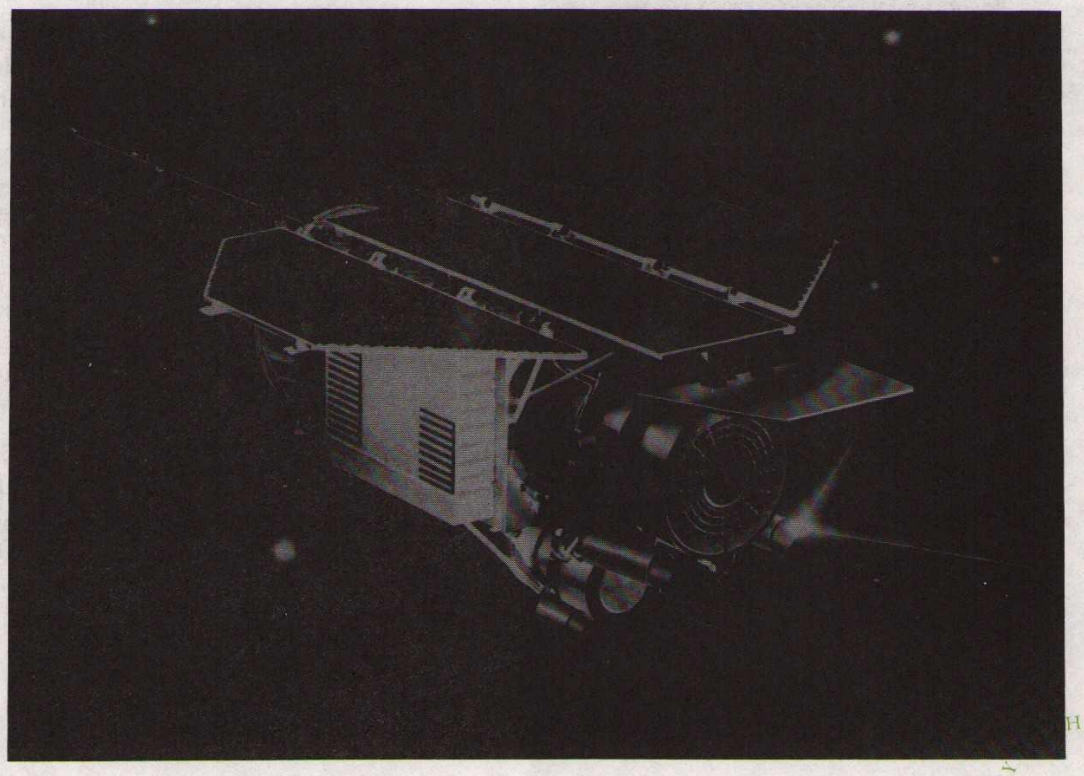

The ROSAT solar panels undergoing tests.