

# RAL

## DESIGN & DISCOVERY

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#### RUTHERFORD APPLETON LABORATORY

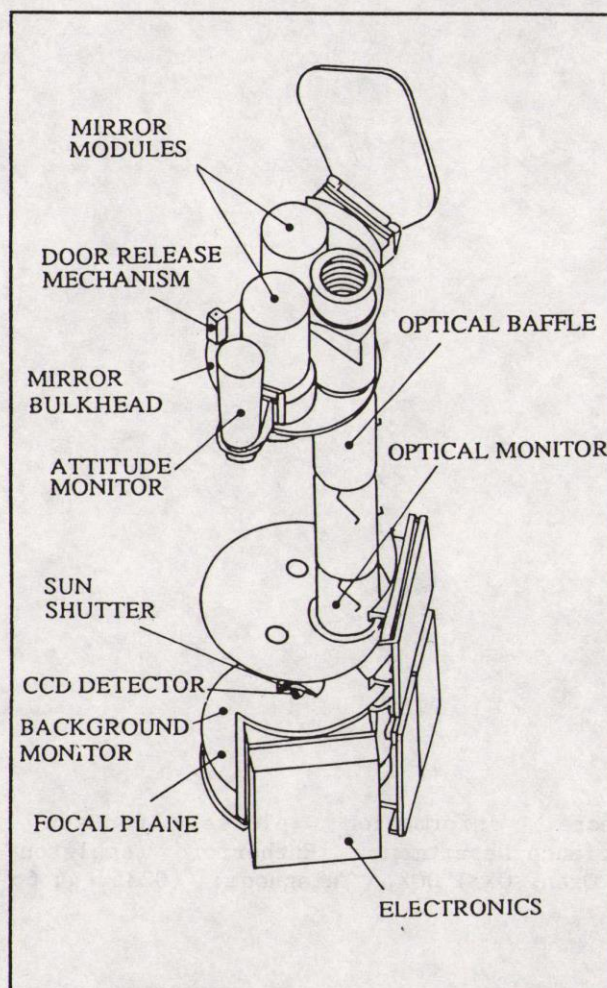
SCIENCE AND ENGINEERING RESEARCH COUNCIL

#### Spectrum-X

The Soviet Union is planning to launch a large set of telescopes to study high-energy phenomena in the Universe. At present the launch is set for 1993 and the mission, known as Spectrum-X, will include a major UK contribution in the shape of an X-ray Telescope called JET-X.

The JET-X instrument will study stars and galaxies which are hotter than normal, above about one million degrees. This behaviour generally indicates that some extremely high energy processes are at work in the object to be studied, and mark it out as unusual. Frequently the cause of the high temperatures is a black hole or neutron star, or perhaps a star called a white dwarf. These are all objects which have undergone massive collapse after their life as ordinary stars and now possess huge gravitational and possibly huge magnetic fields. In the centre of some galaxies black holes can grow to contain a million times more mass than our Sun.

A Consortium of the UK, Italy, the USSR, Germany and the European Space Technology Centre are jointly building the JET-X instrument. The drawing shows the component parts of JET-X. At the front end are two mirror modules which focus X-rays in the energy range 0.1 - 10 keV onto two CCD detectors mounted on a bulkhead at the lower end. The CCD detectors can provide both images and energy spectra of the astronomical sources simultaneously. Also contained in the instrument is an optical monitor which will allow optical images to be taken of the same objects studied with the X-ray telescopes. An attitude monitor provides accurate information on the pointing position of the telescopes.



The JET-X Subsystems.



During a four day orbit the JET-X instrument may point at ten to twenty different sources and the data collected will be stored in the electronic memory in the instrument, to be read out over the satellite telemetry link to a Soviet ground-station once each day. A computer line will link the ground-station to the institute in Moscow where the UK part of the data will be separated for transmission to RAL. The data will be despatched to the British scientist who proposed the observation.

Spectrum-X is the first major UK-USSR venture in space and involves the Universities of Birmingham, Leicester and University College London (the Mullard Space Science Laboratory). The UK is providing the overall design of JET-X as well as the electronics, mass memory, attitude monitor, CCD detectors and the thermal design and testing. An unusual feature of the project has been the need to obtain an export licence to send this equipment to the Soviet Union. The project team in the UK has already delivered the first model to Moscow and the next one will follow in November 1990. The flight model will be delivered in 1992 for a launch in 1993.

For more information please contact Dr A M Cruise,  
Space Science Department, Rutherford Appleton Laboratory, Chilton,  
Didcot, Oxon, OX11 0QX. Telephone: (0235) 44 6675

