RAL

DESIGN & DISCOVERY

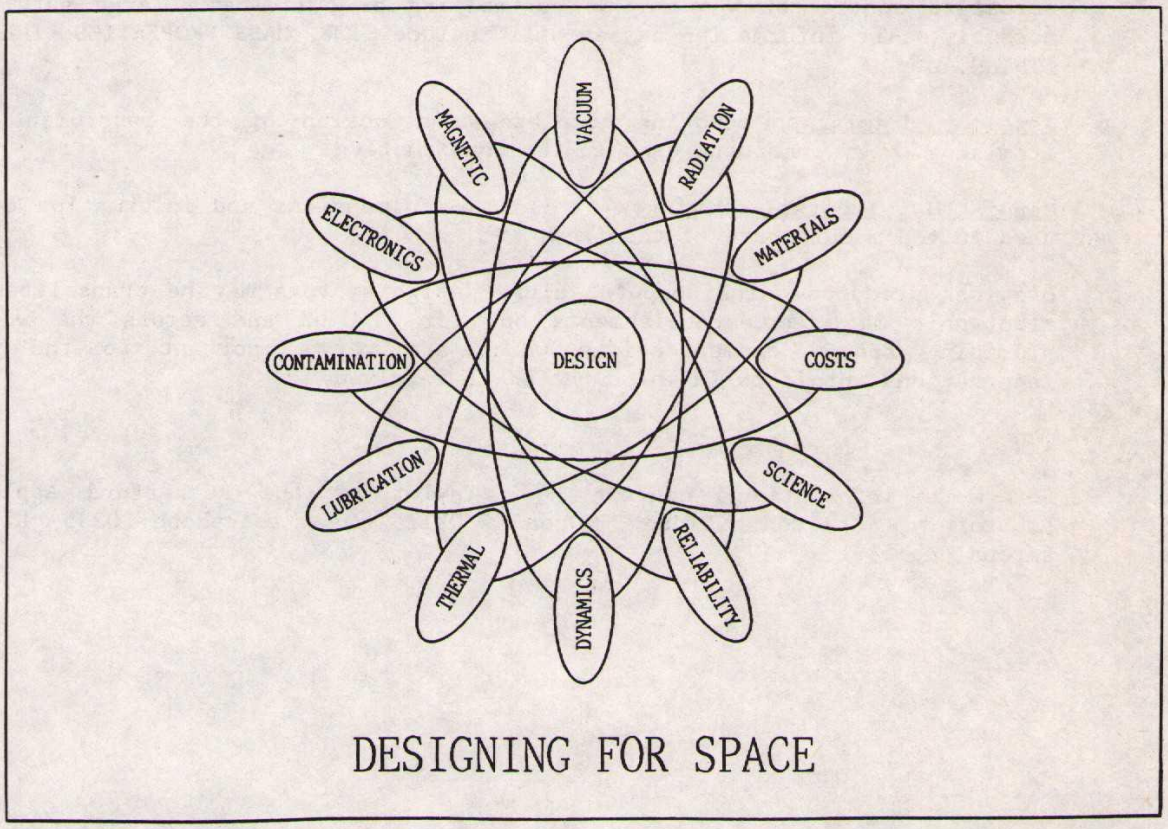
Open Days July 1990

RUTHERFORD APPLETON LABORATORY

SCIENCE AND ENGINEERING RESEARCH COUNCIL

MECHANICAL DESIGN

In the early stages of a project, teams of engineers, scientists and designers at RAL work together to produce ideas, schedules, layouts and proposals. Engineering solutions to the design problems are then developed in collaboration with other institutions or universities. These designs are formalised and drawings are produced defining the instrument.



DESIGNING FOR SPACE

The mechanical design of spacecraft instruments divides into two categories, structural components and mechanisms. Structural design constraints include mass, cost, dynamically induced loads, thermal stability and control, cost of manufacture etc. Mechanism designs are subject to the same constraints as those imposed on structures but with additional obstacles such as lubrication. A set of typical conditions to be encountered in the design of a mechanism could include:-

Mass Limit - 700 grams
Rotating Bearing Life - better than 6 x 10^8 revolutions
Operating temperature - range -30 to +20°c
Vibration test levels - ± 10g peak-peak sinusoidal
Lubrication system - Must not produce any debris or contamination.

Computer Aided Design

All aspects of mechanical design are undertaken in the SSD design office using traditional and computer aided drafting techniques (CAD). The drawings produced are basically of three types:-

(a) Interface drawings;
(b) assembly drawings;
(c) manufacturing detail drawings.

Interface drawings - are used to provide information to interested parties, i.e., European Space Agency, NASA and British Aerospace, or any major aerospace contractor who may be controlling or building a large satellite assembly. The information passed will include SIZE, MASS PROPERTIES, THERMAL FINISH, etc.

Assembly drawings - showing complete construction of the instrument and itemising every component used in the construction.

Manufacturing detail drawings - to provide dimensions and information to be used in the manufacture of the item.

Drawings produced using computer aided design systems may be transmitted by electronic mail to establishments both in the UK and across the world, providing speedy communications which are very important to the many international projects in which the UK is involved.

For more information, contact H S Taylor at the Rutherford Appleton Laboratory, Chilton, Didcot, Oxon OX11 0QX, telephone 0235 821900 extension: 5861.