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Ministry of Defence
Careers for Science
Graduates ' 1974

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EXPLOSIVES RESEARCH AND DEVELOPMENT ESTABLISHMENT

Waltham Abbey, Essex

STAFF About 900

ERDE was formed in 1945 to carry out, on behalf of the Services, research and development concerned principally with ingredients and compositions for all types of explosives and propellants; the work and staff had a strong bias towards chemistry although physics and engineering were also represented. The interests of the Establishment have now widened considerably to include many aspects of materials technology in the fields of rubbers, plastics and composite engineering materials, but the bias towards chemistry remains. A more recent development has been towards rendering scientific and technical advice and assistance to industrial firms.

The work of ERDE is organised in the following groupings:
Propellants 1 & 2.
Formulation of new solid propellants and the study of ballistic and mechanical properties. Combustion kinetics. Rheology of heavily loaded, two-phase systems and the mixing of stiff pastes. Adhesives and adhesive strength properties.

Explosives

The development of explosive compositions and research on explosion and detonation.

Non-metallic Materials

New organic polymers; synthesis, characterisation and stability. Processing and mechanical properties of composite materials.

Process Research

Development and research on chemical and processing plant, instrumentation and remote-control systems, the growth and mechanical properties of ceramic whiskers and heat transfer properties of fluids.

General Chemistry

Synthesis, analysis and thermochemical properties of organic and inorganic compounds. Development of new analytical methods particularly those based on physical techniques such as chromatography, spectroscopy and crystallography.

Within these main groupings a wide range of topics in both research and development is actively investigated. In addition to the equipment appropriate for modern chemical and physical-chemical research, the Establishment operates a variety of facilities for testing, evaluating and investigation by special techniques; supporting services include sections responsible for electronics and glass technology. An Elliott 903 computer is in use and access is available to large fast computers. The library has a wide coverage of appropriate journals and reference works and includes a well-equipped lecture theatre seating 120.

Apart from being linked with the Rocket Propulsion Establishment, Westcott, under the directorship of Dr L. J. Bellamy, CBE, ERDE maintains close contact with other Government Establishments and with universities, and has a special relationship with the University of East Anglia.

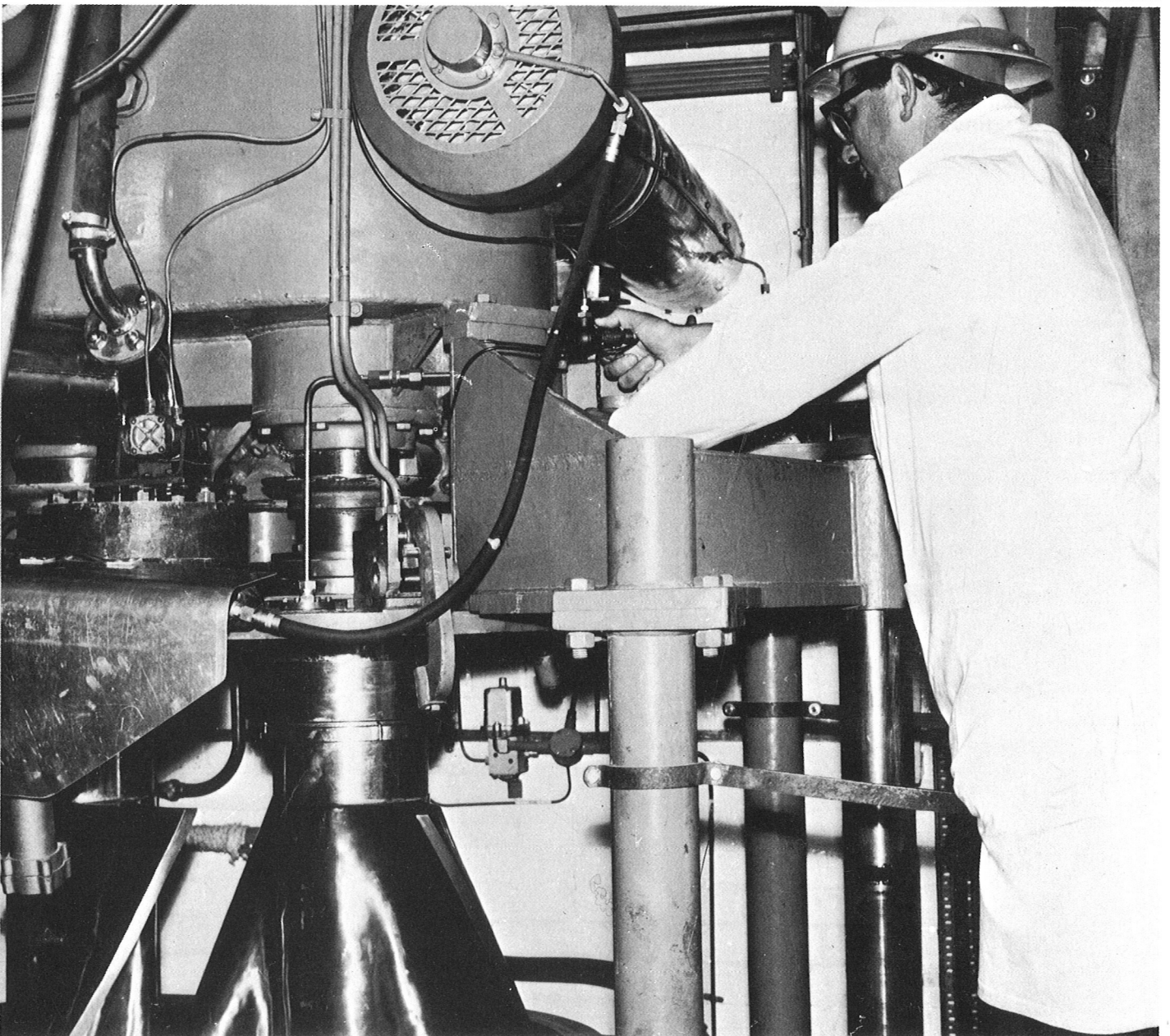
Every encouragement is given to individual scientists to publish accounts of their work in the open literature.

An adjacent modern housing estate provides living accommodation of good standard for married scientific staff joining the Establishment.

More detailed information is given in a brochure obtainable on request from the Director, Explosives Research and Development Establishment, Waltham Abbey, Essex.

Top: Gas chromatography

Bottom: Vertical mixer for rubbery-type solid propellants



ROCKET PROPULSION ESTABLISHMENT

Westcott, Buckinghamshire

STAFF About 840

Guided Missiles occupy a significant position in the United Kingdom's defensive system. Their operation depends on rocket propulsion and the prime purpose of this Establishment is to conduct research and development so that the best rockets become available to the three armed services. In addition, rockets constitute the only possible means of propulsion for launching Earth satellites and space probes. In this respect, the Establishment has already made an important contribution to Britain's Upper Atmosphere Research Programme by designing and developing 'Raven', the solid propellant rocket used in the Skylark Research Vehicle. Also the Establishment did the initial design and development of the liquid propellant rockets used so successfully for propelling the Black Knight Test Vehicle.

The meteorological sounding vehicle, Skua, uses the Chick and Bantam rockets developed by the Establishment. Skua was introduced into service in 1964 by the Meteorological Office and has been purchased by the French and Spanish Governments. A larger Meteorological sounding vehicle, Petrel, sponsored by the Science Research Council, is propelled by Lapwing, another rocket motor developed by the RPE.

Thus the Establishment occupies an important position within the Ministry of Defence collaborating closely with the Royal Aircraft Establishment, Farnborough; the Royal Radar Establishment, Malvern; and many important firms.

The Explosives Research and Development Establishment is jointly under the same director, Dr L. J. Bellamy, CBE.

As propulsive devices, rockets may take several forms but the two that are of greatest significance at present operate by converting chemical energy, stored in liquid or solid propellants, into kinetic energy. The harnessing and conversion of these propellants constitutes the 'art' of rocket propulsion and requires efforts in many branches of modern science calling upon the knowledge and ingenuity of chemists, physicists, metallurgists, mathematicians, electronic and mechanical engineers. Because of the demands for high performance, the problems which the scientists and engineers have to face are generally more severe than are met in other scientific and technological fields. For example, a liquid propellant rocket may have some of its components operating at temperatures as low as 20°K and other components, only a few inches away, operating at over 3000°K. Working pressures may be above 1000 lb per sq inch yet the ambient pressure may be virtually zero. Thus many of the problems are unique and, because rocket science is still young, whole fields of research are waiting to be explored.

Further details are obtainable from the Director, Rocket Propulsion Establishment, Westcott, Bucks.

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