

WASC 2074

WAI 544

Explosives Research and  
Development Establishment

from

' Careers for Science  
Graduates ' 1976

# Explosives Research and Development Establishment

Waltham Abbey, Essex

1976

NEG No. W 304

WASC 2074 WA/5

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. 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

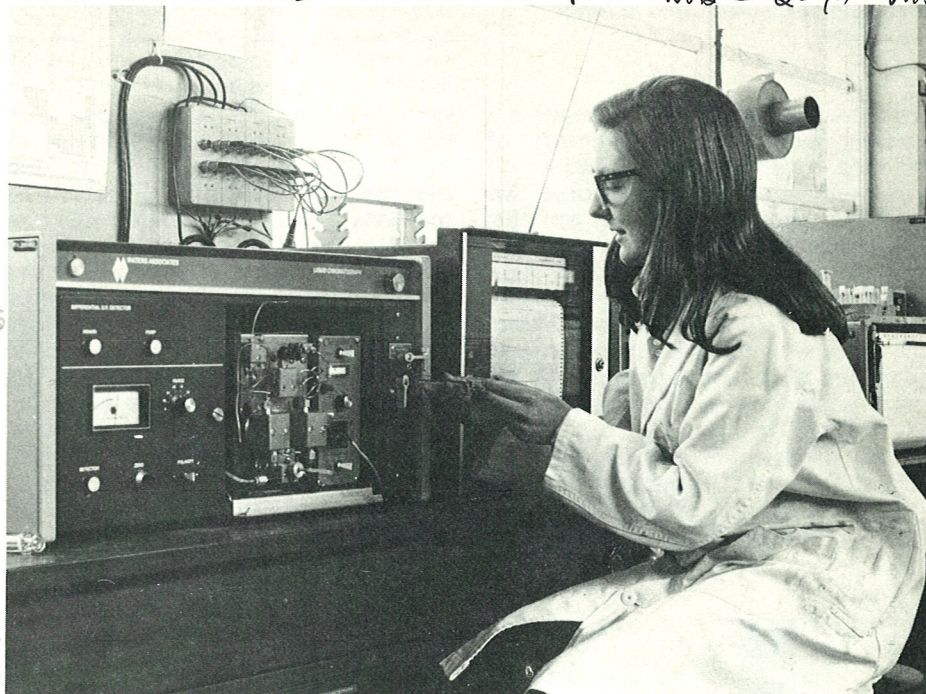
New organic polymers; synthesis, characterisation and stability. Processing and mechanical properties of composite materials.

## 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



Analysis of the degradation products of explosives

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 using equipment appropriate for modern chemical and physical-chemical research. 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, ERDE maintains close contact with other government establishments and with universities, and has a

special relationship with the University of East Anglia.

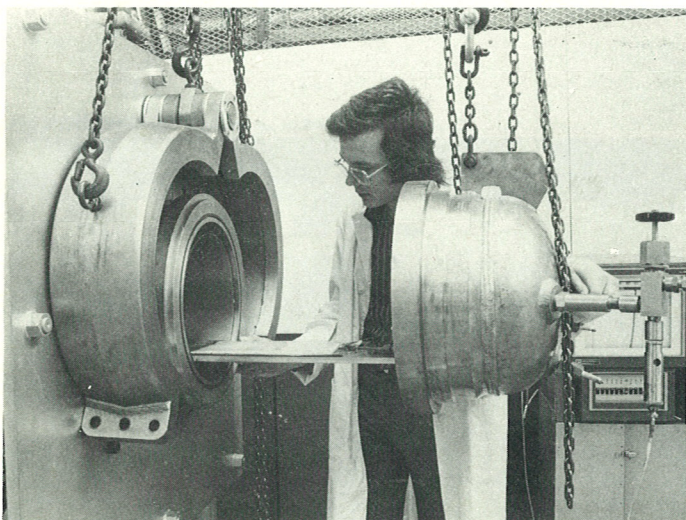
Every encouragement is given to individual scientists to publish accounts of their work in the open literature.

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.

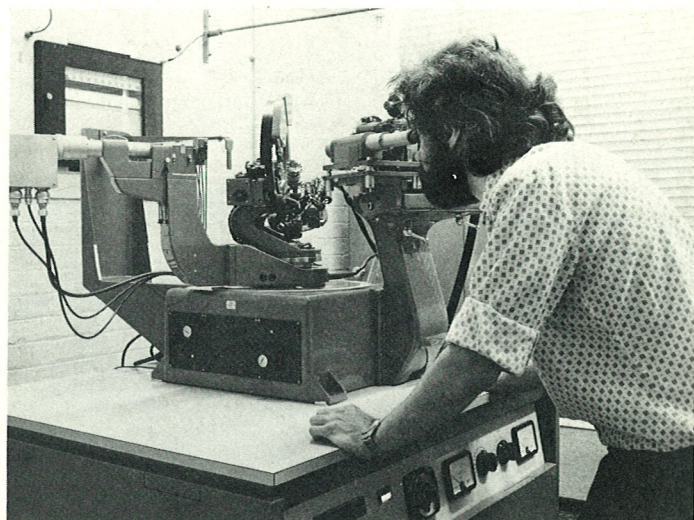
From MOD  
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High temperature and pressure moulding of composite components



NEG No W 302

Studies of the crystal structures of explosives



NEG No. W 304  
with Bert

# Defence Operational Analysis Establishment

West Byfleet, Surrey, and at other locations

The Establishment provides operational analysis services to the Ministry of Defence, and undertakes studies which are essentially concerned with objective choice between alternative options. The Establishment continues to help in solving problems of resource allocation within the defence budget, particularly in the equipment field, and, in addition, has become increasingly involved with questions of defence strategy and the major policy decisions which face the UK and NATO.

Most of the scientific staff are employed at the Defence Operational Analysis Establishment at West Byfleet in Surrey, a unit of some 130 professional

and military staff whose authority and expertise are well recognised. DOAE is one of the most important such units in NATO and has developed close links with those in other nations. Equal in importance are the smaller groups in the Establishment attached to the departments of the Chief Scientists of the Navy, Army and Royal Air Force in London, in the Royal Air Force commands, and overseas. These groups attached to the departments of the Chief Scientists deal mainly with the assessment of operational needs, future equipment and the development of appropriate tactics in relation to specific arms of the Services, whilst the staffs in research branches of the RAF commands are concerned mainly with the efficiency of the existing RAF systems.

The work at DOAE is basically directed at broader multi-Service problems such as the interaction of land, air and sea forces, communications command and control, cost effectiveness of new weapons systems and basic research into such topics as decision theory and conflict. Close co-operation is involved with the Armed Services and Service officers are integral members of the study teams. Among the techniques used in the analysis of systems and the assessment of their cost effectiveness are systems modelling, computer simulation and field trials. Facilities available on site include a large Computer Services Division equipped with ICL 1907 E equipment, a library, workshops, photographic and reprographic sections.



*Above: Scientific debriefing following a field trial*

*Left: ICL 1907E computer in use*

*Lower left: DOAE mobile field trials centre on location*

*Below: Studies of Harrier dispersed site operation*

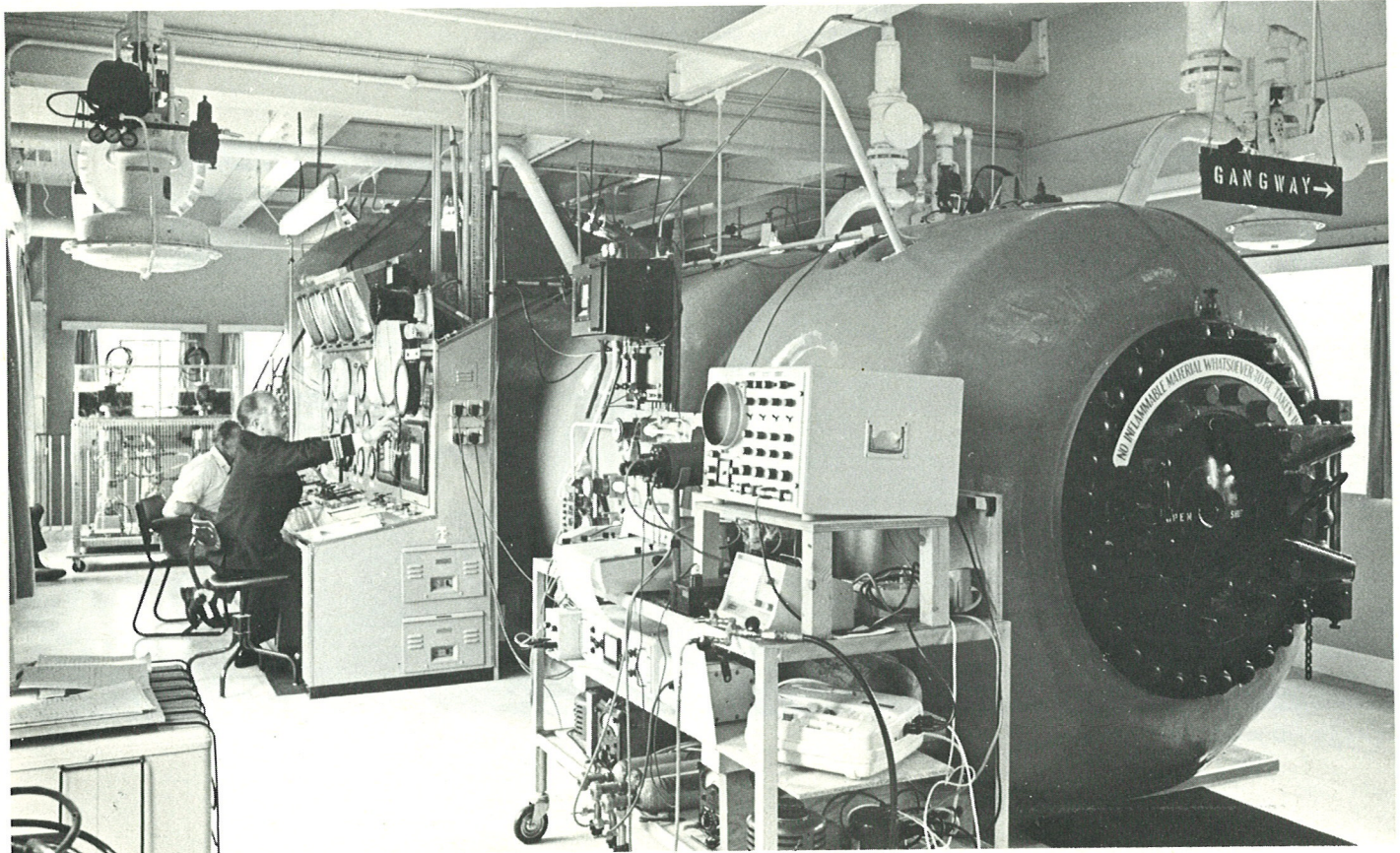
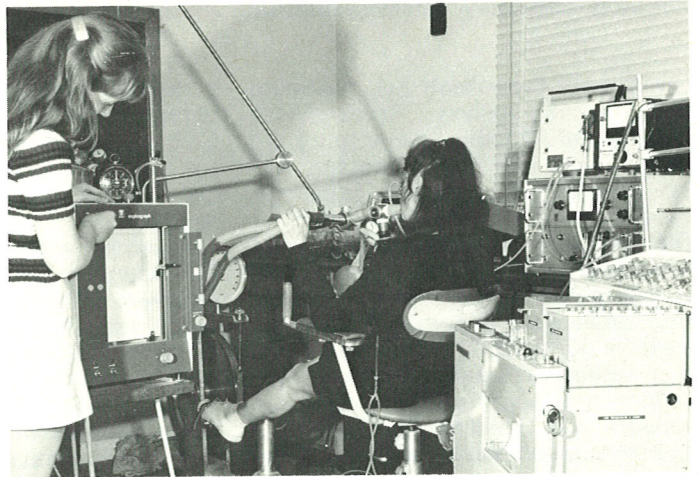


# Royal Naval Physiological Laboratory

Alverstoke, Hampshire

The Royal Naval Physiological Laboratory is a centre for research into underwater physiology, diving and submarine escape. This involves Laboratory-based work and sea trials. The Laboratory's present areas of investigation are principally concerned with air and oxy-helium decompression schedules, decompression sickness, inert gas narcosis, respiratory mechanics and cardiovascular physiology. Other projects concern man/machine interface problems in a variety of circumstances, such as man-operated

*Experiment investigating respiratory mechanics*



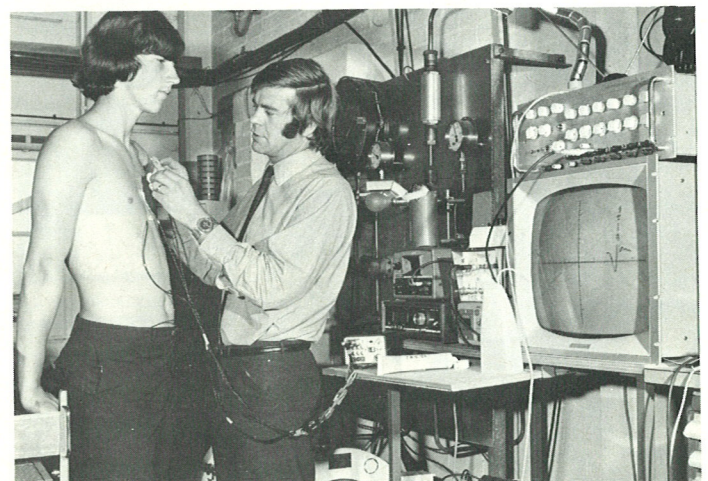
*Chamber complex at the deep trials unit*

underwater manipulator systems and sonar display.

Close liaison is maintained with the Construction Industry Research and Information Association and the Medical Research Council. Members of the Laboratory take part in international symposia and conferences and make significant contributions.

The main disciplines employed are medicine, physiology, pharmacology, bio-engineering and ergonomics.

*Electrodes being attached to subject before recording his electrocardiogram*



# Rocket Propulsion Establishment

Westcott, Aylesbury, Buckinghamshire

The Rocket Propulsion Establishment and the Explosives Research & Development Establishment (q.v.) are jointly under the same Director, and the programmes of the two Establishments are closely interlinked.

The Rocket Propulsion Establishment is situated in very pleasant agricultural country about 10 miles from Aylesbury and carries out research and development for the three Service departments in all aspects of rocket technology.

Liquid and solid rocket propulsion systems are investigated in modern well-equipped firing facilities. There are also laboratories for the study of the properties of rocket exhaust jets, as well as for the investigation of novel

materials for use as rocket motor cases or in rocket nozzles. A computer (ICL 1904S) is used for predictions of performance and for detailed analysis of firing data.

Non-destructive inspection techniques are an important part of the Establishment's work; there are comprehensive facilities for X-ray, ultrasonic and holographic work.

The scientific staff are supported by a very well equipped engineering workshop and by a design staff and instrumentation sections.

Westcott's research and development is conducted in close association with other Ministry of Defence establishments and in collaboration with all the major commercial organisations in the aerospace industry.

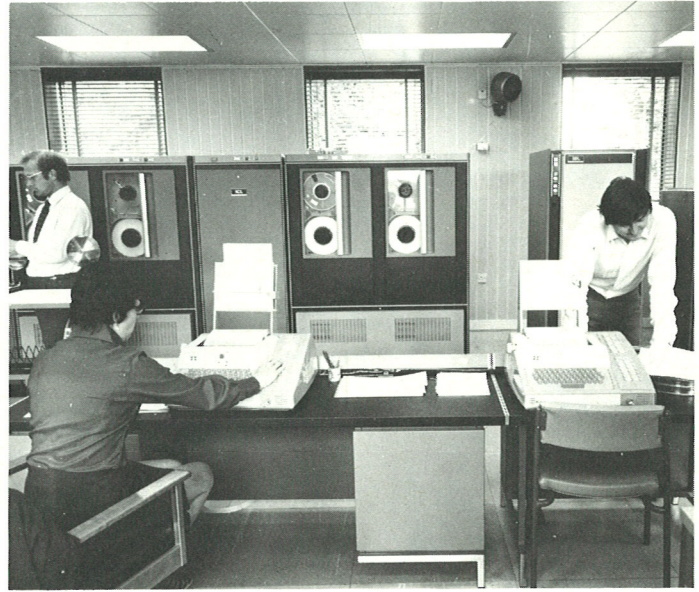
Because of the demands for increased

performance and reliability, the problems facing scientists and engineers are challenging and offer considerable scope for new ideas and ingenuity. The basic disciplines are physical chemistry, chemical engineering, physics, mathematics, materials science, computer science and mechanical engineering.

Further details may be obtained on application to the Director, Rocket Propulsion Establishment, Westcott, Aylesbury, Bucks.

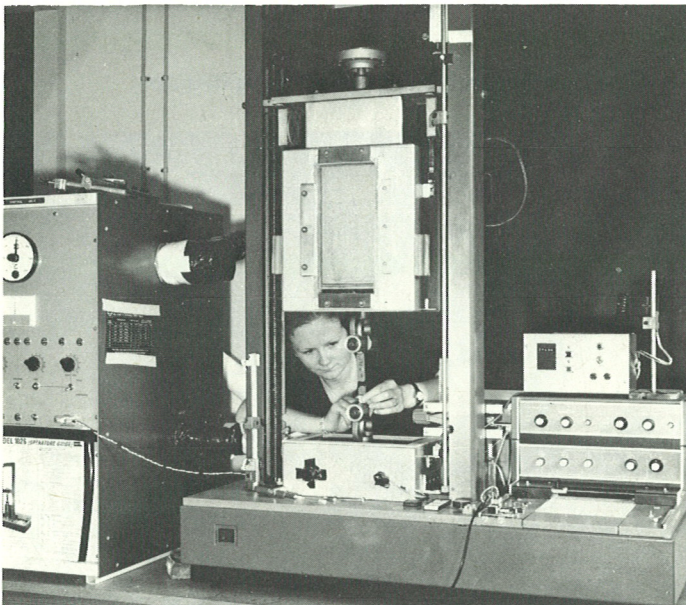


*Spectrum analysis of a rocket motor firing*



*At work on the new computer*

*Tensile testing of solid rocket propellant samples*



*Static firing of a liquid propellant rocket engine*

