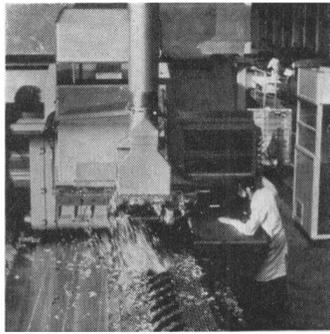


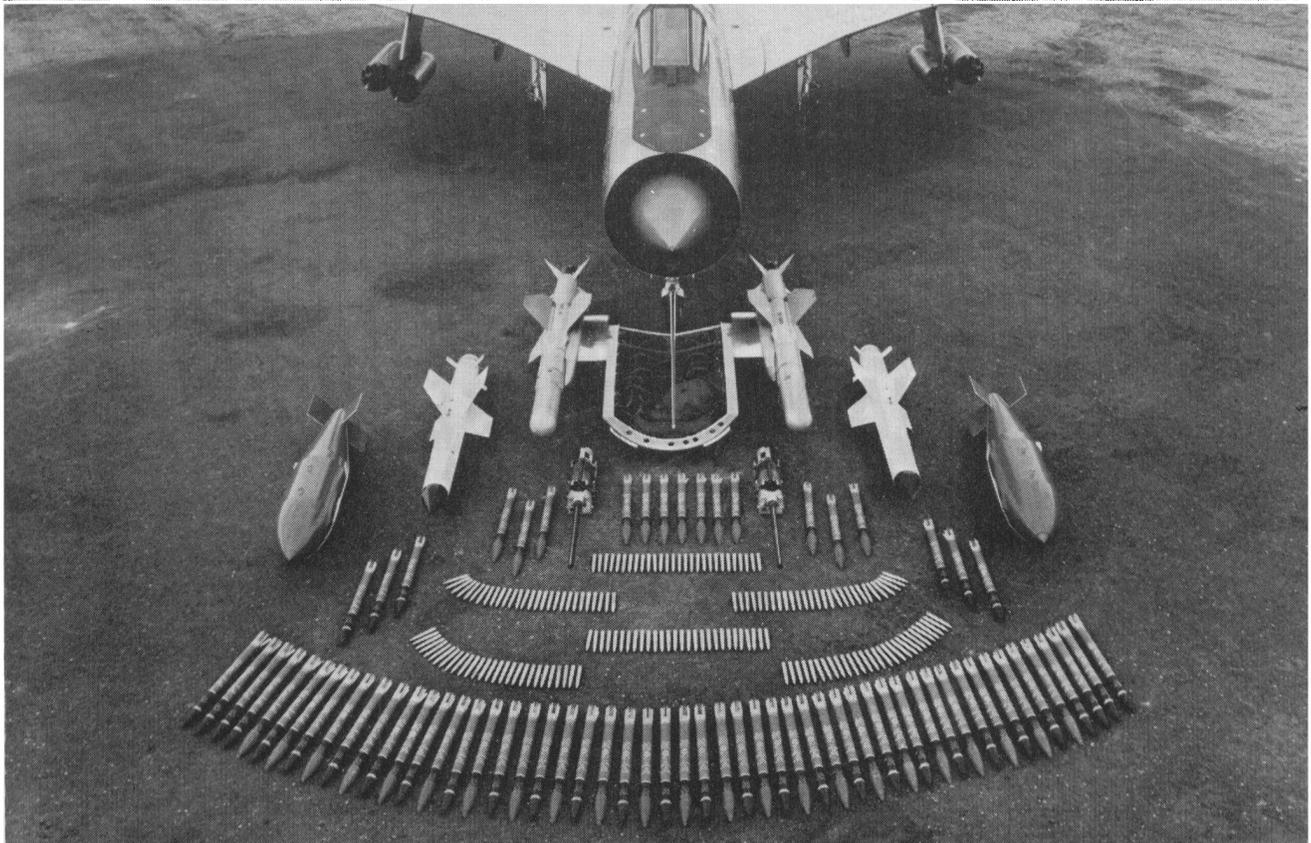
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on taking
weight off...*



BAC's method of machining skin panels from solid metal slabs involves up to 80 per cent of the metal being cut away

...sometimes on putting it on

The ground attack version of BAC's Mach 2 Lightning fighter developed for export can deliver a formidable weight and variety of weapon loads with great accuracy



The aircraft designer strives to achieve minimum structure weight – and maximum load. British Aircraft Corporation pioneered at Weybridge skin-milling techniques which minimise the structure weight needed to achieve a given strength and life. Its Preston Division has developed the Lightning to carry a formidable weight and variety of ground attack weapons. Both developments are characteristic of BAC's technical mastery over the whole of aerospace engineering – subsonic and supersonic airliners, military aircraft, missile systems, space satellites, precision instruments and equipment. Behind these technological advances lies a unique blend of skill, experience and resource – one of the many reasons why BAC is the only European aerospace company accepted worldwide as a pace-setter for the state of the art.



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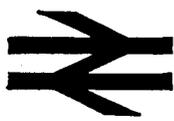
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ADVANCED PASSENGER TRAIN PROJECT

international interest quickens pace of progress

Work on the high speed Advanced Passenger Train at British Railways Board Research Department at Derby is building up quickly. This challenging project has attracted international interest, particularly in the USA. New appointments are

available for engineers interested in Research innovation and invention applied to the solution of the basic engineering problems of high speed ground transportation.

STRUCTURE ENGINEERS

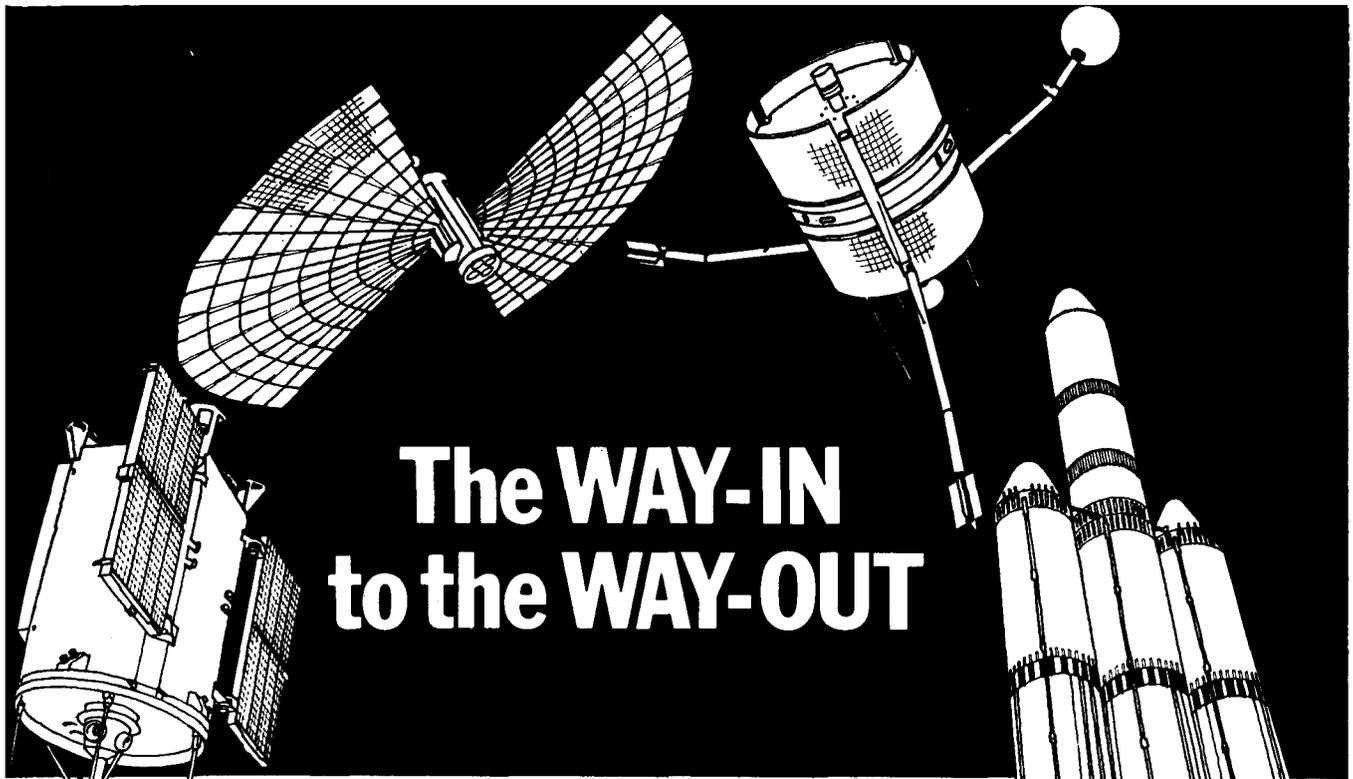
Mechanical, civil or aeronautical engineers with experience of structural design, stressing or the development of manufacturing techniques are required to lead and control design, research and development programmes on new types of vehicle body structures for the Advanced Passenger Train. Applicants should have degrees in engineering or mathematics or have equivalent engineering qualifications.

DESIGN ENGINEERS

Mechanical Engineers are needed with interests and experience of power plant installation, transmission, systems or mechanisms in the aircraft, automotive or other fields. Applicants should be chartered engineers or possess qualifications leading to this status.

These are appointments with salary ranges varying from £1700 to £2010 and £2635 to £3175. The Board operates a contributory pension scheme and has arrangements with many employers for the preservation of pensions. There are also free and reduced rate rail travel facilities.

Applications stating age, education, qualifications, experience and present salary should be sent to the Headquarters Staff Manager (quoting reference RB/RES/VE) British Railways Board, 222 Marylebone Road, London, N.W.1.



The WAY-IN to the WAY-OUT

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That's a pretty exciting future—and there is a pretty exciting future for the scientists and technologists we need.

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For work on design analysis of control systems, overall control systems design integration, mission analysis and development of techniques for the analysis of engineering systems.

The work demands the highest level of technical capability in the most challenging field of systems analysis.

Senior Mechanical Engineers & Designers

For challenging work on new spacecraft and launch vehicle projects. Applicants must be capable of generating original concepts and following these through development to manufacture. Specialist areas of activity include thermal design of new projects and stress analysis of static and dynamic loadings.

Senior Reliability Engineers

To work on predictions of systems and circuit reliability and failure mode analysis.

Design Engineers

For electronics packaging. Projects will need to be followed through to prototype manufacture.

Circuit Design Engineers

With experience in design of digital and analogue circuits.

Systems Engineers

Capable of originating and controlling overall design and development activities to meet customers' requirements in the fields of:—

- (a) microwave and R/F communications
- (b) attitude control
- (c) power systems
- (d) digital data transmission and recording
- (e) executive control and checkout systems logic
- (f) instrumentation.

Designers & Draughtsmen

Experienced in the project areas listed above. This sphere of design work provides a particular challenge in an exciting technological field. Applicants should have had experience in electrical, mechanical, electro-mechanical or aircraft structural engineering and be qualified to at least ONC standard.

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The Personnel Manager (Ref: 478),
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GUILD OF LOUGHBOROUGH UNIVERSITY OF TECHNOLOGY

The Council of the University and the former Loughborough College Past Students' Association have jointly approved the formation of the Guild of Loughborough University of Technology.

Existing members of the Past Students' Association are transferred to full membership of the Guild which is also available to holders of first or higher degrees of the University, or DLC granted by the former Loughborough College of Technology.

Associate membership is available to holders of other qualifications of the University and past students who have studied at the University for a minimum of one academic year.

Those interested in joining the Guild are invited to write for details to the Secretary of the Guild, c/o The Registry, University of Technology, Loughborough, Leicestershire.

Members of the PSA who have lost touch with the Association are also requested to notify their current address.

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Increases in material and wages unfortunately necessitate increased binding charges for 1969.

1969 Volume (including packing and postage in the United Kingdom) ... £3 2s. 6d.

Previous Volumes (including packing and postage in the United Kingdom) ... £3 7s. 6d.

Journals, with a note of the name and address of the sender, should be sent direct to The Lewes Press, Friars Walk, Lewes, Sussex, and the remittance to the Secretary at the Offices of the Society.

Members are asked to be certain that the address to which they want their Journals sent is the same on their letters to The Lewes Press and to the Society.

CLEAVER, A. V.

The Case for Space

Current achievements in space are reviewed, and possible future ones are outlined on a basis of technical feasibility. The expenditure of mankind on space activities so far is discussed, together with the current level in various countries. It is concluded that in future these will need to be even higher, if the full possibilities are to be realised, but that this is by no means beyond the resources of the developing world. It is considered that the rate of future progress will be largely determined by social and economic factors, since technical feasibility alone will not guarantee the prosecution of major expensive programmes. These have to be accepted and approved by governments and society at large, as being in some sense worthwhile. As regards motivation, it is suggested that this should be considered under two counts: first, the realisation of the more immediate practical applications in close-orbit space, and secondly the longer-term question of the exploration of the solar system and beyond.

HART, C.

Mediaeval Kites and Windsocks

It has commonly been held (a) that plane-surface kites were unknown in Europe until the late 16th and early 17th centuries, and (b) that in the 14th, 15th, and 16th centuries a form of elongated hot-air balloon, or "semi-kite", with or without wings, was independently evolved from the earlier and well known draco standard. This paper attempts to show, first, that the three-dimensional windsock structure attributed to the "semi-kites" depicted in a number of Mediaeval MSS was probably illusory, and that the miniaturists were probably misrepresenting plane-surface kites having the general shape of a dragon; second, that even if windsock structures were sometimes intended, fire can never have been used to produce sustentation; third, that there occurred some conflation of the misunderstood plane-surface kites and an independent stream of rocket-birds and rocket-dragons to be seen in other MSS of the period. The paper, which reproduces all known illustrations of the so-called "semi-kites", concludes with some observations on the attempts made in the 17th century to translate these apparently three-dimensional objects into physical reality.

DEPLANTE, H.

The Dassault Mirage G

The Dassault Mirage G is an experimental variable geometry single-reactor supersonic two-seater fighter. Its engine is a Pratt & Whitney—SNECMA TF 306 P1. With wings folded back to 70° sweepback its speed is Mach 2.5; with wings forward to 20° sweepback it has remarkable landing and take-off performance. The wing pivot, of great simplicity of concept, lies slightly outside the fuselage; the rubbing surfaces are a cloth woven of mixed glass and PTFE fibres. The material of the pivot is a French development of American Maraging steel. The wing is retracted by a single 70T hydraulic jack, activated by two hydraulic motors; in flight under a load 3 g the operation takes 15 seconds.

High lift flaps and slats on trailing and leading edges give a maximum lift coefficient of 2.8. Wing loading exceeds 600 kg/m² at take off; landing approach speed is 125 kt and touch down is at 108 kt. The aircraft is thus suitable for land or carrier use. A novel undercarriage leaves the lower surface of the plane completely free for bombs or petrol tanks. The prototype flew on 18th October 1967, less than two years after the beginning of work in the drawing office.

BURROUGHS, H.

A Short History of Glosters

The author traces the history of the Gloster Aircraft Company from its beginnings in 1917 as an offspring of the Aircraft Manufacturing Company, up to its demise in 1958, when the Hawker Siddeley Group of whom Glosters were a member, was faced with the necessity of closing down some of its works.

The Aeronautical Journal RAeS December 1969

SHENSTONE, B. S.

Transport Flying Boats—Life and Death

This paper describes the author's personal experiences with flying boats from about 1931, when he worked on the Supermarine six-engined flying boat. The author suggests reasons for the death of the flying boat and illustrates some of his own experiences of the practical difficulties of operation and maintenance.

The Aeronautical Journal RAeS December 1969

HOFF, N. J.

Some Recent Studies of the Buckling of Thin Shells

After a brief summary of the development of our present knowledge of the buckling process of thin shells, the results of recent investigations are discussed in some detail. In particular, information is given on analyses of the maximum stress circular cylindrical shell of infinite or finite length can carry in axial compression in the presence of an initial deviation of the shell wall from the perfect cylindrical shape, and on the number of circumferential waves into which finite cylindrical shells buckle. The maximum external pressure is calculated that can be supported by a complete spherical shell in the presence of known deviations of its wall from the perfect spherical shape. The results of recent experiments on cylindrical and complete spherical shells are also presented and it is shown that satisfactory agreement exists between theory and experiment. Finally, recommendations are made for practical calculation of the buckling stresses of circular cylindrical shells and spherical shells.

The Aeronautical Journal RAeS December 1969

OPENSHAW, P. R.

**Electric Propulsion Development
Part III. System Concepts and Missions**

Parts I and II of this series of papers have dealt with the development of ion thrusters for use in an orbit transfer manoeuvre, and of various types of micro thruster for position and attitude control. The present paper deals with the actual satellite electric propulsion system and configuration needed for expansion manoeuvres. The control problems both during the expansion phase and subsequently in the required orbit are discussed. Short analyses for two specific cases (ELDO launcher and Black Arrow) are presented in which payloads and missions are defined.

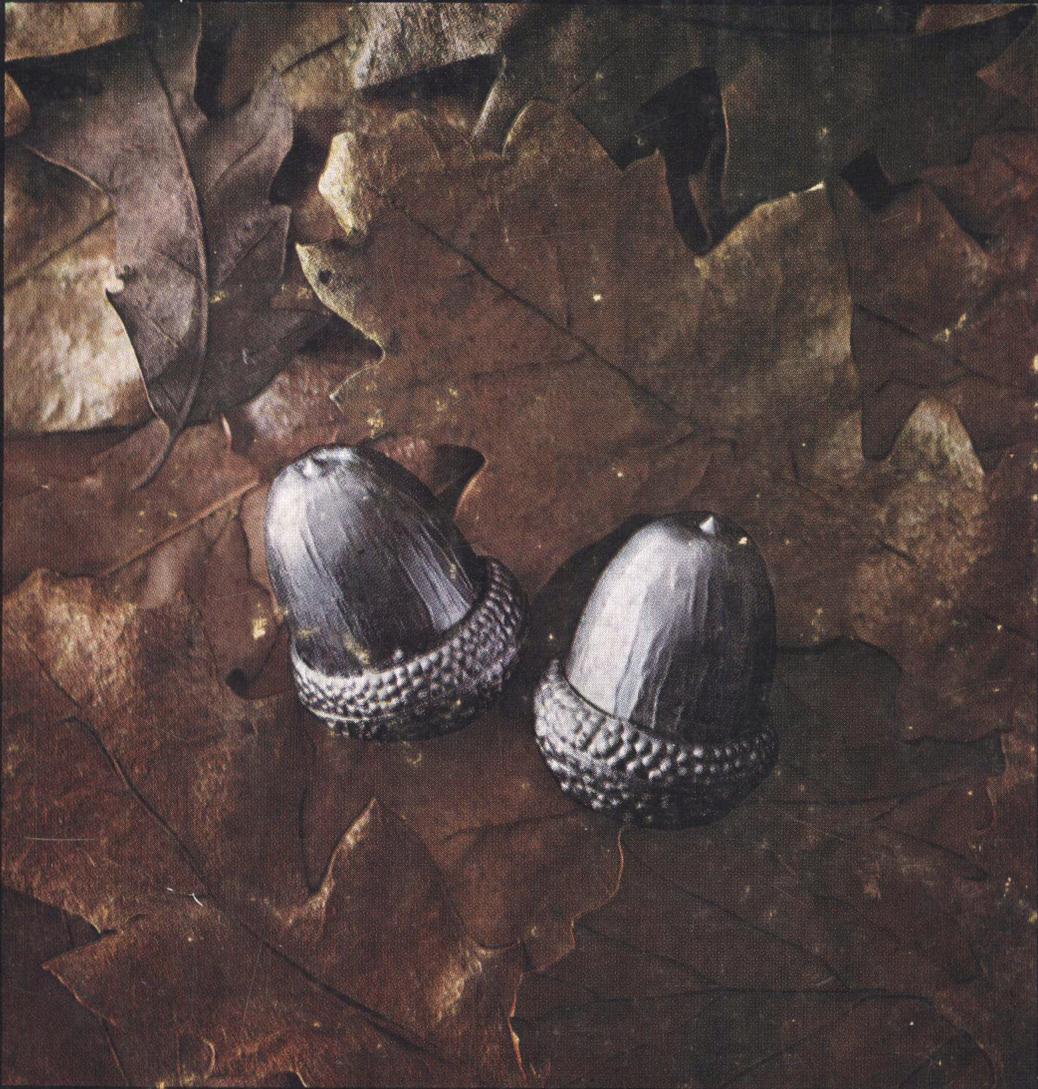
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CRANE, R. I.

A Survey of Hypersonic Near Wake Studies

A review of published work on the fluid mechanics of the near wakes behind hypersonic vehicles is presented in this paper. Emphasis is placed on laminar slender-body wakes, and the survey is chiefly concerned with theoretical treatments, though brief outlines of relevant experimental investigations are given.

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