



Crown Way Cardiff CF14 3UZ  
[www.companieshouse.gov.uk](http://www.companieshouse.gov.uk)

### NOTICE OF ILLEGIBLE DOCUMENTS

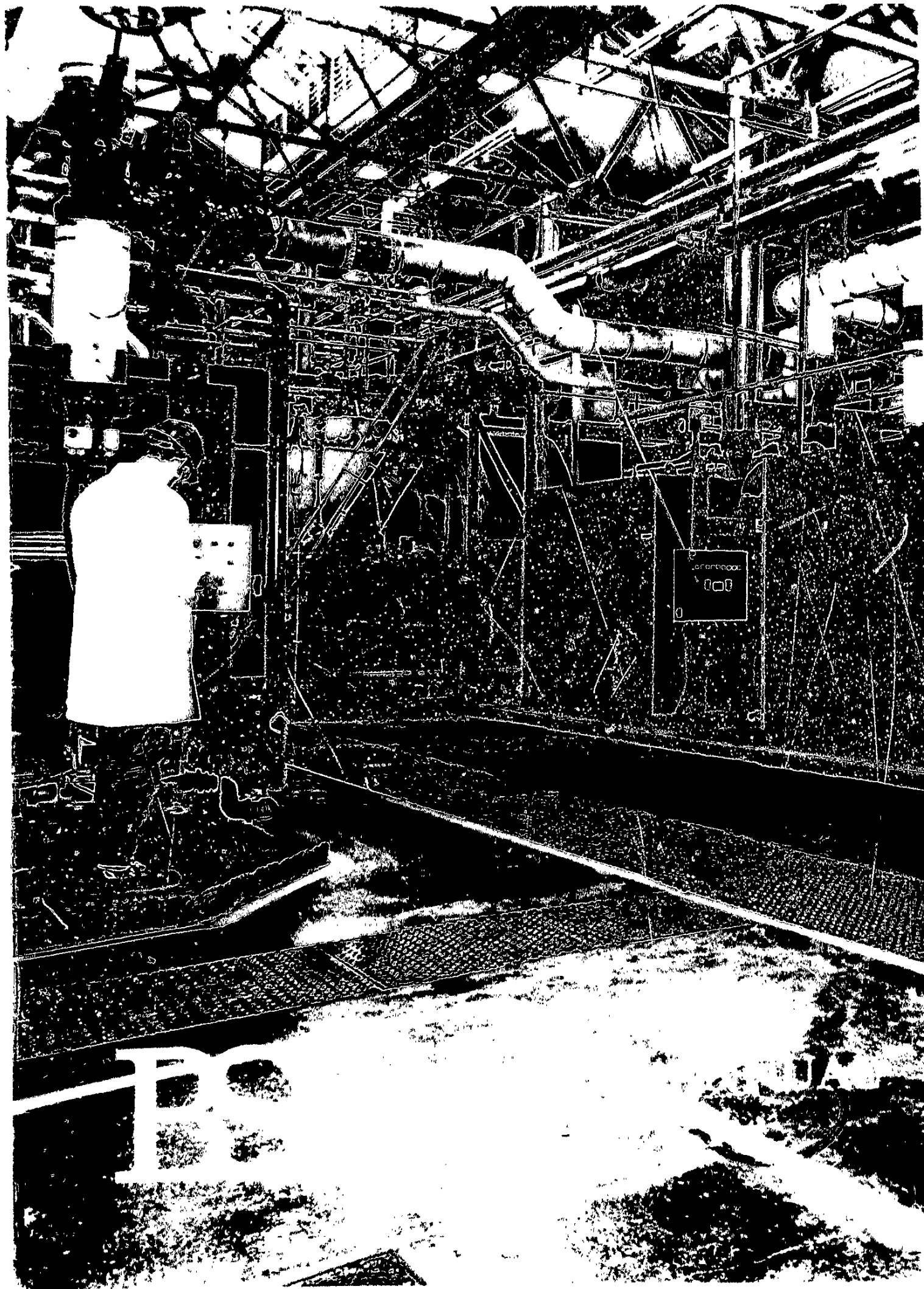
Companies House regrets that documents in this company's microfiche record have pages which are illegible.

This has been noted but unfortunately steps taken to rectify this were unsuccessful.

Companies House would like to apologise for any inconvenience this may cause.

#### COMPANY INFORMATION SUPPLIED BY COMPANIES HOUSE

Companies House is a registry of company information. We carry out basic checks to make sure that documents have been fully completed and signed, but we do not have the statutory power or capability to verify the accuracy of the information that companies send to us. We accept all information that companies deliver to us in good faith and place it on the public record. The fact that this information has been placed on the public record should not be taken to indicate that Companies House has verified or validated it in any way.





# ANNUAL REPORT AND ACCOUNTS 1985/86

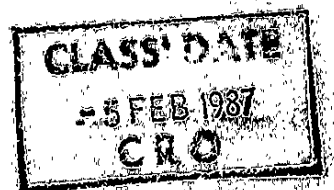
632760  
53

0-1

## Contents

	Page
Report of the Chairman and Director	2
Services to Members	4
Financial Highlights	6
The Sponsorship and Member Research Programme	7
Contract Research	12
Publications and Lectures by BSRIA Staff	16
BSRIA People	17
List of Members	18
Accounts for the year 1985/86	22
Council and Standing Committees	28

The Building Services Research and Information Association  
Laboratories and Registered Offices:  
Old Bracknell Lane West  
Bracknell  
Berkshire  
RG12 4AH  
Tel: 0344 426511  
Telex: 848288 BSRIAC G  
A company limited by guarantee  
Registered in England No 632760  
BSRIA August 1986  
ISSN: 0309 8435



Cover picture: Commercial condensing boilers at Shenley Hospital, Radlett, being monitored by Mark Atteborough

# Report of the Chairman and Director



*R. H. Rooley, Chairman of Council*



*D. P. Gregory, Director*

## BUSINESS DEVELOPMENT

The principal activities of the Association continued to be the provision of collaborative research programmes, the supply of information and expertise to the members and the conduct of research projects, equipment testing and instrument hire on a repayment basis. There was a modest growth in both the membership of the Association and of the subscription income against 1984/5 figures. During the year the level of member services has grown and contract activities provided a valuable income.

## TECHNICAL DEVELOPMENT

The Association continued to develop its capabilities by acquisition of new staff and equipment, and by improving the expertise of the existing personnel. The breadth of technical activity is demonstrated by the outlines of the various programmes described within this report. Particular areas in which development or expansion occurred were in the use of computer techniques, expert systems, quality assurance, advanced maintenance methods, modelling of air movement, energy-related instrumentation, and airflow measurements.

## FINANCE

It was recognised by Council that a reasonable surplus was both necessary and desirable and steps were taken last year to achieve this. The Association has now achieved a surplus in 1985/6 to correct the high levels of borrowing that had occurred and to permit future investment on behalf of the members. Within

this surplus it has been possible for the Association to invest in long overdue repairs to premises and equipment and to install a new Accounts computer which will save significantly on external bureau costs in future years. It should also now be possible to invest in new laboratory equipment and staff for the future growth of the Association, to meet both the needs of its members and the industry at large.

The above has in no small part been assisted by funds from the Department of the Environment that were some 40% up on 1984/5 levels and have been used to share the costs of member projects. Contract/Repayment work however continues to be the major source of the Association income (some 61%). While published reports from this type of work are restricted, staff expertise is developed and fed back to the members in many different ways including talks, lectures, papers and general enquiries.

## MEMBERSHIP

In 1985/6 the Association continued a modest increase in membership, with the subscription income growing by 5.8% against 1984/5 figures. Member subscriptions now constitute 12.7% of the total income, compared to 13.4% last year.

## ANNUAL GENERAL MEETING

At the Annual General Meeting in October 1985 Mr. R. H. Rooley (D.S.S.R.) became Chairman with Mr. R. Farminer (Dunham-Bush Ltd.) as Vice-Chairman and Mr. C. Izzard as Chairman of the Board of Assessors.

Two new Council members were elected, Messrs. C. Izzard (R. W. Gregory & Partners) representing Consulting Engineers, and G. Aylott (Electricity Council), representing Other Ordinary Members. Two casual vacancies were confirmed, D. Faithfull (Contractors) and D. R. Russell (Other Ordinary Members). Eight members were re-elected, Messrs. G. P. Manly, T. Q. Battle (Contractors), J. Campbell, D. Wood (Consulting Engineers), E. M. Davis (Building Owner/Operators), W. D. Griffiths, E. Dance (Other Ordinary Members), M. J. Bean (Manufacturers). Subsequently T. Q. Battle - ex Towco Ltd. - resigned but offered himself for re-election representing TML Ltd. and was elected by the Contractors Group. Mr. F. Stansfield - British Railways Board - retired and Mr. R. H. F. Taylor from British Railways Board was appointed by Council to fill this vacancy until the next AGM.

The Annual General Meeting was preceded by a brief symposium on a topic of general interest to the members, the "Sick Building Syndrome". Four speakers presented their views on the nature, causes and possible cures for this problem which occurs in buildings with restricted fresh air supplies.

## STAFF

The policy of recruiting young and specialised engineering staff has continued and staff numbers were up on last year particularly in the area covering computer technology. Staff numbers are budgeted to increase further in 1986/7 in view of the projects in hand.

All staff in the Association were delighted to see that Jock Stewart, Assistant Director, had been awarded an MBE in the New Year Honours List.

## OPERATING PROCEDURE

Following the implementation of the Council recommendations for a more commercially orientated management policy with a small six member Management Advisory Committee to advise the Director on Management policy and a twelve member Board of

Assessors to review and monitor the Technical work of the Association, it has been shown through the results of the Association that this has worked exceedingly well.

The loyalty of staff during this period of recovery has been most satisfying and encouraging. It is with a much greater degree of confidence that BSRIA enters the new year to provide the services required by its members and to undertake work for the industry as a whole.

## FORWARD LOOK

BSRIA can now move forward on a more secure financial footing than in the past few years. While attention must not be removed from the need to operate on a sound commercial basis, more management time can now be applied to ensuring that the technical future of the Association is in line with tomorrow's needs of the industry.

With current short-term relaxation of fuel prices we must not ignore the continued importance of the efficient use of energy in buildings - a field in which BSRIA already excels. Growing concerns about the health effects of building services; Legionnaires' disease, sick buildings and indoor air quality in general, offer challenging technical problems for which BSRIA is moving into position. The introduction of quality assurance practices into the industry is already occurring, and BSRIA is there in the lead.

Modern computer technology can assist in reducing the cost of ensuring that air movement designs will work predictably in practice; in studying building services systems and their controls; in providing expert knowledge on demand for a designer or for product selection; for rapid searching and identification of relevant documentation ranging from codes and standards to previous research results.

The use of more sophisticated equipment in buildings demands more sophisticated maintenance methods. BSRIA is active in all of these areas and more.

## MEMBER SERVICES

### Membership Changes

Class of Membership	1.4.85	Additions 1985/86	Withdrawals 1985/86	1.4.86	Subscriptions (£)	
					1985/86	1984/85
Honorary Members	7	-	-	7	-	-
Ordinary Members						
- Contractors	63	11	(10)	64	49,203	48,559
- Consulting Engineers	148	31	(30)	149	52,802	50,131
- Manufacturers	108	21	(16)	113	34,247	30,272
- Building Owner/Operators	52	6	(2)	56	23,450	22,882
- Others	46	6	(2)	50	23,383	23,001
Associate Membership	54	6	(7)	53	9,342	7,568
Quasi Membership	6	-	-	6	21,166	19,424
Totals	484	81	67	498	213,593	201,837

# Services to Members

## ENQUIRY SERVICE

The Information Centre continued to receive regular enquiries covering a whole range of subjects to do with our industry. 5427 individual enquiries were handled of which 3310 were from members, distributed as follows:

Consulting Engineers	1544
Contractors	514
Manufacturers	420
Other Ordinary	249
Building Owner/Operators	299
Associates	190
Honorary	10
Quasi	84
Total	3310

## LIBRARY

The library continued to grow as the principal reference library in the Building Services field, and continued to serve members with loans and the provision of photocopies. A significant increase in the number of requests from other libraries, particularly for American Standards, reflects the comprehensive nature of the library's collection.

New additions to the library	
Books	243
Pamphlets	630
Microfiche	6
Loans and photocopies	
Members	4037
Non-Members	403
Total	4440

Access to the rapidly growing base of technical information held at BSRIA and elsewhere now requires rapid electronic searching. Such a procedure has been available for some years at BSRIA through IBSEDEX, the computerised bibliographic database held on our Prime Computer. This has been greatly enlarged during the past year. With financial help from the Department of Trade and Industry a programme has been completed to add all the references from "Thermal Abstracts", 1966-1980, together with the majority of references held in the library catalogue. There are currently 50,000 references on IBSEDEX which make it a unique source of information for the industry. It may be accessed by BSRIA staff, or by members from their own offices using a microcomputer and a modem/telephone connection.

## MARKET RESEARCH

The Market Intelligence Centre continued its quarterly review and comment on the statistics of the building services industry, and published four issues of the *Statistics Bulletin* (1985, Vol. 10, Nos. 2-4, and 1986, Vol. 11, No. 1) containing digests of the most relevant

of this information. In addition each issue contained a profile of a significant product area for which research was carried out on the past and current market distributions, forward market projections, and names of UK suppliers (manufacturers and importers). The products covered were pumps, terminal units, fans, and insulation. *Statistics Bulletin* was mailed free to members on request and to non-members on subscription.

## PUBLICATIONS

Every member received their allocation of free publications during the year. These included the following:

### Technical Notes

- TN5/85 Derek Gregory: Building services in the year 2000.
- TN6/85 A.S. Eastwell: Heat metering for domestic premises.
- TN7/85 D.C. Walker: Factors influencing boiler efficiency.
- TN8/85 John Kew: Heat pumps for building services.
- TN9/85 Jeffrey Wix: Office automation.
- TN10/85 Tony Finch: Non-destructive testing.
- TN1/86 John Armstrong: Condition monitoring - an introduction to its application in building services.
- TN2/86 D.P. Gregory: Future fuel prices and competitiveness to the year 2005.

### Library Bulletins

- 1985, Nos. 2-6
- 1986, No. 1

### Bibliographies

- LB 29/85 Security Systems
- LB 56/86 Direct Digital Control
- LB 79/85 Environmental Comfort and Productivity
- LB 85/86 Libraries

### IBSA

In addition, six issues of the *International Building Services Abstracts* (IBSA), Vol. 20, Nos. 3-6, and Vol. 21, Nos. 1-2, containing selected abstracts from IBSEDEX were supplied to subscribers.

### Air Infiltration Review

The Air Infiltration Centre produced a number of publications of which the *Air Infiltration Review*, Vol. 6, Nos. 3 & 4; Vol. 7, Nos. 1 & 2, were sent to all members, and contain details of other reports available to members free on request.

### Special Publications

A special publication by Jeffrey Wix and Colin McLelland, *Data Exchange Between Computer Systems in the Construction Industry*, 1986, was published by BSRIA for sale.

### Members Newsletter

Four issues of *Omnibus*, the free quarterly newsletter about the activities of BSRIA were produced and mailed to all members and to others with an interest in the activities of the Association.

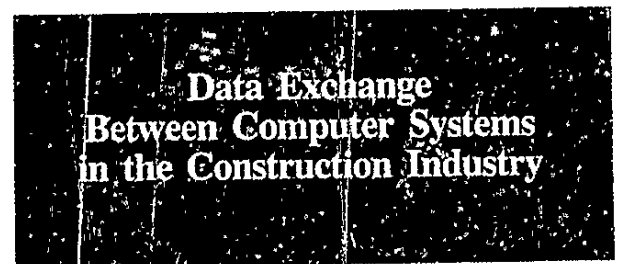
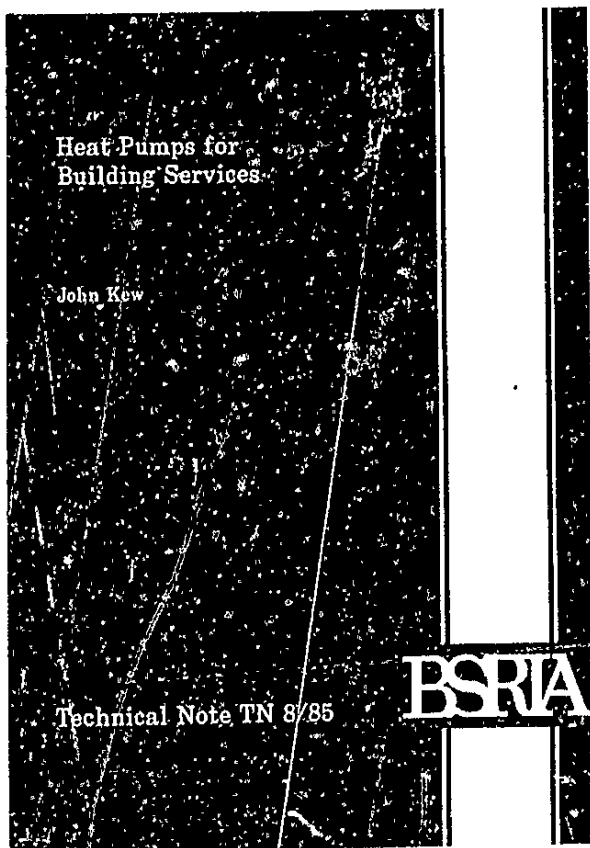
### Computer Newsletter

The Computer Centre continued to produce its quarterly newsletter containing current news and opinion

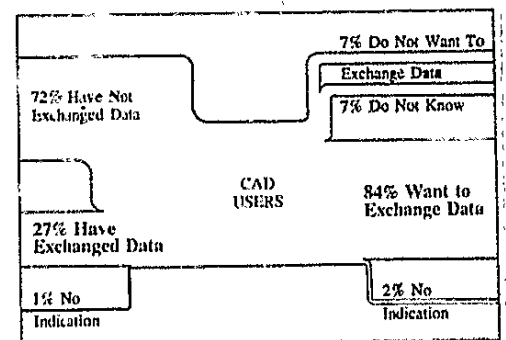
on new developments of interest to the industry, information about courses, conferences and seminars, and a number of contributed technical articles, some written by BSRIA staff, and many by external authors, on topics of interest and importance to the future use of computers by members of the industry. Four issues of the *Computer Newsletter* (1985, Nos. 14-16, and 1986, No. 17) were mailed free to all BSRIA members and to non-members on subscription.

### MEMBER DISCOUNTS

Members continued to receive a 15% discount on contract research, a 50% discount on instrument hire, and a 66% discount on publication prices.



Jeffrey Wix and Colin McLelland



Computer ⊕ Centre

BSRIA

# Financial Highlights

## HIGHLIGHTS OF 1985/6

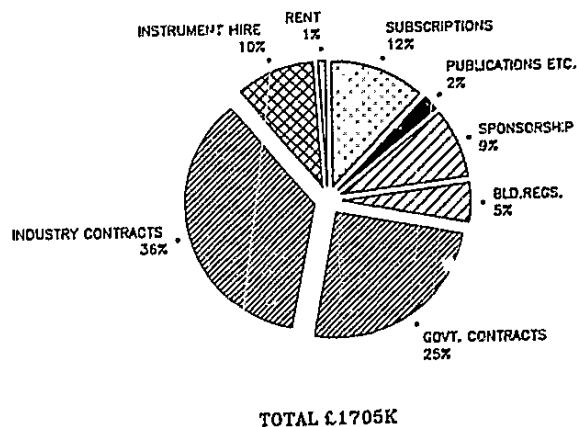
The gross income of the Association continued the trend of the past five years, showing a significant growth in 1985/6. The major growth area was in Instrument Hire, and in the funds received from the Department of the Environment through the sponsorship contract and for research concerned with Building Regulations. Funds were expended on the contract and sponsored research areas in an appropriately increased way, but there was a small reduction in the cost of member-supported projects and information services. This reduction was accomplished by increases in operating efficiency while maintaining a constant or slightly growing member service programme.

The net trading surplus of the Association was £92,000 including £25,000 in property rents received. This met the planned budget and enabled a reduction in the high level of borrowing experienced in the past few years, and has been achieved without cutting the services provided to members.

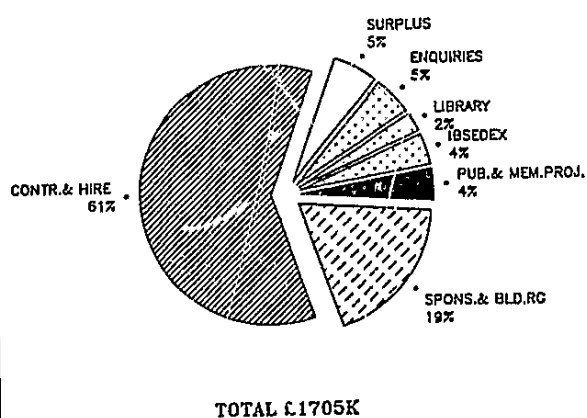
## FORWARD LOOK

The contribution from BSRIA to match the DoE sponsorship contract funding (typically, 50%) has previously been provided wholly from BSRIA operating funds, and as the DoE funds grew the ability of BSRIA to provide matching funds was becoming a limitation on the size of the member research programme. This year a successful pilot effort was made on one sponsorship project to obtain independent matching funds from members. In 1986/7 over £50,000 of such member-provided funds have been agreed. This will result in the ability of BSRIA to accept more cost-shared projects from DoE without putting the member programmes and financial position of the Association in jeopardy. Income from member subscriptions has not been growing in line with inflation, despite index-linking of subscription levels. A major drive to recruit new members is to be undertaken in 1986 and must be successful if the member services are to be maintained at their current levels.

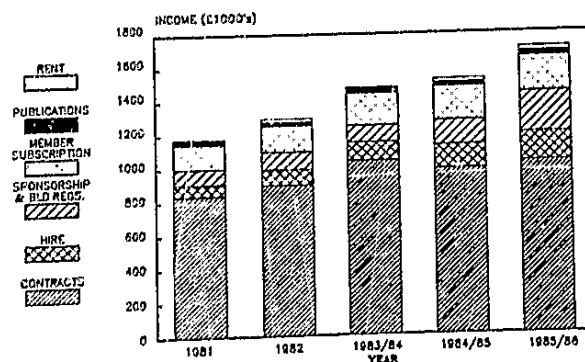
BSRIA INCOME 1985/86



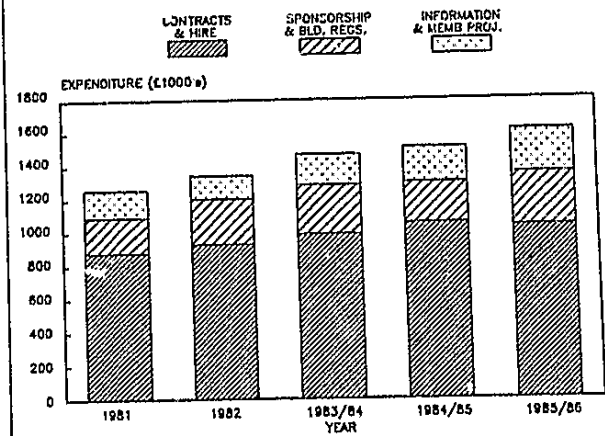
BSRIA EXPENDITURE 1985/86



FIVE YEARS' INCOME



FIVE YEARS' EXPENDITURE





# The Sponsorship and Member Research Programmes

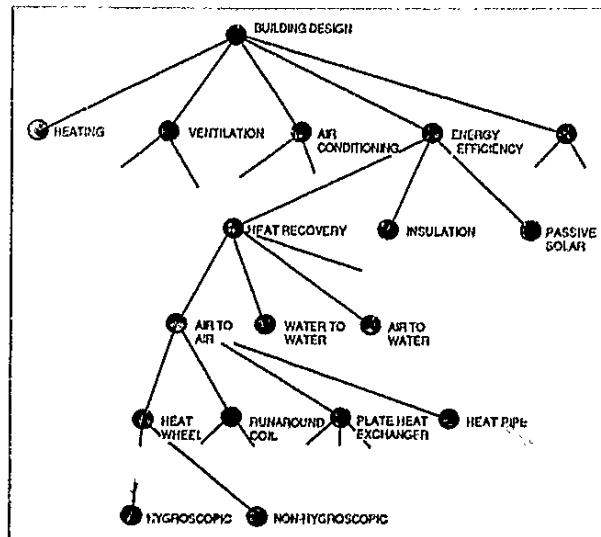
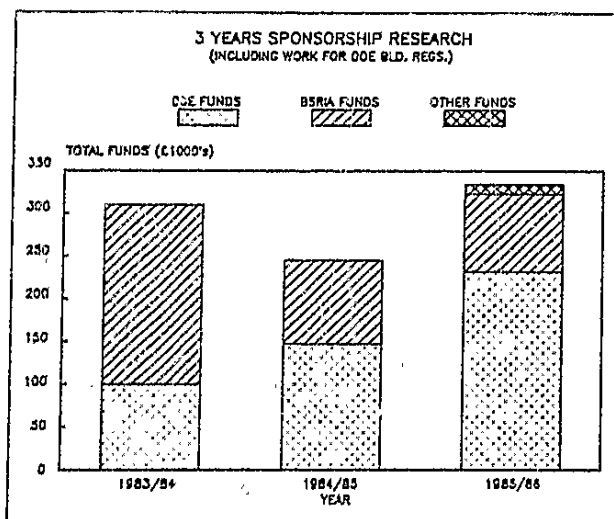
## THE SPONSORSHIP PROGRAMME

Under the Sponsorship Research Programme, BSRIA and the Department of the Environment share the cost of a number of research projects.

The purpose of this programme is to improve the quality and efficiency of the building services industry and to study new developments and their application. It is a programme balanced between attacking immediate problems and seeking the information and application framework for new technological and operational developments. A major reason why DoE provides for a significant part of the sponsorship programme is because the results of the work undertaken has an end-users benefit as well as that of the industry. That is, there is a "national interest" dimension. Where the end users are seen as the major beneficiaries then a higher level of DoE support is provided.

The generators of ideas for the development of the research programme are principally the BSRIA research staff and they take into account ideas put forward by member firms and other industry organisations. The proposals the staff prepare are scrutinised in detail by the BSRIA Board of Assessors who input an industry assessment and advice on the rank order of their relative importance. This process has led to the current research programme and to its proposed future developments. In addition items have been included in the programme which are aimed at supporting the Building Regulations and these have risen directly from discussions on the need for this work.

In the 1985/6 year, DoE provided £232,530 which was matched by £91,500 from BSRIA and £11,000 from individual member organisations of BSRIA. The size of the sponsorship programme over the past three years is illustrated below.



Root system of design levels for an expert system on heat recovery

## EXPERT SYSTEMS

A project entitled "Decision Analysis in Design" was commenced in 1984 and continued throughout 1985/6. The concept of building up a knowledge base on a computer, accessible on demand, has grown to become a reality in recent years. The low cost storage now available on small computers makes the use of such "Expert Systems" potentially attractive for design offices within the industry.

This project was set up to investigate whether a body of building services design information can be made available on computer to allow a design engineer to assess what decisions he has to make and to provide access to the experience of others to allow him to take those decisions. A relevant topic – selection of air to air heat recovery devices – was chosen as the vehicle upon which to build an expert system as an exploratory tool.

Various commercial expert system "shells" and programming languages have been acquired and evaluated. These include Savoir, Expert Ease, ESP/Advisor, Apes, and the languages PROLOG and LISP. Their advantages and shortcomings led us to develop our own shell which operates on the IBM PC AT microcomputer.

A simple demonstration system of fifty rules on the selection of air to air heat recovery devices has been set up and plans exist to enlarge this considerably. In addition to a system dealing with opinion-based design rules, there is a need to investigate a second type of expert system which deals with definitive knowledge such as a code or standard. Part of BS 5588, Code of Practice for Fire Precautions, dealing with smoke control, has been selected for experimental incorporation into an expert system of this type.

BSRIA staff have been involved in a number of talks, presentations and workshops on expert systems, and have become convinced that this technique will have a real place in the methods used by the industry in the future. A major report on Expert Systems is due for publication in May 1986.

The project is funded jointly by BSRIA and the Department of the Environment.

## VENTILATION EFFICIENCY

A project has been conducted to provide information on parameters relevant to ventilation efficiency and fresh air control on mechanical ventilation systems. Two parallel approaches have been made – one to experimentally assess ventilation efficiency in terms of contaminant control for different mechanical ventilation strategies, and the other to measure and control air quantities supplied to commercial buildings with the aim of deriving performance data from actual installations.

Experimental trials were therefore commenced in a mechanically ventilated room to establish the efficacy of a specific procedure for assessing the performance of a system which is also representative of different pollutants. Whilst three dimensional pollution contour maps were derived and a distinct difference could be discerned between heated and isothermal air supply conditions for example, the release mechanism of the tracer was found to be critical. When a suitable release mechanism of tracer representative of respirable exhaled pollutants and smoking products has been established, subsequent comparative surveys will be carried out in a simulated naturally ventilated environment, and for both floor mounted and wall mounted mechanical air supply systems.

Some field measurements of the fresh air supplied to mechanical ventilation systems have been completed. These have been used to develop and validate the tracer gas measurement technique chosen for this purpose. This technique will now be applied to monitor the variation in fresh air supply rate as effected by controlled response to changing enthalpy conditions. From an analysis of these investigations, recommendations on plant operation to achieve reliable and verifiable fresh air ventilation will be prepared.

The project will continue for a further year, and is jointly funded by BSRIA and the Department of the Environment.

## VENTILATION REQUIREMENTS

A project entitled "Ventilation in Institutional and Commercial Buildings" commenced in 1985 and is due to continue for two years. The objective is to produce guidelines on the ventilation rates and methods required to preserve acceptable indoor air quality and avoid health problems in different types of buildings.

Current national and international ventilation standards have been reviewed, and it has become clear that a survey of indoor air quality in selected buildings should include measurements of particulates,

metabolic carbon dioxide, and carbon monoxide (mainly from smoking). Instrumentation for measuring these was obtained, and we developed a sufficiently accurate door-entry person counter to enable occupancy levels to be measured.

Field tests were carried out in a ten-month-old theatre with an audience capacity in excess of 300 people. Reasonable correlations were obtained between measured and predicted carbon dioxide levels, but an inexplicably large range of respirable particulate concentrations was measured. The significance of this needs to be further assessed.

The project was wholly funded by the Department of the Environment (Building Regulations).



*Paul Potter adjusts a thermal analogue of a human body in laboratory investigations of pollutant dispersal*

## MAINTENANCE

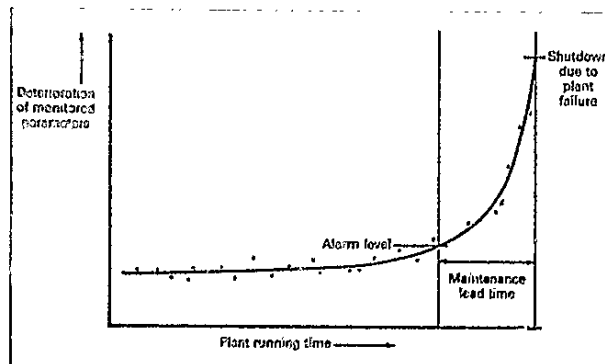
A three-year project on maintenance management was started, covering the subject areas of condition monitoring, operating and maintenance manuals, and maintenance tendering. Condition monitoring was the topic selected for the first year's study. A previous project identified all the relevant techniques, and had concluded that formal inspection is acknowledged to be necessary but that the need for maintenance is currently based on the judgement of the individual who attends the plant.

These relevant monitoring techniques were studied in more detail and equipment suppliers were interviewed, followed by visits to seven organisations who were thought to use condition monitoring techniques in current maintenance operations.

A comprehensive application guide describing the various techniques of monitoring and their potential application has been prepared and is due for publication later in 1986. This guide describes the techniques in depth and provides a valuable source of reference and a method of assessing the suitability of condition monitoring to individual applications. The work of the CIBSE Maintenance Task Group in producing a guidance code for maintenance is being incorporated into the project activity.

Future work will concentrate on preparing advice for writing technical operating and maintenance manuals.

This project was jointly funded by BSRIA, the Department of the Environment, the Department of Health & Social Security and British Rail, and is the first example of a DoE sponsorship project to be cost-shared and technically steered by a "club" of interested BSRIA members.



Condition monitoring can predict the best time for maintenance action prior to the onset of catastrophic failure

## SMOKE CONTROL

A project commenced in April 1985 to carry out a review of the design requirements for mechanical smoke control systems and associated venting requirements applicable to a range of types of compartmented buildings, so that updated design information and guidance on the selection of smoke control measures could be provided.

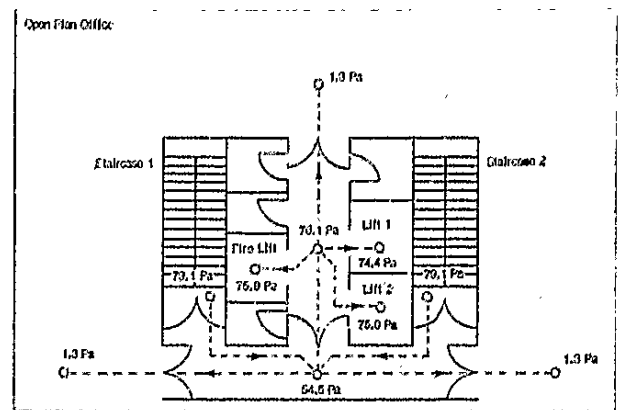
The project has concentrated on the use of mechanically induced pressurisation systems for excluding smoke from escape routes. A review of research and past experience in this field was carried out, and the extent and quality of existing data on air leakage in buildings was completed. Discussions were held with consulting engineers, fire brigades and the BRE Fire Research Station on the implementation of the existing Code of Practice on pressurisation, and the US National Bureau of Standards has been invited to contribute its knowledge of innovative practices.

A computer model has been set up to calculate pressure differentials generated as a function of varying air supply rates, and will be used to test the viability of different pressurisation systems. Caution has been expressed about the need to avoid excessive pressure differentials across doors that have to be opened by young children or elderly people.

A feasibility study has been carried out on the development of a computer-mounted knowledge base (an expert system) for the design of pressurisation systems, and this has proved successful in interpreting the existing British Standard.

An application guide is planned and drafting of the preliminary sections is now complete. The project will continue for a further year.

Funding for the project is provided jointly by BSRIA and the Department of the Environment.



Computer analysis of pressures and airflows delivered by a pressurisation system

## BUILDING PERFORMANCE

A project entitled "Test Procedures to compare the performance of buildings and their installed systems with design" was commenced during the year and is due to continue for a three year period. The degree to which a total building actually performs in comparison to the objectives of the designer and the wishes of the client has long been an important subject. The objective of the project is to produce test methods for measuring the operating performance of heating and ventilation systems installed in buildings and to define calculation procedures for comparing the measured performance with the design intention.

The initial phase consisted of a review of the current situation with particular attention to developments in attitudes and technology that in combination are making performance testing a much more desirable and practical proposition than previously. Some of the input to this review was provided by discussions with representatives of various disciplines within the building services industry.

It has been concluded that performance testing must form part of the current development towards the enhancement of the overall quality of building services engineering. As the project continues, attention will be given to the specification of performance criteria, measurement techniques and analysis procedures with a view to producing a manual on the practical application of performance testing.

The project is funded jointly by BSRIA and the Department of the Environment.

## CHIMNEYS

The Department of the Environment's Building Regulations Advisory Committee requested BSRIA to conduct a project to recommend test procedures for factory-made insulated metal chimneys. Problems had been experienced from damage of the chimney structure under conditions of thermal shock as can be experienced in the event of a chimney fire. A project to study these problems progressed throughout the year. Five chimney system types have been subjected first to a regime of high temperature testing with flue gas temperatures up to 1250°C and



*Laboratory test rig for prefabricated metal chimneys*

then to a programme of tests using direct flame application when a burner flame was introduced into the test chimney section. The study was commissioned to provide data which can be used in a review of the existing British Standard BS 4543 with particular reference into the possible need for a revised thermal shock test procedure. An interim report reviewing the current standard against the results of tests with two of the chimney systems has been submitted to the appropriate BSI committee.

The project will continue to cover vitreous enamelled chimneys and masonry chimneys, and is wholly funded by the Department of the Environment (Building Regulations).

## QUALITY ASSURANCE

Following the preliminary study of the potential application of Quality Assurance procedures, and of BS 5750, to the Building Services industry, a project was continued on the implementation of quality systems. Part of the project was concerned with supporting the activities resulting from the initiatives taken by industry leaders attending the BSRIA "Futures" symposium at Sunningdale in April 1985. These leaders urged the industry to commit itself to a programme for the introduction of Quality Assurance throughout the industry by 1990. BSRIA staff supported a conference organised by CIBSE in October 1985, provided recommendations and a suggested implementation plan to the Building Engineering Services Quality Assurance Group (BESQA) set up by NEDO, and arranged our

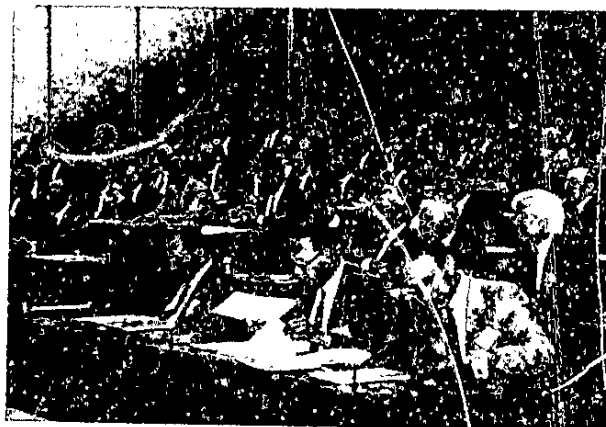
own highly successful educational conference on Quality Assurance held in April 1986 which proved to be the best attended conference ever held by BSRIA.

We collaborated with a Local Government design office who were setting up their own quality system and obtained valuable feed-back on the proposed procedures. Discussions were held with a number of other industrial personnel, particularly in the design field, to compare opinions and experience.

The importance of a reliable source of information and a single and available method of accessing it became clear during the project. Standards and Codes, used as a measure of quality, must be readily available, and the specification of relevant procedures and practices to be used in a project must be made with the knowledge of what alternatives are available to the client, designer and installer.

A report is due to be published in late 1986.

The project is jointly funded by BSRIA and the Department of the Environment.



*BSRIA Chairman and Director were among the delegates at the BSRIA Quality Assurance Conference*

## TECHNOLOGICAL DEVELOPMENT

The Department of the Environment sponsorship project provides funds for state-of-the-art reports to be produced on new technical developments, probably arising elsewhere than at BSRIA, which may have an impact on the Building Services industry.

One of the future technology topics identified at the BSRIA "Futures" Symposium in April 1985 was the development of adaptive building envelopes whose thermal and optical characteristics could be controlled remotely. The technology of electrochromic coatings for glass and other surfaces, and the possibility of altering the thermal conductivity of walls by various mechanical means was reviewed and a report published.

Another "future" technology identified was the control system for a "smart" building and a review of the development of programmable logic controllers was therefore commenced, and a report is due for publication later in 1986.

The significant impact of natural ventilation control on energy conservation, and the various approaches to this being made in other countries has been closely followed by the BSRIA Air Infiltration Centre, and a review report on International Practice of Building Airtightness and Ventilation was produced.

The project is jointly funded by BSRIA and the Department of the Environment.

## **DISSEMINATION OF RESEARCH RESULTS**

Under the Department of the Environment sponsorship contract, limited funds are provided to disseminate results of research conducted by BSRIA or others, where those results are publicly available and are deemed to be of general interest to the industry.

At the suggestion of HVCA, some of the information resulting from market research and testing on aluminium radiators was assembled and a brief report on the market growth, application and installation recommendations and use of aluminium radiators will be published in mid 1986.

The results of an earlier BSRIA project concerning the design of air to air heat recovery systems were gathered together for processing into a summary selection guide covering run around coils, plate heat exchangers, rotary regenerators and heat pipes. This document will be published in mid 1986.

The results of earlier BSRIA projects on inspection procedures for building services plant and on the potential use of modern "information technology" equipment in BSRIA members' offices were also summarised into technical notes which were prepared for publication and distribution to all members.

A report on design and evaluation of room air distribution systems, resulting from a number of earlier research studies carried out at BSRIA, was also produced and published to all members.

The project is jointly funded by BSRIA and the Department of the Environment.

## **A FORWARD LOOK**

In 1986/7 the projects on Dissemination, Technical Trends, Expert Systems, Maintenance Management, Mechanical Ventilation Design, Smoke Control, Ventilation in Commercial Buildings, Building Performance, and Chimney Testing will continue.

In addition the following new projects will commence:

- \* The preparation of a guidance document for the production of design briefs in accordance with quality assurance procedures.
- \* The preparation of a guidance document for producing commissioning manuals in accordance with quality assurance procedures. This will also involve re-drafting the existing BSRIA commissioning manuals.
- \* The preparation of a design and evaluation guide for room air distribution systems.
- \* A review of the quality and quantity of information available on building services maintenance costs, how it is used, and how better use could be made of it.
- \* Assembly and validation of the "Rules of Thumb" used by Building Services designers, and an investigation of how these could be best applied to computer-based design systems.
- \* Preparation of a guidance document for wet central heating system design to accommodate the use of heat pumps, electric storage heaters, and variable thermal capacity and insulation data for buildings.

An examination of the potential for applying quality assurance procedures to maintenance of building services.

Examination of the education and training needs of the Building Services industry.

For all the projects marked \*, "clubs" of sponsoring firms are being organised to provide all or part of the matching funds requested by DoE, and to provide technical steering committees for each project.

## Contract Research

Members of BSRIA are offered free access to expert staff to provide information and consultancy on topics requiring only a modest amount of time. Requirements in excess of the "free" service are provided for by charging a fee, and this "repayment" use of the expertise and laboratory facilities has grown to become a major part of BSRIA operations. Contract research testing, hire and consultancy are offered at commercially attractive rates to non-members and members alike, with members obtaining a significant price discount. Any surplus generated by this business is used to augment the facilities and the services offered to members and to provide part of the funds for the sponsorship programme. The knowledge and the expertise developed at BSRIA through contract research is a growing resource which is continually accessible to members and clients.

Clients for contract research include Local and National Government departments, industrial firms and private partnerships. In some cases groups of clients are brought together to co-fund projects to their mutual advantage.

The principal areas of activity are described below.

### ENERGY CONSERVATION

A project was started for the Energy Technology Support Unit (ETSU) of the Department of Energy to collect and disseminate information on energy efficient refurbishment and maintenance measures in educational buildings. Following a pilot study with three local education authorities to assess the feasibility of obtaining the necessary information, work is now proceeding to produce a portfolio of case studies covering a range of refurbishment technologies in different types and age of school building.

The Department of Energy has commissioned BSRIA to develop an "energy audit" procedure for British Standards related to building services. A checklist and reporting format have been produced to enable a systematic review of attention paid in individual standards to factors affecting energy efficiency.

Our work on the two school projects continued with very successful results obtained at Hither Green where a reduction of some 48% in consumption has been identified, and the Building Energy Management System demonstration in schools throughout Hereford and Worcester was completed and will be fully published by the EEO in 1986. A parallel study in 15 Ladbroke's hotels continued and will be completed in the forthcoming year.

A significant new five-year contract to develop and run a new technical centre for the Building Energy Management Systems industry was placed by the Department of Energy in February.

Research into domestic heating methods utilising gas-fired appliances has been supported by the British Gas

Corporation with a new efficiency rig commissioned late in the year. This will enable us to examine the system performance of several types of domestic hot water generator under simulated occupancy patterns.

A contract was commenced for ASHRAE to produce data for design guidance for perimeter heating systems.

Condensing boilers continue to attract enquiries and the prototype Hamworthy system installed in our own boilerhouse has been fully monitored and reported. We maintained, for ETSU, the installation, commissioning and operation of new boiler plant at Shenley Hospital, Radlett. Three condensing boilers and two non-condensing boilers, all gas-fired, provide an opportunity for comparative performance measurement.



*Shenley Hospital, Radlett, where new high-efficiency boiler plant is being monitored by BSRIA*

### BOILER AND HEATER TESTING

In the BSRIA laboratory we validated the use of an inert test gas, rather than explosive gas-air mixtures, to examine the necessary purge times for indirect gas-fired industrial air heaters. A number of domestic oil-fired boilers were tested for compliance with BS 4876 in a programme under which BSI has taken over the re-approval of equipment previously certified by DOBETA.

### AIR DISTRIBUTION

A number of specialised laboratory-based investigations of air movement were undertaken in rooms in which the performance of the room air distribution system was deemed to be highly critical. Such investigations usually involve detailed measurements of air velocity and temperature distributions, and assessments of thermal comfort. One project involved building and testing a quarter-scale model of an airport passenger terminal building; another involved full-scale investigations of the air movement patterns in domestic premises equipped with warm air heating systems running from low temperature heat sources (heat pumps, solar collectors, etc.). In parallel to this, a research project was initiated during the year to assess

the ability of numerical modelling techniques to predict air movement and temperature distributions in enclosures. The early indications are encouraging and on this basis work will develop further during the coming year.

Other laboratory investigations included a study of the control characteristics of a domestic off-peak electric storage heater operated in an environmental test chamber; pressure loss characteristics of perforated floor tiles and the performance of a proprietary air distribution system. Site investigations in occupied buildings were conducted in response to occupant complaints of poor thermal quality and of concerns relating to "sick building syndrome".

## INDUSTRIAL VENTILATION

We continued investigations of laboratory fume cupboards for DHSS, in which laboratory tests at BSRIA provided justification to start work drafting a specification for aerodynamic design criteria. In addition a third-party proposal of a testing protocol for fume cupboards was investigated and proved to be unsuitable for use.

The design of an air transfer device and associated air supply strategy for use in clean rooms in the pharmaceutical industry was finalised in a full-size mock-up constructed in the BSRIA laboratory.

The research programme into the reduction of pollutants when patients are subjected to anaesthetic gas during dental surgery has continued with clinical trials on a prototype system developed by BSRIA. A comparison between the existing system and the BSRIA system demonstrated that a substantial reduction in the levels of anaesthetic gas pollution could be achieved.

An investigation to determine the level of nitrous oxide which occurs in maternity suites was also carried out. In this instance, four labour wards were equipped with sampling tubes and monitored continuously to determine the level of nitrous oxide pollutant that can occur during the use of Entonox.

An investigation to compare two types of air distribution systems in operating theatres with respect to

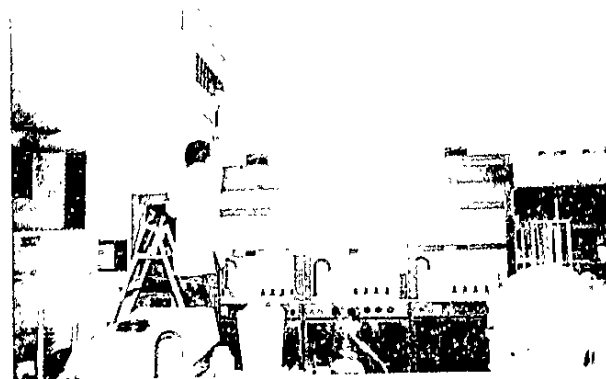


*Karen Jones makes measurements of anaesthetic gas pollution levels in a hospital ward*

pollutant levels has also been carried out. Comparisons were made between the use of linear diffusers and laminar flow systems.

A tracer gas technique was used to measure the degree of short-circuiting into the extract system of fresh air introduced into a ceiling void above an office.

The trend towards fully air conditioned warships with limited fresh air intake has led to a study for the Ministry of Defence of the mechanical ventilation requirements for the extraction of smoke from zones affected by fire damage.



*William Booth investigates the movement of air make-up in a chemical laboratory*

## ESTATE MANAGEMENT

Two contracts were carried out for a large public sector organisation, one to assess the potential for condition monitoring in its property estate and the other to determine the feasibility of developing maintenance budgets and cost monitoring data from elemental inputs. We also conducted an energy survey of a Spanish hotel, provided a critique of a mechanical refurbishment scheme for a theatre, and assessed the potential market for maintenance contractors. The outbreaks of Legionnaires' disease at Stafford has not yet resulted in contract work for BSRIA, but has kept us very busy in providing answers to queries or redirecting enquiries to relevant sources of information.

## MARKET RESEARCH

The Statistics & Forecasting Unit was renamed and launched as the Market Intelligence Centre at a seminar and Open Day for BSRIA members.

The changed name marks an increase in staff at the Centre, a greater commitment to client market research and a shift in emphasis from information provision to consultancy work.

Assignments undertaken have included diversification studies, recommendations on market entry and advice on new product development. While some products studied have been near the forefront of technology – heat pumps, unvented water systems, heat recovery and energy management systems – many have a much longer history – storage heaters, dehumidifiers and fan coil units.



The Centre's client list now numbers some 80 firms and, in addition to the traditional use of the Centre by manufacturers, recent projects - in co-operation with the Estate Management Unit - on the contract maintenance market and M & E contracting have shown a growing interest in market research across the whole building services industry.

## AIR INFILTRATION CENTRE

The Air Infiltration Centre completed its seventh year and successfully gained international funding for a further three year period. With an annual budget in excess of £200,000 the Centre is an important BSRIA industrial contract which is operated through Oscar Faber Consulting Engineers on behalf of the International Energy Agency.

The major technical effort of the AIC has concentrated on the production of an air infiltration and ventilation calculation techniques guide which is scheduled for publication in June 1986. In addition to providing background to the theory behind calculation methods, it also contains examples and numerical data for use in computer simulations.

The Centre's bibliographic database, "AIRBASE", currently contains in excess of 2000 articles on air infiltration research. This has been transferred to an IBM personal computer in readiness for making machine readable versions available on a regular basis to all twelve of the AIC participating countries. Literature searching is achieved using "Micro STATUS" and the service is supported by a technical library containing all referenced articles.

The AIC's programme of conferences and workshops continued with the 6th annual conference being held in the Netherlands in September devoted to ventilation strategies and measurement techniques, and a specialist workshop in March to plan the production of a measurement techniques guide.



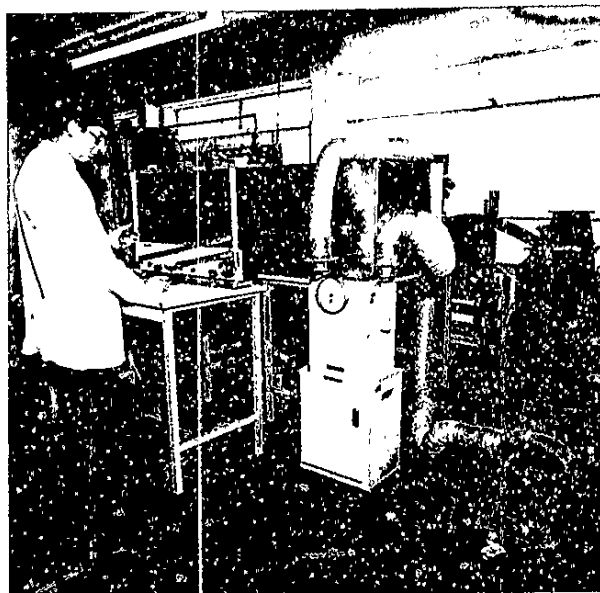
*Martin Liddament gains access to the "AIRBASE" database using a desktop personal computer*

## QUALITY ASSURANCE

BSRIA developed documentation for the Property Services Agency's "Quality System for Commissioning Air Conditioning and other Complex Installations", which was distributed for public comment in October 1985, and work still continues on this task.

## PLUMBING AND WATER SUPPLY

A small contract for the Department of Education and Science assisted in the correct sizing of water services in school buildings and our continuing involvement in the design of unvented domestic hot water systems was supported by the Department of the Environment. Some of the results of this work were presented at a BRE seminar.



*The performance of a ductwork joint is measured by Peter Heywood*

## TEST AND HIRE

135 individual equipment testing contracts were carried out, covering the spectrum of building services, from fans to radiators via airhandling units, fancoils and luminaires. We have carried out prototype, production and conformance testing to various standards. Site visits both here and abroad for per-



*Pauline Jones attends to orders for instrument hire received by telephom and despatched by courier*



formance tests, commissioning, temperature surveys and failure investigations were undertaken on behalf of clients.

The Calibration service experienced a small increase in instruments being calibrated for clients who are building up their Quality Assurance Systems.

There was an 18% increase in the business of instrument hire. There has been a gradual change in the type of instrument available for hire, whilst retaining the older more traditional instrument, we are now often able to offer the electronic equivalent giving the engineer ease of operation and frequently more versatility. 1681 individual instruments were hired out in 960 separate contracts. We noted a trend towards more foreign hires into the Middle East and France.

## COMPUTER APPLICATIONS

During the year, we completed a major research project on data exchange between computer systems. This is a vital topic in the development of CAD and we were able to publish a report detailing the work done. Resulting from our work in this area, we have become a sponsor of the CAD/CAM Data Exchange Centre at Leeds University.

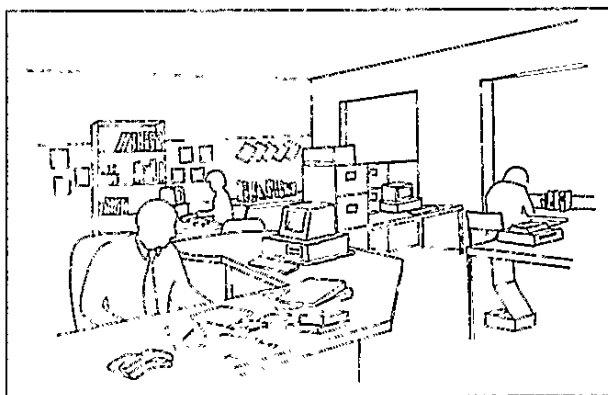
We continued to act as consultants to one Government department's computerisation programme and have undertaken software evaluation work for another. We

are currently building a materials and components database for use in a dynamic thermal modelling program. The services of the Computer Centre, in conjunction with other BSRIA sections, were used in developing a design guide for direct digital and programmable logic control systems. In addition to these major projects, we have carried out a number of smaller consultancy projects for consultants and contractors for computer-aided design, estimating, financial management, planning and other applications.

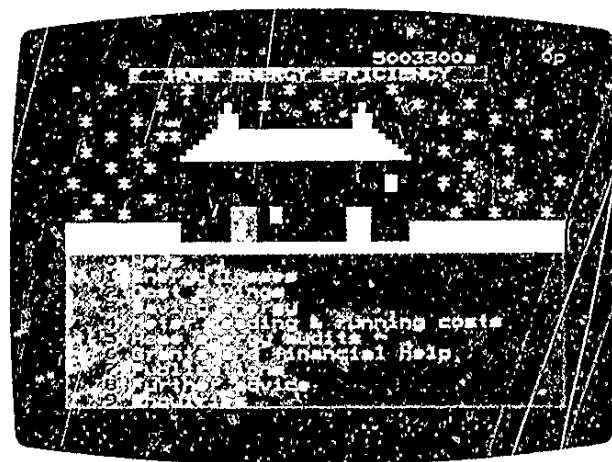
## INFORMATION

The Information Centre conducted a review of electronic sources of information for the construction industry on behalf of the Building Research Establishment. This work looked at how the information services are used across the industry and possible constraints on their widespread adoption. ENTEL, the energy efficiency information service on Prestel, has been operated and maintained for the Energy Efficiency Office. During the past year there has been a noticeable increase in the number of people accessing this service from home computers.

Translation of the Russian journal *Teploenergetica* continued for the British Library.



The BSRIA Computer Centre expanded to house a staff of six during the year

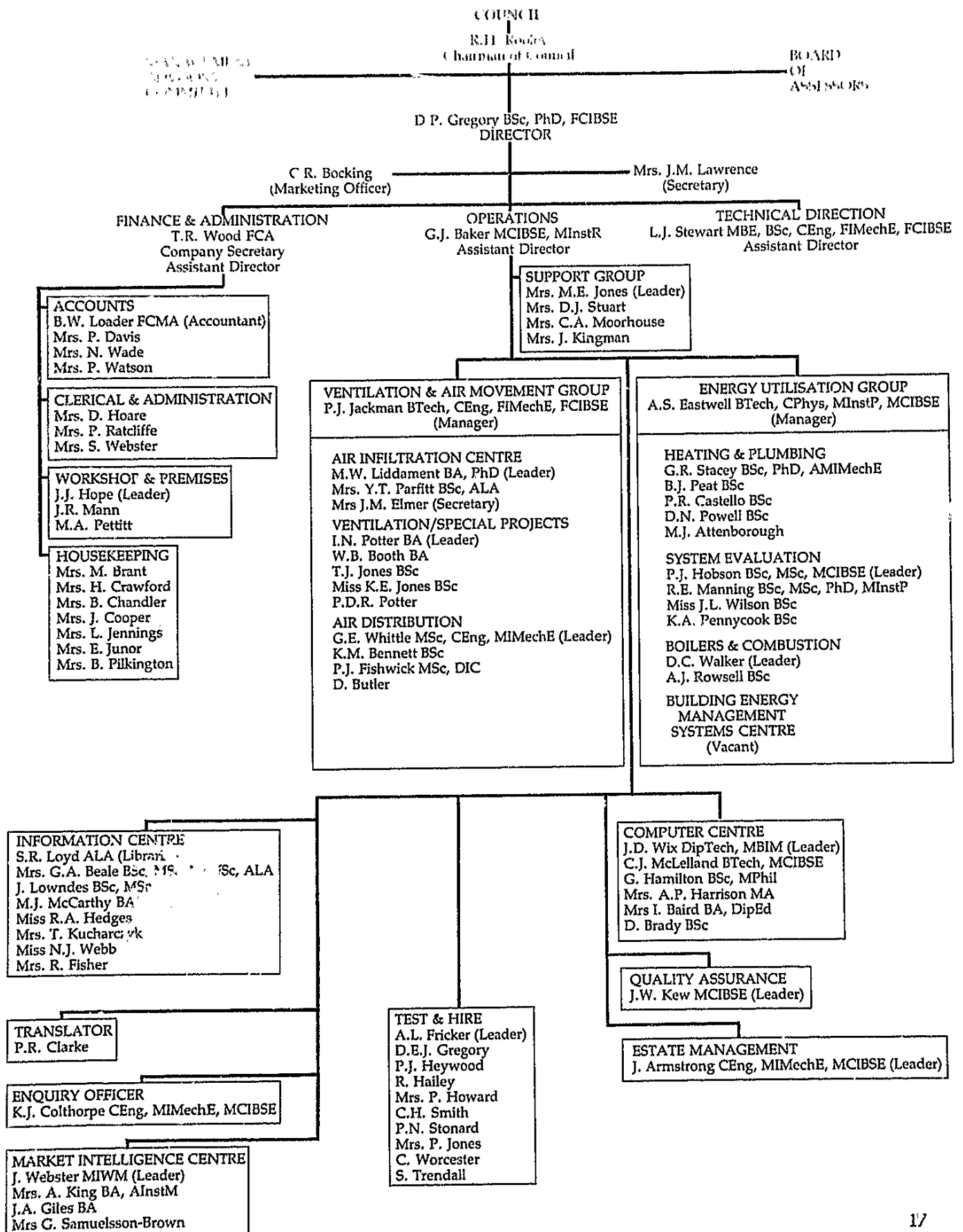


Information frames for ENTEL, mounted on Prestel, have been designed with the householder in mind

## Lectures and papers by members of staff – 1985–86

Commissioning - The Maintenance View – Seminar at the Polytechnic of the South Bank, June 1985	J. Armstrong
Energy Conservation and Management – Lecture to Sauter Automation Users Group, London, October 1985	D.P. Gregory
Heat Pump Applications – Lecture to EEO Seminar on Heat Pumps, Stratford upon Avon, September 1985	D.P. Gregory
Energy Conservation in Buildings – Lecture to the Cambridge Energy Research Group, Cambridge, May 1985	D.P. Gregory
The Air Infiltration Centre and its Work – Lecture to invited German representatives of research and industry, Dusseldorf, April 1985	P.J. Jackman
BSRIA's Work in Quality Assurance, Past, Present and Future – Paper to BESQA (Building Engineering Services Quality Assurance) subcommittee of NEDO, Building EDC, London, September 1985	J. Kew
Introduction to Quality Assurance – Keynote paper to Institute of Hospital Engineering Symposium "Quality Assurance and Reliability in Hospital Engineering", London, March 1985	J. Kew
Ventilation Aspects of Moisture in Buildings: A Review and Assessment of the Future Role of Prediction Techniques – Paper to Condensation and Energy Problems Workshop, Leuven, Belgium, September 1985	M. Liddament
A Review of Wind Pressure Data for Air Infiltration Calculations – Paper to International Seminar, ETH, Zurich, Switzerland, March 1986	M. Liddament
ENTEL – Energy Efficiency Information, Health Service Estate, December 1985, No. 57, p 36	S.R. Loyd
AIRBASE – The Air Infiltration Centre's Bibliographic Database, Air Infiltration Review, May 1985, 6, 3, 6–8	Y. Parfitt
Energy Efficiency in Schools – Lecture to EEO Seminar, Energy Efficiency in Local Authority Buildings, Stratford upon Avon, September 1985	L.J. Stewart
Energy Savings in School – Lecture to EEO Seminar, Energy Efficiency in Schools, Newcastle upon Tyne, February 1986	L.J. Stewart
Computerised Maintenance: A Helping Hand, Journal of CIBSE, January 1986, 6, 1, 45–56	P. Taylor
Outlook for the UK Air Conditioning Market – Lecture to HEVAC Association, Air Conditioning Group, November 1985	J. Webster and J.A. Giles
Computers in Buildings Services Design – Paper presented at the Computers in Building Services and Design Conference, University of Nottingham, April 1985	J.D. Wix
Integrated CAE – Paper presented at the Construction Industry Computer Fair, London, June 1985	J.D. Wix
Expert Systems in Building Services – Paper presented to ESCAD 85, University of Reading, July 1985	J.D. Wix
Preliminary Results of a Survey on Data Exchange Between Computer Systems in the Construction Industry – Paper presented to the CIB W78 Symposium, Rotterdam, September 1985	J.D. Wix
The Future of Computers in Building Service Design, Building Services and Environmental Engineer, July 1985, 7, 11, 17–19	J.D. Wix
The Role of Computers in Planned Maintenance, Building Services and Environmental Engineer, October 1985, 8, 2, 12–13	J.D. Wix
Analysis of Computer Estimating Requirements and Link Between Estimating and Other Management Applications – Papers presented at the HVCA/BSRIA Computer Workshop, October 1985	J.D. Wix
Space Allocation in Building Services – Lecture to CIBSE West Midlands Region, October 1985	J.D. Wix
Computers in Building Services – Lecture at Barford Hall College, Nottingham, November 1985	J.D. Wix
Standards for Data Exchange – Talk to the CICA Advisory Committee, January 1986	J.D. Wix
Project Cost Control. Analysis of Requirements – Paper presented to the HVCA/BSRIA Computer Workshop, February 1986	J.D. Wix
External Databases and Online Information Services – Paper presented at the Construction Industry Computer Fair, London, June 1985	J.D. Wix and G. Beale
Instant Information for the Building Industry, Building Magazine, 20 September 1985, pp 91–92	J.D. Wix and G. Beale
The Use of Computers in the Timber Industry – Paper presented to the Timber Research and Development Association, September 1985	J.D. Wix and I. Baird
Software for Air Conditioning Load Analysis and Design – Paper presented to the Conference on Air Conditioning "Impact on the Built Environment", Nottingham, March 1986	J.D. Wix and C.J. McLelland
Expert Systems in Building Services – Paper presented to the WIMS User Group Seminar, University of Reading, September 1985	G. Hamilton
An Introduction to Expert Systems – Lecture to the CIBSE Electrical Services Group, October 1985	G. Hamilton
Expert Systems in Building Services, CIBSE Journal, November 1985, pp 44–45	G. Hamilton
Expert Systems in Building Services – Talk to the staff of Zisman Bowyer & Partners, February 1986	G. Hamilton
Expert Systems, Building Magazine, 14 March 1986, pp 77–79	G. Hamilton
What You Can Get for Nothing – Lecture at the CIBSE Software Show, December 1985	C.J. McLelland
The Use of Computers in Energy Demand Analysis, Building Magazine, 21 March 1986, p 62	C.J. McLelland
Problems and the Way Forward for BEMS Technology – Paper to EEO Seminar at Winchester, April 1986	A.S. Eastwell
Unvented Water Systems – Practical Experience at Birch Hill, Bracknell – Paper to BRE Seminar, Garston, Herts, March 1986	A.S. Eastwell

# People as at 31 March 1986



## Members as at 31 March 1986

### Honorary Members

C. & K. Bennett Ltd  
 T. C. Brington (GB)  
 P. A. Cole  
 J. E. Duffin  
 D. Gifford  
 M. C. Jamieson  
 C. Troop

### Ordinary Members

#### Contractors

Abrey-Garland Group Ltd.  
 ACJ Air Conditioning Jersey Ltd  
 Airstal Ltd  
 Airstream Home Counties Ltd.  
 Andrews Weatherford Ltd.  
 Artifacts, Harry Taylor Ltd.  
*Artifacts, Charleston Sheet Metal Ltd*  
*Artifacts, Atlantic Ltd.*  
*Artifacts, Maintenance Ltd*

Balfour Kilpatrick Ltd.  
*Balfour Kilpatrick International Ltd.*  
*J. Jeffreys & Co.*  
*Jeffair Ducts Ltd.*  
 Barrett & Wright Ltd.  
 Bayliss Kenton Installations Ltd.  
 Bennett, W.A. & Sons Ltd.  
 Beynon, W.G. & Sons Ltd.

Carter Building Engineering Services Ltd.  
 Chester, P. & Son (Bedford) Ltd.  
 Comfort Cooling Ltd.  
*Staleway Ltd.*  
*Redgate Engineering Ltd.*  
 Commissioning Management Ltd.  
 Costell Mechanical Services Ltd.  
 Crown House Engineering Ltd.  
*Crown House Engineering (Northern Ireland) Ltd.*  
*EMIECO Instrumentation Ltd.*  
*Crown House Energy Ltd.*

Delta House Engineering Ltd.  
*Delta House (Electrical Contracts) Ltd.*  
 Drake & Scull Engineering Co. Ltd.  
*Simon-Drake Automation*

East Grinstead Mechanical Services Ltd.  
 Ellis Mechanical Services Ltd.  
 Environmental Installations (Ipswich) Ltd.

Fisher Group Limited  
*Fisher Group Contracts Ltd.*  
*Fisher Group Maintenance Ltd.*  
*Fisher Mechanical Services Ltd.*  
 Foster & Pearson Ltd.

Gibson Wight Ltd.  
 Gough & Sons (Burton) Ltd.

H & I Engineers Ltd  
 Hader Group  
*Center Ross Engineering Ltd*  
*Haden Young Ltd*  
 Hall, Matthew, Mechanical & Electrical Engineers Ltd.  
 Horrocks, Stuart B. Ltd

Jetco Mechanical Services Ltd

Lindsey, C.H. & Son Ltd.  
 Longley, M.W. Ltd.  
 Longstaff & Shaw Ltd.  
*Longstaff & Shaw (Electrical) Ltd*  
*Longstaff & Shaw (Heating) Ltd.*  
*Longstaff & Shaw (Services) Ltd.*

M.D.H. Ltd.  
 M & E Building Services Ltd.  
 MJN Ltd.  
 Mala Engineering Ltd.  
*Mala Maintenance Ltd.*  
*Mala Construction Ltd.*  
*Mala Air Conditioning Ltd.*  
*Mala Designs Ltd.*  
*Mala Electrical Ltd.*  
*Mala Investments Ltd.*  
 Manly, A.G. & Co. Ltd.  
*J.M. Podmore Ltd.*  
 Marston, A.T. & Co. Ltd.  
*Calorsol Ltd.*  
 Megah Ltd.

Oxford Refrigeration & Air Conditioning

Perfectair Ltd.  
 Perma Pipe Services Ltd.  
 Pickup, H. Heating & Ventilating (1983) Ltd.  
 Plant Energy Systems Ltd.  
 Prout Plumber Plus

Quantum Mechanical Services Ltd.

Radvent Installations Ltd.  
 Reliance Environmental Services Ltd.  
 Rosser & Russell Building Services Ltd.  
*Rosser & Russell (Ductwork) Ltd.*  
*Rosser & Russell (Electrical) Ltd.*  
*Rosser & Russell (Building Services) Ltd.*

Servotomic Ltd.  
 Shepherd Engineering Services Ltd.  
 Simpson, Delvarr & Co. Ltd.  
 Sulzer Brothers (UK) Ltd.  
 Sutton Group Services

TML Ltd.  
*TQB & Associates Ltd.*  
 Taylor, Harry, of Ashton Ltd.  
*Harry Taylor of Bromley Ltd.*  
 Warmco Ltd.

Taylor Woodrow Contractors Ltd  
*Tugwell Ltd*  
 Tyler Engineering Ltd

Universal Ductwork Ltd  
*Universal Ductwork (London) Ltd*

Valeforge Ltd.  
*Plant Installation & Maintenance (London) Ltd*  
*Energy Control & Management (1988) Ltd.*

White, Bays & White Ltd.

Young Austen & Young Ltd.  
*Fireproof Protection Services Ltd.*  
*Bosworth Ltd.*  
*Venduct Ltd*  
*Clark & Fenn Ltd.*

#### Consulting Engineers

ACDP (Integrated Building Services)  
 Adams Green & Partners  
 Andrews Property Services Ltd.  
*A.S.A. Consultants*

Arup, Ove & Partners, London  
*Arup Associates*  
*Arup, Ove & Partners, Manchester*  
*Arup, Ove & Partners, Scotland*  
*Arup, Ove & Partners, Cardiff*  
*Arup, Ove & Partners, Birmingham*  
*Arup, Ove & Partners, Johannesburg*  
*Arup, Ove & Partners, Hong Kong*  
 Atkins, W.S. & Partners  
 Aukett, Michael Associates  
 Austen Associates  
 Austin Company of UK Ltd., The  
 Austin Smith: Lord Engineering

BCW Consulting Engineers  
*BCW Engineering Ltd.*  
 Bament Browne & Partners  
 Barker, A.H. & Partners  
*Cymap Ltd.*  
 Barker & Kes Partnership  
*Temp. Associates Ltd.*  
 Barlow, Leslie & Partners  
*Barlow, Leslie Partnership*  
 Bianco Associates  
 Blezard, Norman & Partners  
 Bordass William Associates  
 Briggs, James R. & Associates  
 Brockham Design Associates Ltd.  
 Brunel Engineering Consultants Ltd.  
 Bryant Consultants  
 Buckle & Partners  
 Building Design Partnership  
*Engineering Design Partnership*  
 Building Energy Partnership  
 Building Services CoPartnership Ltd.  
 Buro Happold

Cade Groves & Associates  
 Centre for Construction Market Information, The

Chapman Bathurst Partnership, The  
 Chick, D.R. & Partners  
 Child, Alan & Associates  
 Clifford, Talbot & Jaehme  
 Cells, M.A.  
 Colquhoun, Brian & Partners  
 Co-ordinated Engineering  
 Consultants  
 Crocker, Alan Associates  
 Cundall, Johnson & Partners

Dale & Goldfinger  
*Dale & Goldfinger (London)*  
 Databuild Ltd.  
 Davridge, John & Associates  
 Dawson, H.L. & Partners  
*Master Designer Ltd.*  
*H.L. Dawson & Associates*  
*Dawson Computed Designs Ltd.*  
 Dinsdale Brown & Wilson  
 Doy Webster Partnership

ECD Partnership, The  
 Edwards & Partners  
 Eley, David A.  
 Energy Conservation & Solar Centre  
 Environmental Engineering  
 Partnership

FHP Partnership  
 Faber, Oscar Partnership, The  
*Faber, Oscar Consulting Engineers*  
*Faber, Oscar & Partners*  
*Facet Ltd.*  
 Field, Alan A.  
 Ford Heatel Ltd.  
 Fordham, Max & Partners  
 Fowler, Kenneth & Partners  
 Fowler & Pemberton  
 Freeman, Fox Ltd.  
 Fuel & Energy Consultants Ltd.  
*FEC Ltd.*  
 Fulcrum Consulting Engineers

Gibb, Sir Alexander & Partners  
 Gray, Charles Associates  
*Envirotek Commissioning Services*  
*Envirotek Drafting Services*  
 Greaterox, J.E. & Partners  
 Gregory, R.W. & Partners  
*Gregory, R.W. & Partners (Far East)*  
*Gregory Associates*  
*Gosnell, Jeffrey Associates*  
 Grey, Gerald W. & Associates  
 Griffiths, Ernest & Son

Hampton & Sons  
 Hannaford Upright  
 Hartfield Engineering Services  
 Herrington, E.W. & Partners  
 Hoare Lea & Partners  
 Homan, Seamus Associates  
 Hulley & Kirkwood  
 Humphries & McDonald, Sir Herbert  
 Hunter, Ian & Partners

IDC Consultants Ltd.  
 Isherwood, Boyd & Partners  
*Isherwood, Boyd & Atkinson*

James, R.T. & Partners  
 Jenner, David C. & Associates  
*C.B. Faulconbridge & Associates*

Johnson, W.F. & Partners  
*Johnson Partnership Overseas*  
 Justham, Rex & Associates

KSG Design Services Ltd.  
 Kennedy, Peter  
 King, Ralph T. & Associates  
 Klimaat  
 Kut, David & Partners

Lee, Terence Associates  
 Lewin, Kenneth  
 Lines, Peter & Partners  
 Love, John Kenneth  
*Nordale Associates*

MRM Partnership  
*Manders, Raikes & Marshall*  
 Mackay, Ian & Associates  
 Mackenzie, Douglas & Partners  
 Matthew, Robert, Johnson-Marshall  
 London Ltd.  
 McCann, M. & Partners  
 McEllan & Partners  
 Mechel Associates  
 Mecserve Associates  
*Sutch Coacher Partnership*  
 Miles, David & Partners  
 Mitchell, Dey, Norton & Partners  
 Mitchell Swain Associates  
 Moon, A.F.W. & Partners  
 Mott, Hay & Anderson Electrical &  
 Mechanical Services  
*Heap Laverack & Partners*  
 Munnery Design Associates  
 Murland & Partners

National Industrial Fuel Efficiency  
 Service Ltd.  
*Energy Users Research Association*  
*Ltd.*  
 National Utility Service Inc. (UK) Ltd.  
 Norman & Dawbarn Associates

O.S.V. Designs Ltd.  
 Ogle Jones Partnership  
 Orchard Partners

P.A. Technology Ltd.  
 Pashler Walton Partnership, The  
 Pearce, Edward A. & Associates  
 Pearce, Edward A. & Partners  
 Posford, Pavry & Partners  
 Preston, J. Roger & Partners  
 Price Grant Associates

Reid, Andrew & Partners  
*Andrew Reid - Robert Blower*  
*Partnership*  
 Richards, Round & Partners  
 Robb, A.E. & Associates  
 Ross, W.O. & Associates Pty Ltd.  
 Rudd, Donald & Partners

SSC Consultants Ltd.  
*Salem Al-Marzouk & Sabah AbiHanna,*  
*Kuwait*  
 Sampson, Derick & Partners  
 Sandy Brown Associates (MSU)  
 Schwarz, L.J. & Partners  
 Sealy, S.I. & Associates  
 Seifert Environmental Design Ltd.  
 Sibley Robinson Partnership  
 Smith, Donald, Seymour & Rooley

Snow, Sir Frederick & Partners  
 Soden, R.H.  
 Southern Heating Ltd.  
*Herbert & Lascelles Ltd.*  
 Steensen, Varming & Mulcahy  
 Partnership, The  
*SVM Services Ltd.*  
 Sutherland, C.M.J. Associates

TM Energy Ltd.  
 T.R. Technical Services  
 Tansey, Peter R. Esq.  
 Tilney Simmons & Partners  
 Traynor, J.N. & G. & Partners  
 Troup Bywaters & Anders  
 Tucker Associates  
*Tucker Associates Consultancy Ltd.*

Unilever Engineering  
 Universal Energy Ltd.

Varming, Mulcahy, Reilly Associates  
 Vervard Cater & Partners  
 Voce, Case & Partners

Wagrel, Martin Esq.  
 Wilson & Partners  
*Norman Ventilation Service*  
 Worthington, Gary

Zisman, Bowyer & Partners

#### Manufacturers

ACR Heat Transfer Manufacturing  
 Ltd.  
 AMF International Ltd.  
 Adrian Sheet Metal Works Ltd.  
 Advanced Air (UK) Ltd.  
 Airedale International Air  
 Conditioning Ltd.  
 Airflow Developments Ltd.  
 Andrews Industrial Equipment Ltd.  
 Armstrong World Industries Ltd.

B.G. Perimeter Systems Ltd.  
 Bahco Ventilation Ltd.  
 Barber & Colman Ltd.  
 Barlo Heating Ltd.  
*Barlo Products Ltd.*  
*Coppas Controls Ltd.*  
 Biddle, F.H. Ltd.  
 Boulter Boilers Ltd.  
 British Alcan Commercial Extrusions  
 Ltd.  
*Alcan Building Extrusions*  
*Alcan Systems*  
*British Aluminium Extrusions*  
*British Alcan Extrusions*  
*Almetex*  
*Minaltex*  
 British Steam Specialties Ltd.  
 Brooke Air Diffusion Ltd.

Clipper Air Handling Units Ltd.  
 Colt International Ltd.  
*Colt, W.H. (London) Ltd.*  
 Comyn Ching & Co. (Solray) Ltd.  
 Courtney Pope Lighting  
*Allom Lighting Ltd.*

Danfoss Ltd.  
 Dantherm Ltd.  
 Delrac Ltd.  
 Diffusion Environmental Systems Ltd.

- Drayton Controls (Engineering) Ltd.  
 Dunham Bush Ltd.  
 Dynamic Logic Ltd.
- Eaton Williams Group Ltd.  
*Eaton-Williams Service Ltd.*  
*Eaton-Williams Products Ltd.*  
*Precision Air Control Ltd.*  
*Vapac Humidifiers Ltd.*  
*Edenair Ltd.*
- Ellis Miller Ltd.  
 Eltron Ltd.  
 Environheat Ltd.
- Faral Tropical  
 Farr Europe  
 Fecon Ltd.  
 Fernox Manufacturing Co. Ltd.  
*Industrial Anti-Corrosion Services*  
 Fischer, George Sales Ltd.  
*George Fischer Castings Ltd.*  
*George Fischer Plastics Ltd.*
- Fläkt Ltd.  
*Fläkt Products*  
*Fläkt Environmental*  
*Fläkt Marine*
- Frenger Troughton Ltd.
- Gilberts (Blackpool) Ltd.
- H.C.P. Ltd.  
 Hamworthy Engineering Ltd.  
 Heating Aids (Coventry) Ltd.  
 Heatways Groups  
 Holmes Valves Ltd.  
 Honeywell Control Systems Ltd.  
 Horstmann Timers & Controls Ltd.  
 Howden, James & Co. Ltd.  
 Hunter International Ltd.  
*Greenwood Airvac Ventilation Ltd.*  
*Hunter Building Products Ltd.*  
*Ozonair Engineering Co. Ltd.*  
*Waterloo Grille Co. Ltd.*
- Imperial Metal Industries plc  
*IMI Range Ltd.*  
*IMI Marstair Ltd.*
- JEL Energy Conservation Services Ltd.  
 Johnson Control Systems Ltd.
- Kampmann (UK) Ltd.
- Landis & Gyr Ltd.  
 Laporte Industries Ltd.  
 Lee-Thompson (High Heat) Ltd.  
 Levermore, A. & Co. Ltd.
- McQuay Italia (UK) Ltd.  
*Advent Air Conditioning (Sales) Ltd.*  
*Klima-Therm (Distribution) Ltd.*  
*Girdwood Halton Air Conditioning Ltd.*  
*Mogul Air Conditioning Ltd.*
- Marley Extrusions Ltd.  
 Martingale Technical Services Ltd.  
 Metal Supplies Ltd.  
 Metrona Ltd.  
 Modular Developments Ltd.  
 Molyneaux, E.A. Ltd.  
 Monodraught Flues Ltd.  
 Monteith, K. Building Materials Ltd.  
*Rettig Ltd.*
- Myson Group plc
- Netaline ADP Ltd.  
 Noad, John (Ceilings) Ltd.  
*John Noad Consultants*  
*John Noad Ltd.*  
*John Noad (Building Environment) Ltd.*
- NuAire Ltd.  
*NuAire Contracts Ltd.*  
 Nu-Rad Ltd.
- PSDI (UK) Ltd.  
 Par Acoustics Ltd.  
 Phoenix Burners Ltd.  
 Property Mechanical Products Ltd.  
*Kensal Equipment Ltd.*  
 Pullen Pumps Ltd.  
*Pullen Products Developments Ltd.*  
*Pullen Foundries*
- Qualitair (Air Conditioning) Ltd.
- Ranger Instrument Co. Ltd., The  
 Red Bank Manufacturing Co. Ltd.  
 Rega Metal Products Ltd.  
 Reycol Service Company Ltd.  
 Ridge Tool UK  
 Royair Ltd.  
 Runtalrad (1970) Ltd.  
*Tube Rollers (UK) Ltd.*
- S & P Coil Products Ltd.  
 Sangamo Controls  
 Satchwell Control Systems Ltd.  
 Sauter Automation Ltd.  
 Selkirk  
 Sensotherm Europanel Ltd.  
 Siemens Ltd.  
 Sonning Heating Co. Ltd.  
 Sound Attenuators Ltd.  
*Sound Research Laboratories*  
*Sound Control Ltd.*
- Spur Engineering Ltd.  
 Staefa Control Systems (UK) Ltd.  
 Stelrad Group Ltd.  
*Hattersley Bros. Ltd.*  
*Ideal Boilers Ltd.*  
*Steel Radiators Ltd.*
- Stock Electronics Ltd.  
*Pacemaker Controls Ltd.*  
 Strax Distribution Ltd.  
 Strebel Ltd.
- TI (Group Services) Ltd.  
*TI Domestic Appliance Division*  
*TI Flexible Tubes Ltd*  
*Composflex Division*  
*UFM Division*  
*Powerflex Division*
- Toshiba (UK) Ltd.  
 Tour & Anderson Ltd.  
 Trend Control Systems Ltd.  
 Trox Brothers Ltd.
- Unitair Equipment (UK) Ltd.  
*Unitair Equipment (Europe) Ltd.*
- Veba Ltd.  
 Verrolec Ltd.  
 VES Andover Ltd.  
 Victaulic Company plc, The
- Warmastyle Ltd.  
 Wirsbo (UK) Ltd.  
 Woods of Colchester Ltd.  
*Keith Blackman Ltd.*
- Building Owner/Operators**  
 American Express Europe Ltd.  
 Anchor Housing Association  
*Bield Housing Association*  
*Corlan Housing Association*  
*Fold Housing Association*  
 Avon County Council  
 Ayrshire & Arran Health Board
- Bank of England, The  
 Barclays Bank plc  
 Bath City Council  
 Berkshire County Council  
 Boots Co. plc, The  
 Brewers' Society, The  
 British Broadcasting Corporation  
 British & Foreign Bible Society  
 British Railways Board  
 British Telecom plc
- Civil Aviation Authority  
 Corporation of London
- Emstar Ltd.  
 English Province of the Congregation  
 of the Daughters of the Cross  
 Essex County Council
- Gwent County Council
- Hampshire County Council
- IBM United Kingdom Ltd.  
 Imperial Chemical Industries plc
- Lancashire County Council  
 Land Securities (Management) Ltd.  
 Lewis, John plc  
 Lincolnshire County Council  
 Littlewoods Organisation plc, The  
 Lloyds Bank plc  
 London Borough of Camden  
 London Borough of Greenwich  
 London Borough of Hillingdon  
 London Borough of Hounslow  
 London Borough of Newham  
 London Borough of Tower Hamlets  
 London Borough of Wandsworth  
 London Hospital (Whitechapel), The  
 London Regional Transport
- Milton Keynes Development  
 Corporation  
 Mount Alvernia Hospital
- National Westminster Bank plc  
*City & West End Regional Premises Office*  
*South Regional Premises Office*  
*West Regional Premises Office*  
*North Regional Premises Office*  
*East Regional Premises Office*  
 Northamptonshire County Council  
 North Western Regional Health  
 Authority
- Oxford Regional Health Authority  
 Oxfordshire County Council
- Post Office
- Rank Holdings UK Ltd.
- Sainsbury, J. plc  
 Scottish Development Agency

South East Thames Regional Health  
Authority  
Sports Council, The

Thistle Hotels Ltd.

University of Oxford

Welsh Health Common Services  
Authority

Wessex Regional Health Authority  
Woking Borough Council

### Other Ordinary Members

A.H. Mechanical & Electrical Services  
Ltd.

*Solar/Cool (Films) Ltd.*

Air Conditioning Commissioning  
Services (J. Beharrell) Ltd.

Associated Heat Services plc  
*Energy & Building Management -  
Wakefield*

Bovis Construction Ltd.

British Airports Authority

British Board of Agrément

British Gas Corporation

British Steel Corporation

Building Services Publications Ltd.

Burgess, C.R. (Commissioning) Ltd.  
*Tecserve (Electrical) Ltd.*

Chartered Institute of Building  
Services Engineers, The  
C.T.S. Ltd.

*CTS (Western) Ltd.*

Commtech Ltd.

Conder Group Services Ltd.

Configuration Management Ltd.

Contract Technical Services Co., The  
Cory Heating Services

Dects Ltd.

EEG Ltd. (Microcomputer  
Enterprises)

Electricity Council

Entech Energy Consultants Ltd.

Federation of Environmental Trade  
Associations

Fisher Moore Associates Ltd.

Glynwed Consumer & Building  
Products Ltd.

Hollingsworth Associates

Industrial Development Board for  
Northern Ireland  
Irish Export Board, The

Kalamazoo plc

Laing Design & Development Centre

Maclean Hunter Ltd.

Miller, John & Associates

Mowlem Projects Ltd.

*Mowlem Building Ltd.*

*Mowlem Civil Engineering Ltd.*

*Mowlem Management Ltd.*

Paragon Commissioning Services

Pegler-Hattersley plc

Petrofina (UK) Ltd.

*Energy Equipment Co. Ltd.*

*Fina Chemicals Ltd.*

*Synfina (UK) Ltd.*

Phoenix Design Services Ltd.

*Air Conditioning Maintenance & Co.*

*Phoenix Building Services*

Pilkington Glass Ltd.

*Pilkington Insulation Ltd.*

*R & G Latham (Pilkington Group)*

Piscean Analytical Ltd.

Potterton Energy Developments Ltd.

S.M. Services Southern Ltd.

*John Male Associates*

*Services Design Partnership*

Shell UK Oil

Shearring, Dr. H.A.

Ship Shore Services

South of Scotland Electricity Board

Southern Commissioning Services

Taylor & Stapleton Engineering Ltd.

*Taylor & Stapleton (Publications) Ltd.*

Topicplan Services Ltd.

3M United Kingdom plc

United Kingdom Atomic Energy  
Authority

Wang Laboratories, Scotland

Whitehaven Ltd.

Wimpey Construction Management

### Associate Members

Brighton Polytechnic

Building Management Authority of  
Western Australia

Building Research Association of New  
Zealand

Chase Manhattan Bank N.A., The

City of Birmingham Polytechnic

Commonwealth Scientific &  
Industrial Research Organisation,  
Australia

Consumers' Association

Cranfield Institute of Technology

Department of Housing &

Construction, Australia

Dublin Public Libraries

*Bolton Street College of Technology  
Library*

Essex Institute of Higher Education

Faculty of Mechanical Engineering  
and Naval Architecture, Zagreb,  
Yugoslavia

Finco Engineers - Nigeria

Forbes, G.A.

GDC Inc., USA

Gloucestershire College of Arts and  
Technology

Hong Kong Polytechnic

Hudevad Britain

Kingston Polytechnic

Leicester Polytechnic

McDonnell Douglas Information  
Systems Ltd.

Marcq & Roba, Belgium

Ministry of Works & Development,  
New Zealand

Napier College

National Building Research Institute,  
South Africa

Newcastle upon Tyne Polytechnic

Ngee Ann Polytechnic, Singapore

Norwegian Ventilation and  
Energytechnical Federation

Oxford Polytechnic

Paisley College of Technology  
Polytechnic of the South Bank

Royal Holloway and Bedford New  
College

Samuelsson-Brown, G.F.  
Scott Sutherland School of  
Architecture

Sheffield City Polytechnic

Shipowners Refrigerated Cargo

Research Association

Slough College of Higher Education

Tasmania State Offices Library,  
Australia

Thames Polytechnic

TipData Ltd.

Trend Polytechnic

University of Technology, Bath

University College London

University of Glasgow

University of Leeds

University of Liverpool

University of Technology,  
Loughborough

University of Manchester

University of Nottingham

University of Reading

University of Surrey

University of Trondheim, Norway

Wolverhampton Polytechnic

ZMCK Consulting Engineers -  
Zambia

### Quasi-Membership

Department of Education & Science

Department of Energy

Department of the Environment

*Building Research Establishment*

*Property Services Agency*

Home Office

Ministry of Agriculture, Fisheries &  
Food

Ministry of Defence, Procurement  
Executive

# Accounts for the 52 weeks ended 30 March 1986

## Income and Expenditure Account for the 52 weeks ended 30 March 1986

	Notes	52 weeks ended 30 March 1986 £	52 weeks ended 31 March 1985 £
INCOME	2	1,680,777	1,502,324
DIRECT EXPENSES	4	<u>1,466,835</u>	<u>1,368,724</u>
SURPLUS OF INCOME OVER DIRECT EXPENSES		213,942	133,600
ADMINISTRATION EXPENSES	5	<u>146,552</u>	<u>140,956</u>
OPERATING SURPLUS/(DEFICIT)		67,390	(7,356)
OTHER INCOME Rent receivable		<u>25,000</u>	<u>19,404</u>
SURPLUS OF INCOME OVER EXPENSES, transferred to General Fund	11	<u>£92,390</u>	<u>£12,048</u>

The accompanying notes are an integral part of these accounts.

### Report of the Auditors

To the Members of The Building Services Research and Information Association

We have audited the accounts on pages 22 to 27 in accordance with approved Auditing Standards.

In our opinion, the accounts, which have been prepared as in previous years under the historical cost convention, give a true and fair view of the state of the Association's affairs at 30 March 1986 and of its excess of income over expenditure and source and application of funds for the 52 weeks then ended and comply with the Companies Act 1985.

37 Minster Street  
READING  
RG1 2RY



CLARK WHITEHILL  
Chartered Accountants  
24 July 1986

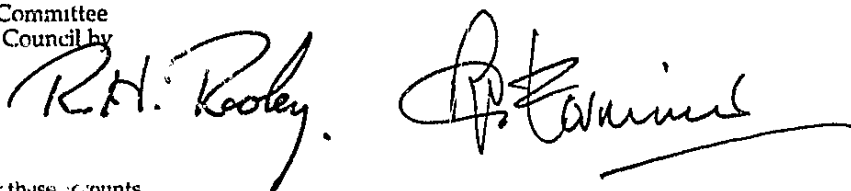


# Balance Sheet at 30 March 1986

	Notes	£	1986 £	1985 £
<b>FIXED ASSETS</b>				
Tangible assets	1d & 6		424,858	<u>449,562</u>
<b>CURRENT ASSETS</b>				
Stocks, Work-in-progress	1f & 7	17,003		21,177
Debtors	8	636,365		449,470
Cash in hand		<u>2,145</u>		<u>2,444</u>
		<u>655,513</u>		<u>473,091</u>
<b>CREDITORS: amounts falling due within one year</b>				
Bank loans and overdrafts		112,916		160,469
Creditors	9	<u>531,160</u>		<u>384,993</u>
		<u>644,076</u>		<u>545,462</u>
<b>NET CURRENT ASSETS/(LIABILITIES)</b>			<u>11,437</u>	<u>(72,371)</u>
<b>TOTAL ASSETS LESS CURRENT LIABILITIES</b>			436,295	<u>377,191</u>
<b>CREDITORS: amounts falling due after more than one year</b>				
Bank loan	10	147,500		166,000
Other creditors		<u>12,942</u>		<u>27,728</u>
			<u>160,442</u>	<u>193,728</u>
<b>NET ASSETS</b>			<u>£275,853</u>	<u>£183,463</u>
<i>Represented by:</i>				
<b>CAPITAL AND RESERVES</b>	11			
Capital fund			47,285	47,285
General fund			<u>228,568</u>	<u>136,178</u>
<b>TOTAL FUNDS OF THE ASSOCIATION</b>			<u>£275,853</u>	<u>£183,463</u>

Approved by the Management Advisory Committee  
on 23 July 1986 and signed on behalf of Council by

R.H. ROOLEY  
R.G. FARMINER



The accompanying notes are an integral part of these accounts.

# Statement of Source and Application of Funds for the 52 weeks ended 30 March 1986

	£	52 weeks ended 30 March 1986	£	52 weeks ended 31 March 1985	£
<b>SOURCES</b>					
Surplus of income over expenses			92,390	<u>12,048</u>	
Adjustment for items not involving the movement of funds:					
Depreciation	99,755			75,389	
Profit on disposal of fixed assets	<u>(487)</u>			<u>(268)</u>	
Funds generated from operations			99,268	<u>75,121</u>	
			191,658	<u>87,169</u>	
<b>OTHER SOURCES</b>					
Sale proceeds of fixed assets			10,999	<u>1,550</u>	
			<u>202,657</u>	<u>88,719</u>	
<b>APPLICATIONS</b>					
External applications:					
Repayments of medium term loan	18,500			18,500	
Capital expenditure	<u>85,563</u>			<u>117,292</u>	
			104,063	<u>135,792</u>	
<b>INCREASE/(DECREASE) IN WORKING CAPITAL</b>					
Work-in-progress	(4,174)			(6,689)	
Debtors	186,895			34,283	
Creditors: amounts falling due within one year, excluding bank loans and overdrafts	<u>(146,167)</u>			<u>(36,672)</u>	
Decrease / (Increase) in Creditors: amounts falling due after more than one year, excluding bank loans			36,554	<u>(9,078)</u>	
			14,786	<u>(26,872)</u>	
			<u>155,403</u>	<u>99,842</u>	
<b>(INCREASE)/DECREASE IN NET SHORT TERM BORROWING</b>			<u>£47,254</u>	<u>£(11,123)</u>	
<i>Reflected in:</i>					
Bank overdraft			47,553	(10,307)	
Cash balances			<u>(299)</u>	<u>(816)</u>	
			<u>£47,254</u>	<u>£(11,123)</u>	

The accompanying notes are an integral part of these accounts.

## Notes to the Accounts

### 1. ACCOUNTING POLICIES

The principal accounting policies of the Association are set out below.

- (a) **Accounting Basis**  
These accounts have been prepared under the historical cost convention.
- (b) **Subscriptions, Quasi-Membership Payments and Sponsorship Contracts**  
Subscriptions and quasi-membership payments and sponsorship contracts are credited to the Income and Expenditure Account in the year to which they relate.
- (c) **Government Contracts, Equipment and Consultations**  
Interim and final accounts for Government contracts, equipment testing and consultations are credited to the Income and Expenditure Account in the year in which they are receivable.
- (d) **Fixed Assets**  
Fixed assets are included in the Balance Sheet at cost of purchase less accumulated depreciation.
- (e) **Depreciation**  
Depreciation is provided in equal annual instalments over the following terms:
 

Leasehold premises	- First fifty years of ninety-nine year lease expiring 2058
Plant and machinery	- Five years
Office furniture and equipment	- Ten years
Motor vehicles	- Five years
Computer equipment	- Three years (During the year the Association re-assessed the working life of computers as a result of which computers are now written off over three years instead of five.)
- (f) **Work in Progress**  
Work in progress is valued at the lower of cost and net realisable value. Cost comprises materials, direct labour, expenses and overheads.

### 2. INCOME

	52 weeks ended 30 March 1986 £	52 weeks ended 31 March 1985 £
Subscriptions, quasi-membership payments and sponsorship contracts (notes 1b & 3)	457,123	349,146
Repayment income (note 1c)	1,193,157	1,126,835
Other income (publications, royalties, etc.)	30,497	26,343
	<u>£1,680,777</u>	<u>£1,502,324</u>

### 3. SUBSCRIPTIONS, QUASI-MEMBERSHIP PAYMENTS AND SPONSORSHIP CONTRACTS

	£	£
Members' subscriptions	192,427	182,413
Quasi-membership payments		
DoE	15,705	15,000
Other Government departments	5,461	4,424
Sponsorship contracts - DoE	232,530	147,309
Other	11,000	-
	<u>£457,123</u>	<u>£349,146</u>

### 4. DIRECT EXPENSES

	£	£
Salaries (note 5)	399,966	363,450
Direct expenses - Repayment	173,084	182,386
Direct expenses - Membership/Sponsorship	114,068	71,147
Decrease in work in progress	4,174	6,689
Overheads apportioned as direct (note 5)	775,543	745,052
	<u>£1,466,835</u>	<u>£1,368,724</u>

**5. ADMINISTRATION EXPENSES**

	52 weeks ended 30 March 1986 £	52 weeks ended 31 March 1985 £
<b>Staff costs</b>		
Salaries	744,214	736,147
Social Security costs	56,927	56,671
Other pension costs	90,498	79,298
Other staff costs	17,145	43,127
	<u>908,784</u>	<u>915,243</u>
Less: Direct salaries (note 4)	<u>399,966</u>	<u>363,450</u>
	<u>508,818</u>	<u>551,793</u>
<b>Other costs</b>		
Bank interest:		
On facilities wholly repayable within five years	29,563	32,580
On other facilities	25,202	25,294
Depreciation	99,755	75,389
Auditors' remuneration	1,975	1,850
Other expenses	<u>256,782</u>	<u>199,102</u>
	<u>922,095</u>	<u>886,008</u>
Less: Overheads apportioned as direct (note 4)	<u>775,543</u>	<u>745,052</u>
	<u><u>£146,552</u></u>	<u><u>£140,956</u></u>

The Association has re-examined the allocation of overheads apportioned as direct in order to ensure that direct costs include all expenses incurred in connection with the provision of services to Members and repayment work. The effect of the re-allocation has been to increase direct expenses and reduce administration expenses by £134,234 (1985 £92,843).

The average number of staff employed during the period were as follows:

	1986 No.	1985 No.
Directorate	3	3
Administration	11	11
Operational	<u>64</u>	<u>65</u>
	<u>78</u>	<u>79</u>

**6. FIXED ASSETS**

	Leasehold Premises £	Plant and Machinery £	Office Equipment and Furniture £	Total £
Cost at 1.4.85	346,834	296,918	67,469	711,221
Additions	-	82,223	3,340	85,563
Disposals	-	(50,672)	(1,237)	(51,909)
At 30.3.86	<u>346,834</u>	<u>328,469</u>	<u>69,572</u>	<u>744,875</u>
Depreciation at 1.4.85	80,472	148,378	32,809	261,659
Charge for year	10,672	82,249	6,834	99,755
Disposals	-	(40,160)	(1,237)	(41,397)
At 30.3.86	<u>91,144</u>	<u>190,467</u>	<u>38,406</u>	<u>320,017</u>
Net Book Value at 30.3.86	<u><u>£255,690</u></u>	<u><u>£138,002</u></u>	<u><u>£31,166</u></u>	<u><u>£424,858</u></u>
Net Book Value at 1.4.85	<u><u>£266,362</u></u>	<u><u>£148,540</u></u>	<u><u>£34,660</u></u>	<u><u>£449,562</u></u>

**7. WORK IN PROGRESS**

	30 March 1986 £	31 March 1985 £
Cost	27,768	22,627
Less: Provision for losses	<u>10,765</u>	<u>1,450</u>
	<u><u>£17,003</u></u>	<u><u>£21,177</u></u>

NOTES TO THE ACCOUNTS *continued*

8. DEBTORS

	30 March 1986	31 March 1985
	£	£
Trade debtors	575,433	377,310
Other debtors	2,299	13,864
Prepayments and accrued income	58,633	58,296
	<u>£636,365</u>	<u>£449,470</u>

9. CREDITORS

	£	£
Trade creditors	101,801	90,819
Taxation - P.A.Y.E. & V.A.T.	78,710	48,976
Social Security	11,207	8,269
Other creditors	28,226	24,690
Deferred income - Subscriptions	157,924	145,341
Other	119,430	46,795
Accrued expenses	33,862	20,103
	<u>£531,160</u>	<u>£384,993</u>

10. BANK LOAN

The Association received a medium term bank loan of £240,000 from Barclays Merchant Bank Limited, repayable by 12 equal annual instalments commencing in August 1982 and final instalment of £18,000 in August 1994. The loan carries interest at a rate of 2½% over the Barclays Bank Base Rate. The purpose of the loan was to provide funds for the extension of the existing premises, it is secured by a legal charge over the leasehold land at Old Bracknell Lane West.

11. CAPITAL AND RESERVES

	Capital Fund	General Fund
	£	£
Balance 1.4.85	47,285	136,178
Transferred from Income and Expenditure Account	-	92,390
Balance 30.3.86	<u>£47,285</u>	<u>£228,568</u>

12. FUTURE CAPITAL EXPENDITURE

	30 March 1986	31 March 1985
	£22,144	£395
Contracted but not provided for	<u>£22,144</u>	<u>£395</u>
Authorised but not contracted for	<u>£NIL</u>	<u>£4,000</u>

13. TAXATION

The Association has been approved as a scientific research association under Section 362 of the Income and Corporation Taxes Act 1970 and is thereby exempt from those taxes.

# Council and Committees as at 31 March 1986

## The Council

### Representing Contractors

T.Q. Battle	TML Ltd.
K.R. Beck	MJN Ltd.
J.B. Deal	Haden Young Ltd.
D. Faithfull	Matthew Hall Mechanical & Electrical Engineers Ltd.
B.D. Fox	Balfour Kilpatrick Ltd.
S.B. Horrocks	Stuart B. Horrocks Ltd.
H. Howard	Harry Taylor Artifacts Ltd.
G.P. Manly	A.G. Manly & Co. Ltd.

### Representing Consulting Engineers

J.R. Briggs	J.R. Briggs & Associates
J. Campbell	Ove Arup Partnership
A.W. Knight	Hoare Lea & Partners
D.R. Oughton	The Oscar Faber Partnership
R.H. Rooley ( <i>Chairman</i> )	Donald Smith, Seymour & Rooley
C.P. Swain	Mitchell Swain Associates
G.S. Vincent	Building Design Partnership
D.W. Wood	Sir Alexander Gibb & Partners
C. Izzard	R.W. Gregory & Partners

### Representing Manufacturers

M.J. Bean	Honeywell Control Systems Ltd
R.H. Eaton-Williams	Eaton-Williams Group Ltd.
R.G. Farminer ( <i>Vice-Chairman</i> )	Dunham-Bush Ltd.
T.J. Smith	ACR Heat Transfer Manufacturing Ltd.
G.A. Topple	Landis & Gyr Ltd.

### Representing Other Ordinary Members

W.D. Griffiths	British Steel Corporation
E. Dance	British Gas Corporation
D.R. Russell	The Contract Technical Services Company
G. Aylott	Electricity Council

### Representing Building Owner/Operators

E.M. Davies	South East Thames RHA
P. Ibbotson	J. Sainsbury plc
T.A. Jones	Berkshire County Council
R.H.F. Taylor	British Railways Board
K.C. Viney	Oxfordshire County Council

### Nominated by the Department of the Environment

D.S. Ashworth	Property Services Agency
I.C. MacPherson	Construction Industry Research Unit
Dr. S.J. Leach	Building Research Establishment
J. Tory	Headquarters Staff ( <i>non-voting</i> )

### Nominated by the Chartered Institution of Building Services

D. Lush	Ove Arup Partnership
<i>Co-opted (non-voting)</i>	
R.G. Courtney	Department of Energy

## Management Advisory Committee

R.H. Rooley (*Chairman*)  
 G.F.W. Adler (*co-opted*)  
 R.G. Farminer  
 C. Izzard  
 C.P. Swain  
 D.P. Gregory (*ex officio*)

## Board of Assessors

C. Izzard ( <i>Chairman</i> )	H.E. Martin
G. Aylott	S.J. Leach
J.B. Deal	D.R. Oughton
R.H. Eaton-Williams	G.S. Vincent
J. Tory ( <i>representing DoE</i> )	K.C. Viney
P. Ibbotson	D.W. Wood
B. James	D.P. Gregory ( <i>ex officio</i> )
G.P. Manly	

## About BSRIA

The Building Services Research & Information Association is a collaborative Association which provides information and enquiry services, research and library facilities, expert staff and opinion, and conducts cooperative research projects for its members, who number about 500 firms, large and small. Areas of technical expertise include heating, ventilating, air movement, plumbing, air conditioning, energy conservation, building management, market projections, and materials. A staff of approximately 85 occupies 22,000 sq ft of laboratory and offices at Bracknell, Berkshire. Contract research services and the hire of instrumentation are offered to members and non-members. Membership of BSRIA is available, subject to approval of the BSRIA Council, to all firms operating in the Building Services field at an annual fee based on the size of the firm's operations. Membership of BSRIA offers access to the opinion and knowledge of the BSRIA specialist staff, participation in collaborative research, the receipt of a number of regular publications and research reports, free access to the enquiry service, use of the library loan service, and the provision of photocopies of reference material held in the library.

# BSRIA

The Building Services Research and Information Association  
Laboratories and Registered Offices:  
Old Bracknell Lane West  
Bracknell  
Berkshire  
RG12 4AH  
Tel: 0344 426511  
Telex: 848288 BSRIAC G  
A company limited by guarantee  
Registered in England No 632760