

THE ELECTRON

Issue 1

Spring 2009

WELCOME AND INTRODUCTION

Welcome to The Electron, the new look electronic newsletter for the Institute of Electronics.

The Institute was initiated in 1930 by a select group of scientists and engineers with a particular interest in the applications of high-frequency electricity, particularly in the field of telecommunications. The rapid growth of membership which followed ultimately brought together not only those with a primary interest in this field, but also many others who were concerned with other developments in the science of electronics.

The study of the electron, from which this newsletter takes its name, became a matter of importance to members, which later resulted in the scope of the institute being widened beyond the field of telecommunications to include all subjects which come together under the general title of the science of electronics. The name of the Institute, The Institute of Electronics, therefore came to represent this general range of subjects and the practitioners within them.

Within such a general range of subjects it is inevitable that various specialisms will exist, and these are grouped according to whether they fall under the division of Physics, Applied Electronics, or Electro-therapeutics. These divisions are, however, combinable to the extent that members of one group who have an interest within another would naturally be invited to participate in the activities of both.

OBJECTS OF THE INSTITUTION

The objects of the Institution may be summarised as follows:

To promote information in the science of electronics and other specific subjects through lectures, discussions, publication of papers and correspondence with public bodies and individuals.

To encourage the study of electronics and related scientific subjects, and to promote improvements and facilities for practising the science of electronics.

To promote the efficiency and usefulness of the professions of the science of electronics by establishing a high standard of professional and general education and knowledge.

In order that the above objects can be achieved the Institute provides the following services:

Provision of meetings for reading, lecturing and discussing matters which bear upon the science.

The holding and promotion of examinations for those engaged in or interested in the science who wish to become certificated members of the Institution.

The holding and promotion of relevant exhibitions and conferences.

Establishment of a library of books, literary works, manuscripts and papers of relevance to the profession.

Establishment of a representative journal for the publication of learned papers in the field of electronics.

CONSTITUTION AND MEMBERSHIP

The membership of the Institution consists of Corporate Members (Fellows, Members and Associate Members), and Non-corporate Members (Companions, Associates, Graduates and Students).

Each member's liability in the event of winding up or dissolution of the Institute is limited to the sum of one pound.

The abbreviations for the above grades of membership are: F. Inst. E (Fellow); M. Inst. E. (Member); A.M. Inst. E. (Associate Member); Comp. Inst. E. (Companion); A. Inst. E. (Associate); and Grad. Inst. E. (Graduate).

Honorary members may prefix the abbreviation 'Hon' to the above quoted abbreviation for their appropriate grade.

FEES AND SUBSCRIPTIONS

Unless otherwise decided by the General Council, the fees for the various classes of membership are as follows:

£30.00 Entrance Fee and £40.00 Annual Subscription for Ordinary Fellows, Members and Associate Members.

£30.00 Entrance Fee and £30.00 Annual Subscription for Companions, Associates, and Graduates.

£8.00 Entrance Fee and £8.00 Annual Subscription for Student Members.

The minimum subscription payable prior to enrolment is that for one year, except that:

Members elected after 1st. July in any year shall only be required to pay half of the appropriate annual subscription for the current year if, at the same time, they pay the full subscription for the following year.

Members elected after 1st. October in any year shall only be required to pay one quarter of the appropriate annual subscription for the current year if, at the same time, they pay the full subscription for the following year.

Persons wishing to transfer from one grade to another shall pay in advance the entrance fee for the higher grade, together with the difference between the two annual subscriptions for the remaining fraction (to the nearest quarter) of the current Institution year. Election to membership is conditional upon all entrance fees and annual subscriptions being paid as appropriate.

All annual subscriptions fall due on January 1st. of the Institution year commencing on that day, although the Council reserves the right to amend this date of payment.

New members joining now are guaranteed no change in subscription for life provided that they pay annually by standing order and that no payments are missed.

INCORPORATION OF THE INSTITUTION

The Institute of Electronics was incorporated by the Board of Trade on 28th. August 1935, as a company limited by guarantee, and is also a registered educational charity.

The Institution is managed by a Council of Corporate Members, together with its Honorary Treasurer and Secretary. The Honorary Treasurer and Secretary are appointed by the Council, which is itself elected by at the Annual Ordinary General Meeting, with one third retiring each year, but being eligible for re-election.

Tax Relief for Members

The Commissioners of the Inland Revenue have approved the Institution of Electronics for the purposes of Section 16 of The Finance Act 1958, such that the whole of the annual subscription paid by a member who qualifies for relief under that Section will be allowable as a deduction from his or her emoluments assessable to income tax deductions under Schedule E.

A member who is entitled to the tax relief should apply to his or her tax office for form P358 on which to make a claim for relief due.

FURTHER RESOURCES

In addition to the above, the Institute offers the following resources:

Skills training – e-learning at affordable prices.

Search engines – links to major search engines to allow websites to be easily accessed.

Electron Job Search – established by the Institute’s human resources team to assist those seeking to fill vacancies, as well as those seeking jobs in the electronics field.

Utility Warehouse – a scheme to help save money on telephone calls, mobile phone calls, gas and electricity.

Storeplus – for on-line purchasing of goods and services.

C.V. publishing – free for members (£16 for non-members).

Weather and satellite links – including Inshore Waters 24 hour forecast, satellite images, and R.N.L.I. Weather.

Links to other sites – including Applegate (with information on over 150,000 companies cross-referenced to over 26,000 products), as well as the Japan Journal, G.E.C. publications archive, Marconi calling (dedicated to the life, science and achievements of Guglielino Marconi), The Institution of Electrical and Electronic Engineers, The Institution of Electrical Engineers, The World’s Computer Society, The British Computer Society, The Foundation for Science and Technology (a neutral platform for the debate of policy issues that have a science, engineering or technology element), The Chartered Institution of Building Services Engineers, and The Electronics and Telecommunications Research Institute located in Taejon in Korea.

APPLYING FOR MEMBERSHIP

The membership criteria for the Institute of Electronics are as follows:

Fellows:

Should be at least 30 years of age

Should have passed the Institute’s examination for Fellowship, or possess academic or technical qualifications equivalent to an honours degree from a British university in Electronics, Physics, or Electrical Engineering, or have submitted a thesis or dissertation that the Council has approved.

Should have been engaged in a branch of electronic science or its application for at least ten years.

Should have held a position of superior responsibility in a branch of electronic science or its application for at least five years, or have carried out work or research of importance in such a field for an equivalent period.

Alternatively an applicant for Ordinary Fellowship may have been a member for at least ten years, have been engaged in a position of superiority in some field of the science of electronics and its application, or who, in the opinion of the Council, possesses such qualifications as shall merit the distinction of Fellowship. If deemed necessary the examination for Fellowship may be required to be taken.

Members

Should be at least 25 years of age.

Should have passed the Institute's examination for Full Membership or such other examinations (such as Graduateship of a British university in Electronics, Physics, or Electrical Engineering, or an H.N.C/H.N.D. plus two endorsements), or have submitted a thesis or dissertation that is approved by the Council.

Should have been engaged in a branch of electronic science or its application for at least five years.

Should have held a position of responsibility in a branch of electronic science or its application for at least three years, or have carried out work or research of importance in such a field for an equivalent period.

In special circumstances only, the Council may waive one or more of the above requirements.

Associate Members

Should be at least 22 years of age.

Should have passed the Institute's examination for Associate Membership, or equivalent other examinations (such as H.N.C. or C.G.L.I.), or submits a dissertation that is approved by the Council.

Should have been engaged in a branch of electronic science or its application for at least five years.

The Council may accept extensive practical experience in lieu of the qualifications stated above.

Companions

Should be at least 35 years of age.

Should have either rendered important services to electronics or allied sciences, but not necessarily in a technical capacity, or have attained a high degree of responsibility in the electronics or allied industries.

Associates

Should be at least 21 years of age.

Should have passed the Institute's examination for Associateship, or such other examinations (such as O.N.C./O.N.D. or C.G.L.I.) or have submitted a thesis or dissertation that the Council approves.

Should have been engaged in a branch of electronic science, or its application for at least three years.

Alternatively, an applicant may be accepted if he or she is at least 21 years of age, has been involved in electronics for at least three years, and is adequately qualified in his or her discipline.

Graduates

Should be at least 20 years of age.

Should have passed the examinations as specified for Full Member.

Should be regularly acquiring practical experience in the science of electronics and its application that will eventually justify the upgrade to Full Member.

Students

Should be at least 16 years of age.

Should have passed the Preliminary Examination of the Institution or equivalent.

Should be receiving regular training in the science of electronics and its application.

Should intend to satisfy the conditions of election to Graduate as above.

On attaining the age of 25 Student Members are requested to have qualified for and applied for a higher grade of membership.

Fees for Dissertation and Thesis Assessments

The adjudication fees for a thesis or dissertation for the various grades of membership shall be a sum equal to the entrance fee for the grade of membership requested by the applicant, unless otherwise determined by the Council. This fee shall be non-returnable whether or not the application is successful.

Where an applicant chooses to submit a thesis or dissertation in place of technical qualifications, this should be a reasoned account of work done by the candidate, or a critical review of a field of knowledge. A mere account of the work of someone else will not be accepted. In the first instance a short synopsis of not more than 600 words should be submitted for approval.

Membership Election and Transfer

Each applicant for Full Membership is required to be sponsored, from personal knowledge, by two Corporate Members of the Institution, at least one of whom should be a Full Member. Each applicant for membership as an Associate Member, Companion, Associate, Graduate or Student must be sponsored from personal knowledge by two responsible persons who should preferably be Corporate Members of the Institution. The Council retains full discretion with regard to the admission of any person to membership.

At the discretion of the Council, a properly qualified person may, on application, be transferred from one grade of membership to another. Such application should be sponsored in the same way as an application for election to the class of membership selected.

THE MODERN INSTITUTE OF ELECTRONICS

It is now 78 years since The Institute of Electronics was first initiated, and the science of electronics and its application has advanced enormously. Thermionic valves and telegraphs have given way to silicon chips and mobile phones, whilst fields of application have extended to include such areas as long-range weather forecasting, computer aided design, life support systems, air traffic control networks and space probes. The information age has dawned and it now impacts daily on everyone's lives. Personal computers, laptops, and e-mails are a part of everyday life for most people, with the internet providing the power to download the information we need in an instant, thanks to search engines and readily accessible websites.

With this growth in technology comes a need for continual research and development, with both breakthrough improvement and incremental improvement in both the science and application of electronics. The invention of the transistor, for example, was a breakthrough in its time, whilst incremental improvements in application have, over the years, transformed paper-based systems, such as those used in stock control, into far more efficient and less labour intensive systems. Computers, likewise, have moved from large mainframes to modern p.c.s and laptops with many more times the amount of memory.

For The Institute of Electronics this is all good news, as members are able to cross-fertilise ideas, and benchmark, in order to further generate new applications, foster innovation and disseminate best practice. Gone are the days where practitioners sit in isolation. With the Institute's networking facilities ideas may be developed and exchanged at the push of a button.

In future issues of The Electron The Institution of Electronics will be looking to harness the knowledge and expertise of both members and potential members so as to drive innovation and the pursuit of best practice within the electronics industry. By sharing knowledge and working together with our sponsoring organisations, the electronics industry can continue to think in terms of what is possible as well as what is, helping to reverse the trend of economic downturn.

IDEAS PLEASE

Contributions of ideas, whether technical or applications based, would be very much welcomed by the editor for future publication in a special section of The Electron which will be devoted particularly to ideas generation and knowledge sharing.

News from the education sector would also be very much welcomed, as it is from here that the ideas for industry most often stem. In this regard the editor hopes to include a 'Bright Sparks' column to publicise the ideas and achievements of schoolchildren, many of whom no doubt will have a flair for electronics, which our Council would be delighted to recognise.

FUN AND GAMES

Science can be fun as well as having its serious side, and the science of electronics is no exception. So, let's show off a few things. The practical side of electronics can be both entertaining and interesting, and it is proposed that at some stage, given sufficient contributions, that an exhibition may be staged to show ideas in practice, particularly from schools, colleges and universities, but contributions from individuals and families will also be welcomed to add to the fun.

Robot Wars challenge is being notably considered as a central feature of this event, and would take the form of a mini version of the popular TV series.

EXHIBITION AND CONFERENCE

More generally, it is anticipated that a full supporting exhibition and conference would be organised, allowing members to meet one another, other than at their computer, and be able to socialise also. Electronics and computer personnel are known for living with a higher than average degree of isolation in their working lives, and it is hoped that the new-look Institute of Electronics will be able to help remove some of the barriers and provide a relaxed and friendly forum for discussion.

SPECIAL INTEREST GROUPS

Is anyone interested in establishing Special Interest Groups within the Institute? Possible areas include the public sector, transport, electricity industry, process industries, computers and I.T., and manufacturing, all of which have an interest in improving the reliability, efficiency and performance of electronic equipment.

There would be no additional fees for members for joining the S.I.G.s, although non-members would be requested either to join the Institute or pay a contribution fee.

THE ARKWRIGHT SCHOLARSHIP SCHEME

The future prosperity of the country depends upon encouraging talented young individuals to consider careers in the field of design and engineering so as to provide the much needed engineers of the future, and the Arkwright Scholarship Scheme is designed to encourage and stimulate high calibre 15 and 16 year old students to take up engineering and technological careers by awarding scholarships during A Level / Scottish Highers which are funded by industry partners and charitable trusts.

The Arkwright Scholarship Trust is a registered charity (1091988) which was established in 1991, and since then 1396 scholarships have been awarded.

The work of the Trust is managed by two full-time members of staff and two part-time members (Chief Executive, Manager Charity Relations, Administration Manager, Administration Clerk). In addition there is a Board of Trustees which includes 9 trustees. There is also a non-remunerated Advisory Group (7 members) and a volunteer Working Group of current Design and Technology teachers who assist in the selection process (4 members). Arkwright also has 10 regional liaison officers who are paid a small honoraria and expenses to mentor the scholars and visit schools.

The Arkwright Scholarships Trust works with schools and scholars in England, Scotland and Wales and all members of staff have been checked by the C.R.B. The Emmott Foundation, The Dulverton Trust, The Ernest Cook Trust, and the S.F.I.A. Trust are among the key charity and trust sponsors. Rolls Royce, Lloyds Register and National Grid are major sponsors from industry, together with support from The Royal Navy, R.A.F. and C.I.T.B. The Arkwright Scholarships Trust works closely with its industry partners, many of whom are keen to provide its scholars with valuable work experience as part of its Adopt a Scholar scheme.

The Arkwright Scholarships Scheme aims to improve the quality, breadth and relevance of learning for young people by ensuring that sufficient support and status is afforded to an area of study which is suffering from poor public perception. Many high ability students who would be interested in engineering and technology do not make the best option choices due to:

Poor perception of engineering as a good career choice for the able pupil – A careers survey published by Roffey Park Management Institute provides evidence from young people of the unfashionable nature of engineering as a career.

Teachers are unclear about pathways open to their pupils to enter engineering and technology careers and what qualifications are best suited to this.

There is a lack of work-based learning – research conducted on behalf of the Engineering Technology Board suggests that “without exposure to engineering workplace equipment, workflows and disciplines, qualification holders are often found to be inadequately equipped with the skills engineering employers seek”.

There is a lack of role models – the relative invisibility of careers in engineering and technology has the effect of creating significant mis-conceptions about potential career pathways, particularly for girls.

Perceived inequality – girls are still less likely to consider a career in engineering (SEMTA: Views of Engineering as a Career, 1998, 2001).

Equality of access – Arkwright believes that all young people, whatever their background, should be encouraged to excel in the field of engineering and technology and are proud that many current and ex-scholars have come from a variety of backgrounds and cultures.

The Arkwright Scholarships Trust aims to raise the profile and status of engineering through the Scholarships Scheme and Arkwright Liaison Officers work with schools and teachers to raise awareness of current opportunities. Arkwright also runs an Adopt a Scholar Scheme which ensures that each scholar is ‘adopted’ by an industry partner who can offer invaluable work-based learning. The growing Alumni website aims to provide scholars past and present with an additional network of support and shared experience, and marketing materials and case studies all feature the experiences of young men and women in an attempt to encourage applicants.

Each scholarship brings with it a number of benefits:

Benefits to the scholar.

Benefit to the school, and, in particular, the Design and Technology, Maths and Science departments.

Benefit to peers in the provision of good role models.

Benefit to the future economy.

Applying for Arkwright

The Arkwright Local Liaison Officers work with interested schools so that they may be placed on an accredited list. Currently there are over 500 accredited schools in England, Scotland and Wales. In order to be considered for membership of the Arkwright Scholarship Scheme schools need to have:

A Level / Scottish Standard Grade students studying Design and Technology.

Staff teaching Design and Technology or engineering related subjects at A2.

A head teacher who is a strong supporter of Design and Technology in the curriculum.

The authorised school list is reviewed on an annual basis as some schools do not apply year-on-year, as they do not have the right calibre of students. All new schools are visited by a regional Liaison Officer.

Schools nominate possible candidates who then sit the Selection Aptitude Paper in their school. This paper is set by a voluntary group of Design and Technology teachers who are currently teaching and are aware of the needs of the curriculum. A

proportion of these candidates are subsequently interviewed at university venues around the country. The schedule includes a team building exercise and tour of the engineering department as well as the interview. Parents are invited to participate in the tour, and the scholarships are awarded at a high profile Awards Day Ceremony. The scholarship covers a period of two years, beginning when scholars embark on their A Level courses.

Arkwright Sponsorship

Arkwright is keen to increase its level of sponsorship in 2009 – 10, and The Institute of Electronics sponsors Arkwright through The Institute of Electronics Arkwright Scholarship.

Each Arkwright Scholarship is £1,800 spread over two years. It is broken down into costs as follows:

£500 for scholar

£450 for school

£850 for added value i.e. mentoring, Adopt a Scholar Scheme and Alumni website.

Benefits to sponsors are:

An opportunity to identify and influence quality young people at an important stage in their education.

Access to the Alumni website to contact all past scholars to enhance the profile of the sponsoring organisation.

An opportunity to promote graduate and post-graduate sponsorship or employment opportunities on the Alumni website.

Raised profile in the community by working with local schools.

Further Information

Further information about the Arkwright Scholarship Scheme may be obtained from The Arkwright Scholarships Trust, Holly House, 74 Upper Holly Walk, Leamington Spa, Warwickshire, CV32 4JL. Telephone: 01926 333210. E-mail: jclark@arkwright.org.uk.

THE INSTITUTE OF ELECTRONICS ARCHIVING PROJECT

The Institute has, this year, begun the process of constructing an archive database for its members. These include a variety of learned papers from the 1950s to 1970s

extracted from selected issues of The Institution of Electronics Journal. Issues that have been archived to date include papers from the years 1958, 1961 and 1974.

ELECTRON FEATURES

In addition to case studies and areas of specialised interest, The Electron hopes to provide a number of general features for the benefit of members. These are:

An advertising section for both members and non-members (rates yet to be determined).

A jobs section for both members and non-members.

A CV section for those wishing to post their CV for the attention of prospective employers in the electronics field.

A members section for individuals and organisations to publicise their achievements or request information.

A Forthcoming Events section informing members of events around the country that may be of interest.

A training news section bringing news and views from the various Institution training centres.

Anyone wishing to post information in any of these sections should contact the editor, jim@spirecity.go-plus.net.

NEW BOOK ACQUISITIONS

The Institute is pleased to announce the acquisition of the following archive books in 2009:

Transistor Manual Light – Weight Edition (Seventh Edition), by various authors, Edited by J.F. Cleary and published in 1964 by the Semiconductor Products Department, Advertising and Sales Promotion, General Electric Company, Electronics Park, Syracuse, New York.

The book covers Basic Semiconductor Theory; Small Signal Characteristics; Large Signal Characteristics and Transistor Choppers; Biasing and D.C. Amplifiers; Logic, Switching Characteristics; Digital Circuits; Oscillators; Feedback and Servo-amplifiers; Regulated D.C. supplies; Audio and Hi Fidelity Amplifier Circuits; Radio Receiver Circuits; Unijunction Circuits; Tunnel Diode Circuits; Experimenter Circuits; Silicon Controlled Switches; Silicon Digital Diodes and Snap Diodes; Transistor Measurements; The Transistor Specification Sheet and Specifications; and Application Literature.

Mullard Reference Manual of Transistor Circuits, First Edition, 1960.

The book covers The Junction Transistor; New Techniques; Static Characteristic Curves; Small-signal Characteristics; Basic A.C. Circuits; Transistor as a Current Network; Bias and Stabilisation; Equivalent Circuits; Limiting Values; Semiconductor Diodes; The Phototransistor; Audio Amplifier Stages; Class A Output Stages; Class B Push-pull Output Stages; Hearing Aids; Low-power Audio Amplifiers; Public Address Amplifiers; I.F. Amplifier for 470 kc/s; Radio Receivers; 4W 500 kc/s Transmitter; Tuned Oscillators; Phase-shift Oscillators; Transistor as a Switch; Pulse Circuits; D.C. Amplifiers; D.C. / D.C. Converters; Protection Circuit for Stabilised D.C. Power Supply; 1000 c/s Oscillator and Tuned Amplifier for H.F. Measurements.

Computers Self-taught through Experiments by Jack Brayton, published by W. Foulsham and Co. Ltd., 1966.

The book covers The Binary Number System; Basic Computer Functions; Pulse Shaping Circuits; Transistor Facts; Pulse-generating Circuits; Experiments with Logic Circuits; Transistor Logic Circuits; Logic Adders; Logic Subtracters; Matrix Circuits; The Versatile Flip-flop; Flip-flop Adders; Flip-flop Subtracters; Counters and Sequence Generators; Shift Registers and Ring Counters; Elements of Memory Circuits; Read-In Circuits; Read-Out Circuits and Building a Calculator.

High Speed Computing Methods and Applications by S.H. Hollingdale, published by The English Universities Press Limited, 1959.

The Book covers Computing and Computing Machines; Representation of Numbers in an Automatic Computer; Introduction to Programming; The Pioneer Stage; EDSAC- A Single-address Sequential Computer; DEUCE- A Multiple-address Non-sequential Computer; Storage Devices; Logical Design of Computing Circuits; The Operation of a Computing Service; Applications of Automatic Computers; The Monte Carlo Method; The Control of Industrial Processes by Computers and Machine Translation of Languages.

An Introduction to Electronics by B.V. Rollin, published by Oxford University Press, 1964.

Originally intended for students of physics and engineering from first year undergraduate to graduate level, the book covers Linear Circuit Theory; Circuit Elements; Vacuum Tubes; Vacuum Tube Amplifiers and Oscillators; Non-Linear Circuits; Rectification and Mixing; Semiconductors; Semiconductor Devices and Circuits; Noise; Negative Feedback; Very High Frequencies; Receivers; Infra-Red and Optical Frequencies; Radiation and Propagation; Measuring Equipment and some classical experiments.

Further Information

These and other titles held by the Institute may be borrowed or purchased from the Institute. Those interested should contact the editor jim@spirecity.go-plus.net.

FREE BOOKS FOR NEW MEMBERS

As a special offer to all members who join The Institution of Electronics in 2009, the Institute is offering one free copy of 'Quality Matters: The Decade of Quality 1989-2000' by G.J. Clark, published by Spire City Publishing (ISBN 1-904208-02-09).

The book covers ISO 9000; Health, Safety and Environment; Business Excellence; Benchmarking; Teamwork; Innovation and Creativity; Achieving Transformation (applying the Deming theory of management); Quality Methods and Tools; Measurement and Reliability; Customer Satisfaction; Human Resources Development and the Learning Organisation; Information Technology; Quality in the Financial Sector; Improving Quality in Education; Quality and the Small Business and numerous miscellaneous articles.

The book is hardback and is intended as a reference work for students of Business and Management. It consists of 1070 pages of text and 48 illustrations. Papers of particular interest to the electronics industry include Sharp Electronics U.K. case study; D2D European Quality Award winning presentation (1994); Texas Instruments Europe European Quality Award presentation (1995); Honeywell case study; S.G.S. Thomson European Quality Award presentation (1997); Lucent Technologies Ireland case study; NEC Semiconductors Ireland case study; 3M Electronics Products Europe case study; GEC Caswell case study; Harris Ireland case study; 'NO Fault Found' (research by the International Electronics Reliability Institute at Loughborough University); Measuring In-Service Reliability; Safety related Fault Tolerant Systems in Vehicles; Improving Quality in Electronics Manufacture; The S.E.I. Capability Maturity Model and numerous articles on quality in I.T.

The offer of this free book also extends to existing members who introduce a new member to the Institute in 2009.

'Quality Matters: The Decade of Quality 1989-2000' is currently available from Spire City Publishing, P.O. Box 84, Clitheroe, Lancashire BB7 2WA, price £15 for Inst. E. Members (£30 for non-members) plus post and packing.