

BUSH

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TELEGRAPH



BUSH

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TELEGRAPH

the magazine of

R&EL

wood lane



Cover

"Swans at Rickmansworth"

by Peter Revell

Editorial Board

David Green
Denis Groombridge
Mike Hagger
Richard Hammond
Geoff Holder
Ted Morrison
Peter Revell



Editorial

Last month we made some blunt comments in this column which evoked some positive reactions. Quite rightly we were called upon to justify some of our assertions. This we did, and the outcome has been a crystallisation of views as to one aspect of the Bush Telegraph's role, namely to assist in every way possible in the transmission of information from Management to Staff. Every member of the Editorial Board is committed to this part of the job and we are pleased to report that Mr. Banks has volunteered to set aside a little time each month to discuss with us the significant matters, both technical and otherwise, which may affect Wood Lane. We appreciate this initiative and the first report appears elsewhere in this issue.

You will note that as part of this process we aim to expand the technical content and we hope that staff at all levels, not just managers and heads of department, will contribute. Given that there are people willing to respond in the technical area, and it cannot be done without time and effort, it may be possible to utilise such articles to give the activities of R&EL a wider audience through the LINK. Before he left, Alan Arnold made a start on a comprehensive feature about R&EL, and if there is anyone willing to take over this project they should contact Mike Hagger who is Wood Lane's official LINK correspondent. We are sure that such a feature and the proposed technical articles could help the process of communication from Wood Lane to the rest of BICC.

Think about it over the Easter holiday, but don't let it spoil the enjoyment of being with your families and friends.

Personnel News

LEAVERS

A belated farewell to Alan Arnold who left at the end of January on a four year secondment to CMAP in Australia.

FAREWELL TO:

Jerry Turner of the Control Engineering Department who left on 10th March.

Vivienne Shepherd of the Typing Pool who leaves on 31st March.

Norman Waterhouse who has gone to Balfour Kilpatrick at Hackbridge.

Miss C.A. Pouliopolus of the Commercial & Patents Department who left on 28th February.

RETIREMENT

Margaret Kingston of the Library who is retiring after 25 years of service with the Company.

Thank you

We would like to thank everyone for their very generous wedding gift. We decided to buy some 'Le Creuset' French cooking pans which will be most useful. We had a lovely wedding only made possible by everyone's kindness and thoughtfulness.

Walter & Cathie Mascarenhas

LAST MONTH'S BT

Half-way through the production of last month's magazine we discovered "a bit of a boo-boo". This necessitated the remaking of a number of plates and the scrapping of a quantity of printing. Nevertheless we published "ON TIME", so we must express our appreciation of the extra efforts of the Studio, Print Room and General Office which made this possible. Many thanks to all concerned.

Diary of Events

DATE	EVENT	FOR INFORMATION
March 22nd	Executive Council Meeting	John Heggie
March 29th	Lecture and Slide Show "Over the Alps by balloon and the growth and development of Hot Air Ballooning". 6 pm. Main Hall.	Mr. D.J. Moore (Alperton) Miss D.V. Moore (269)
March 31st	Disco - Main Hall Time: 8.00 pm. to 12.30. Price: 50p	Miss Y. Ferrier
April 5th	Bridge Pairs Competition	Roy Fraser
April 6th	Last day for contributions to Bush Telegraph	Editorial Board
April 20th	Publication Day for Bush Telegraph	Editorial Board
April 29th	Sea Angling Trip	Peter Walton
<u>Regular Events</u>		
Tuesdays	Badminton	Vic Banks
Thursdays	Badminton	Vic Banks
" (not 2 nd March)	Air Pistol Shooting	Denis Groombridge

First Aid Team

Is there any lady member of the Staff who would like to learn First Aid, with a view to taking Miss Susan Hurst's place on Wood Lane's First Aid Team, now that Susan has left for pastures new?

Training, normally a 3-day full-time course leading to the Adult Certificate, will be arranged through the British Red Cross Society, and will be paid for by the Company.

Anyone who would consider taking up this very well worth while interest - and it could one day save a life, even your own! - is invited in the first instance to get in touch with Geoff Holder on 380.

View from the Top

In response to an offer by Mr. Banks to talk to the Bush Telegraph the first meeting with members from the Editorial Board has taken place. It is hoped that through these meetings we will be able to keep you, our readers, fully aware of both technical and site matters affecting us all. Selected topics will then form the basis of more in depth articles based on interviews with the departmental manager concerned.

At this initial meeting Mr. Banks outlined the main priority work areas for this year. These are:-

1. Specialist plant
2. Optical fibres
3. High stress polymers
4. Radiation processing
5. Special purpose polymers
6. Mini/micro computers
7. Energy.

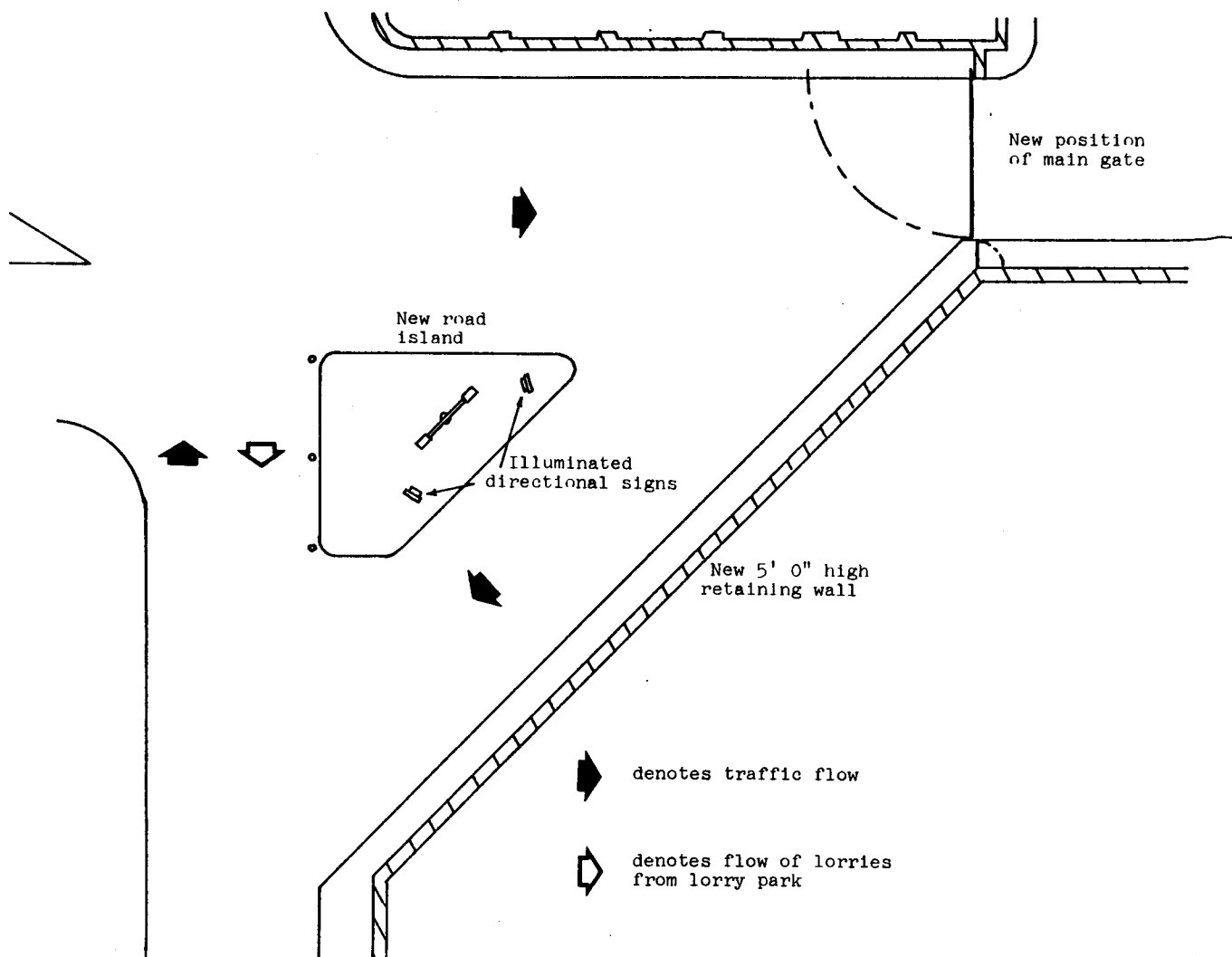
Mr. Banks explained that the budget for R&EL came primarily from two sources namely the BICC operating company contributions and the central board grant. Commenting on how these funds were allocated he stressed the importance placed on the New Markets Technology Panel and how this was to receive additional funding.

At present consideration is being given to the location of future plant associated with the development of optical fibres. It is hoped to write an in depth article on this subject in the near future. In this edition we have an article dealing with the manufacture of wave guides at Alperston (page 6). This process is now in its final stages. Mr. Banks stated that he considered the role of the Bush Telegraph to be one of expanding basic information, circulated by management, but not as the only method of communication. This would still depend largely on the hierarchical management system. A small example of this amplification process is the inclusion, in this edition, of a sketch showing the proposed alterations at the site entrance. Another alteration affecting us all is the proposed change in the main entrance hall to McFadzean.

It is proposed that the telephone operator, who will also become the receptionist will be based in this area. Consideration is being given at present to providing a comfortable working environment. It is anticipated that the new push button telephone system will be operational by September. Again this will be the topic of a special feature.

In conclusion Mr. Banks stressed the importance he placed on effective communication and the part the Bush Telegraph has to play.

Site Entrance



The above diagram shows broadly the main changes that are now being made to improve access to the site. The road is being widened by removal of the corner wall at the entrance and this is to be replaced by a new wall running at an angle joining the existing walls. A footpath is to be provided adjacent to the new wall.

A road island roughly triangular in shape is to be used to control the flow of traffic as indicated on the diagram and illuminated directional signs, as well as a twin light lamp standard, are to be set up.

When the construction is completed the general flow of traffic to and from the site should be improved, particularly in the evenings when heavy lorries entering the lorry park often obstruct vehicles leaving our site.

WATCH OUT!

By now you all should have received the notice about the unfortunate outbreak of petty thieving on the site. Please pay attention to it, lock up your valuables and don't leave personal possessions lying around in laboratories offices or in your car. It's in your own interest.

The Waveguide

A FOND FAREWELL

by D.A. Taylor

When the Project Engineering Department was set up in 1968 and the Alperton premises leased, the intention was to form a group of development engineers who could explore new processes and techniques and provide them with adequate space to set up complete lines of manufacturing machinery for this purpose. Those who visited Alperton in its early years will remember the plant for manufacturing Polypropylene Film Capacitors spreading across the factory floor and the slightly sinister looking guillotine which formed part of the mechanical handling equipment for Series Refining looming over the scene.

In 1970, "Dickie" Beal, who was then running the Telephone Cables Division, decided that BICC must become actively involved with the new developments in telecommunications technology being considered by the Post Office and as a result, Project Engineering undertook a joint study with Plessey Telecommunications Research Ltd. (PTR), financed by the Post Office, into the design, potential performance and economies of TE_{01} waveguide.

This waveguide is essentially a circular section pipe of 50-70 mm bore and with an appropriate inner surface, through which electromagnetic energy can be transmitted at frequencies in the range 35-110 GHz. This enormous bandwidth permits a single pipe to carry up to the equivalent of 500,000 telephone channels and provides a trunk route capacity greater than any current demand. The fundamental constructional problem is produced by the requirement that the bore shall be an accurate cylinder in order to limit the losses. As we usually described it, the diameter must be "more accurate than a car engine cylinder" and the straightness "better than a gun barrel".

We came to the conclusion that the type of waveguide best suited to the British Post Office requirements would be based on a glass fibre reinforced resin tube laid up on a precise mandrel and Derry Moore, who was appointed Project Manager for all the subsequent contracts, developed a number of designs which culminated in the Post Office acceptance of the "Mark I" for installation on their field trial route between Martlesham and Wickham Market, a distance of 14.3 km.

This major contract involved designing and building a complete production plant because one of the requirements was that the trial waveguide should be produced under production conditions so that the production economies could be determined. Derry, Dave Greene, Eddie Kaczmariski and their mates got down to work and in the very short time of 18 months the whole novel plant had been designed, built and assembled at Alperton, creating the forest of columns, runways and machines which now dominate the factory area. Dick Turner joined us as Production Superintendent, recruited a team of temporary production workers and produced the 16 km of waveguide required, within the contract price and delivery, in spite of all the start-up problems.

This field trial was regarded as very successful and we felt that our efforts had been rewarded when the Post Office announced, in November 1976, their intention to put waveguide into commercial service. Bristol-Reading was chosen as the first route and the Post Office Board approved the expenditure., and aimed at service in 1982.

Then the roof fell in! It appeared that the costs allowed for other contributors of the system were inadequate, forcing a re-examination of the economics and this also revealed that the traffic growth which had been expected had not materialised. So, last month we heard that Bristol-Reading was "off" and, with optical fibres coming so rapidly, there was no point in preserving the plant for the many years which must now elapse before traffic growth justifies consideration of another installation.

Fortunately the work programme at Alperton will more than take up the staff effort released from waveguide work and within a few months the forest of columns will have vanished, to be replaced by a large extrusion line and a new armouring process. But those of us who developed waveguides through the last eight years will not forget them quickly and their memories will be stimulated by the many scrap lengths serving as fences, pergolas, beanpoles, landing stages and even spinnaker poles! Useful things, waveguides.

From our Northern Correspondent

It may come as something of a surprise to many members of the Staff at Wood Lane that BREL have a Northern outpost in the Arctic regions of Merseyside, in the form of the Technical Library & Information Centre at Prescott. This Centre, which heads up to Dr. P.C. McNeill, is responsible for the provision of a vast amount of technical information and publications to the factory site at Prescott, as well as to various other sites at Helsby, Leigh, Wrexham, Kirkby, Huyton Quarry, Melling - you name it, wherever information is required throughout the Group, we are ready and eager to supply it!

Occasionally, members of the Staff at Wood Lane don their snow shoes and get out their dog sleds and venture this way to see how we are faring; sometimes, even, messages in bottles float our way - usually containing requests for books and magazine articles from our well-regulated stock.

We have now received three copies of "Bush Telegraph", and the general concensus of opinion here is that this is an excellent publication, well-deserving of management support. It is to be hoped that the quantity and quality of contributions remain as high as they have been in these issues. You never know, someone from this end of the country may send a return message in a bottle for consideration by the Editorial Board.

The contents of the issues - with everyone, almost without exception, being referred to by their forenames - gives the impression of Wood Lane being a very friendly and tight community (this last word is used advisedly, bearing in mind allusions in some of the contributions!), and we at Prescot would like to feel that someone down there gives us a thought now and again.

On behalf of the Staff at the Centre - Ken Baker (Librarian), Lilian Leyland, Colette Thompson and Barry Mitchell, I send greetings to all our colleagues at Wood Lane!

Les Ireland.

P.S. about the front cover which will be kept in reserve in case the quality of submitted photographs is below standard - why not do an illustration (or line drawing) of a Welsh shepherd (you can tell him by his crook) banging on a jungle drum (get it - (Shepherd's) Bush Telegraph). Sorry I'm no artist, otherwise I could have shown you what I mean!

EDITORIAL COMMENT

We're delighted to hear that the B.T. is reaching the frozen wastelands north of Runcorn Bridge, especially as you seem to approve of our efforts so far. Anything you care to send us in a bottle will be carefully drunk (sorry, considered), so, please let us know if you require a supply of empties! As for the cover, perhaps you don't remember the 1954-62 versions, which contained, in various forms, the symbol reproduced here. With nostalgia already well into the sixties perhaps we should restore it to its former glory. Whatever we finally decide, thank you for your suggestion. The 280 staff "down here" return greetings to the 5 of you "up there" and will try to think of you (or send you a food parcel) from time to time!



Canteen

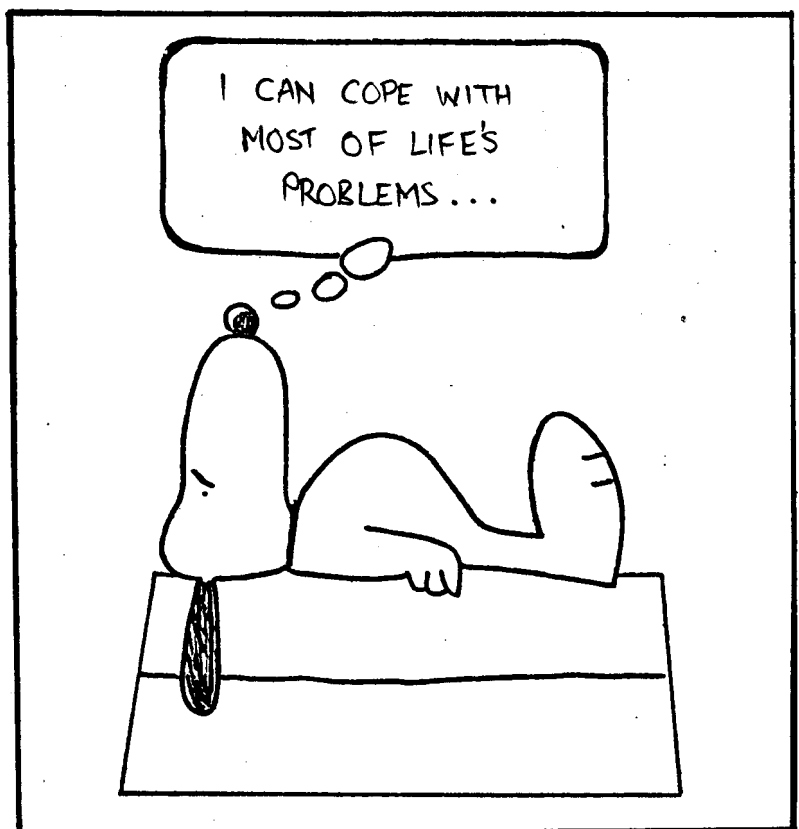
On February 22nd, a meeting was arranged by Mr. Lam between the Manageress of Bateman Catering (Mrs. Hill) at Wood Lane and representatives of all Staff in the presence of Bateman's Area Manager (Mr. Vernoum) to discuss the operation of the canteen and to air grievances on specific matters. To this end, representation included Staff who had made specific complaints in recent months.

In the exchange of views that occurred, the following points were covered:-

- (i) Size of meals and their relationship to the Company subsidy
- (ii) Availability of dishes during the lunch hour
- (iii) Quality
- (iv) Cost of specific items eg. fresh fruit, cigarettes
- (v) Quality of ancillary services such as cleanliness of cutlery, availability of jugs of water on tables, poor quality of the condiments.

After a detailed discussion, Bateman's representatives agreed to take action on those points that had not already been dealt with from previous complaints.

It was agreed that the discussion had been useful and that Bateman's Area Manager now had first hand knowledge of the Company's and the Staff's attitude as to the function of the canteen.



Technical Society

"Polymer programmes and influences throughout BICC" was the title of the Technical Society lecture, the fourth in the series, which was held on Tuesday 28th February. The speaker was Mr. Stefan Verne, Head of Polymers Department, and about 60 staff and one pensioner were present which, considering it was the last afternoon of the holiday year, was an extremely healthy turnout.

By way of introduction Stefan emphasised the remarkable post-war growth rate of synthetic, particularly plastics, materials. Between 1950 and 1973 world consumption of plastics had risen 2600% compared with a population increase of 55%. In volume terms consumption of synthetics in 1973 had reached three-quarters that of the more traditional indicator of economic performance, steel. It was important to note in this context that plastics were now widely regarded as engineering materials in their own right and not just cheap substitutes.

The Polymers Department represents about 1/6 of the technical effort at R&EL (an establishment of 38) and the same proportion of the 1978 budget (£475,000). Stefan explained that the department was essentially technological with an emphasis on solving problems. In doing so it assisted BICC in that part of its function which can be termed "survival", and sought to influence opinion, both inside and outside the Company, when it had something valuable to offer.

Stefan illustrated his points by reference to eight programmes within his department.

The RW-90 project (insulation for 600 v industrial and domestic cables) was an instance where existing departmental expertise allowed R&EL to solve a problem for the North American market where others had failed. The successful product was finally developed in the laboratory after solving the problems of polymer quality, compound formulation, processing and testing. The current phase involved transferring the technology to an industrial environment and scale.

Stabilisation featured in the second item, waterproof telephone distribution cables. Some years ago R&EL had predicted unacceptably short lifetimes for the thin-radial polyethylene insulation when installed in hot climates. BICC took immediate action to improve the lifetimes of their insulations tenfold. The action was fully justified by subsequent events which saw products of the North American manufacturers fail in periods of 3-5 years. The BICC philosophy was widely accepted both by industry, and by national and international specifying bodies which adopted, or are adopting, Wood Lane test procedures.

The importance of the Sioplas-E process for manufacturing cross-linked polyethylene lay in the reduction in plant required and the faster rate of production. This potential had only been fully realised following a joint

programme between BICC and plant manufacturers which combined mixing, grafting and extrusion into a single process. Considerable expansion of the process for use in low voltage power cables was now anticipated both at home and abroad.

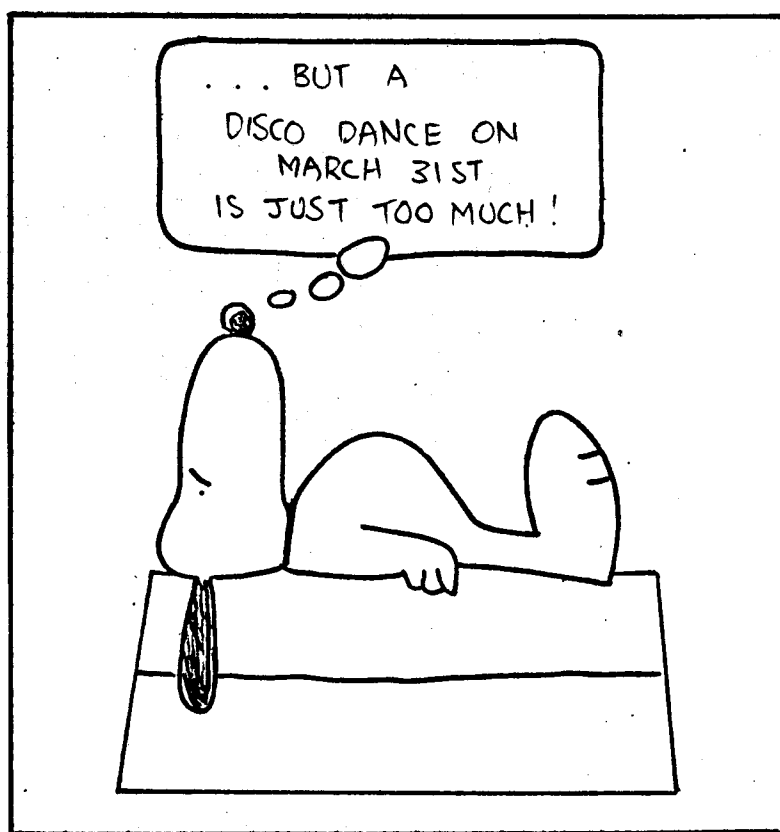
In the field of mass market polymers the opinion was that major new products were unlikely. The Department had therefore decided to embark upon a programme of work to study grafting and blending in polymer systems to produce "tailor-made" materials.

Also of major importance were projects dealing with high performance cables particularly for the aerospace industry, and low fire risk cables. In both cases new skills had to be acquired within the department. For the aerospace cables, high temperature extrusion techniques using small (often less than 50 g) quantities of material had been developed, and in the socially desirable area of low fire risk cables it had been necessary to find a method of measuring the generation of smoke from burning materials.

The final projects mentioned by Stefan covered radiation processing where a long history of collaboration between the Polymers and Chemistry Departments of R&EL and BGCL had resulted in the launching recently of an irradiation cross-linked PVC insulated wire, and enamels, where economic and health considerations had given impetus to the continued research into solventless techniques.

The Sioplas-E development was the one which captured the imagination of the audience, and during a lively series of questions it emerged that this product had development possibilities up to 11 kV.

Mr. Fran Lam proposed a vote of thanks to Stefan.



Special Notice

A GRAND NEW COMPETITION has been suggested by a contributor, who wishes to remain anonymous (but hasn't much hope).

HE HAS INVENTED a new art form specially for Bush Telegraph and has given it the name "Puntoon".

A PUNTOON HAS TWO PARTS, a first part that is the name of a fictitious person having a hidden (or obvious) second meaning and a second part that is a cartoon of the person, shown in such a way as to bring out the second meaning.

EXAMPLES OF NAMES have been provided by the inventor, for those with greater artistic than literary skill, as follows:

Delhi Kit	Harry Karry
Major Kalamittee	Tom A. Hork
Emma Nate	Sal. A. Shuss
Bill E. Yuss	Mr. Ree
Grandma Neeay	Sue Pine
Jess Tewel	Mick Stocky
Dai Hard	Pam Flettear
Ma Soupial	N. Tropic
Jock Ewlar	Joe Kose
E. Cleasy-Astick	Mr. Vocation
Ben E. Facktor	Frank N. Stein
Deacon Tammy Nashum	Man Schnouss
Vi Tooperate	Len Tickular
Liz Ard	Sam Ovar
Jim Crack	R. Finch
N. Thalpie	Miss D. Meaner

TO MAKE IT CLEARER, the inventor has provided three sample cartoons which are scattered throughout this issue. Each represents one of the names listed above. No prizes will be given for guessing which.

YOU CAN DO BETTER THAN THIS. Send your entries to any member of the editorial board. The cartoon should be in black ink on A4 paper with the fictitious name and your name written on it (make sure that it is clear which is which). Noms de Plume will not be accepted.

THE PRIZE will be an illustrated diploma awarded by the inventor for the best Puntoon of the year selected by him from those chosen by the editorial board for publication in the Bush Telegraph.

The History of Electric Wires and Cables

PART 4: COOKE AND WHEATSTONE AND THE EUSTON TELEGRAPH By: R.M. Black

On the 10th June, 1837 Professor Charles Wheatstone of King's College London and William Fothergill Cooke obtained the King's signature and received the Great Seal on their patent for "Improvements in Giving Signals and Sounding Alarums in Distant Places by Means of Electric Currents Transmitted Through Metallic Circuits" (Patent No. 7390 of 1837).

The collaboration of Wheatstone and Cooke, the shy professor with the gifted entrepreneur, was of particular importance in the development of insulated wires and cables being one of the earliest examples in this country of insulated and protected wires being described in a patent specification.

William Fothergill Cooke was born in Ealing in 1806, the son of a surgeon who was subsequently appointed to the Chair of Anatomy at Durham University. With this academic background, William was educated at Durham and at Edinburgh University, but for some unspecified reason he left Edinburgh at the age of nineteen to become a cadet in the Madras Establishment of the East India Company's army. After a year in India he was promoted to the rank of Cornet or Ensign, and held this rank until 1833 when he returned to England and resigned his commission on grounds of ill health. It was in the same year that he visited Paris and, also, started to model anatomical sections in wax for his father, an occupation for which he apparently had no mean ability. Accordingly, he decided to take up anatomical modelling as a profession. After a tour of the continent with his parents in 1834 he ended up in Heidelberg with the object of studying anatomy at the university there.

In 1836, however, the whole direction of his life was to be changed, for attending a lecture by a Professor Muncke he witnessed a demonstration of Schillings single needle telegraph which produced a considerable impression upon his mind. He was later to write:

"I was so much struck with the wonderful power of electricity and so strongly impressed with its applicability to the practical transmission of telegraphic intelligence, that from that very day I entirely abandoned my former pursuits, and devoted myself thenceforth with equal ardour, as all who know me can testify, to the practical realisation of the Electric Telegraph."

Charles Wheatstone on the other hand was born in Gloucester in 1802, the son of William and Beata Wheatstone, a cordwainer or shoemaker of that city. In 1806 the whole family moved down to London where William set up in business in Pall Mall as a manufacturer of musical instruments. Young Charles, after attending school in nearby Vere Street, was placed with his Uncle Charles, who was a music publisher and instrument maker in the Strand. The boy, however, was more interested in book studies and in carrying out experiments with sound and with electricity. His father, apparently, gave him a fairly free rein, and encouraged him to carry out demonstrations in his own shop, and an early demonstration devised by young Charles was of an instrument known as the Acoucryptophone or Enchanted Lyre, which consisted of an ornate ancient lyre suspended from the ceiling, but in fact connected by a brass wire to the sound board of a piano forte in the room above. The transmission of sound to the instrument formed an impressive and mystifying demonstration. In 1823 young Charles and his brother William took over their Uncle's business in the Strand and two years later he began an association with the Royal Institution which lasted for the rest of his life and resulted in his becoming a close friend of Michael Faraday. In 1834 he was appointed Professor of Experimental Philosophy at King's College in the Strand. It was here that Cooke came to consult him about the design of a practical telegraph which he had in mind for the Liverpool and Manchester Railway at that time an obvious outlet for his invention.

In those days, the terminal stretches of the railway were often rope-hauled, due either to the difficulties that the engines had with the steep hills and inclines, or because the local residents objected to their noise and smoke in the vicinity of their homes. At Liverpool when the line was extended to the present Lime Street Station, the carriages ran down hill through the tunnel to the station under gravity, and on return were hauled back up the incline by means of a rope attached to a winding engine at the summit. The whole success of the operation depended upon communication between the train and the engine house. This had previously been achieved by means of a pneumatic telegraph, a simple whistle blown at one end and sounding at the other. Obviously, the electric telegraph could offer something as an alternative. Cooke discussed his proposition with the Directors of the Liverpool and Manchester Railway, but they were of the opinion that the proposed telegraph was too complex as it stood. They were, however, sufficiently interested to allow Cooke to experiment in the Lime Street tunnel, which he did.

Being unsure of the effect of distance between the sending and receiving stations on the signal strength, Cooke made occasion to discuss the problem with Faraday at the Royal Institution, but, unfortunately, had not been able to obtain a definite answer. In order to resolve the problem, Cooke himself tried an experiment using a mile of wire festooned around the office of his rather patient solicitor, but even so the result was not unequivocal. In a letter to his mother, and they were great correspondents, Cooke wrote:-

"February 1837

Dissatisfied with the results obtained, I this morning obtained Dr. Roget's opinion (Secretary of the Royal Society and compiler of the famous Thesaurus) which was favourable, but uncertain. Next Dr. Faraday's who, though speaking positively as to the general results formerly, hesitated to give an opinion as to the galvanic fluid acting on a voltaic magnet at great distance when the question was put to him in that shape. I next tried Clark, a practical mechanic, who spoke positively in favour of my views, yet I felt less satisfied than ever, and called upon Mr. Wheatstone, Professor of Chemistry at the London University (SIC) and repeated my queries. Imagine my satisfaction at hearing from him that he had four miles of wire in readiness, and imagine my dismay on hearing that he had been employed for months in the construction of a telegraph, and had actually invented two or three with a view to bringing them into practical use. We had a long conference, and I am to see his arrangement of wire tomorrow morning, and we are to converse upon the project of uniting our plans and following them out together. From what passed, my plan, if practicable, will, I think, have advantage over any of his, but this remains to be proved.

In truth I had given the telegraph up since Thursday evening (when he had failed to get satisfactory signals through the mile of wire in the office of his solicitor), and only sought proof of my being right to do so ere announcing it to you. This day's enquiries partly revive my hopes, but I am far from sanguine. The scientific men know little or nothing absolute on the subject, Wheatstone is the only man near the mark."

A partnership deed was eventually drawn up between the two men, in which the terms finally agreed were that Cooke should be Business Manager of the partnership and take ten percent of the profits as Manager's fee. The remaining profits should be equally divided between them and Cooke should have the sole right to act as contractor for installing telegraph lines. After this they filed the joint patent which was duly signed by His Majesty and received the Great Seal on the 10th June.

Wheatstone applied his customary ingenuity to the development of the necessary instrumentation, while Cooke, the entrepreneur, considered the commercial implications. One of the first of these was another railway application which looked attractive, as not only was there a need for a telegraph, but, also, railways had the advantage that their companies possessed continuous ribbons of protected land which did not require the permission of the local parish vestries before laying of telegraph wires could commence. At Euston Square, the London terminus of the London and Birmingham Railway, a tube for communication was being installed. This was to be an obvious opportunity for a telegraph. It was intended that trains leaving the station would be rope hauled up the hill to Camden Town, where a locomotive would be coupled on. Trains returning to London from Birmingham were detached from the locomotive at Camden

and ran under gravity into Euston. The Directors of the Company and their engineer Robert Stephenson required a means of signalling between Euston and Camden Town, so that the men operating the winding engine would know when the train was ready to start.

Cooke was able to persuade the Company to put down an installation of their four needle telegraph system, and for this purpose the necessary five copper wires were laid in long wooden balks of trapezoidal cross section, the grooves were subsequently plugged with wooden strips, and the balk painted with preservative tar compound (figure 1). The installation was laid in a trench alongside the railway track which was then filled in with pitch. The length of the system was just under two miles.

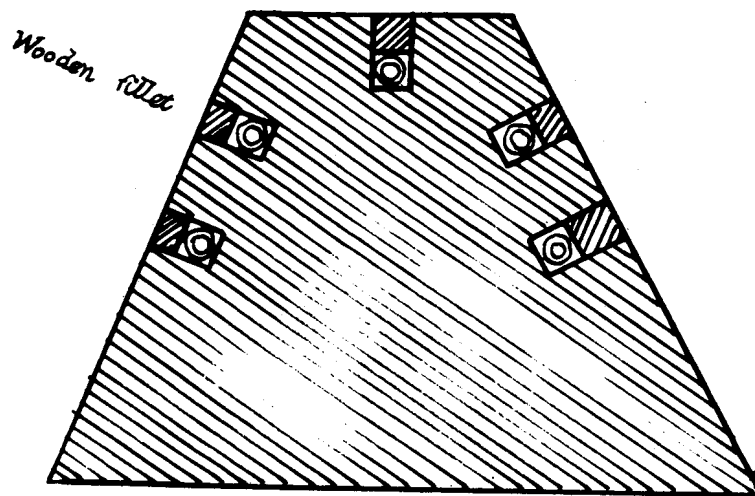


Figure 1

On the 28th July, 1837 Cooke was stationed at Camden Town, while Wheatstone was at Euston seated in a dingy office lit by a tallow candle. After Wheatstone had sent a message and received Cooke's reply he was later to recall:-

"Never did I feel such a tumultuous sensation before, as when, all alone in the still room I heard the needles click, and as I spelled the words, I felt all the magnitude of the invention pronounced to be practicable beyond cavil or dispute."

The telegraph was a success. The wooden balk conductor array functioned satisfactorily, despite the fact, as obtained from the lengths that have survived, that the conductors used were not insulated in any specific way, other than by the timber of the balk (see photo). In the original specification, it was suggested that, if necessary, the wires could be covered with thread and varnished.

As an alternative to the rigid system used over the route from Euston to Camden Town, it had been suggested that instead of enclosing the several conducting wires in distinct channels, as in the timber balk, "they may all be carried along one channel, for provided they are kept dry, their covering of thread and varnish will form a sufficient insulation of each wire from its neighbours. The whole number of conducting wires may be bound together in a bundle by a wrapping of coarse thread and varnish over, that may, if required, be covered again with a spiral fillet of hemp, and then covered with pitch or tar to keep out wet, the one channel receiving a set of wires either when so bound together, or when detached one from another, may be formed in wood rails put together in two halves, or in iron troughs or tubes formed of hoop iron bended up and put together in two halves, and united with screw bolts at suitable intervals, having tarred felt interposed in the joint between the two halves or tubes may be formed by bending up hoop iron with a sufficient longitudinal opening left between its meeting edges to introduce the wires one by one, and afterwards closing up the opening by inserting tarred felt and pinching the edges together thereon by screw bolts applied at suitable intervals." (Figure 2)

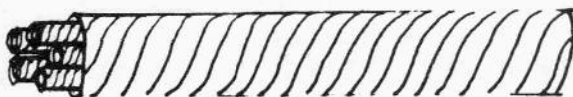
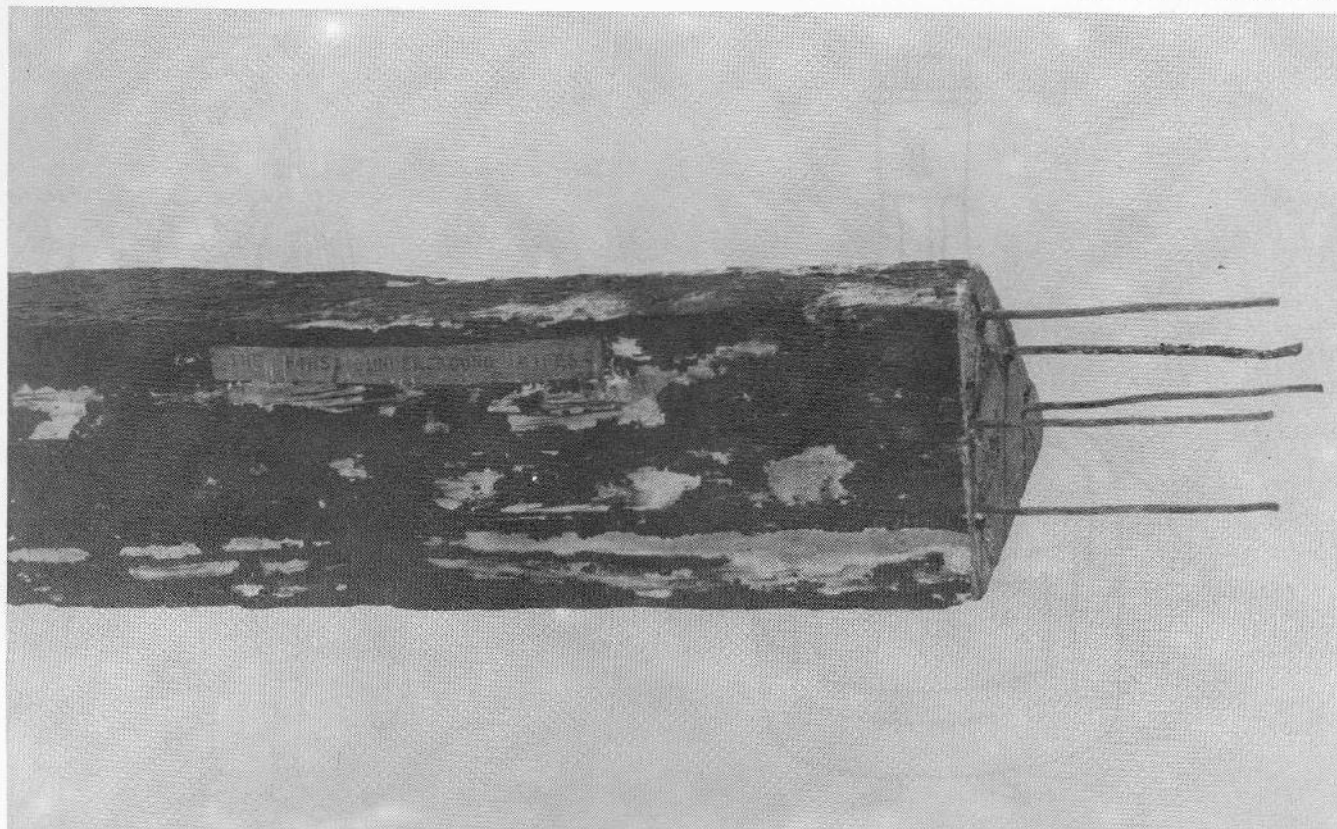


Figure 2

*Rope containing insulated
Conducting Wires*

The exclusion of moisture from telegraph cables was to be an important criterion and how this was overcome by the introduction of a natural thermoplastic will be described in the next article of this series.

(to be continued)



Poets Corner

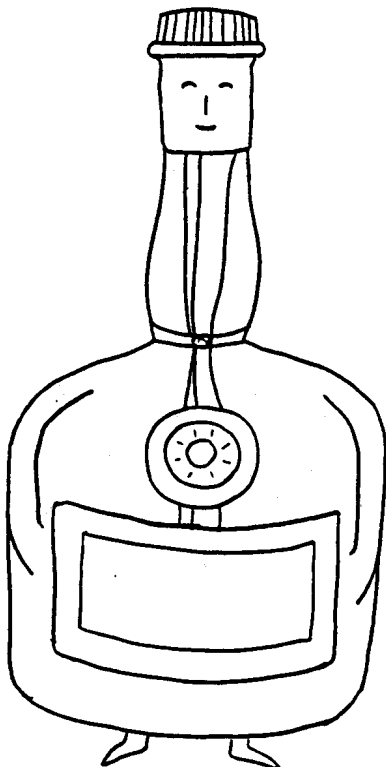
.... AND WHO'S FOR CLEARING UP?

Wednesday morning at Eight
Is a time that I hate
As the lift takes me to the fifth floor,
For I have to re-do
What the badminton crew
Have undone from the evening before.

All those tables and chairs
And those plant pot affairs
That normally grace our Main Hall,
Are emphatically not
On their pre-arranged spot
But more likely adorning the wall.

When you've finished your fun
And the game has been won
Spare a thought for the chap who, unseen,
Replaces the chairs
And those plant pot affairs
He's your gardening friend - known as Gene.

I don't mean to be rude,
Have my words misconstrued,
So don't claim that it's manners I lack -
When you've finished your jar
I'd prefer it by far -
If you'd put all the bloody things back!



PUNTOON I



PUNTOON II

Valentine's Dance

Since agreeing to write this note on the Valentine's Dance I have tried to think of a suitable analogy to describe the general trend of happenings at that event. One possibility is an evening at the theatre, one arrives early to find few people present, all feeling rather self-conscious in the vast emptiness of the auditorium. The theatre slowly fills up and the play begins, the tempo gradually increasing up to the interval. The second half of the play begins, albeit in front of a smaller audience who appreciate more fully what is going on (having thought about the plot during the interval) and who are a little saddened when the final curtain all too quickly falls.

Back to the dance, it started slowly, for the first hour hardly anyone danced, in fact hardly anyone was present, the band played rather self-consciously in one corner of the room. Finally a sort of threshold was reached (with regards to numbers in the audience and type of music being played) and some intrepid souls exhibited their skill at the waltz, foxtrot and quickstep. I say some since the majority of us (conspicuously of the post-Lonnie Donegan era) stayed seated unable or unwilling to attempt the deft footwork required, waiting for music more to our tastes or abilities. The band duly obliged and the wriggling, jiggling, bumping, boring etc associated with "modern dancing" began. It seemed to this observer, however, that most individuals exhibited the same range of actions whatever the tune played (the frequency of arm waving, hip gyration etc being varied to suit the tempo). The interval came a little early, but then if everyone had arrived on time A few words about the cold buffet provided - it was quite a feast - savoury sausages, tasty snacks and gateaux of many varieties, it was a pity that too few people were present to enjoy it all.

The second half of the dance was perhaps a little more lively than the first, several hours imbibing of alcohol having loosened inhibitions (at least with regard to exhibition of prowess at dancing). It was evident, however, that there were more young ladies present able and willing to dance than young men available to take advantage of the situation - is this a reflection on the young men of Wood Lane?

All in all, an enjoyable evening was had by myself and my wife (I cannot speak for the rest of those present but have no reason to believe that they had felt otherwise). The band was good, though perhaps a little loud, the buffet was sumptuous, the bar was well stocked, the only thing lacking was a large audience - a disappointment, perhaps, for the organizers of the dance who had obviously worked hard to make the evening a success and who are to be thanked for doing so.

Pete Walters

Family Tree

Opposite is a puzzle of a type which has appeared several times before in the pages of the Bush Telegraph, in which the idea is to connect the great-great-great-great-grand-father word in the centre to the 64 peripheral words via the interceding "generations", which may be found as follows. Working outwards from the centre, each word has TWO "offspring", each begotten according to ONE only of the following rules:

- (1) It may be an ANAGRAM of the preceding word:
- (2) It may be a SYNONYM for the preceding word:
- (3) Father and son words may be HOMOPHONIC (sound the same) (e.g. RIGHT, WRITE, WRIGHT, RITE):
- (4) Successive words may be formed by ADDING or SUBTRACTING one letter, or by CHANGEING one letter, anywhere in the word, the remaining letters KEEPING THE SAME ORDER. (Hence PAN - PAIN - RAIN - BRAIN - BRAN, etc.):
- (5) Father and son words may go together to form another longer word, (e.g. CAR-PET, IN-TACT, REST-RAIN, etc):
- (6) Father and son may form a well-known word-pair (e.g. PLUM PUDDING, YELLOW STREAK, CABLE DRUM, GOLF CLUB, etc.):
- (7) Father and son may go together in a wider sense than in (5) to form a well-known phrase or saying, connecting words such as conjunctions, prepositions, and the definite or indefinite article being ignored (e.g. BLACK (as) SOOT, TIGHT (as a) DRUM, JACK (-in-the-) BOX, ROCK (and) ROLL, etc).

All the rules may apply in either direction, i.e. either CAR or PET, for instance, may be nearer to the centre, so may ROCK or ROLL. NO ABBREVIATIONS are to be used.

To help (or hinder?) you, we've filled in one intermediate generation. Fill in the rest, and send your completed puzzle to reach Geoff Holder not later than Thursday, 6th April, when the first out of the hat will win the sender a prize of £1. (There may well be alternative solutions to any one line of descent - we will accept any that are within the above rules and which use words of the given number of letters).

OVERHEARD TOWARDS THE END OF FEBRUARY

"Nearly everyone's out in our lab next week".

"Yes, if it wasn't for the fact that I was on leave myself I'd come in just to see how empty the place was".

Section Reports

GENEALOGY SECTION

PARISH REGISTERS

The Archbishops of Canterbury and York have decided that 1st January 1979 will be the date when the Parochial Registers and Records Measure becomes effective. From that date registers completed, and more than 100 years old, must be deposited in diocesan record offices, unless the diocesan bishop has advised that they can be kept satisfactorily in the parish concerned. It is anticipated that a large number of registers currently with incumbents will now be deposited.

REGISTERS OF BIRTHS, DEATHS AND MARRIAGES

Further good news (unconfirmed as yet) is that the registers of Births, Deaths and Marriages over 100 years old (ie. 1837-77) are to be made available to the public. This will put an end to the current abuse of the "100 years rule" in this area, which has meant that researchers have had to pay for certificates in respect of entries for these early years. The latest information we have (again unconfirmed) is that these registers would be available at the same location as the census records. The same treatment is likely for wills currently at Somerset House. In view of this possibility the proposed move of the census from Portugal Street to Chancery Lane has been deferred.

Bad news of the month concerns B, D and M certificates applied for by post - they've gone up from £4.50 to £6.00. The cost for personal application remains at £2.50.

READERS TICKETS (PRO)

Members with the old style "white card" PRO reader's tickets are advised that they will be asked to change them for the new plastic computer cards when they pay their next visit. The office for this transaction is at Chancery Lane, on the right-hand side immediately BEFORE the main entrance to the PRO.

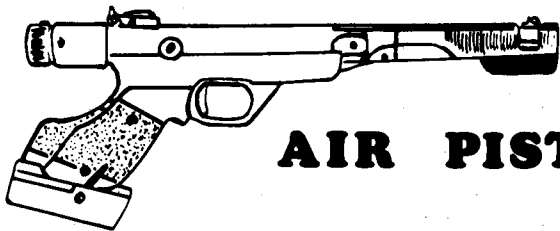
SECTION LIBRARY

The section has obtained a map showing the census and registration districts for England and Wales for the period 1837-51. A second map, covering 1852-1946, has been ordered but is currently out of print. Members may consult the map at any time. Contact Mike Hagger (208).

SOCIAL CLUB BUDGET

Attention all Section Secretaries.

If you haven't already submitted budget proposals for your section for the year commencing 1st April 1978 please do so as soon as possible. Details to the Hon. Treasurer, Pat Donovan.



AIR PISTOL SHOOTING



Member of

Shooting Averages at 23.2.78

Pos.		Ave.	Pos.		Ave.
1	Ian Fennemore	45.1	6	Tom Doré	37.1
2	Joe Lou	44.4	7	Pete Walters	33.5
3	Denis Groombridge	42.8	8	Pat Donovan	29.1
4	Stefan Verne	42.4	9	Graham Taylor	29.0
5	Bob Maidlow	40.2	10	Keith Sichel	25.7

The Thursday target shooting sessions are continuing to be quite popular with an average attendance of 14.

Ian Fennemore has been helping to run the section, but has now found that he will not be able to attend as regularly as before. Pete Walters has agreed to fill the gap left by Ian and so those requiring further information about the section should contact Pete, Denis Groombridge or Bob Maidlow.

p.s. There will be no shooting on Thursday March 23rd.

CRICKET SECTION

Once again the cricket season is nearly upon us, and after last year's successful run of matches against other teams we would like to continue with more games this year. If anyone is willing to play cricket for Wood Lane on an evening or weekend from April to September would you please send the attached slip back to Terry Alleyne, Polymers Department (Ext. 208).

I will be able to play cricket for Wood Lane on an
* evening/weekend during the summer.

* Delete where not applicable.

POT WHITE '78

The 1978 snooker Tournament is now well under way. So far the only definite qualifier for the K.O. stages is Geoff Holder who won all his 4 matches in Group 2. In Group 3 Mike Kendle is unbeaten in 3 matches and is almost certain to qualify but can mathematically be caught if Wally Mascarenhas beats him by a margin of at least 85 points. In Group 4 Glyn Stainthorpe won 3 of his matches and would have probably qualified but with his leaving the Company the way is now open for 3 of the others in the group. In Group 1 Keith Elder is still unbeaten but rumour has it that Stuart Castle only let him win on the black because otherwise he might decide not to continue running the tournament.

HOT AIR BALLOON SECTION

In the last issue, it was explained how the A&SC came to acquire a Hot Air Balloon Now to expand a little on its operating schedule during 1978. If you find the following list is a little optimistic you are probably right but it does give us some scope for choice.

First the balloon is definitely on order but its livery has not been decided. Delivery is dependent on the colour scheme that is finally chosen and could push the actual date into mid-June. In the interim a general interest lecture cum slide show and a short series of teach-ins are being planned.

All and sundry are invited to the one hour lecture which is being organised in cooperation with the Film Society. The scheduled date is 6 pm on Wednesday 29th March. The lecture is to be given by Tom Sage who is a professional balloonist. It is entitled "Over the Alps by Balloon and the Growth and Development of Hot Air Ballooning".

The teach-ins are more specifically for the members, male and female, of the section and are designed to familiarise them with the first principles of ballooning. When the balloon arrives it will not seem so strange to us. Additionally the instructional syllabus for pilot training will be explained.

Once the balloon is obtained, flying can commence from sites near Henley, Newbury, Watford (or anywhere outside the Heathrow control zone). Training can be enhanced by flights with other balloons. This is particularly nice if done at the various ballooning fetes which take place across the country (and abroad). As soon as we have the official diary of events we will make our own diary. This will probably also include some BICC social dates.

Unfortunately delivery is a little too late to make much impact with our educational public relations campaign this year, we really need it now! But we can do something even during training. One example is to infiltrate the various university press with articles describing the BICC balloon and its function, and to seal the article by invitation to the press to spend a weekend with us. Any in-house mention of BICC must work for us!

By September our negotiations with the chosen Universities should be complete and our by now dedicated and expert crew will be ready to go into action.

We need a name for the balloon, care to have a go? There is a bottle of wine for the winner, who will be chosen by an independent panel. Suggestions to date are BREL, Bush Baby, RandE, Isaac Newton, Nancy. Suggestions should be sent to Darrel Moore.

DERRY MOORE

p.s. As our maintenance officer, Jerry Turner, has left for pastures new, the position has been taken over by Nick Thearle from Control Engineering.

SPRING 1978 AMERICAN HANDICAP BADMINTON TOURNAMENT

(DOUBLES)

Format of Tournament is as per last American Handicap Tournament played in November/December 1977: Contact Vic Banks (272) or Graham Taylor (322) for details.

The Tournament will be played in the last two weeks of April with Final Group in early May: Tuesday, Wednesday or Thursday evenings.

Pairings will be decided by draw. To help in 'fiddling' handicaps (see Poets Corner II, Bush Telegraph, February 1978), it would be appreciated that people could play once/twice for assessment before entering.

If you wish to enter, please put your name on the entry forms on the notice board.

CLOSING DATE : FRIDAY 7TH APRIL

BRIDGE SECTION

With the season's programme nearly completed, both the section's teams are placed midway in their respective leagues.

In the 2nd division of the L.B.H. league the highlight of the season was the 9-1 defeat of the previously unbeaten 'Lensbury', but heavy defeats were suffered in both the matches against 'Lyons'.

In the 2nd division of the Hammersmith league good results were obtained against Morganite and Wimpeys.

The section will be holding a 'Pairs' competition in the Main Hall on Wednesday 5th April 78 starting at 6.30 pm. The entrance fee of 70 p per pair will cover the cost of refreshments.

Those wishing to enter should return the entry form to R. FRASER not later than the 31st March.

Match Results to date:-

L.B.H. League			HAMMERSMITH League		
I.C.L. 'A'	HOME	5-5	NTG 'B'	AWAY	4-6
WATSON HOUSE 'B'	AWAY	10-0	WATSON HOUSE 'A'	HOME	3-7
P.O.H.Q. 'B'	AWAY	7-3	HAMMERSMITH FLYOVER	HOME	6-4
LENSBURY 'B'	AWAY	3-7	MORGANITE	HOME	9-1
LYONS 'B'	HOME	0-10	HAMMERSMITH FLYOVER	AWAY	0-10
P.O.H.Q. 'B'	HOME	6-4	WATSON HOUSE 'A'	AWAY	3-7
LENSBURY 'B'	HOME	9-1	WIMPEY 'B'	HOME	7-3
LYONS 'B'	AWAY	2-8	WIMPEY 'B'	AWAY	9-1

BRIDGE PAIRS COMPETITION ENTRY FORM

I would like to enter the Pairs Competition

NAMES OF PAIR

DATE

SIGNED

FILM SOCIETY

The 24th season of the film society is over, and we hope everyone who attended the shows enjoyed the selection of films.

Now we look forward to the 25th season-our Silver Jubilee! Obviously we would like to do something really special to celebrate this event, but we do need some extra help. Anyone who feels they could be of assistance will be most welcome - no experience is necessary!

The NFT programme for the remainder of March is given below, further details are available in the booklet kept in the library.

ANNETTE MATTOCK

20 Mon-							
24 Fri	NFT2	2.30	daily	VIRIDIANA			EST
20 Mon	NFT1	6.30	8.45	A Doll's House (Losey)			
20 Mon	NFT2	6.15	8.30	Berkeley Square (unconfirmed)			
21 Tue	NFT1	6.00	8.40	The Outlaw Josey Wales			
21 Tue	NFT2	6.15	8.30	Espagne 37/Family Album (unconfirmed)			EST
22 Wed	NFT1	6.30		Tramp, Tramp, Tramp/Un Chien Andalou			PA
22 Wed	NFT1		8.45	Manon (unconfirmed)			EC/EST
22 Wed	NFT2	6.10	8.40	The Outlaw Josey Wales			
23 Thu	NFT1	6.30		White Shadows in the South Seas (unconfirmed)			
23 Thu	NFT1		8.45	Adieu Léonard			EC
23 Thu	NFT2	6.15	8.30	A Doll's House (Garland)			
24 Fri	NFT1	6.30		Dark Passage			
24 Fri	NFT1		8.45	You Only Live Once			
24 Fri	NFT1	11.00	p.m.	The Hindenburg			
24 Fri	NFT2	6.15	8.30	Twin Pawns			PA
25 Sat	NFT1	4.15		The Beistone Fox (J.)			
25 Sat	NFT1	6.30		Summer Madness (J.)			
25 Sat	NFT1		8.45	Get Carter			
25 Sat	NFT2	4.00		Yellow Submarine (all seats bookable at 50p) (J.)			
25 Sat	NFT2	6.15	8.30	Dark Passage			
26 Sun	NFT1	4.15		Negatives			
26 Sun	NFT1	6.20		The Private Life of Sherlock Holmes			
26 Sun	NFT1		8.45	Killer of Killers (The Mechanic)			
26 Sun	NFT2	4.00		Yellow Submarine (all seats bookable at 50p) (J.)			
26 Sun	NFT2	6.15	8.30	Strike			PA
27 Mon-							
31 Fri	NFT2	2.30	daily	L'AGE D'OR (unconfirmed)			
27 Mon	NFT1	6.30		Battleship Potemkin			PA
27 Mon	NFT1		8.25	October			PA
27 Mon	NFT2	6.15	8.30	The Wild Duck (1976) (unconfirmed)			EST
28 Tue	NFT1	6.30	8.45	Alexander Nevsky (J.)			EST
28 Tue	NFT2	6.15	8.30	Pillars of Society			EST
28 Tue	NFT3		8.30	Eisenstein Seminar (admission free - no pre-booking)			
29 Wed	NFT1	6.30		The General Line			PA
29 Wed	NFT1		8.45	Fun with Dick and Jane			
29 Wed	NFT2	6.15	8.30	Time in the Sun/Bezgin Meadow			
30 Thu	NFT1	6.30		Ivan the Terrible Part 1			EST
30 Thu	NFT1		8.45	Ivan the Terrible Part 2			EST
30 Thu	NFT2	6.15	8.30	Ghosts (1915)/Pillars of Society (1916)			PA/EST
31 Fri	NFT1	6.30		Ivan the Terrible Part 1			EST
31 Fri	NFT1		8.45	Ivan the Terrible Part 2			EST
31 Fri	NFT1	11.00	p.m.	Pete Kelly's Blues			
31 Fri	NFT2	7.00		Scottish Film Council Programme (all seats bookable at £1.00)			PA

For Sale

1974 Dolomite Sprint. Excellent Condition.
Near - new tyres. Long MOT. Phone Ron Arekion (283).

FORE SAIL!

Graham Taylor is selling his boat, National 12 N1558. Clinker built, Proctor/Wyche and Coffock, v.g.c. Two fore sails, two centre plates, two covers and launching trolley; ready to sail - £180 o.n.o.

'phone 322 for more details.

Bar

(St.) PATRICK'S DAY CELEBRATION (ALMOST)

With the end of the Social Club's financial year in sight, your Treasurer is most anxious to see a "clean slate" in the Bar Sales account.

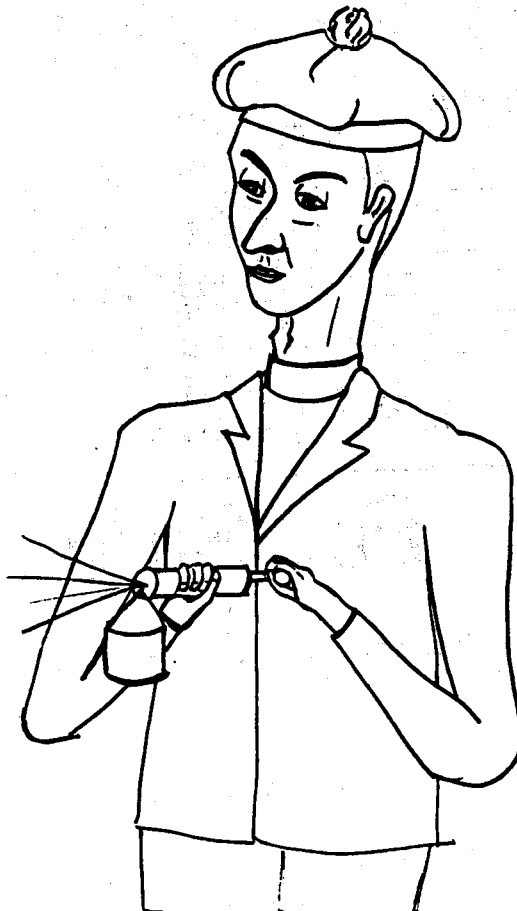
To achieve this happy state, may I ask all those members who have an outstanding account with the Bar, to unearth those "pieces of paper" from David Goff and go along to see him with your cash no later than:-

17th March (if you're Irish or Dr. Who)

22nd March (if you're an ordinary mortal).

From the 1st April 1978 a new style of invoicing is to be adopted which I hope will be successful. The ordering and purchasing however, will not be changed. This will continue to be arranged by members of the Bar Committee.

Pat Donovan
HON. TREASURER



Caption Competition

Regretably, the response to Arthur Boardman's Cartoon was poor, but the standard of entry of those who did bother to 'have a go' was high. Seven unprintable entries from the editorial board were disregarded as were their comments on the poor support. Judging was conducted in a scientific manner by means of a clapometer specially built for the occasion! A report will be issued in due course but for the benefit of Bush Telegraph readers who cannot wait that long the results are published below:-

Winning Entry: (Mr. George Price - Corrosion Department)



"He asked me if he could slip-out sometime during the performance".

Other entries included:-

"I kept telling him to fasten his braces".

"Not to worry partner - they'll shrink next time they are washed!"

"That diet of yours seems to be working Fred".

"I told him to go easy with that embrocation".

"I've been telling him for a long time he needed a new pair of braces".

"He never did quite seem to get the hang of it".

"I always said those stretch towelling suits were a mistake".

Poets Corner II

Here we are at Number Four,
And from this source you'll get no more.
The time has come, as you all know,
For me to pack my bags and go.
So not for long you'll hear me say
"You've got a book due back today".
But that is life and life goes on
There'll still be books when I am gone.
So choose them carefully, read them well
And send them back to BLL,
Or someone else will say to you,
"That book you've got is overdue".
And so goodbye, God bless and don't forget
Your ex librarian, Margaret.

Cover Competition

Our competition to design a cover for the BT (see February issue, page 9) has so far produced two entries, one from our colleagues in Prescott Library (see "From our Northern Correspondent") and the other from the Machine Shop. We can only assume that the other 270 or so if you are still beavering away hoping to beat the April 6th deadline and qualify for the £5 prize. Remember that it's the basic idea that we are interested in, not the final artistic masterpiece. Denis Groombridge (212) will be delighted to talk to you on the subject and receive your entries.

For Sale

- (1) Grandstand Colour Video T.V. game. Can be used on black and white or colour sets, any size. Practice - squash, tennis and football with sound effects. Game for 2 players. As new £25
- (2) Lobo of California skateboard. Second hand. Good condition. Fibreglass board, Silver Fox trucks, precision bearing wheels. Bargain £15.
- (3) Hamma Drum Kit, brand new, never used, black gloss finish; comprises:-
 - 1 x 20 in Bass Drum
 - 1 x 13 in Rack Tom Tom
 - 1 x 16 in Floor Tom Tom
 - Plus 1 new 14 in Snare Drum
 - Plus all new stands etc.
 - 1 x 18in Ride Cymbal
 - 1 x 14 in Crash Cymbal, both good quality

Bargain at £350

Contact D.J. Green (Chemistry, 322)

Cartoonorama

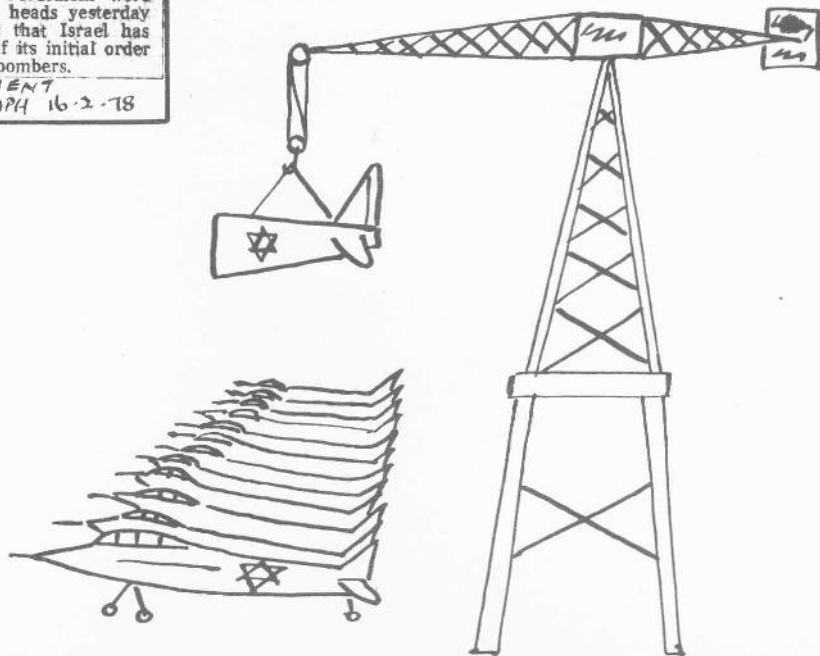


Laurence Brookes, Arthur Smith, Ray Slaughter.

Semi-strength

POLITICIANS in Jerusalem were scratching their heads yesterday over official reports that Israel has already received half its initial order for 25 F-15 fighter-bombers.

ACKNOWLEDGEMENT
DAILY TELEGRAPH 16.2.78



GEP.