



APPLETON LABORATORY NEWSLETTER

No. 158

July 1974

Birthday Honours

We are glad to learn that a member of the Laboratory Staff has been named in Her Majesty's Birthday Honours List.

Our warmest congratulations go to Mr. G. M. Johnston, Officer-in-Charge at Stanley, Falkland Islands. The value of his work has been recognised by his being appointed a Member of the Order of the British Empire.

SOME ASPECTS OF THE

SCIENCE RESEARCH COUNCIL'S SPACE ACTIVITIES

(Based on information contained in J.B.I.B. 27 pp. 343-348)

Apart from the activities of the Department of Trade and Industry (DTI), mainly in relation to Earth resource investigations, the United Kingdom's Space Programme can be considered under two main headings, the part sponsored by the Ministry of Defence (MOD), which includes the experiments flown in the National Space Programme by the Meteorological Office, and the scientific studies which are the responsibility of the Science Research Council (SRC); these are managed from the Appleton Laboratory. The programme primarily enables post-graduate studies in space science to be pursued at universities in the United Kingdom.

The Council's activities in space science have made use of the Skylark, Petrel and Skua rockets and of satellites in the UK/Ariel series. All of the Council's rockets have two stages which use solid propellents. The Skua rocket (12.5 cm diameter) was developed initially for the Meteorological Office in the form of Skua I and was subsequently adapted for SRC to carry telemetry and to have a slightly enhanced performance giving rise to the present version Skua II(T); the Petrel (19 cm diameter) is a slightly larger sounding rocket which was developed from the Skua.

The Ariel series of satellites is also available to experimenters in the National Programme. The first, Ariel I, was launched on 25 April 1962 by the courtesy of NASA using a Thor-Delta rocket; the remaining Ariel satellites

respectively Ariel 2, 3 and 4 were launched also by the courtesy of NASA, free of charge, using Scout rockets. The current British satellite, known as UK5 until launch, and thereafter Ariel 5, is under construction at present and is due to be launched later this year.

Some of the universities which have participated in the civil space activities supported by SRC are as follows:

University College, London	University of Southampton
Mullard Space Science Laboratory	Imperial College
University College of Wales	University of Sussex
University of Birmingham	University of Leicester
University of Sheffield	University of Bristol

Groups at these laboratories have made considerable use of the rocket facilities and launchings have taken place at ranges situated in many parts of the world from Scandinavia to Australia (fig. 1).

That the U.K. National Space Programme has made no mean contribution to the European effort over the years may be seen from the table in fig. 2. The year 1971/73, for example, saw an expenditure of £60 m. by the Council of which £4.7 m. (8%) was subscribed to the European Space Research Organisation.

Commitments outside Europe have not been neglected, though they form a perhaps less well known aspect of the Sounding Rocket Programme. The Commonwealth Collaborative Programme (C.C.P.) has seen the launching of Petrel and Skua rockets from Thumba in South West India and Petrel and Skua rockets from Sonmiani in Pakistan. An extensive programme of launchings which will include these rocket types and Indian made Centaures is scheduled to take place at Thumba at the beginning of 1975.

In order to carry out an experiment within the scope of the National Rocket Programme, an experimenter makes a proposal to SRC giving details of the scientific objectives and the way he would like to pursue them. He may also apply to SRC for a grant to enable him to meet the extra expenses in implementing the proposal. Both proposals and grant applications are considered within the Secretariat at State House and by Appleton Laboratory, who advise how the proposals can be implemented within the existing programmes.

After further consideration within S.R.C. the appropriate Committee awards suitable funding, bearing in mind the adequacy of the facilities available to all the experimenters. Finally the managers at Appleton Laboratory implement the decisions of the Committee in providing rocket vehicles and other services. Liaison is achieved collectively with the experimenters by means of Panels, which meet regularly to arrange programme details.

The activities of Appleton Laboratory in relation to the UK series of satellites are rather more complicated than for sounding rockets and only a brief mention is given here of highly complex operations. A typical case is UK4 which was launched on 11 December 1971. In this as in other previous cases the NASA provided the launch vehicle and certain other services free of charge; amongst other numerous benefits this simplified the organisation. The spacecraft was built in the UK by British Aircraft Corporation and the Procurement Executive MOD acted as agents for SRC, whilst RAE provided the considerable R & D support required. The Project Scientist was located at the Appleton Laboratory.

Of the five experiments carried, four were from the UK; the fifth was from the University of Iowa, USA. Liaison with American interests was via a project office at the GSFC and NASA HQ although of course there was also direct contact with the experimenter. The launch arrangements were also handled through NASA. Close liaison was maintained with SRC through the Programme Manager and the Experiment Co-ordinator, whose tasks are to some extent self explanatory.

FIGURE 1
RANGE FACILITIES USED IN THE NATIONAL AND COMMONWEALTH
COLLABORATIVE SOUNDING ROCKET PROGRAMMES

RANGE	LAUNCHER	TELEMETRY*	TRACKING	SCIENTIFIC GROUND INSTRUMENTATION
WOOMERA (Australia)	Skylark	Type 465	FPS - 16 'C' Band Radar	Ionosonde Camera Sites
SOUTH UIST (Hebrides)	Skua Petrel	Type 465	Cossor 353 'S' Band Radar	Ionosonde Riometer
KIRUNA (Sweden)	Skua Petrel	Type 465 (SRC Station)	Selenia RIS 4C 'C' Band Radar	Ionosonde Riometer Camera Sites
ANDOYA (Norway)	Skua Petrel	Type 465 (SRC Station)	Nil	Riometer & Ionosonde Magnetometer
THUMBA (India)	Skua Petrel	IRIG (215/265 MHz)	Cotal LV-300 Radar	Ionosonde Riometer Camera Sites
SONMIANI (Pakistan)	Skua Petrel	IRIG (267/273 MHz)	MPS 19	Camera Sites

*Since this paper was written several of the ranges have increased their telemetry facilities to include IRIG and, in one case, PCM.

FIGURE 2

Numbers of Satellites and Sounding Rockets launched within
(a) the E.S.R.O. Programme and (b) the U.K. National Scientific Programme

	1967	1968	1969	1970	1971	1972
(a) <u>ESRO: Satellites</u>	Nil	ESRO-II ESRO-IA HEOS-AI	ESRO-IB	Nil	1971	TDI-A
Sounding Rockets	18	20	29	26	43	13
(b) <u>U.K. National Programme:</u>						
Scientific Satellites	ARIEL III	Nil	Nil	Nil	ARIEL IV	Nil
Sounding rockets (C.C.P. incl.)	13	33	39	49	41	40

Staff News

Congratulations to:

Robin and Ruth Guy on the birth of their son Thomas on 13th July.

John Crawford who was awarded a College Prize by Southall College of Technology for his high standard of performance in the three year H.N.D. course which he followed after being awarded an S.R.C. Bursary. His success in the final year has been marked by a first class pass and the award of the Diploma. He has now been seconded to University College, London.

P.A. Vanzeebroek now Exp. Wkr. II.

Welcome to:

Mrs. N.P.P. Taylor	C.A. P/T
A.R. Whittington	A.S.O.
A.W. Bryant	S.C.S.
P. Jordan	S.C.S.
Mrs. P. O'Hara	Canteen Asst. P/T
M.I. Sprague	H.S.O. (GSFC, U.S.A.)
Mrs P.T. Willmott	Typist II P/T
Miss B.G. Dorman	Machine Operator
Mrs. E.B. Garrett	Canteen Asst. P/T
G. White	Vacation Worker
Miss J.M. Payne	" "
I. Botnen	" "
A. P. Coulson	" "
Miss M. Fawcett	" " Culham

Resignations, Retirements etc.

Mrs. J. Coombes	A.S.O.	Resignation
S.W. Lillington	PTO III	"
W.A. Etheridge	S.O.	End of contract. Remaining in Falklands
Mrs B.A. Lewington	Photoprinter I P/T	Retirement
G.W. King	H.S.O.	Secondment ceased
D. Stewart	Handyman (F.I.)	End of contract (off A.L. Complement)

Other Changes

R.A. Guy	(E.O.)	} Transferred from Culham to Datchet
P.A. Vaughan	(P.S.O.)	
H.C. Bevan	(S.S.O.)	
B.T. Austin	(P.T.O. III)	} Moved to Datchet from Culham (on detached duty)
G.W. Ackland	(P.T.O. II)	
S.W. Lillington	(P.T.O. III)	
P.S. Trowbridge	(P.T.O. I)	
T.T.L. Jones	(S.S.O.)	

D. John S.O. Seconded to UCL (from Div. 4 Grp 4 to Div. 1 Grp 4(B))

Mrs. A. Street C.O. Changed from Personnel to Office Services

Mrs. D. Baldwin C.O. Changed from Office Services to Personnel

Station News

Dr. L. Thomas has been appointed a member of the Atmospheric, Magnetospheric and Plasmas in Space (AMPS) Working Group selected by NASA for the scientific definition of Space Shuttle Missions. The first meeting will take place at Marshall Space Flight Center, Huntsville, Alabama during 6th - 8th August.

Dr. J. E. Hall visited ESRO HQ, Paris, on 11th July for a coordinating meeting of experimenters concerned with ATS6.

Mr. Burton attended the ESRO meeting of Large Space Telescope Science Group - 7th-8th July.

The ARD programme of detector development for future Cosmic UV Astronomy instrumentation passed a significant milestone this week when a spectrograph incorporating an electronographic detector was successfully operated. In this device the spectrum (1200-2000 Å) is recorded by accelerating the photoelectrons, produced when the ultraviolet spectrum is imaged on a caesium iodide photocathode, towards a photographic film. The electrons are focused onto the photographic emulsion by electric and magnetic fields. When fully developed, the system is expected to be significantly more sensitive than existing photographic detection systems.

Dr. McWhirter departed for the USA on 5 July for approximately three months visiting the High Altitude Observatory at Boulder to prepare observing programmes and operations on OSO-I. He will also be attending the meeting at Harvard College Observatory on 9th-11th September.

Sports & Social Club News

The Bar-B-Que

After a weeks postponement due to the inclemency of our Great British Weather, with the sun finally shining kindly on Ditton Park, we once again participated in those curious outdoor activities of throwing small red balls at pegs in the ground, and the ceremonial eating of the fatted calf (well, beefburgers and bangers, actually!

It was the Annual Appleton Bar-B-Que.

The dust and rust were removed from our barbequeing machines, and primed with charcoal, we proceeded on these to burn large quantities of the aforesaid victuals, which were then foisted onto the unsuspecting public, accompanied by such delicacies as baked beans, baked potatoes, fried onions (my, how we cried) and Norma Allnutt's Delicious Barbeque Sauce.

A minor catastrophe occurred during the evening when the drunken hordes drank the bar dry of draught beer. Fortunately, however, the majority were able to make a fairly smooth transition to the bottled variety, and the entire evenings ritual then proceeded uneventfully until throwing-out time.

I would like to express great thanks to all those who gave assistance, and helped to smooth the passage from one trauma to the next.

Chris Gibbins

Cricket

The first half of this year's season has been very disappointing not only with respect to the number of wins achieved on the field but also to our luck with the weather.

Our very first fixture, the Practice Match, although well supported this year was a washout. There had only been a few overs bowled when rain stopped play and an early adjournment to the bar had to be taken. On May 7th, Wilkinson Sword "thrashed" us at Colnbrook when we only scored 41 all out in less than 16 overs (Paul Springate 15). Wilkinson Sword passed our score without the loss of a wicket. Our next match, May 9th, was an afternoon and evening affair against the Treasury and C.S.D. at the Civil Service Ground, Chiswick. Treasury batted first and were all out for 172 (Terry Paterson 4 for 49) when tea was taken. There was a time limit on the match and we were only able to score 96 for 9 before the end of play (Alan Buck 32). We recorded our first victory of the season against British Aluminium at home. We scored 64 for 6 in 18 overs (John Kitt 39) and at the end of their allocated overs British Aluminium had only scored 54 for 5 (John Kitt 3 for 10). In our "local Derby" match against A.C.O., rain again intervened. We batted first and scored 53 for 6 in 16 overs (Barry Martin 15). A.C.O. had scored 14 for no wicket when rain stopped play.

In our matches against Royal Holloway College Staff and Lilley Research we were again defeated. We scored 69 for 9 against R.H.C. (Mike Johnson 33) and 72 all out (Barry Martin 20) against Lilley Research after they had scored 125 for 7! The sad story continued against I.C.I. (Jealott's Hill) when we played them on their ground. I.C.I. scored 108 for 5 in twenty overs and we only reached 61 for 7 (Peter Davies 28) in twenty overs.

This brings us to the S.R.C. Sports Day on 19th June and the inter-Station knock-out competition. We beat London Office (or is it Swindon Office already!!) in the first round. London Office scored 49 for 9 in 16 overs (Terry Paterson 3 for 10; Bill Hayes 3 for 6). Barry Martin and John Kitt, our opening batsmen passed this score. We were knocked out by R.G.O. in the next round when R.G.O. batted first and scored 85 for 6 (John Kitt 3 for 16). We had reached 72 for 4 in our allocated 16 overs (Barry Martin 25) - so the glories of being in the Final were not ours this year.

Cricket continues to be a popular sport here, with several new fixtures arranged for the second half of the season, so why not come along and support us? The bar is always open on Wednesday evening and when we lose you can tell us where we went wrong. When we win you can buy us a drink!!

John Cathrew

Golf

The Appleton Golf Society, after it's inaugural meeting earlier in the year, has had one outing so far when some of us played on the new public course at Farnham Royal. We enjoyed a good afternoon's golf and incidently I can thoroughly recommend this as a good, local, beginners' course and, if played on a week-day, quite quiet at present. Another Society Member has told me that it is very quiet on Saturday late afternoon/evening as well.

Our team which was entered in the S.R.C. Golf Competition this year did commendably well. The Sir Brian Flowers Cup for Golf was won by the Daresbury 'A' Team with Appleton Laboratory the runners-up.

The four best 36-holes score from a team of six players was to count and Daresbury returned 562 (Nett). The Appleton Nett returns were as follows :

B. Shenton (Culham)	137
John Delury (Appleton)	139
John Kitt (Appleton)	144
John McDermott (Appleton)	<u>145</u>
	<u>565</u>

As you see then we were within three strokes of winning the first ever S.R.C. Competition when our Society had only been formed a matter of weeks! I should like to congratulate the team on a fine effort and look forward to the next inter-station meeting with enthusiasm.

A mid-August date has been suggested for our next outing at a local club - possibly Goring and Streatley - with our Members there making the visiting arrangements. Anybody interested in playing, always with the possibility of returning a card for a Society Handicap of course, for either the day or half-day will be most welcome.

John Cathrew
(Secretary)

SRC SPORTS DAY 1974

Once again the sports ground at Chiswick was invaded by representatives of the various SRC establishments for the annual Sports Day. The weather, though slightly unsettled, remained merely overcast, and the dry day allowed us to compete at tennis, football, cricket, netball, chess, bowls, and finally the tug o' war. Reports on some of these events appear below. The day ended with a social evening in the clubhouse, with music supplied by the "Appleton Disco" (!)

I would like to thank all those who took part in the sports, and particularly those who assisted with the organization of events.

Chris Gibbins

FOOTBALL

We fielded two teams again this year but our results were less encouraging.

The "A" team, consisting of six of our crack players did manage to score a few goals, win one game and draw two. The "B" team drew one and lost by rather more: No double figures though, thanks to the agile goal-keeping of Alec, The Super Scot.

No one seems to have a copy of the actual scores: sheer luck!

U. Yilmaz

CHESS AT SRC SPORTS DAY 1974

As last year the chess competition was run on a teams-of-three, all-play-all basis. Seven teams took part, including two from AL. Also as happened last year, our A team failed very narrowly to win the event. All went well in the early rounds, including a comfortable win over the holders, Rutherford. In our final match we met RGO, with both teams having won all their matches at that stage. Unfortunately we could manage only half a point from the three games and so finished in second place behind RGO. Our B team was somewhat further down the table. The most consistent AL player was Dudley Long who scored $5\frac{1}{2}$ from his six games.

E.N. Bramley

TENNIS

Two trophies are contested in the SRC tennis tournament at Chiswick and since this event started, at least one of these has returned to Slough. This year was no exception, with the mens doubles title being retained by Gus Gordon-Smith and Arthur Roberts. In the mixed doubles, although we lost the title to R.G.O., Dr. and Mrs. Horner and Richard Smith and Pat Martin finished runners-up in their sections. Jack Moore and Marie Huggins and Paul Gardner and Kitty Gordon-Smith were also well placed.

R.W. Smith

BOWLS TOURNAMENT AT CHISWICK

We played last year's winners (Rutherford) in the first round, and defeated them after a very close and exciting game. We were unable, however, to sustain our form after lunch and succumbed to the team, another one from Rutherford, who went on to win the tournament.

R.W. Meadows

S.R.C. SPORTS DAY 1974

FIRST AID

Four participants were sent to hospital. In addition many more minor injuries were treated, mainly grazes from the football pitches.

I would like to express my appreciation to all those people who assisted with the first aid, and in particular to Janet Ryder who volunteered at very short notice to ferry people to and from hospital.

F. Bennett

LETTER TO THE OUTSTATIONS

Dear Colleagues,

I am, I suspect, a true suburban, disliking Town, distrusting traffic, but never quite at ease with the animal kingdom. The programming of cattle, horses and such seems unreliable and, while prepared to look kindly on the tortoise and hedgehog, I own to once being alarmed by a hostile glance from a squirrel which showed no inclination to get out of the way for the likes of me.

Despite this, the other day, a flicker of sunshine made a stroll in North Park seem inviting. The lowing herd had, presumably, wound o'er the lea and was nowhere to be seen. Relaxed, the mind ranged in space and time about the park. There stood the first huts (destroyed 1927); there was where we built a tower in February sleet (demolished 1965); here stands hut twenty eight. ...Where? - here, this hut to the - oh, ah-er....well it should be hereabouts.

It wasn't though. Just a patch of earth, a scorch mark or two and a thing like a vast crushed biscuit tin. Nought remained besidesave speculation. Fire, but what caused it? An insurance swindle? Vikings fed-up with waiting? ('You spend far more bloody time hanging about for these long boats than you ever do on the journey'). The apocalyptic result of an apprentice Elijah getting it right at last?

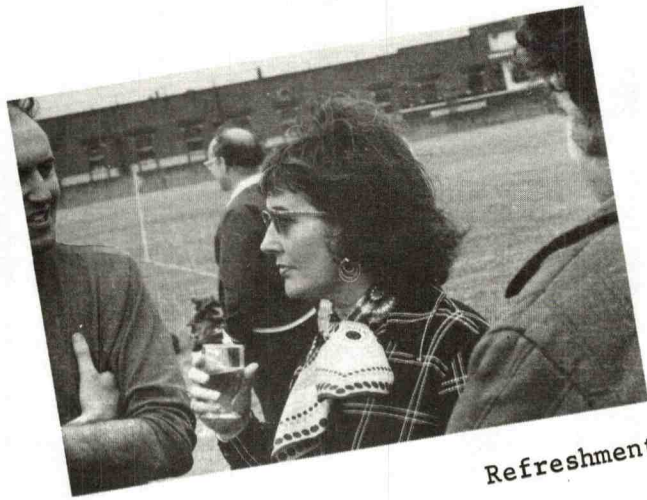
Truth was prosaic but still a bit odd. The building had received several visits from a self-appointed Alternative Laboratory Committee made up of, presumably, philosophically-minded cattle. They left little doubt as to their lack of satisfaction with the state of our research there. Of course everyone has a right to criticise, but criticism can be forceful yet not inelegant. Not so in this case.

Such was our shame that honour, and probably the public health authorities, demanded that the site be ritually purged by fire, which it was. Only lining from a screened room survived, bent yet pure.

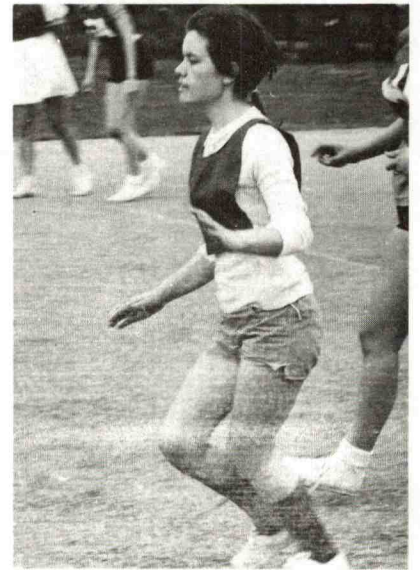
We should tread warily, things as well as poets can be killed by critics. There's little danger, though, of either being snuffed out by articles such as this from,

Yours sincerely,

The Editor



Refreshment



Acceleration



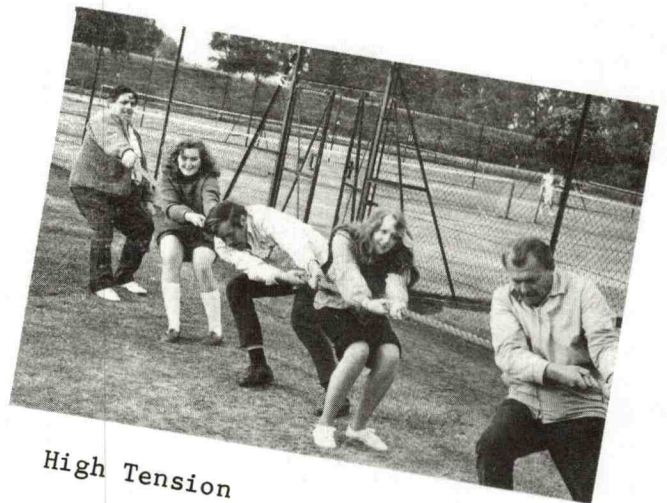
Achievement



Observation



Particle Study



High Tension

SCENES FROM SPORTING LIFE

Being some familiar faces recently glimpsed at Chiswick

Reprint List July 1974

- M. E. Cleverley "Observations of the small-scale structure of intense rain by the scattering of microwaves" Electronics Letters, 1973, Vol. 9.
- H. Rishbeth "Electrical coupling of the E- and F-regions and its effect on F-region drifts and winds". Planet. Space Sci., 1974, Vol. 22. 743-756
- L. Thomas "Recent developments and outstanding problems in the theory of the D Region". Radio Science 1974, 121-136.
- M. P. M. Hall "Effect of rain on 4 GHz troposcatter radio paths".
G. R. Dowling Electronics letters, 1974, Vol. 10, No. 11.
- G. R. Thomas "Comparisons of solar proton trajectory computations using model
D. M. Willis magnetospheres." Correlated Interplanetary and Magnetospheric
R. J. Pratt Observations. 1974, 449-461. Editor D. E. Page, D, Reidel, Dordrecht

Internal Memoranda

N I L