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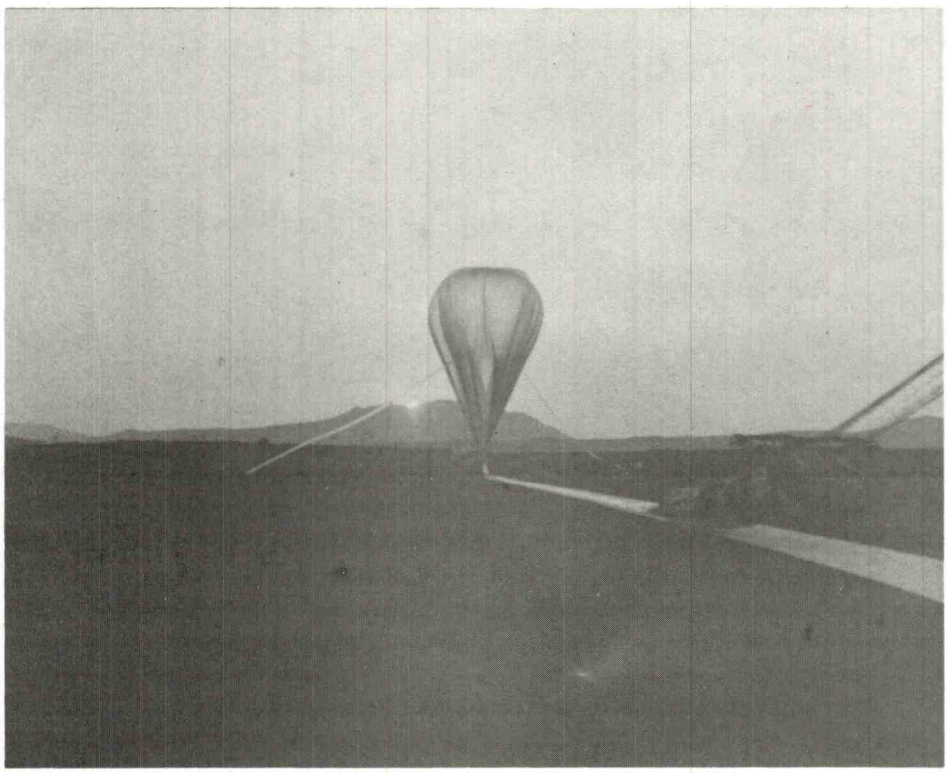
APPLETON LABORATORY
NEWSLETTER

No. 173 October 1975



TRANSATLANTIC BALLOON SUCCESS

On 8th August at 1627 hrs, Local time, not far from Lexington, Kentucky a large balloon carrying scientific equipment came to earth. This marked the successful end to the three and a half day validation flight of the transatlantic balloon facility. The 21 million cu. ft. balloon with its payload of detectors for heavy particles and gamma rays, together with navigational, telemetry, auto-ballast and radiometer systems had crossed the Atlantic, from its launching ground

in Sicily; a flight of approximately 8,500 km, at a mean speed of some 100 km/hr, most of the journey being carried out at a height of about 40 km above the surface of the earth.

The flight was primarily intended to prove that a balloon could cross the Atlantic from east to west, using high-altitude winds during the summer months, and that positional, housekeeping and scientific data could be acquired for a large proportion of the time with a high frequency radio communication system using low bit rate telemetry.

The scientific payload carried comprised a 500 kg. experiment from Bristol University, designed to detect the ultra-heavy component of primary cosmic rays by tracks made in a plastic emulsion; and a small gamma-ray experiment of Southampton University.

As well as being responsible for the overall project management; including liaison with collaborating organisations in Italy and the U.S.A. who provided the launch base, specialised launching equipment and techniques, payload recovery and second ground control station; Appleton Laboratory staff designed and developed the h.f. telemetry and telecommand radio links and the data handling systems for both the balloon and the ground terminal in Sicily. A contract was placed with Southampton University to design and develop the automatic ballast and navigation systems and to provide a balloon service module and structure to carry the various parts of the payload.

The 10 watt h.f. transmitter, handling P.C.M. telemetry at a rate of 33 b/s was pre-programmed to switch alternately between two frequencies selected from six allocated in the aeronautical mobile bands and could be held by command on the better of the two frequencies. The frequency selection at any time took account of the time of day and expected range using predictions of ionospheric propagation conditions derived from an A.L. computer program. At the half-way point of the flight control was passed from the ground station in Sicily to that in the U.S.A.

At the Sicily ground station provision was made for dual diversity reception over a range of 4 to 15 MHz and for facilities for quick-look output in addition to tape-recorded data for subsequent computer analysis. Telecommands to the balloon equipment were sent by a 1 kw transmitter at the ground station.

The performance of the communication links appeared consistent with the ionospheric propagation predictions. Satisfactory signals were received at Sicily from the balloon transmitter at all ranges up to 3000 km and at greater ranges when the path was in darkness. Between 3000 km and the half way point at 4000 km signals were unusable at times during the day, probably due to the poor performance of the receiving aerials at low elevation angles.

The success of the transatlantic flight has demonstrated that a facility can be provided for certain types of scientific experiment requiring an exposure period in space many times longer than that obtained from a normal balloon flight. It is the first flight of its kind, for previous attempts, from U.K. to Canada, flew unballasted, carried no experiments and no attempt was made to recover the payload, which telemetered only crude longitude derived from the sun-angle.

So far all attempts to cross the Atlantic by a manned balloon have failed - sometimes fatally for the fliers. However the way seems clear for further development of unmanned transatlantic balloon facilities in the next few years, with telemetry at higher bit rates, and an annual campaign with several flights.

LABORATORY NEWS

THE URSI GENERAL ASSEMBLY, LIMA, PERU

The Director and Drs. Horner, King and L. Thomas attended the General Assembly of the International Union of Radio Science (URSI) held at Lima, Peru, during the period 7-21 August; the Director was the head of the U.K. Delegation to the Assembly. Sessions were held by the eight individual URSI Commissions which, between them, cover the whole field of radio science (from radio astronomy to radio-wave propagation in the troposphere). In addition, special symposia on topics such as "Radio Waves in the Ionosphere", "Non-stationary signal analysis" and "The telecommunication noise and interference environment" were held. The business meetings at the Assembly were chiefly concerned with the manner in which the Union should be re-organised to permit greater attention to be paid to radio communications and also to several newly-emergent branches of radio science. Dr. King will serve as the Chairman of Commission G (on ionospheric radio and communication) for the next three years.

The official social programme included visits to the Paruchuco, Cajamarquilla and Pachacamac Inca Ruins in the vicinity of Lima and to the Jicamarca Radio Observatory and the Entel Satellite Communications Station. A very alarming earth tremor experienced in the early hours of the first day of the Assembly did not form part of the official programme!

A private visit to Machu Picchu, several hundred miles from Lima, was made by most of the U.K. delegates and their accompanying families. For the majority, this represented the most memorable part of their visit to Peru; the fame of these remnants of the Inca Empire is very well deserved and far from exaggerated. Drs. King and Thomas visited the ruins during the first week-end and, for them, the Cuzco-Machu Picchu train journey was particularly eventful. The derailment of a previous train necessitated the "improvisation" of travel arrangements which included a night-time journey in highly precarious postures on the observation platform of a very overcrowded steam train on which there were no lights, and then a walk along the railway track in pitch darkness with the frequent disappearance of colleagues into deep holes between the railway sleepers. However, their experiences and fortunately only minor injuries did not detract from the visit nor deter them from encouraging the other U.K. delegates to make the visit the following week-end on the assumption (which proved to be justified) that normal travel arrangements would have been restored by then.

"M. P. M. Hall attended a NATO Advanced Study Institute at Goslar in Germany from 22 to 30 September. The meeting was on Atmospheric effects on radar target identification and imaging."

STAFF NEWS

Welcome to :

T. R. Eyre	S.C.S.
D. N. Matheson	H.S.O.
A. J. Ruddell	H.S.O.
B. Benson	P.T.O. III
C. P. Chaloner	H.S.O.
Miss H. J. Benge	Personal Secretary
R. Henzell	Craftsman I (Ind)
K. G. Maris	Craftsman I (Ind)

Resignations, etc. :

. Newton	S.C.S.
M. S. Hargreaves	S.C.S.
K. S. Griffin	S.C.S.
R. J. Henson	S.C.S.
S. Hale	S.C.S.
R. H. Lancaster	S.C.S.
A. R. Thomas	A.S.O.
M. R. Witney	Craftsman I (Ind)

LETTER TO THE EDITOR

Dear Sir,

May I, through your News-Letter, draw attention to the insidious growth of certain reprehensible habits in the use of written and spoken English in our local affairs? In the minutes of a recent meeting we find a reference to "a store for flammable liquids". This puzzles me, even though I recognise here, as elsewhere, the transatlantic influence. May we expect shortly to see a notice that "flammable liquids must be kept in an inflammable store"? That would indeed be a flammatory instruction likely to flame my temper!

Furthermore, the second-syllable emphasis in kilometre is now widespread. Such a deviation from our mother tongue may occasionally be convenient poetically :-

> My section has bought some distrometers,
> Which are really just rows of speedometers,
> For they sample rain drops,
> From the size of their spots,
> As these fall down through several kilometres.

But this is hardly a sufficient justification. In this context, Sir, you will be pleased to note that the U.S. National Bureau of Standards, in its Special Publication 330, supports the British spelling of "metre". Such a concession to the "illogical" deserves praise. For illogical spelling is a national heritage. In what other land would you write that "the metre in this poem is enhanced by the liberal use of hexameters"? But the ability to master these curious rules is of course the hall-mark of a properly educated English gentleman of intelligence. Perhaps our American cousins may one day soon write that "the pitcher throws to the batter, but we pour the battre into the pitchre"!

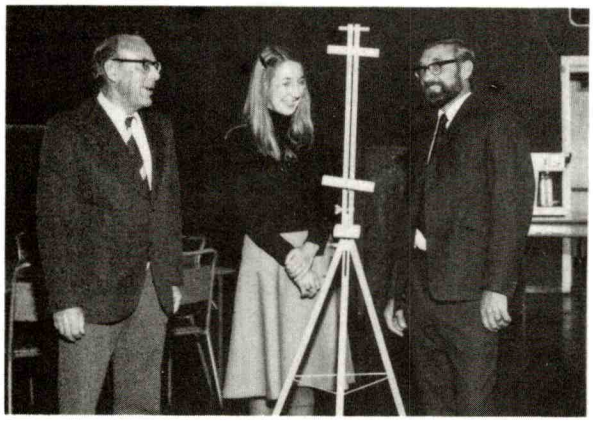
Finally, the effeminate "continental" version of the numeral "7" is finding increasing favour. Like you, Sir, I was taught to write this in a strictly rectangular fashion, portraying a gibbet-like structure - indicative of my fate perhaps if I failed to achieve the calligraphic standard required. The popular modern counterpart should be confined to the bistro menu across the Channel where it belongs so that it does not contaminate our documentation in the guise of trussed daffodils with broken necks.

Yours sincerely,

Peter Simple

FORTHCOMING EVENTS

Christmas Dance	20.12.75
Children's Party	13.12.75



LEAVE TAKING

On the occasion of her leaving Appleton to take up a Senior Personal Secretary appointment at London Office, Mandy Taylor was presented with a variety of gifts from friends throughout the Laboratory.

MEASUREMENTS LABORATORY NOTE

Missing Items

The reference copy of the 1975 Signetics Data Book has been returned but the Texas Instruments Semiconductor Design Manuals are still missing. It is requested that all members of Staff carry out a special search for the missing books and return them to Measurements Laboratory so that they may be available for use by all.

INTERESTING BOOK REVIEW

Green Beach by James Leasor, 250 pp with illustrations, 1975. Published by William Heinemann Ltd. at £2.90.

Gives a short history of radar immediately preceding and during the early war years. Mentions Watson-Watt and many other well known names and places including R.R.S. Also describes the equivalent German radar techniques including Freya and WUrzburg then explains why it was so vital for us to discover the capabilities of this equipment. It then describes two commando raids on coastal stations in France to actually "steal" the secret parts from these equipments. The second raid is described in considerable detail.

As the real objective of these operations was kept secret until after the war the general public were not aware of what really happened. A gripping and true adventure story full of bravery and heroism.

L.M.

LETTER TO THE OUTSTATIONS

Dear Colleagues,

Recently, when going from A to B, I became aware of a change in the paved footpath joining these two important points. It ran straight as ever, some cracked flags had been replaced and the way made smooth.

Still that wasn't all, it was in some way different, then came realisation, the path was now raised above its surroundings. What of that? You may ask. What ndeed - on its own very little .....

Consider though; for some weeks past we have been having our doors improved. Skilled men have been much employed taking down our old inter-corridor doors, which opened any which way, replacing them with stouter models which do not. Not content with this, a further pair has been interpolated into the main corridor near C spur. Thus passes that impressive vista, converging to infinity. The grand design is broken into quanta and no more shall we see the tea trolley coming from afar off.

Is all this just for that? Indeed not. It is a necessary precaution against fire, we are told, and this is doubtless true. Recollect, however, the new raised path; in the event of flood it will form a handy causeway, and those doors a series of watertight (well almost) bulkheads. Could it be that some of our colleagues at work on the cyclic nature of severe winters have come up with inside information sufficient even to convince the Central Works Unit. Impressive evidence indeed, that which moves hard-headed engineers.

Might it not be as well to consider that a modest expenditure on small boats be part of future forward looks? Should we not renew long-past attempts to improve technique in a punt, perfection in which always eluded,

Yours sincerely

THE EDITOR

Reprints List for October 1975

A1137	A J Gibson L Thomas	Ultraviolet laser sounding of the troposphere and lower stratosphere	Nature	1975 Vol. 256 No. 5518	561-563
A1082	J Norbury W J K White	Intensity-time profiles of high-intensity rainfall	Met. Mag.	1975 Vol. 104	221-227
A1117	H Rishbeth	On the theory of diffusion in the ionosphere	Geophys. J. R. astr. Soc.	1975 41	311-317
A1118	D M Willis	The microstructure of the magnetopause	Geophys. J. R. astr. Soc.	1975 41	355-389
A1120	R G Evans Carol Jordan R Wilson	Observations of chromospheric and coronal emission lines in F stars	Mon. Not. R. astr. Soc.	1975 172	585-602