



APPLETON LABORATORY

NEWSLETTER

No. 184

November 1976

Ariel 5 Two Years in Orbit (continued)

The impressive list of scientific achievements reported in our last Newsletter would not have been possible without the technical support of our Laboratory.

In completing its second year in orbit, Ariel 5 has doubled its originally planned operational life. The scientific observing programme has continued successfully despite some degradation with time in the performance of certain spacecraft and experiment sub-systems. To achieve this success, Control Centre operations have had to become more flexible as the satellite has aged. It has been necessary to adjust quickly to new situations and to maintain the spacecraft within new operational constraints.

The propane gas supply, which provides the manoeuvring capability for pointing the spin axis, should last, at the present rate of consumption, for a third year, and possibly longer. Attitude manoeuvres have been carried out successfully in spite of a loss of performance of the gas pressure reducing valves. This has been made possible through the precise judgment and response of operators, as well as appropriate modifications to computer software to take account of irregular changes in gas pressure.

Gas manoeuvres are restricted to times when the jet manifolds are warmer than the central propane tank in order to avoid possible problems with liquid propane passing through the valves. In turn, as this depends on the time of day and spacecraft attitude with respect to the Sun, operational schedules are affected, and also the scientific observing programme is restricted by prohibiting the viewing of certain sources at a given time of year.

The on-board magnetic torquing system has been used regularly to minimise the attitude drift rate of the satellites spin axis, and this facility can also be used for manoeuvring in a limited way, both to conserve the gas supply and partially relieve the new operational constraints.

The battery charging cycle, which takes power from the solar cells during the 60 minutes in sunlight to supply the satellites power requirements during the 35 minutes of darkness, is expected to continue operating reliably for a third year.

The functioning of the data handling equipment on board Ariel 5 has continued unimpaired, and all modes of operation have been used, and have performed well, for two years.

Spacecraft attitude measurements have made use of the back-up sensor system to allow partial failure of a sensor in the primary system to be overcome. It has also been possible to refine the accuracy of some measurements by using the known position of certain X-ray sources. To optimise calculations of spacecraft attitude, data obtained since launch have been used as the basis for making changes to the computer software.

BRIEF FACTS ON ARIEL 5 HISTORY IN ORBIT

Launched:	15 October 1974 from San Marco Range, Kenya.
Ground stations:	NASA/STDN - Quito, Ecuador; Ascension Island.
Control Centre:	SRC, Appleton Laboratory, Slough.
Apogee:	557 km at launch: 545 km after 2 years.
Perigee:	513 km at launch: 501 km after 2 years.
Inclination:	2.9°.
Orbital period:	~ 100 minutes.
Number of Orbits:	~ 11,000.
Distance travelled:	~ 300 million miles.
Effective 'Project Cost':	~ 1½p per mile.
Number of manoeuvres:	~ 650
Proportion of gas used:	70%.
Number of Scientific Papers produced:	~ 70.

Letter to the Editor

Dear Sir

Following recent exhortations to be more "safety-conscious" I inspected the HMSO publication "Health and Safety at Work Act, 1974". On p.23 I found the following:

"Where any of the relevant statutory provisions applies to a building or any matter connected with a building and an inspector proposes to serve an improvement notice relating to a contravention of that provision in connection with that building or matter, the notice shall not direct any measures to be taken to remedy the contravention of that provision which are more onerous than those necessary to secure conformity with the requirements of any building regulations for the time being in force to which that building or matter would be required to conform if the relevant building were being newly erected unless the provision in question imposes specific requirements more onerous than the requirements of any such building regulations to which the building or matter would be required to conform as aforesaid."

In case this is not sufficiently clear, we have the addition:

"In this subsection "the relevant building", in the case of a building, means that building, and, in the case of a matter connected with a building, means the building with which the matter is connected."

I suppose we should at least be grateful for the lone comma in the first paragraph!

Yours sincerely

Peter Simple

Staff News

Congratulations to :

Shelagh Mackinnon and Lakis Akrivos who were married at Maidenhead Registry Office on 6th November.

Welcome to :

Miss A.J. Garner C.O. (Culham)

Resignations etc. :

C. Murphy	H.S.O.
P. Jordan	S.O.
A.R. McWhyte	Lab.
Mrs V.M. Tutty	Cleaner.

Retirement

Mr A.R. McWhyte

A recent ceremony marked the retirement of Mr A.R. McWhyte. To some it came as a surprise to learn that he is no novice at this sort of thing, having already completed a career at the Road Research Laboratory, as it then was. There he gained considerable experience in dealing with heavy machinery and, as chance would have it, was one of those involved in the making of our tennis court.

A veteran from the days of the Royal Flying Corps Mac's self-reliance and interest in life make it evident that his is a powerful technique for holding time at bay.

May his retirement be a long and happy one.

External Lectures to Appleton Staff

The following lectures have been arranged :

The Open University
Dr Milo Shott
Wednesday 19 January 1977

The Autarkic Housing Project
Dr A. Pike
Wednesday 16 March 1977

Further details will be announced in due course.

Bonfire and Fireworks - November 5

The crowds thronged to Appleton on the evening of November 5 to behold the magnificent annual display and to sample our world-renowned bangers.

Once again the weather held (what have we done to deserve such good fortune throughout the year) although the showers of the days leading up to the 5th led to some difficulty in getting the blaze going in time. However, there were no other hitches and judging by the numbers of Ooohs! and Aaaahs! emerging from the crowd, everyone had a thoroughly enjoyable evening.

A special thank you to our many helpers.

Chairman
Sports & Social Club.

Letter to the Outstations

Dear Colleagues

Flexibility is come, at least for them as chose to sign on. Small machines have taken to hanging about the corridors offering the time of day, more or less, to passers-by and hoping for custom, a bit like Lisle Street ladies in years gone by.

Each gadget has its own particular client. On command it displays information about the individual's temporal bank balance under the heading 'variance' - a happier term presumably than 'deviation'.

Though the system has much to commend it, one effect is less happy. The gaining of useful time credit by taking merely a half-hour lunch may have a deleterious effect on conversation. Seldom can any of us develop a tongue so honeyed as to talk our friends out of the chance to accrue time for a possible Monday off. This may, in turn, lead to a conciseness in utterance, doubtless beautiful to the analytic mind, but forming too damned professional an approach to what should be an idle pat-ball of a game among amiable companions.

Flexibility (and a fair conversational gambit) was also recently manifested in a group of good-looking lady visitors who, on having been welcomed to the Laboratory, responded for the first and, doubtless, only time in my experience, with the words 'So glad we were allowed to come, where can we take our clothes off?'. Years of training took command over personal inclination; they were directed to the nearest S.P.S.O's office - it's not my fault if he chooses to be away in Puerto Rico at the time.

In due time they emerged, translated into Martians (Martianinnen?) ready to be photographed with a 'Space Man', all in aid of a Charity. Ladies from Mars, it seems, look most fetchingly like our own, possessing, among other attributes, long shapely legs which they encase in silver tights. Ladies from Mars are A GOOD THING.

Let image enhancers do what they will, our Martian observations provide far more characteristics of interest than do a whole gallery of Viking pictures to the untutored eye of such as,

Yours sincerely,

The Editor.

November Reprint List

ZAVODY, A M & B N HARDEN A1182

Attenuation/rain-rate relationships at 36 and 110 GHz
Electronics Letters, 1976, Vol 12, No 17, pp 422-424.

SMITH, J F & G M COURTIER A1169

The Ariel 5 Programme
Proc. R. Soc., Lond. A., 1976, 350, pp 421-439.

ALLNUTT, J E A1179

Slant-path attenuation and space-diversity results using 11.6 GHz
radiometers
Proc. I.E.E., 1976, Vol 123, pp 1197-1200.

Internal Memorandum

I.M. 370

Tables and graphs of zenith atmospheric
gaseous attenuation from 10 GHz to 300 GHz.

C.J. Gibbins
C.L. Wrench
D.L. Croom