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NEWSLETTER

No. 104

January 1970

THE CHILBOLTON COMPUTER

An Argus 500 computer has recently arrived at the Chilbolton Field Station of R.S.R.S. The prime purpose of the computer is to provide a convenient method of steering the eighty five foot aerial and to look after its safety. As a secondary function, the computer is able to process the various signal's output from experiments, in between the demands of the aerial steering system.

The way in which Argus integrates with the aerial control system can best be seen by first looking at the original steering scheme. The pointing direction of the aerial is determined by a special purpose steering computer (not Argus) whose sole function is to control the aerial. Values of azimuth and altitude can be input to this steering computer, known as the Interpolator, in a number of different ways, which for experimental purposes, become only two ways. The interpolator can read a block of characters on paper tape which specifies the values of azimuth and altitude at a particular time. The interpolator always holds three of these blocks of data and uses the values to drive the aerial along an interpolated, parabolic path, hence its name. As it reaches the point specified by a particular block of data, it reads another block, so continuously updating the data it holds. Programs have been developed for the ICL 1905 computer which create these steering tapes for a number of purposes, such as stellar tracking. An alternative method of producing a particular scan about a fixed point is to introduce an analogue voltage into the steering computer's servo control loop, which makes it think that there is a positional error.

The servo system quickly reduces this error to zero by moving the dish to a new position. If the value of the analogue voltage, "the error voltage", is swept from one level to another, the aerial will follow the same path. This method of control is very useful to the tropospheric experiments as these typically require a raster scan about the direction of a distant transmitter to find variations in any arrival angles with tropospheric weather changes. Both these methods are used in practice, but they do impose other rigid restrictions on what can be done.

The method we have adopted for connecting Argus to the interpolator is to use the interpolator in its tape reading mode. Azimuth, altitude and time values are represented on paper tape by a block of twenty-four tape characters. We have built equipment which allows Argus to give a single character to the interpolator as the latter asks for each one. To the interpolator, Argus looks like a paper tape reader with an infinitely long paper tape. But unlike a paper tape, Argus is able to change the message depending on external circumstances.

It is not enough just to send positional information to the interpolator and expect the aerial to move to the required position, we must also check that the aerial has got there. Aerial angular position measurements are already available to the interpolator, as they are needed to compute the deviation of the aerial from the interpolated track. A special interface has been made to enable Argus to read the angular positions, and these are used to compare the position demanded by Argus with the actual position. The system parameters are currently set so that if the aerial is outside its positional tolerance for three consecutive seconds, Argus assumes that there is a fault and shuts the aerial down. A proposed extension to this, is a monitor of the local wind speed. If the wind speed became dangerously high, the aerial would be put to its "stow" position, that is pointing directly at the zenith.

All the calculations implied by the previous paragraphs, together with a computer program to produce a particular track, only require a few per cent of the total processor time. This spare time is available for performing data processing operations on the received signal as each particular measurement is made. Perhaps the principal advantage of on-line processing of data is that the results of an experiment are instantly available. Apart from the obvious usefulness as a check to make sure that all knobs and switches are turned the right way, it is nice to know if the looked for phenomenon is occurring today. It is sometimes possible to set-up "twin" experiments. For instance, a tropospheric program might look for refractions in stable air conditions and rain scatter in rainy weather. A computer program could, in principle, inspect the received radio signal along with other parameters and make an hourly choice,

say, as to which experiment to run. As this choice may have to be made at 5.00 a.m., or on Sunday morning, the system has its points. A more direct application of on-line processing would be the case where the received signal is used to control the pointing of the aerial. A simple case would be a computer program which measured the variation, with altitude, of the difference between the measured altitude of the dish and the true radio axis of the paraboloid. The aerial would be made to track a suitable radio star and Argus could make adjustments to the track calculations to maximise the received signal. The difference between the aerial angular position and the known position of the radio star gives the required figure. By using the program for twelve hours, a computer table of corrections to measured angles could be generated.

(to be continued)

C. M. Comer

OBITUARY

Mr. I. Monkman

We are very sorry to learn of the sudden death of Mr. I. Monkman on 15th January at Stanley, Falkland Islands.

Ian Monkman joined the staff of this Station just over three years ago and in June 1967 was posted to the Falklands. Since then he has been a valued member of the community there, both in the scientific and social sense. His duties enabled him to spend time at both R.S.R.S. and E.S.R.O. stations and his photographic and business skills enabled him to make a useful contribution to life in a distant part of the world. A young man of promise, his death as a result of a motorcycle accident is a matter for deep regret and we offer our sympathies to his Mother and brother.

STAFF NEWS

Congratulations to:

Dorothy and Bill Bellchambers, on the birth of their son, Richard John, on January 1st.

Carol and John Cathrew, on the birth of their son, Vincent John, in Singapore, on 13th November.

Mr. and Mrs. D. W. Hardy, on the birth of their daughter, Juliet Evelyn, in the Falklands, on 17th December.

Mrs. K. E. Shand now C.O.

Welcome to:

| | |
|--------------|---------------|
| N. C. Lewis | E.O. |
| R. D. Calley | A.E.O. (Perm) |

Resignations:

| | |
|-----------------|-------------------------|
| L. R. Jackson | Sandwich Course Student |
| R. A. Challinor | S.S.O. (Non-perm.) |
| M. W. Lawton | S.O. |
| L. P. Smith | Messenger |

Other Changes

| | |
|-----------------|---|
| J. A. Murphy | E.O. (Became permanent) |
| L. T. J. Martin | S.E.O. trans. from Division VI to Division II |

SPORTS AND SOCIAL CLUB NEWS

Christmas Dance

As Chairman of the Sports and Social Club I would like to take this opportunity of thanking all those who assisted in the running of the Christmas Dance. Unless you are actually involved in the arrangements, it is, I am sure, difficult to envisage the volume of work involved; I certainly didn't until I became involved in Sports and Social Club affairs.

In particular I would like to thank Mike Farman who was Officer-in-Charge, Christmas Dance; Elaine Wright who, together with her merry band of helpers, planned the decorations and of course Jack Savage who once again came up trumps. I would also like at this point to thank Alec Carroll (husband of Betty Carroll) who, although not a member of RSRS staff, did an excellent job as M.C. and who ably assisted in the tidying-up operations on Sunday.

In closing I would also like to thank Dr. Saxton for allowing us to use official premises and facilities for the function, for without this approval it would have been impossible to stage the event.

Vince Foley

BILLIARS AND SNOOKER SECTION

DO YOU WANT TO LEARN? READ ON - THIS CONCERNS YOU TOO!

A Billiards and Snooker group has been formed as a sub-section of the Sports and Social Club. Anyone, Lady or Gentleman, who might be interested in joining should contact one of the undersigned.

Although facilities are not, at present, all that might be wished, it is hoped that following the formation of this sub-section, some improvements will be possible.

The sub-section intends to both hold tournaments within the establishment and to challenge other clubs. We also hope to take part in the competition for the Smith Rose cup.

The first of these competitions will commence as soon as sufficient members have been enrolled, and it will be played annually on a knock out basis, the winner's name to be inscribed on a commemorative trophy, which will be placed on display.

Beginners are welcome, and tuition, from how to hold a cue to the limit of the organisers' abilities, will be held whenever possible.

P. A. Eggett - Spur B. Lab.
R. F. Hemmings - Establishment.
D. M. Kelley - 121a.

Film Shows

These will be shown on the 1st or 2nd Monday of each month, in the board room, during the lunch hour. Further details will be posted on the notice board.

P. Dadds

Stereo Section

The club has recently bought a record player, as the first part of a complete stereo unit. It will be situated in the Cricket Pavilion and should be ready for general use by the beginning of February. It is hoped that the complete unit will be available next year.

Further information can be obtained from -

R. Knight
D. Llewellyn-Jones

Motor Club

The motor club will hold a rally on March 22nd starting from Maidenhead Thicket (O.S. Map 159; Map Reference 859, 809), at 11.00 a.m. The route is confined entirely to this map, and is a non-speed event, being a test of navigation. Further details may be obtained from -

R. Marsh

Wine Circle

This month the Wine Circle are publishing two recipes for Ginger Beer, which should prove popular with children.

Ginger Beer 1

| | | |
|--------------------|-----------------------|-------------------------|
| <u>Ingredients</u> | 1 lb. sugar | 1 gallon boiling water |
| | 1 oz. cream of tartar | $\frac{1}{2}$ oz. yeast |
| | 1 oz. ground ginger | |

Method

1. Mix all the ingredients except the yeast together.
2. Allow to become lukewarm ($65-75^{\circ}\text{F}$) and then stir in the yeast.
3. Cover and leave to stand for 24 hours.
4. Strain and bottle. Cork down tightly and leave overnight before serving.

Ginger Beer 2

| | | |
|--------------------|---|---|
| <u>Ingredients</u> | 2 lb. sugar | 1 gallon water |
| | 2 lemons | 1 teaspoonful yeast |
| | $1\frac{1}{4}$ oz. well bruised root ginger | $\frac{1}{4}$ teaspoonful cream of tartar |

Method

1. Put into large bowl or jar, the sugar, the rinds (thinly peeled) and juice of the lemons and the ginger.
2. Boil the water adding the squeezed lemons as it comes to the boil.
3. When water boils pour into bowl, remove lemon halves stir well and cover.

Proceed now as in Recipe 1 from 2 onwards.

F. Bennett

LETTER TO THE EDITOR

Dear Sir

As our research programme becomes more closely associated with problems of a practical nature I feel sure your readers will note with interest the following extract from a recent issue of Proc. I.E.E.:-

'A noticeable reduction in noise pick-up took place when gooseberry bushes were removed from the front of the test site'.

Now, Sir, there's a fruitful topic for study! We know of course that such vegetation is correlated with one source of interference, having a noise spectrum dominantly in the audible range and exhibiting a diurnal variation with a maximum generally soon after midnight. But the possibility that these sources might possess a wider spectral output had not occurred to us, and their characteristics would seem to deserve further study. So far as we can determine, these sources are quite inexpensive to produce and I'm sure there would be no shortage of staff willing to assist in their construction, with a view to observations starting in the autumn.

I propose to raise this at the next progress review.

Yours hopefully

Volunteer

R.S.R.S. CHART

Each point represents a place with the same name as a member of R.S.R.S. staff. Specifically they should represent 1 Anderson, 2 Ashwells, 3 Bamptons, 1 Baldwin, 1 Barnes, 3 Bramleys, 6 Bradleys, 1 Brindle, 1 Cottenham, 1 Douglas, 2 Eccles', 1 Elston, 8 Fords, 1 Haigh, 2 Halls, 4 Haltons, 1 Handley, 1 Harden, 2 Hayes', 1 Horner, 1 Hougham, 3 Hursts, 1 Johnston, 1 Lawton, 3 Lees, 1 Marsh, 2 Martins, 1 Mason, 1 Moore, 1 Mortimer, 4 Norburys, 2 Nutleys, 1 Pickering, 1 Prescott, 1 Reed, 4 Sandfords, 1 Saxton, 1 Seal, 2 Watfords, 2 Wells', 1 Wilson and 1 Winteringham.

No prize is offered for identifying each point or for discovering which has been omitted in error.

CROSSNUMBER

I saw this intriguing numerical "crossword" nearly 2 years ago, but only rediscovered and solved it the other week. Many of the clues require some thought to determine which of several alternative answers is the correct one. There are no leading zeros and one digit can be uniquely determined from the clues given.

| | | | | | | |
|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G |
| H | | I | | | | |
| J | | | K | | | L |
| M | | | | | N | |
| | O | | P | | | Q |
| | R | | | S | | |
| T | | | | | U | |

ACROSS

- C M down - C across
- H | B down - M down |
- I 5 X K down
- J K down ÷ S down
- K (O across)³
- M E down - C across
- N \sqrt{N} down
- O $\sqrt[3]{K}$ across
- P x X I down
- R A Palindromic Number
- T A down + B down + M down
- U L down ÷ 2

DOWN

- A A power of some number
- B See H across
- D Has a common factor with U across
- E C across + M across
- F $x^3 + (x + 1)^3$
- G Sum of the digits of Q down
- I A factor of P across
- K S down X J across
- L U across X 2
- M See H across
- N (N across)²
- O x X U across
- Q See G down
- S K down ÷ J across

LETTER TO THE OUTSTATIONS

Dear Colleagues,

January's weather has not been without variations (and has given you a sure sign that your editor can think of damn all else to write about). It came in a bit sharpish like with moderate snow and a dislocated public transport system, but has now been followed by wet mild stuff, almost early summery. Many among us have been hosts to influenza virus which seems to have spent an enjoyable fortnight or so with full bed and board provided by our creaking, wheezing bodies.

Then there were the bells. Ring out wild bells across the snow was not, so far as I know, an injunction obeyed at Ditton Park on January 1st. Better late than never, though, our alarm system burst forth in unholy din just after closing time the other day. Such staff as were still about reacted at once with masterly apathy; no leaping from windows, no 'women and children first', no panic, no interest, no fire.

Just what set the row off is not known, but there is no truth in the rumour that it was started by one of the female staff in a desperate attempt to elude the, purely literary, attentions of,

Yours sincerely,

THE EDITOR

REPRINT LIST - JANUARY 1970

- F. Kift
P. A. Bradley
L. T. J. Martin
E. N. Bramley
- Oblique-sounding measurements over a 6700 km
temperature-latitude path.
- Proc. I.E.E. 1969 116 1985-1991
- L. Thomas and
M. D. Harrison
- The electron density distributions in the D-region
during the night and pre-sunrise period.
- J.A.T.P. 1970 32 1-14
- L. D. J. Harris
- Radio observations of the partial solar eclipse of
September 22nd 1968.
- J. Brit. Astronomical Ass. 1969 80 46-47

INTERNAL MEMORANDA

NIL