ESRO Newsletter

No. 142 MARCH 1973

SIRIO

SIRIO is the name given to the satellite which will be used in an international experiment throughout Europe to test the next frequency-band which has been allocate for Communication Satellites. The satellite is being built by the Italians and is currently scheduled for launch by the Americans in late 1974 from their Eastern Test Range.

SIRIO grew out of earlier co-operative work on the ELDO-PAS vehicle and was later adopted as part of the Italian National Program when the ELDO contract was cancelled. The research mission was changed to that of a geostationary Super High Frequency (SHF) communications test-satellite with an on-board system configuration based on proposals put forward by Professor F. Carassa, Director of the Milan Polytechnic. SIRIO will be spin-stabilised in orbit over a mean longitude of 15° West. From this position the mechanically de-spun antenna will be able to illuminat the whole of Europe and North Africa. It should also be possible to adjust the pointing angle of the antenna slightly so that experimenters on the East Coast of the North American Continent may participate in the program from time to time. Control of the satellite will be in the hands of the Italians, using a Telemetry and Tracking ground-station at Fucino,following the initial launch phase which will be guided by NASA.

Three experiments will be flown on SIRIO; two secondary experiments which will look at trapped charged-particles around the earth, and the SHF experiment. The prime objective of the SHF propagation and communication experiment will be to carry out a systematic long-term evaluation on the operational performance of selected uplink (ground-to-satellite) and downlink (satellite-to-ground) frequencies

on a slant-path through the atmosphere. It is important to fully investigate the propagation characteristics of these SHF frequencies on a satellite link due to the more severe effect that the weather has on the level of the received signals. The uplink and downlink frequencies of the current operational Intelsat IV series of communications satellites, 6 GHz (6×10^9 Hertz) and 4 GHz respectively, are little affected by the weather. However, at frequencies above 10 GHz (the upper SHF region), the effect on the signals of the weather, and in particular rain, is much more significant. Three types of SHF experiments have been planned for SIRO:

(a) Propagation Experiment
(b) Narrow-Band Communications Experiment (Multi-Access Telephony)
(c) Wide-Band Communications Experiment (Television Link).

The two Communications Experiment will only be carried out during clear-sky conditions due to the low level of signals involved, but the Propagation Experiment will be conducted continuously over the full two-year lifetime of the satellite.

Two SHF frequencies will be investigated, 17.4 GHz on the uplink and 11.6 GHz on the downlink. SIRIO will transmit a stable carrier signal at 11.6 GHz with two amplitude modulated side-bands at $\pm$ 266 MHz (266×10^6 Hertz). The uplink to SIRIO will be amplitude modulated signals, put onto a suppressed carrier at 17.4 GHz, and can consist of up to four separate frequencies which are in two frequency-slots $\pm$ 387 MHz either side of the 17.4 GHz carrier. These uplink transmissions are received by the on-board equipment which then linearly transponds them, complete with their uplink attenuation information, onto the 11.6 GHz downlink. These transponded signals appear as extra frequency 'lines' close to the downlink side-bands. In this way all the measurements on both the uplink and downlink may be performed on the ground thus greatly simplifying the flight-equipment. Absolute attenuation and relative attenuation across the bandwidth may be measured on both links but relative phase measurements across the bandwidth are restricted to the downlink for technical reasons. Of the four U.K. groups participating, only the P.O. at Martlesham will be transmitting as well as receiving, thus obtaining propagation data at 17.4 GHz and 11.6 GHz. Birmingham and Essex Universities will receive the 11.6 GHz signals: the former in connection with their radar studies in an urban environment, and the latter in relation to Polarisation Discrimination tests. At RSRS the prime objective will be to obtain space-diversity information, with the measurement of relative attenuation and phase as secondary objectives.

Space-diversity is the term used to describe the provision of at least two separate ground-stations to receive the same signal from the same satellite. By using two independent links to the satellite, should one of the paths be out of

action due to weather-effects, the second should still remain open thus ensuring continuity of service. The space-diversity system only becomes economic when the cost of increasing the size of the receiving aerial at a single site to overcome the greater level and duration of attenuation-events exceeds that of operating two smaller receiving stations at separate sites. The separation of the two diversity-sites is naturally critical in the overall economics of this type of operation. To enable an accurate estimate to be made of the optimum diversity-distance, RSRS is setting up a network of six ground-stations in an E-W line centred on Slough with spacings between sites varying from 0.4 km to 24 km. Five of these ground-stations will only receive the 11.6 GHz carrier signal using 1 metre aerials while the sixth, using a 3 metre aerial, will receive the sideband signals as well in order to measure relative attenuation and phase across the downlink bandwidth. This ground-station will act as the main station for the network and is located in E 128. The larger aerial is necessary because the sideband-signals are at a much lower level than the carrier signals. All the propagation information collected at the five diversity sites will be encoded and transmitted to the main station in real-time over tied P.O. telephone lines. The information is then decoded at the main station and all the data is digitized and recorded on magnetic tape for later computer analysis.

At present the five diversity sites are being equipped with their receiving apparatus and will be operated until satellite launch as total power radiometers detecting changes in the sky-emission Temperatures, as will the main station at a later date. From these temperature changes the attenuation level on a hypothetical satellite slant-path link can be estimated with a fair degree of accuracy. When the satellite is operating it is hoped to compare the calculated attenuation levels, using the changes in sky-emission temperatures, with the actual attenuation levels measured. By the time of satellite launch it is hoped that the RSRS weather-radar is also operational so that a comprehensive study may be made on propagation/diversity characteristics at 11.6 GHz using radiometric, radar and satellite techniques.

J. E. Allnutt

The Newsletter has received the following little-known S.R.C. instruction from a member of the Admin. staff. Publication will, it is hoped, ensure that the information is widely circulated. - Ed.

SRC GENERAL NOTICE 5001/73

To all Staff
Date 26 March 1973

Procedure to be followed when dying

It has been brought to the notice of the Chairman that members of staff have been dying without consent of their Superior Officers. This practice must cease forthwith. It must be understood by all staff that the man power shortage is still acute and any man who dies without a permit commits a serious offence, to which the only answer can be severe disciplinary action. Staff are instructed to fully acquaint themselves with the following SRC CEM.8B-105-207.

Dying (The Control of)

1. Dying (drill for) The following drill will be followed by all members of staff.
   (a) No man below the rank of E.O. may give the order to die
   (b) Those permitted to die will in all cases be known as victims. Under no circumstances will a man be allowed to die in his own time.

Drill

2. Drill movements On the receipt of the order the victim will die by numbers.
   (a) One The man will stagger forward a pace of 30" followed by short paces of 27" and 19" respectively. At the same time the eyes will be allowed to glaze.
   (b) Two The victim will sink slowly but smartly to his knees and counting the correct pause (two three) will fall forward on his face with the arms outstretched with hands in line with the ears
   (c) Three The victim will lower his legs with heels resting on the ground. Toes must be at an angle of 30 degrees to the shoulder blades.
   (d) Four The last breath will now be drawn. The last breath will consist of two parts of oxygen (BSI-49/1393)
   N.B. The death rattle will not be used except on special occasions or by very senior staff.

Preparations

3. Action before dying. Before dying the following action will be taken by the victim.

(a) A chart of the approaches to Heaven will be drawn from the Library.

(b) A haversack ration will be drawn from the Staff Canteen. Early warning must be given to the Canteen staff and allowance must be made for sandwiches to be made up on the spot at pre-arranged collection times.

(c) All debts must be cleared in the Cash Office. Failure to cash travel and other claims prior to dying will result in these credits being made over to the Spirits section of Bar Account of the Sports and Social Club.

Action after dying

4. On dying

(a) No overtaking en-route for Heaven. All senior officers passed will be paid the usual marks of respect.

(b) Staff will form an orderly queue on the Styx. Senior Officers will board the funeral barge first.

(c) On arrival at the destination report to the Angelification Officer and draw the following items of equipment:-

i)	Harps, basic playing with strap	1 (one)
ii)	Wings, pair	1 (one)
iii)	Clouds Fleecy line cumulus	1 (one)

5. The terms and conditions of the above notice have been agreed with the Undertakers Union. Any queries should be addressed to the Senior Archangel.

(With apologies to a strangely similar notice appearing in the R.N. Amateur Radio Society Newsletter).

STAFF NEWS

Congratulations to:

Bill Etheridge and Alice Wallace on their marriage on 27th January at Stanley F.I.

Dr. E. M. Doyle now S.S.O.

Welcome to:

R. A. Bohlander	H.S.O.
A. Liput	S.C.S.
Mrs. C. A. Taylor	A.S.O./PT
D. G. Back	Cfn. 1

Resignations

D. Andrews	H.S.O.
A. Thackray	Cfn. 1

Other Changes

K. Burrows, P.S.O. Transferred from Div. 4 to Div. 5, Group 3

Sports and Social Club News

Bridge Club

For the first time for at least a decade, competitors from R.S.R.S. have entered the Civil Service Contract Bridge Association Pairs Championship. In the first round at Bracknell on 1 March, Barry Martin and Mike Johnson were placed third out of twelve pairs in their section and qualified for the semi-final.

Tony Gibson

Football Club

The football Club have played better during this last month. In their match against the league leaders, R. J. United, R.S.R.S. were holding their own until the last twenty minutes when they allowed through four "soft" goals. R.S.R.S. went on to beat AFC Braywick Res. very easily in the middle of the month, and were only beaten by the third placed team, CORONA SPORTS, because of more accurate shooting by the Corona forwards.

Results:

R.J. United v RSRS	Lost 0-4
AFC Braywick v RSRS	Won 9-1 G. Baldwin 2. A. Smith 2. J. Bains 2. G. Thomas 1. S. Sayer 1. R. Babadone 1.
RSRS v Corona	Lost 3-6 G. Baldwin 2. A. Smith 1.

LETTER TO THE OUTSTATIONS

Dear Colleagues

Libraries are a good thing. The joys within them are varied, ranging from that of the hunter - adrenalin ago - catching tantalising glimpses of his quarry as it flits from reference to reference, to that of the lotus-eater, admiring the industry of others whilst toying with some matter of little moment. This latter state is really a sort of hole-in-the-road-watching. Indeed, to the contemplative mind, it affords a bonus. To the merely idle observation of contemporary activity, there is added speculation about the accumulated energy of generations. A massive intellectual charge contained, as it were, by the leaves of a vast literary condenser.

It was with some disappointment then, that we read a recent notice proclaiming the closure of our library for one whole week. The cause - redecoration - has bedevilled most rooms at some time or other and will doubtless continue to do so.

This time, though, it wasn't redecoration merely, but eventual expansion, for a reading room and archive is being added to our present site. By one of those paradoxes which happen all the time, the first sign of eventual expansion was - contraction.

In the space of a day or so the entire army of books, papers and information had vanished from the shelves, shrunk to the little measure of close-packed filing cabinets in the new archive. This presented paradox the second; that the archive should fill with current stuff before fulfilling its true function as a haven for those older books which, like maturer ladies, no longer eagerly sought after, still provide the joys of experience, given a gentle light and cosy surroundings.

The week's banishment is now past, we are admitted again. The pleasures of the new reading room are however not quite ready for the public. As for the archive, to intrude there before the goods were decently arranged would be churlish indeed. Joy must still reside in work or the spectacle of work from the standpoint of idlers such as

Yours sincerely

The Editor

List of Reprints - March 1973

Z. Warhaft	The relation between temperature and humidity in the free atmosphere under conditions of stable stratification and strong thermal intermittency - a case study. Quart J.R. Met Soc 1973. Vol 99. 89-104.
P. G. Davies	Radiometer measurements of atmospheric attenuation at 19 and 37 GHz along Sun-Earth paths. Proc I.E.E. 1973. Vol 120. No. 2 159-164.
I. E. Owolabi J. A. Lane	Transhorizon propagation on VHF and UHF radio links in the United Kingdom. Proc I.E.E. 1973. Vol 120 No.2 165-172.
P. A. Bradley D. R. Howard	Transmission loss at high frequencies on 3260 km temperate latitude path. Proc I.E.E. 1973. Vol 120 No.2. 173-180.
D. A. Bryant G. M. Courtier G. Bennett	Electron intensities over two auroral arcs. JATP. 1973. Vol. 35 397-404.
L. Thomas P. M. Gondhaleker M.R. Bowman	The negative-ion composition of the daytime D Region. J.A.T.P. 1973 Vol. 35. 397-404.
L. Thomas P. M. Gondhaleker M. R. Bowman	The influence of negative-ion changes in the D region during sudden ionospheric changes. J.A.T.P. 1973. Vol. 35. 385-395.

Internal Memoranda

NIL