RSR Newsletter

No. 137 October 1972

PRECURSORS OF BROADCASTING PT. I

This month marks the celebration of 50 years of broadcasting in Great Britain and while staff here are no doubt clear on the matter, people, in general, tend to confuse this with the beginnings of radio signalling, which was in fact already established for nearly a quarter of a century before 1922. The term "broadcasting" seems not to have been used in its present sense till this time, since when usage has virtually displaced the older definition, the scattering of seed.

Since, in a sense, any type of message intended for the general ear could be said to be broadcast, it is perhaps as well to limit ourselves to the concept of broadcasting by means of electric signals. In fact the rather archaic title is not inappropriate for the germ of the idea can be traced back almost 25 years before Victoria's reign came to an end.

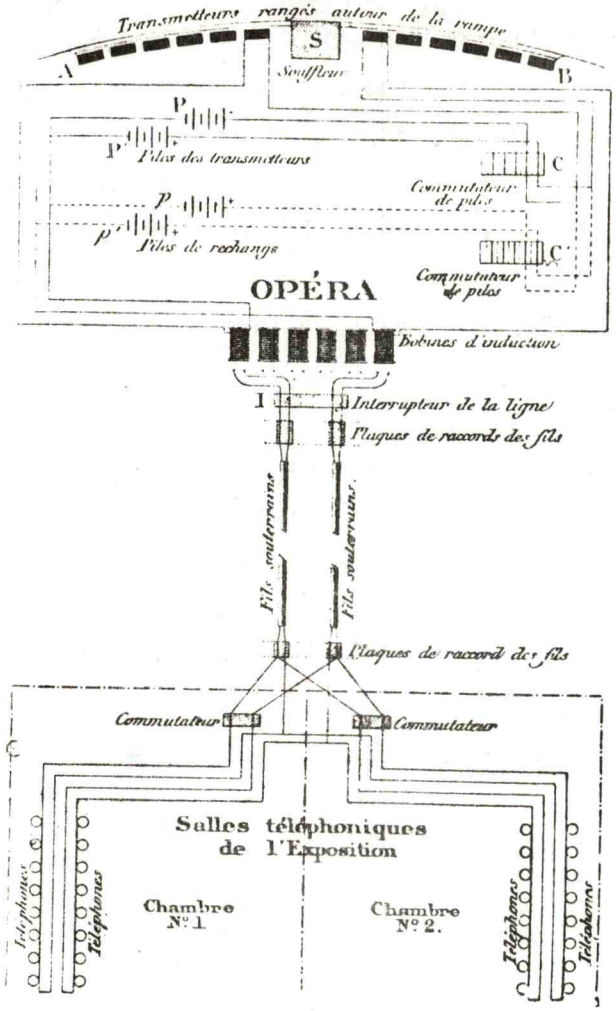
Even earlier, there were the printing telegraphs, produced for the dissemination of stock-exchange and such like information, where one transmitter supplied a number of subscribers capable of reception only; but nothing even faintly resembling the present-day concepts was possible until the successful invention of the telephone in 1876.

This device, the result of Alexander Graham Bell's sound theoretical grasp of the nature of complex wave forms, coupled with his acute observational and experimental gifts, was indeed seminal. Simple to construct, it rapidly became part of the armoury of many experimental physicist's and entrepreneurs - within 18 months of its first appearance nearly 800 instruments were in action, and probably nearly as many law suits, as rivals sought to lay claims to their own particular slice of a lucrative cake.

Robust, yet sensitive beyond anything yet produced, the telephone was hung on unused telegraph lines in both open and close-circuit arrangements, just to see what there was to hear, (it is from this period that our first evidence of 'whistlers' comes) and experiments to exploit its possibilities took place in several countries. Indeed, shortly after the invention was known, journals predicted that it would be possible to "listen perfectly at great distance to concerts and sermons".

In 1877 Edison was giving experimental concerts over telephones linked up to telegraph wires between New York and Saratoga Springs. In September of that year the concerts were given from the Western Union Office, New York, again linking with Saratoga, Troy and Albany. Performers sang or played into an Edison telephone and this was connected through the telegraph circuits using an earthed return. These experiments, incidentally, became known a good deal further than the inventor intended, or perhaps hoped, for the currents induced in neighbouring telegraph wires, on which other experimenters had connected telephones, enabled the music to be heard over a considerably wider area. This is perhaps the first example, albeit by accident, of broadcasting without wires. Those unsuspecting observers who had thought only to hear atmospheric noise were, to say the least, surprised!

In Italy the following year Donizetti's 'Don Pasquale' was listened to "without having lost any of the delicacy of the charming music". However, the most striking example of this forerunner of broadcasting took place in 1881 in Paris, at the Electrical Exhibition, when the theatres of the Opéra and Opéra Comique were suitably wired, under the guidance of Monsieur Ader, to provide what we now would call stereophonic sound to be heard by a number of listeners situated at the Exhibition Hall 2 km away. A diagram of his circuit is shown here. This appears to have been an ingenious and entirely successful display and, though no doubt by modern standards the quality of reproduction was somewhat lacking, it was, so far as is known, the first time that such a demonstration was given.



These early telephone link-ups could be said to point the way to public broadcasting. Inevitably little more could be done on other than a private-line subscriber basis until the development of wireless telephony, a pre-requisite of which is a stable source of continuous waves.

Lack of such a source doomed early attempts at radio telephony to failure. Gallant efforts were made using ingenious circuits and spark excitation but it was not until the introduction of the arc and the high-frequency alternator early in this century that serious progress was made.

At first the arc as a source posed problems of stability; more success attended the H.F. alternator where Fessenden, and later Alexanderson, developed the earlier concepts of a number of eminent engineers. Dynamos were produced capable of directly generating A.C. at frequencies of 50 kHz and more, with a power of several hundred watts.

Using such a machine in 1906 Fessenden successfully radiated speech and music from Brant Rock Mass. It was heard at Plymouth, distance some eleven miles and, in the sense that it was available to anyone with a receiving device, could be regarded as a true broadcast.

One problem partially solved, another appeared - modulation. These early transmitters were modulated by the simple device of putting a carbon microphone in series with the aerial lead! As powers increased the life of the microphone diminished and risks of R.F. burns to the incautious user became greater.

Fearsome contraptions with multiple spouts and water cooling were invoked in an attempt to overcome at least the power problem, and one ingenious magnetic circuit amplifier did go some way to improving matters.

Then, in about 1913, it became apparent that a newish device, the Audion; by Deforest out of Fleming's 'Oscillation Valve' as the stud book might have it; had potential far beyond its inventor's original dreams. It would oscillate producing continuous waves; it would amplify, it would rectify, it was, in fact, the triode, the cornerstone of a complete wireless signalling system for transmitting, receiving, telegraphy and telephony.

All it needed for quick implementation was a massive dose of incentive to develop. It got it - an Archduke was murdered, the most technically advanced nations in the world were at one another's throats and desperate for advances in communications. In a few years broadcasting would arrive, though many would never survive to hear it.

G. W. Gardiner

ACADEMIC SUCCESSES

Congratulations to:

Mr. B. Stewart on gaining Ph.D. (London University)
Mr. T. Bagnall on gaining HNC (Computer Studies)
Mr. P. Bannister " " HNC (Computer Studies)
Mr. A. Lucas " " HNC (Maths., Statistics and Computing)
Miss Y. Dias " " CG319 (Computer Programming)
Miss W. Harrington " " CG319 " "
Mr. M. Guest " " CG509 (Mech. Eng.)
Mr. A. Thomas " " CG345 (Phot. Tech.)

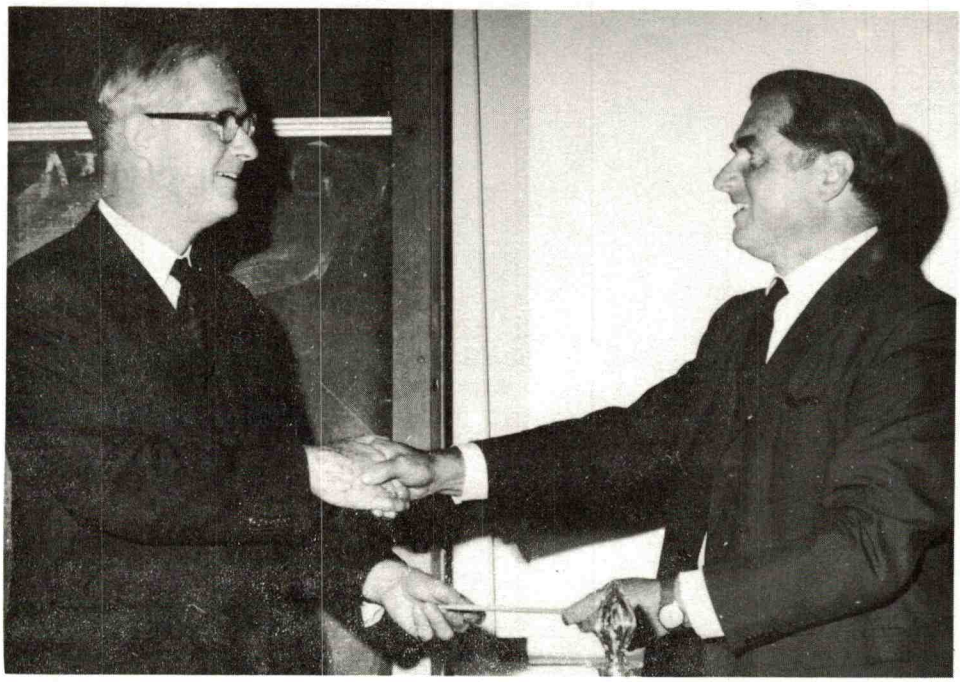
CANADA IN SPACE: IMPRESSIVE PAST AND EXCITING FUTURE

David Eccles and Joe King visited the Communications Research Centre (CRC), Ottawa, in October and attended the Alouette 10th Anniversary celebrations held in conjunction with the 27th ISIS Working Group meeting. Alouette was launched on September 29, 1962 and is now the oldest satellite still sending back useful information from space. The Canadian Minister of Communications paid tribute, at an international gathering of scientists and diplomatic representatives from the many countries now involved in the ISIS programme, to the outstanding achievements of the Alouette project. He referred to the R.S.R.S. and other non-Canadian laboratories, saying of them "We owe a debt of deep gratitude to many agencies of many countries who have worked with us in this cooperative scientific programme. They have constructed and operated telemetry stations, processed and distributed data and, by their efforts in data analysis, have greatly extended the scientific knowledge of the near space environment".

An enormous new building, built for assembling and testing future Canadian satellites, was opened at the CRC during the celebrations. The first satellite to be constructed there will be the Communications Technology Satellite (CTS) to be launched in 1975 into a geostationary orbit. This satellite will be used not only for experiments in satellite design and ground-station technology etc., but also for research into the social and economic implications of such systems. The CTS is a purely experimental project; it is not intended to provide a service for present needs because these will be catered for by the mighty ANIK satellite, scheduled for launch this month into a geostationary orbit. ANIK will provide for Canada the world's first geostationary domestic communications system and is intended to improve communications in all regions of the country.

J. W. King

RETIREMENT OF DR. B. G. PRESSEY



A ceremony at R.S.R.S. marked the recent retirement of Dr. Brion Pressey, Head of S.R.M.U.

Dr. Pressey has been associated with this Station ever since his appointment in 1935; his contributions to the literature of our science have covered a wide range, and in so doing reflected the changing emphasis of the Station's commitments as the years have passed. He was early involved in the development work needed to make radar an effective operational system, later spending some time in Washington as scientific liaison officer for radio.

Post war years saw research into problems of H.F. direction finding and studies of the propagation effects of coastal boundaries on low frequencies used for navigational aids; matters which led to a spell on secondment to the Ministry of Transport.

Not surprisingly his D/F experience enabled him to be instrumental in the Station's earliest work on artificial satellite tracking and, eventually, to his transfer to the Space Research Management Unit, then at London Office.

At a gathering at R.S.R.S., Dr. Pressey was presented with farewell gifts from the staff; the good wishes of the Director being echoed by all former colleagues as well as a number of old friends who were able to be present.

ROCKET LAUNCH

The ESRO Skylark S77/2 was launched from Kiruna, Sweden, on 24th September. Among those taking part in the launch campaign were Duncan Bryant and Trevor Edwards from the R.S.R.S. group carrying out rocket-borne studies of the aurora.

The rocket, carrying particle detectors from Lindau, Toulouse, and Slough, was launched as intended over a stable East-West auroral arc. In the early part of the flight the particle intensities were relatively high as the rocket penetrated the stream of particles producing the arc. At about 135 secs. the rocket reached the northern limit of this intense stream, and very low intensities were recorded until about 240 secs. when the arc moved northward and overtook the rocket. Particle intensities then increased and remained high for the rest of the flight, with intermittent periods of low intensity due to fluctuations in arc position.

From first examination it appears that 13 of the particle detectors worked perfectly, including all 7 on the ejected package, and a further 5 detectors produced some useful results. There were, however, some failures due to a cause that is unknown at present. The event was well documented by all the Range instrumentation which appears to have worked well, and by three additional cameras.

This flight and its supporting measurements will without doubt lead to some extremely valuable information about the processes responsible for the formation of one of the most striking and most puzzling features of the aurora - the auroral arc.

STAFF NEWS

Congratulations to:

Graham and Elaine Thomas on the birth of their son David Graham on 20th September.

Mr. H. Lovesey now P.T.O. II

Welcome to:

D. H. Long	SSO
M. J. Smith	SO
V. D. Sandal	CA
D. E. P. Watts	CA
R. J. Emery	SSO

Resignations

W. A. Brown	SCS
M. J. Corry	SCS
J. Woolf	SCS
Mrs. E. B. Tkaczyk	ASO
Miss B. Okolotowicz	Vacation Worker
D. C. Griffiths	ASO
I. C. Carpenter	CA
Miss M. Bramley	Vacation Worker
G. C. White	Vacation Worker
P. Bridge	Vacation Worker
M. F. Holmes	SCS
Mrs. I. B Holland	Cleaner (P/T)

Other Changes

J. K. Wilkie	SO Changed from Gp. 4 to Gp. 1 in Div. 2
D. G. Carter	HSO " " Gp. 2 to Gp. 4 in Div. 1
V. A. W. Harrison	SSO Changed from Div. 3 to Div. 1
A. F. Smith	HSO Left UK for 18 month tour in Falklands
Mrs. D. Baldwin	CO (P/T) Changed from Div. 1 to Office Services
H. C. Bevan	SSO Changed from Div. 3 Winkfield to Div. 1 ARU Culham
J. A. Crawford	SO returned to College

STATION NEWS

As a result of a recent Selection Board, Mr. P. J. Barker, who is currently a member of the Staff of A.R.U. Culham, has been appointed to the vacant S.P.S.O. post created by the promotion of Mr. Dalziel.

Mr. Barker will not, in fact, assume all the duties held by Mr. Dalziel as head of division, since there will be some reorganisation of divisional structure, about which the Director expects shortly to inform the Staff.

Mr. Dalziel and Dr. Martin attended an I.U.E. Project U.K./U.S. Technical Meeting from October 16th-20th, at the Goddard Space Flight Centre.

SPORTS AND SOCIAL CLUB NEWS

The visit to the Royal Greenwich Observatory at Herstmonceux on September 29th was very enjoyable. The results of some of the return matches are as follows:-

Football

The two teams were well matched from the start and a close game was settled by R.G.O. converting a penalty although even this had to be taken twice.

Result: R.G.O. 1 R.S.R.S. 0

Team: L. Kell
V. Brown
A. Hardie
N. Roberts
D. Jones
U. Yilmaz

D. Wright

Netball

Herstmonceaux	v	R.S.R.S.
6		8

This was a very close exciting game with not much to choose between the two teams. At half time Herstmonceux were leading by one goal but R.S.R.S. managed to take the lead in the second half with the help of some lively support from our spectators. There was some fine shooting from Carol Cathrew and Barbara Brown (who stepped in at the last minute as we were one short) and very good play by the rest of the team.

This was a good win for R.S.R.S. which avenged the defeat by Herstmonceux when we last met.

Team:

GS	Barbara Brown	GK	Marie Huggins
GA	Carol Cathrew	GD	Carol Spears
WA	Faith Miller	WD	Yvonne Dias

C Wendy Harrington

Wendy Harrington

Table Tennis

In the return match with R.G.O. we were unlucky not to repeat the draw we achieved in the first match and we have come to the conclusion that staring into the sky so much gives them a better eye for round objects. Be that as it may, the games were mostly very close, which resulted in an interesting and enjoyable match. A summary of the results is as follows:

John Dudeney beat Pete Standon
Piers Eggett beat Pete Standon
Alan Buck beat Keith Parrett and Pete Standon
Ken Long for R.G.O. won all his three games
R.G.O. won the doubles.

(Answers on a blue beer voucher to A. Buck)

Result: R.G.O. 6 R.S.R.S. 4

So far this season, each of our league teams has played one match, the second team losing 8-2 to Eton Nalgo Wasps and the first team beating I.C.I. 'B' 8-2. This defeat of the second team is the first league defeat they have sustained in 23 matches. John Dudeney played well in the first team match to win all his three games.

Results:	R.S.R.S. 'B'	2	Eton Nalgo Wasps 8
	I.C.I. 'B'	2	R.S.R.S. 'A' 8

A. Buck

Darts

It has been pointed out by those with a mathematical turn of mind, that there exists an inverse square law which governs the success of the darts team and the quantity of alcohol it consumes. This of course is far from the truth and will be quickly denied by all regular throwers. However, the darts team lost again at the return R.G.O. meeting, despite an infusion of new talent. All the games were very close, but the luck seemed to fall in the direction of the home team. We played three games of doubles and a five-a-side game, and won only the latter, with a well placed arrow from Bert Childs.

The results were as follows:

Alan Buck Len Kell	v	Phil Little Phil Gibbs	lost 1-2
Piers Eggett Bert Childs	v	Melvyn Oliver Bruce Patchet	lost 1-2
Roy John Pete Ross	v	Dave Branch Dave Walker	lost 1-2

R.S.R.S. won the five-a-side

Result R.G.O. 3 R.S.R.S. 1

A. Buck

Car Club

Readers of the notice boards and/or CSMA "Motoring" will have realised that anti-freeze time is here. Others have probably noticed the onset of frosty weather but for the benefit of those few remaining - make sure your car engine contains the proper amount and dilution of anti-freeze The Car Club sells anti-freeze (and oil) to all staff members. "Royal Snowdrift" anti-freeze as supplied to the C.S.M.A. is satisfactory for all types of engine including those containing aluminium parts, and is based solely on Ethylene-Glycol as the anti-freeze components. Some preparations contain Methanol or Ethanol which reduce the boiling point of the coolant. A leaflet containing more technical information is obtainable from the Section Secretary.

For the benefit of newer (and some older) members of the Staff, CSMA oil is available to all at prices lower than those quoted to individual purchasers. Postage and poundage is also saved. The most popular oil is 20w/50 but some prefer the 10w/40 grade. 20w/50 Sterling F is slightly dearer but contains an additive claimed to reduce piston ring seizure and piston deposits.

P. Muzlish
Hon. Sec.

Football Club League Results

The Club have played six games so far, losing five and winning one.

Manor Park	v	R.S.R.S.	Lost
R.S.R.S.	v	Windsor Works	Won
R.S.R.S.	v	R. J. United	Lost
R.S.R.S.	v	Nalgo Reserves	Lost
Jeallots Hill	v	R.S.R.S.	Lost
R.S.R.S.	v	Merrymakers Reserves	Lost

Although the results so far have been disappointing, I feel the team has potential and a few more games will see us in winning form.

(D. Wright)
Secretary

LETTER TO THE OUTSTATIONS

Dear Colleagues

Ferretings about in manholes and ducts and changes in the weft and warp of piping and wiring, are part and parcel of the life-force sustaining and maintaining this husk of brick and plaster we know as R.S.R.S. We scarce notice them, they are part of things which needs must be, in order to render incarnate the spirit of research. Wires carry electric energy or hang about waiting to do so. Pipes, if you do prick them, will they not bleed in some fashion. Only when this accepted order breaks down do we become uneasy, glimpsing ourselves as strangers, and afraid.

A friend, seeking water, once turned a tap and his glass filled with feathers. It was a similar shock recently to hear a pipe give forth particulate rather than fluid noises. Something in it moved; not flowed; trundled, and at speed. Alarm melted into interest however, as reason supplied the answer; it was the PNEUMATIC TUBE.

In an attempt to improve communications and the lot of our messengers, plans to install this splendid device had been implemented. Many will recollect how such things were once part and parcel of the equipment of large stores. A purchase made, money and paperwork were placed in a cylindrical container and offered to a spout, up which it rapidly vanished to the accompaniment of pneumatic noises. Then after a pause, more noises, and bang! out shot the container with receipt and change, if any. Thus was the cashier placed on line or at any rate on pipe.

This useful gadget is now with us, linking S.R.M.U. with the messengers office and, in a long distance circuit through bush, briar and cattle country, in an engineering feat worthy of Brunel himself, it unites the Old Building with the New. Many of us, it must be owned, have waxed sceptical about the project's chances. We are confounded, at least for the present, and have to fall back on delayed action prophecies of doom due to weathering or interaction between cow and pipe.

Maybe the Brunel image is not so wide of the mark. Remember the Atmospheric Railway; no? well, get someone to explain it to you. It worked on somewhat the same principles, but came to an untimely end when rats persistently consumed the leather self-sealing valves. Our set-up is certainly proof against this but lacks something withal. Perhaps it is the need to have the pumping done in the old Railway manner with crank and great wheel. Having the whole issue driven by steam would surely give pleasure and instruction to those of an antique turn of mind such as,

Yours sincerely,

The Editor

List of Reprints - October 1972

H. Rishbeth	Superrotation of the Upper Atmosphere. Reviews of Geophysics and Space Physics Vol 10. No. 3 pp. 799-819. Aug. 1972.
L. Thomas P.M. Gondhalekar M. R. Bowman	Photodetachment of Electrons from Major Negative Ions in the Lower D Region. July 1972. Nature Vol. 238. No. 5359 pp 89-90.

INTERNAL MEMORANDA

354	Design of VLF Counter for the Ariel 4 Satellite	D.G. Carter and S.M. Cherry
355	Vertical F. Layer Drifts: Some idealized problems.	H. Rishbeth
356	Report on papers presented at AGARD Conference on Telecommunications aspects on frequencies between 10 and 100 GHz.	J. Allnutt

YOUR

SPORTS & SOCIAL CLUB COMMITTEE

invite you all to :-

"GRAND CHRISTMAS DANCE"

Saturday, 9th December 1972

bar open 8pm - 12 midnight

Dancing to "The Clubmen"

Tickets - 50pence each

Raffle ticket proceeds to Children's Party

"CHILDRENS XMAS PARTY"

All children welcome between ages 4 - 9 years old FREE

bun fight - films - games & every child a present from "Father Christmas"

Saturday, 16th December

from 3pm. - 6pm.

"NEW YEARS EVE PARTY"

In the Bar

Sunday 31st December

To welcome in 1973

FREE, & "Nice & Easy"