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BERNARD DECAUX

1899-1981

La mort de Bernard Decaux sera particulièrement ressentie au sein de l'URSI, non seulement parce qu'il était un de ses Présidents d'Honneur, mais aussi parce qu'il restait le seul lien direct avec le Général Gustave Ferrié, Président fondateur de l'Union.

Bernard Decaux naquit le 6 novembre 1899 à Lisieux, dans le Calvados, et c'est au vieux collège de cette ville qu'il commença ses études. Il aimait raconter que son père, qui était médecin, lui avait parlé dès avant 1910 du "tube de Branly" et lui avait montré des expériences avec l'air liquide. Le jeune écolier aurait difficilement imaginé à cette époque qu'un demi-siècle plus tard, devenu radioélectricien, il aurait dans son laboratoire à Paris une machine à air liquide. Grâce au goût et à la curiosité que son père lui avait inculqués pour les questions scientifiques, Bernard Decaux acheva ses études à l'Ecole Polytechnique en 1920-21 et il reçut le diplôme d'Ingénieur de l'Ecole Supérieure d'Electricité.

Cependant, l'événement qui dut marquer le début et déterminer la direction définitive de sa longue carrière fut son entrée en 1924, sous les ordres du Général Ferrié et de Raymond Jouaust, au Laboratoire de Radiotélégraphie Militaire, qui donna naissance en 1926 au Laboratoire National de Radioélectricité de Bagneux, incorporé depuis au Centre National d'Etudes des Télécommunications. Sa première tâche fut de créer un service de mesures absolues de fréquence dans le cadre des attributions dévolues au Laboratoire dans le domaine de la conservation des étalons de mesures radioélectriques. A cette époque lointaine, la précision des diapasons libres à sa disposition n'était que de l'ordre de $1/10^4$; quarante ans plus tard, grâce à l'emploi d'horloges à jet atomique, une précision voisine de $1/10^{12}$ était devenue normale dans le laboratoire de Bernard Decaux. Inutile de rappeler à ceux qui s'intéressent à l'URSI et, en particulier, aux membres de la Commission A, les bornes qui jalonnèrent ce long cheminement, avec ses succès et ses déceptions; ils seront tous unanimes à souligner l'importance de la contribution

personnelle de Bernard Decaux au progrès continu dans tous les domaines de la métrologie des fréquences et à cette discipline étroitement apparentée qu'est la mesure du temps.

En dépit de ses nombreuses responsabilités en tant que Chef du Département Fréquences du CNET, de 1928 à 1965, Bernard Decaux n'était pas de ces savants qui aimaient à se cloîtrer dans leur tour d'ivoire. De tous côtés, en France et à l'étranger, appel était fait à ses connaissances et à sa vaste expérience. Il suffit de citer comme exemples les quelques faits suivants: il présida la Commission d'Etudes VII (Emissions de fréquences étalon et de signaux horaires) du CCIR de 1948 à 1969, il fut Rapporteur du Comité consultatif pour la Définition de la Seconde à partir de 1957 et Conseiller technique du Bureau International de l'Heure, l'un des Services dont sont conjointement responsables l'UAI, l'UGGI et l'URSI, à partir de 1949. Il est intéressant de rappeler que Bernard Decaux était un vétéran du Club alpin français et qu'en 1932-33 il avait procédé à de nombreuses expériences sur l'influence des parois rocheuses en haute montagne sur la propagation des ondes; ces travaux aboutirent d'ailleurs à l'organisation du réseau radiotéléphonique du massif du Mont Blanc par les Services des PTT.

Etant donné sa renommée mondiale dans le domaine de la mesure du temps, et plus tard dans celui de la mesure des distances, il était inévitable qu'il entre en contact avec les astronomes de l'UAI et les géodésiens de l'UGGI. Mais, parmi les Unions scientifiques, c'est probablement à l'URSI qu'il consacra sa plus grande attention car les études de la Commission I (Mesures et étalons) de l'URSI formaient la base scientifique pour les applications techniques ultérieures dans le domaine des mesures de précision en astronomie et en géodésie. Il avait fait partie des délégations françaises aux Assemblées générales de l'URSI de 1938 à 1966 et ses mérites exceptionnels avaient déjà été reconnus en 1954 par son élection à la présidence de la Commission I. Notons, parmi les importantes décisions prises au cours de ses six années de présidence, l'adoption en 1957, après étude approfondie des travaux récents, d'une nouvelle valeur pour la vitesse des ondes dans le vide: $299.972,5 + 0,4$ km/s; cette valeur fut ensuite adoptée par l'UGGI en 1960. Bernard Decaux avait été élu Vice-Président de l'URSI en 1960 et, à la fin de son mandat, en 1966, il fut élu Président d'Honneur.

Il est naturel d'évoquer ici plus particulièrement les activités internationales de Bernard Decaux, mais il serait injuste de ne pas mentionner l'appui inlassable qu'il fournissait au Comité National Français de Radio-électricité Scientifique. Membre de ce Comité depuis 1934, il en fut le Secrétaire général de 1948 à 1959 et en assumait la présidence de 1956 à 1959, lorsqu'il en fut nommé Président d'Honneur. Le couronnement de la carrière scientifique de Bernard Decaux fut probablement son élection, en 1966, à l'Académie des Sciences dans la Section Géographie et Navigation. Lors de la traditionnelle cérémonie de remise de l'épée, à laquelle l'URSI et nombreux de ses amis s'associèrent, il tint à rappeler la mémoire du Général Ferrié et la sollicitude du grand homme pour les travaux du jeune chercheur qu'il était. "C'est pour moi - disait-il dans son allocution - une joie profonde de "siéger à l'Académie dans la même section que lui, de "suivre son exemple au Bureau des Longitudes, d'être "Président d'Honneur de l'Union Radio-Scientifique Internationale dont il fut le premier Président, de même qu'à "la Société chronométrique de France, où je suis son "lointain successeur".

Mes premiers contacts avec Bernard Decaux remontent au début de 1949. Suite à une visite à Londres du R.P. Lejay et de M. Haubert, le Laboratoire National de Radio-électricité et la Radio Research Station de Slough s'étaient mis d'accord pour échanger des appareils destinés à la relance de la recherche scientifique après la guerre. J'étais chargé d'effectuer à Bagneux l'échange d'un "balistègre" français contre une ionosonde "Marque 129" britannique, tous deux du millésime 1941 et oubliés maintenant depuis de longues années. Je n'ai jamais oublié l'accueil chaleureux qui me fut réservé par M. Bureau, alors Directeur du LNR, et les autres chercheurs français de l'époque. Parmi eux Bernard Decaux que j'eus le grand plaisir de rencontrer souvent pendant les 30 années qui allaient suivre. En 1979, j'eus le privilège de collaborer avec lui pour la préparation du résumé historique qu'il devait présenter au Colloque organisé à Bruxelles pour marquer le 60e anniversaire de l'URSI. J'avais rédigé, à sa demande, quelques notes sur les faits saillants des Assemblées générales de l'URSI et, lors de ma visite chez lui à Passy, je fus très impressionné par la précision de ses souvenirs personnels concernant le

développement de l'URSI et ses rencontres avec les nombreuses éminentes personnalités qui participèrent aux activités de l'Union entre les deux guerres. Le texte de son allocution a été reproduit dans le Volume commémoratif publié par l'URSI à cette occasion et il est à remarquer que cet article, qui résume les années héroïques de l'URSI, fut la dernière de ses publications scientifiques, dont le nombre dépasse largement la centaine et dont la première fut consacrée à l'étalonnage des diapasons et présentée à l'Académie des Sciences par le Général Ferrié un demi-siècle auparavant.

Les nombreux amis et collègues de Bernard Decaux regrettent profondément sa disparition mais, peut-être, trouveront-ils un réconfort dans cette phrase de Corneille qu'il avait lui-même citée lors de son entrée à l'Académie: "Le temps est un grand maître, il règle bien des choses".

C.M. Minnis

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THE URSI GOLD MEDALS: 1981

On the occasion of each of its General Assemblies, URSI presents two Gold Medals for outstanding contributions in the field of radio science made during a six-year period preceding the Assembly. These Medals commemorate Balthasar van der Pol and John Howard Dellinger, two well-known scientists who played important rôles in the affairs of URSI over many years.

The Board of Officers of URSI has recently decided to award the Medals for 1981 as follows:

Balthasar van der Pol Gold Medal

Professor D.S. Jones, Department of Mathematics at the University of Dundee, Scotland, for his recent work on electromagnetic theory and in particular on the development of a number of analytical approaches, the careful attention given to the accuracy of numerical techniques, and the formulation of problems to ensure unique solutions.

John Howard Dellinger Gold Medal

Dr. J. Fejer, Max-Planck-Institut für Aeronomie at Lindau, Federal Republic of Germany, for his work on ionospheric modifications, parametric instabilities, ionospheric irregularities and incoherent scatter.

Both laureates will receive their Medals during the Assembly in Washington at a Special Session on 12 August 1981. The Appleton Prize, awarded by the Royal Society, London, will be handed over at the same session.

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XX GENERAL ASSEMBLY OF URSI

Meeting to Discuss "Unwanted Effects of Man's Activities related with Radio and Telecommunications"

The attention of all those interested is drawn to the Circular Letter sent out by Prof. K. Rawer, Convener of the above meeting. This letter is reproduced below.

Dear Colleagues,

At the last General Assembly of URSI held in 1978 at Helsinki, Dr. Roger Gendrin (France) held a special meeting on questions arising in connection with unwanted effects of man's activities in space, in so far as URSI's

field of interest is concerned. A formal working group was formed on this occasion.

Meanwhile, COSPAR's Panel on "Potentially Environmentally Detrimental Activities in Space" (PEDAS), of which I am chairman, has finished its report and, before publication in full, delivered a summary report of 29 pages to UN through COSPAR. In this report a part of the problems mentioned at Helsinki are discussed. Possibly, not all aspects of URSI have been considered there, and there is also some concern about unwanted consequences of existing or planned activities on the radio side (e.g., high power radar, energy transport via radio waves). Thus there might be a feeling that URSI consider both problems, those due to other activities which are disturbing radio applications, and those stemming from certain radio applications.

I may mention that problems of this kind are also considered in CCIR. There are questions about e.g. spurious radiation affecting radio astronomy. As a particular example of a very detailed document, I may mention Doc. 6/46 (3.3.80) from UK on "Solar Power Satellites and the Ionosphere". (Copies can be obtained either from CCIR, International Telecommunications Union, Geneva, or from the URSI Secretariat).

Since Dr. Gendrin is not in a position to continue his initiative, I was asked by the URSI Board of Officers to act as convener for a meeting under the above title at the forthcoming Washington General Assembly of URSI. In case you are interested in participating, please announce this to the URSI Secretariat at Brussels.

Hoping for a clarifying discussion at Washington.

Yours sincerely,

18 May 1981

K. Rawer

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URSI FINANCES

In accordance with the recommendation of the URSI Finance Committee, the practice of publishing the accounts of the Union annually in the URSI Information Bulletin is being continued.

The accounts for the year ended 31 December 1980, which follow, have been reviewed by Scott W. Wise CPA, Houston, Texas, USA.

INTERNATIONAL UNION OF RADIO SCIENCE (URSI)

INCOME AND EXPENDITURE ACCOUNT
FOR THE YEAR ENDED 31 DECEMBER 1980

<u>I. INCOME</u>	<u>U.S.\$</u>	<u>U.S.\$</u>	<u>U.S.\$</u>
a) <u>Allocation from UNESCO subvention to ICSU</u>		10,000.00	
b) <u>Contributions from Member Committees</u>		98,158.41	
c) <u>Sales of Publications</u>			
- URSI Information Bulletin and Proceedings of General Assemblies	793.91		
- Review of Radio Science	256.68		
- IRI 1978	27.41		
Total Sales of Publications		1,078.00	
d) <u>Bank Interest</u>			
- American dollars	2,051.46		
- Belgian francs	9,242.23		
Less Interest attributable to BalTh. van der Pol Gold Medal Fund	(553.81)		
Total interest		10,739.88	
TOTAL INCOME			119,976.29
<u>II. EXPENDITURES</u>			
a) <u>Routine Meetings</u>			
- Board of Officers		6,169.70	
b) <u>Publications</u>			
- 60th Anniversary Supplement	1,102.88		
- Proceedings XIX General Assembly (Supp)	1,620.95		
- URSI Bulletins 210,211 (Supplement)	356.70		
- URSI Bulletins 212,213,214	3,894.21		
- URSI Bulletin 215	2,020.00		
- URSI Statutes	1,407.10		
- INAG Bulletin	500.00		
Total Publications		10,901.84	
c) <u>Scientific Activities</u>			
- XIX General Assembly	229.23		
- Symposia	9,301.81		
- Representation at meetings	225.66		
- Grants to organizations			
IUCRM	300.00		
IUCAF	1,250.00		
FAGS	1,000.00		
Total Scientific Activities		2,550.00	
Total Scientific Activities			12,306.70

URSI INCOME AND EXPENDITURE ACCOUNT, continued....

II. EXPENDITURES, continued....	<u>U.S.\$</u>	<u>U.S.\$</u>	<u>U.S.\$</u>
Balance carried forward..... (a,b,c)		29,378.24	
d) <u>Administrative Expenses</u>			
- Salaries and related charges		43,798.06	
- Office equipment		3,477.34	
- Review fees		3,343.20	
- General Office Expenses:			
Rent, heat, light, repairs	4,306.59		
Stationery, office supplies	1,193.64		
Insurance	1,363.40		
Phone	1,872.23		
Postage	1,464.85		
Entertainment	467.37		
Miscellaneous	489.95		
Administrative travel	2,091.37		
Professional services-			
Hulp der Patroons Management Fee	361.20		
Bookkeeping (R.M.Parks)	2,115.00		
Bank charges	<u>273.62</u>		
Total, General Office Expenses		<u>15,999.22</u>	
Total Administrative Expenses		66,617.82	
e) Net Loss on Exchange		10,584.39	
f) ICSU Dues for 1980		<u>2,454.00</u>	
TOTAL EXPENDITURES			<u>(109,034.45)</u>
EXCESS OF TOTAL INCOME OVER EXPENDITURE FOR THE YEAR			10,941.84
BALANCE IN HAND AT 1 JANUARY 1980		116,044.33	
INCOME, 1 JANUARY - 31 DECEMBER 1980		119,976.29	
EXPENDITURE, 1 JANUARY - 31 DECEMBER 1980		<u>(109,034.45)</u>	
BALANCE IN HAND 31 DECEMBER 1980			<u>126,986.17</u>

INTERNATIONAL UNION OF RADIO SCIENCE (URSI)
BALANCE SHEET FOR YEAR ENDED 31 DECEMBER 1980

<u>ASSETS</u>	<u>U.S.\$</u>	<u>U.S.\$</u>	<u>U.S.\$</u>
<u>1) Bank Balances</u>			
On Deposit Accounts:			
In Belgian Francs	22,580.64		
In American Dollars	<u>26,309.57</u>		
		48,890.21	
On Current Accounts:			
In Belgian Francs	6,929.71		
In American Dollars	<u>8,112.89</u>		
Total Bank Balances		<u>15,042.60</u>	63,932.81
<u>2) Belgian Government Securities</u>			91,078.64
<u>3) Petty Cash</u>			122.97
<u>4) Stamps</u>			30.23
<u>5) Sundry Debtors</u>			
a) Phone deposit		148.39	
b) Horner, refund of FS 1,381-		807.60	
c) Symposium on EM Waves and Biology		3,000.00	
d) U.E.R. Centre Technique (Jan'81 rent)		322.58	
e) University Savings, accrued interest		<u>741.89</u>	
Total Sundry Debtors			5,020.46
<u>6) LESS CREDITORS:</u>			
IUCAF		8,386.15	
IUCRM		888.73	
IUWDS		2,766.01	
Sundry Creditors:			
1980 ICSU Dues	2,454.00		
Review fees	3,980.00		
France	2,132.46		
Sweden, 1981 contribution	160.00		
(less loss on exchange)	(5.14)		
Smolinski	7.02		
Christiansen	76.23		
Vaillant-Carmanne	2,020.00		
Parks (bookkeeping services)	1,050.00		
Horner (IUCAF)	55.93		
Hagen (IUCAF)	1,452.55		
Findlay (IUCAF)	<u>206.56</u>		
Total, Sundry Creditors		<u>13,589.61</u>	
Total Creditors			(25,630.50)
<u>7) Less Balth. van der Pol Gold Medal Fund</u>			<u>(7,568.44)</u>
NET TOTAL OF URSI FUNDS, 31 DECEMBER 1980			<u>126,986.17</u>

URSI BALANCE SHEET, continued.....

	<u>U.S.\$</u>	<u>U.S.\$</u>	<u>U.S.\$</u>
NET TOTAL OF URSI FUNDS, 31 DECEMBER 1980			126,986.17
Represented by:			
1) Reserve Fund, Closure of Secretariat		69,032.17	
2) Special Symposium Fund	10,070.00		
(less loan outstanding for			
Symposium on EM Waves & Biology)	(3,000.00)	7,070.00	
3) XX General Assembly		50,884.00	
TOTAL			<u>126,986.17</u>

FEDERATION OF ASTRONOMICAL AND GEOPHYSICAL
SERVICES (FAGS)

In the astronomical, geodetic, geophysical and radio sciences, there are a number of fields in which continuing international services for the reduction and publication of observational material are needed, and it was most appropriate that the International Council of Scientific Unions (ICSU) recognized this need by establishing in 1956 the Federation of Astronomical and Geophysical Services (FAGS) to support such work. The Services in FAGS are directly concerned with the time-varying characteristics of the Earth-Sun environment. In these areas of study, small but significant trends and periodic changes become evident only after the careful statistical examination of long sequences of observations. Their detection and correlation help scientists to understand the processes that control or influence such important phenomena as the weather and climate, radio communications, earthquakes and changes in sea level. The improvement of our capabilities for observation and computation makes it vital that these sequences of observations of environmental indicators be continued and that the data be made available in convenient forms for current and future use.

The work of the Services is, by its very nature, less exciting than individual scientific research but it is none the less an essential preliminary to an understanding of many complicated astronomical and geophysical phenomena. It requires qualities of foresight and enthusiasm to maintain world-wide observational networks and to collate and publish the results, in a useful form, for the benefit of present or future research workers. Each Service works under the scientific direction of a Directing Board which is appointed by one or more of the scientific unions, International Astronomical Union (IAU), International Union of Geodesy and Geophysics (IUGG), Union Radio-Scientifique Internationale (URSI). The Board determines the type of data to be collected, the methods of reduction and analysis to be used, and the format of the publication for the results. The Federation is guided for administrative and financial purposes by a Council composed of representatives of the three Unions and of ICSU. Grants, totalling about \$50,000 per year, are made

to FAGS by UNESCO, ICSU and, to a lesser extent, by other international organisations. The Council allocates these funds to the Services in accordance with the general policy of the Unions. Most of the costs of the individual Services and all of the costs of data acquisition are borne by the host institutions and the observing stations. The international funds are used primarily to meet the special expenses involved in reducing and publishing the data to meet the requirements of the international scientific community; they also serve to demonstrate the value placed on the work by this community.

The above paragraphs were written by Dr. H. Enslin, President of the FAGS Council from 1977 to 1981 and have been extracted from the Foreword to An Introduction to FAGS edited by G. Laclavère.

There are at present nine Services but URSI is concerned only with two: the Bureau International de l'Heure (Director, Dr. P. Guinot) and the International Ursigram and World Days Service (Director, Dr. P. Simon).

The Secretary of the FAGS Council is Dr. C. Boucher, Institut Géographique National, 4 avenue Pasteur, F-94160 St-Mandé, France.

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URSI AND THE BIO-EFFECTS COMMUNITY

1. Why Multidisciplinary Meetings are Important

There are a number of problems associated with the research area in connection with the Interaction of Electromagnetic Fields with Biological Systems. One major difficulty lies in the multidisciplinary nature of the research. It can involve researchers in the physical sciences from physics and chemistry through engineering, as well as the biological sciences including the areas of medicine, psychology, biology, etc., and all combinations and permutations thereof. This creates a two part situation, namely, the team aspect of doing research with the ability to communicate among members of the team and plan experiments, and the associated problem of communications and interaction in connection with the publishing process and the optimum type forum for presenting one's work. Communication between disciplines has always been a problem. On an international level, it can be catastrophic.

The measurement and dosimetry problems are mostly the concern of the engineers and physicists; however, it is important that the biologist-type researchers be aware of the difficulties and limitations since design of experiments is an interdisciplinary chore.

In general, the problem is the following: We require the ability to measure the electromagnetic field outside the biological system, near field or far field, and to specify the characteristics such as frequency, modulation, amplitude, etc., and then to relate this field to the internal electric field distribution in this biological system. In order to be able to assess a biological effect, it is important to be able to know the value of the electrical field at the point or in the area at which the effect takes place. This is a very complex problem when dealing with biological systems.

2. Why URSI Could Play a Rôle

This problem has added significance for the International Bio-Effects community in view of the utilization of research results in the development of health and safety aspects of the electromagnetic radiation environment which exists throughout the world. If we are ever to achieve some commonality in the understanding and

applications of our research to the health and safety problems -- as well as medical applications -- it is essential that we communicate clearly in the measurements area.

It is my belief that in this sense URSI with its international structure and outlook and with its interest in the areas of metrology (Commission A) and Fields and Waves (Commission B) could play a major rôle in bringing some order out of a difficult situation.

3. What Did URSI Do in the Past

According to Dr. Helmut Altschuler, Chairman of, first, Commission A for the US National Committee of URSI and then of URSI Commission A, "the first formal move in URSI toward the field of Bio-effects was in the form of a Commission A resolution at the 16th General Assembly (1969 Ottawa), which resolution generated the impetus for a Bio-effects session at the 17th General Assembly (1972 Warsaw)!"

At about this time, US Commission A was providing a forum for Bio-effects sessions at the US National Committee of URSI, sponsored meetings which were quite well received. This was in addition to a multitude of 'single discipline' organizations providing for Bio-effects sessions at their annual symposia, as well as publication opportunities in their journals. The symposia devoted specifically to the Bio-effects area were generally very well received, but were not held on a regular basis, while the individual sessions at various 'single discipline' meetings left a lot to be desired in terms of the audiences and the opportunity to interact with ones peers.

There was a feeling in the US that the present situation with regard to meetings was a bit chaotic and costly in terms of both time and travel funds, and the idea of one annual symposium in the Bio-effects area became desirable and would provide the opportunity for maximum interaction with ones peers. USNC/URSI provided such a forum. In the United States, this demonstration of a need for an interdisciplinary forum led to the formation of the Bioelectromagnetics Society (BEMS) in the Spring of 1978, which now provides, in addition to an

annual symposium, a journal completely devoted to the "Bio-effects" area, as well as a Newsletter reflecting activities of interest to the Bio-effects community. It is interesting to note that one of the prime movers in the initiation of the URSI series of symposia in the United States, Dr. T. Rozzell, was also the one who conceived and organized the group that brought BEMS into existence.

Partially as a result of the success of the USNC/URSI symposia, the URSI General Assemblies in both 1975 and 1978 passed resolutions in connection with the establishment of a "Working Group on Measurements Relating to the Interaction of Electromagnetic Fields and Biological Systems" and charged the group with:

1. Exploring and planning possible symposia that stress the measurement aspects of the interaction between electromagnetic radiation and biological systems;
2. Interfacing with other interested organizations in the development of such symposia;
3. Giving its active support to international organizations concerned with the health and safety aspects of the electromagnetic radiation environment.

This resulted in the first fully international URSI sponsored symposium on "Bio-effects" at Airlie, Virginia, USA, in 1977 at which the attendance was over 275, with over 100 papers plus "Rump" sessions and with at least 18 countries represented. It was truly an excellent opportunity to participate in an international forum. This was followed by the Helsinki meeting in 1978 as part of the 19th URSI General Assembly, and the French URSI symposium in Jouy-en-Josas in 1980.

The interests of both URSI and BEMS is that of promoting science, and where these interests coincide, provide for cooperation with other societies in organizing symposia and other activities.

4. Bio-Effects at the Washington General Assembly

The URSI "Open Series on the Interaction of Electromagnetic Waves with Biological Systems", as part of the

XX URSI General Assembly, is being held in cooperation with the Bioelectromagnetic Society (BEMS) and is being coordinated with the BEMS annual meeting which will be held at a nearby hotel during this period. The BEMS meeting will be held on 10, 11 and 12 August, and will include mainly contributed research papers. This will be followed by the URSI Series on 13 and 14 August which, together with BEMS, will provide five successive days of coherent subject matter. The URSI Series will include two sessions of invited review and summary papers, in the URSI General Assembly tradition, presented by outstanding researchers in the field, and two audience participation workshops led by invited discussants. Arrangements have also been made to provide for the possibility of joint registration for both the BEMS and URSI meetings.

S.W. Rosenthal
Chairman, Working Group on
Measurements relating to the
Interaction of Electromagnetic
Fields with Biological Systems

22 April 1981

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TIME AND FREQUENCY

Workshop-cum-Training Programme

1. Introduction

A Workshop-cum-Training Programme on Time and Frequency was organised by the National Physical Laboratory (NPL), New Delhi, India on 2-6 February 1981. This preceded the International Symposium on Time and Frequency organised by NPL on 10-12 February 1981 at the same venue.

The 21 participants in the Workshop were from developing countries where time and frequency services are either in the process of being set up or have just been set up and from user organisations in India. The representatives sent by various national laboratories and organisations were of a high professional level.

2. Background

An International Symposium on Time and Frequency was organised at NPL, New Delhi on 10-12 February 1981. This was probably the first time that a symposium on Time and Frequency was being held outside the regime of technologically, industrially and economically advanced countries. The main theme of the symposium was a "Dialogue between developing and developed centres of time and frequency" and a great emphasis was put on the needs of the developing countries and how these needs can be satisfied with minimum inputs in respect of expertise, manpower and finances.

In view of this symposium and an anticipated large attendance from both the developing and the developed parts of the world, NPL decided to organise a Workshop-cum-Training Programme to precede the Symposium. It was meant to train and create an awareness of the utility of the subject among the scientists and technologists from the developing countries and the user organisations, in the process preparing them to be exposed to the state-of-the-art which was to be presented later in the symposium.

3. Objectives

In view of advances made in science and technology in the developing countries, the metrological services

including time standards have now acquired new dimensions and significance. Based on this emerging consciousness the objectives of the training programme were:

1. to train and expose to state-of-the-art the scientists from developing countries trying to initiate a metrological programme on time and frequency or the ones who are already engaged in such services but need to refine them;
2. to facilitate a dialogue and an interaction between the scientists from developing countries themselves and NPL scientists;
3. to initiate a dialogue and an interaction between the scientists of developing and developed countries;
4. to share experiences and problems uniquely encountered by developing countries in the field of time and frequency;
5. to create an awareness for the optimum utilisation of existing time standards and time services;
6. to train the users within the country in the field of time and frequency metrology.

4. Training

The training was both practical and tutorial in nature. During the first two days 10 lectures were arranged and these covered: Fundamentals of precision frequency standards and clocks; Various types of existing time scales and their formulation; Dissemination systems for standard time and frequency; Application aspects in modern science and technology such as Surveying, Geodesy, Navigation, Communication; Use of satellite and television in disseminating time standards; Frequency stability measurements; Precise measurement techniques of time and frequency parameters with the help of commonly available instruments; Development of equipment related to satellite, TV, HF, VLF monitoring and calibration work, etc.

In the practical training, the participants were actively involved, whenever possible, in data taking and analysing. Processing of data, accumulated over long periods, on HF and VLF was also explained. The time was not enough to encourage the participants to build

themselves the electronic circuits used in calibration and measurement of time and frequency parameters. However, the already developed interface units in use were explained to them in great depth.

The participants were taken to the NPL's transmitting station ATA from where standard time broadcasts are made at three carrier frequencies viz 5, 10 and 15 MHz. The time transfer experiments carried out by NPL by means of French-German Satellite Symphonie-1 were explained with the help of simple diagrams.

Informal meetings and discussions arranged, before and after the symposium, between the Workshop participants and the experts who came to attend the symposium proved to be of value in providing useful information, especially discussions with the representatives of the Bureau International de l'Heure (BIH), the International Union of Radio Science (URSI), and the International Radio Consultative Committee (CCIR) besides several heads and directors of time and frequency laboratories.

From the number and depth of questions asked during these sessions, both tutorial and practical training, technical information exchanged among the participants and the sharing of operational experience with NPL scientists, it was evident that this programme filled a real need. The programme not only created an interest, awareness and technical curiosity about the subject but also brought to notice the subtleties involved in the establishment of time and frequency standards and services.

5. Conclusion and Recommendations

The Workshop-cum-Training Programme was of immense value, as expressed by the participants, especially the delegates from the developing countries, and it was strongly felt that future symposia be preceded by similar training programmes. It was suggested informally that the paucity of time due to the short duration of the programme could be made up for by encouraging bilateral arrangements and the concept of guest workers between individual laboratories, with the possible assistance of the United Nations Development Programme on Technical Cooperation between developing countries and other similar world organisations.

6. Acknowledgements

The organisers of the Workshop-cum-Training Programme are thankful to the different organisations from the developing countries and within India for nominating suitable candidates to the training programme. Special mention is made of the Commonwealth Science Council. A subsistence allowance for the Workshop period was provided by the National Physical Laboratory to the participants from abroad.

B.S. Mathur

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SYMPOSIUM AND EXHIBITION ON ELECTROMAGNETIC COMPATIBILITY

This Symposium, which was held in Zurich, Switzerland from 10 to 13 March 1981 and cosponsored by URSI, was the fourth in the series (Montreux 1975 and 1977, Rotterdam 1979). Prof. Leuthold, Chairman of the Symposium, welcomed the participants and asked Dr. Locher, Director-general of the Swiss PTT to give the inaugural address. Dr. Locher reviewed the EMC field, where integrated circuits of growing density and complexity tend to make the problems more difficult. He complimented the authors on excellent theoretical and practical work. Prof. Cosandey, President of the Board of Directors of the Federal Institutes of Technology, said that, in times of scarcity, it is even more important to stimulate research. In Switzerland a harmonious proportion of unskilled labour, qualified workmen and designers, technicians, engineers and research workers with a university background, led to successes in the world of technology. The importance of research he found very well stressed in "The white book on the contribution of scientific research to the progress of France in the period 1980-1990" created by an editorial committee presided by Prof. J. Friedel (Académie des Sciences) at the request of President Giscard d'Estaing. Mr. Mili, Secretary General of ITU, was a guest of honour. Prof. Borgnis was Honorary Chairman, Dr. Dvorak Organizing

Chairman and Prof. Stumpers Chairman of the Programme Committee.

The Symposium started with three half sessions: Spread spectrum, Characterisation of system and noise, Intrasystem EMC. It continued with three sessions in parallel for five half days: Computer methods, Nuclear EMP I and II, EMI in microelectronics, Biological effects, Coupling, Immunity, Communications, Sources of EMI, Measurements, Reliability and Limits, Computer Programmes, Shielding and grounding, Lightning and power line radiation, EMC analysis and modelling. The Symposium had 475 participants and 24 exhibitors were present with 98 representatives.

The task of awarding citations and prizes is a very difficult one for the Programme Committee. At least three of its members had studied all 102 papers, and there was a certain convergence between the results. Several good papers by the organizing ETH staff were, at their request, omitted from consideration.

A citation was given to the paper by Demoulin, De-gauque and Cauterman on "Shielding effectiveness of braids with high optical coverage". This paper, the fourth in a series, gives a good comparison of theoretical and experimental results. Other citations went to Borsero and Nano for "Comparison between calculated and measured attenuation of the site recommended by IEC for radiation measurements". A critical examination of the site attenuation measurement method, presently used in IEC 106, is expected to lead to an amendment of this publication. Crawford's "Options to open-field and shielded enclosure electromagnetic compatibility measurements" is an excellent survey by the author of numerous publications on TEM cells, also discussing the mode tuned, stirred enclosure.

Bersier: "Measurement of the immunity of TV receivers to AM, RF fields in the 3 to 30 MHz range, including the influence of connected cables". Comparative tests on three TV sets by four different methods, with conclusions on their suitability. The work of CISPR and IEC rests on the trustworthy work of experts like this one (Third monetary prize).

Paul: "Adequacy of low frequency crosstalk prediction models". An investigation of a 3-conductor, uniform

transmission line, consisting of parallel, perfect conductors of uniform cross-section, immersed in a lossless medium. Only for very low frequencies ($1/2000$) the traditional lumped model converges to the preferred transmission line model. Good comparison of theory and experiment.

Tesche, Liu: "Recent developments in electromagnetic field coupling to transmission lines". A multiconductor transmission line is excited by an electromagnetic field along the branch and a knowledge of the voltage and current at one particular load point is desired. In a simple case the common-mode model was good enough for an approximate solution, but more data are necessary before the accuracy can be trusted. Tesche and Paul gave two, resp. three contributions, and Tesche organized the workshop on NEMP ("EMP hardening of Electronic Systems", ed. K.S.H. Lee). They shared the first and second monetary prizes.

There were also workshops on EMC diagnostics (Mertel) and on the application of programmable calculators in EMI Prediction and EMC Design (White). On Friday there was a choice of technical visits (Fed. Institute of Technology, Brown Boveri, Siemens-Albis), for which there was a great interest.

F.L.H.M. Stumpers

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BARKHAUSEN COMMEMORATION

On the occasion of the 100th birthday of Heinrich Barkhausen, the creator of light-current engineering, the Academy of Sciences of the German Democratic Republic with the Technical University of Dresden will celebrate a commemoration in Berlin on 1 December 1981 and will organize the 15th Colloquium on Information Techniques to be held in Dresden from 2 to 4 December 1981.

The Dresden Colloquium will cover the following subjects:

- a) Physics and technology of electronic components
- b) Function and modelling of semiconductor components
- c) Integrated analogue and digital circuits
- d) Networks and systems
- e) Recent developments in high-frequency engineering.

A large international attendance is expected at both the ceremonial act and the scientific colloquium.

Requests for information and enquiries should be addressed to:

Barkhausen - Komitee bei der
Akademie der Wissenschaften der DDR,
Otto-Nuschke-Str. 22/23,
DDR - 1080 Berlin, GDR.

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NATIONAL RADIO SCIENCE MEETING

January 13-15, 1982

at

University of Colorado, Boulder CO 80309 USA

This open scientific meeting is sponsored by the US National Committee for the International Union of Radio Science. It is being held in cooperation with the IEEE Antennas and Propagation Society, IEEE Circuits and Systems Society, IEEE Electromagnetic Compatibility Society, IEEE Geoscience Electronics Society, IEEE Information Theory Group, IEEE Instrumentation and Measurement Society, IEEE Microwave Theory and Techniques Society, IEEE Nuclear and Plasma Sciences Society, and the IEEE Wave Propagation Standards Committee; and in conjunction with a meeting of the American Astronomical Society.

The following USNC/URSI Commissions will take part: A (Electromagnetic Metrology), B (Fields and Waves), C (Signals and Systems), D (Physical Electronics), E (Electromagnetic Noise and Interference), F (Wave Phenomena in Non-Ionized Media), G (Ionospheric Radio and Propagation), H (Waves and Plasmas) and J (Radio Astronomy).

Papers on any topic of interest to a Commission are welcome, but in addition certain topics will be emphasized as indicated in the later Call for Papers. The deadline for the receipt of abstracts is 1 October 1981.

For further information, contact the Steering Committee Chairman:

Prof. S.W. Maley,
Department of Electrical Engineering,
University of Colorado,
Boulder, CO 80309,
USA.

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6TH SUMMER SYMPOSIUM ON CIRCUIT THEORY

SSCT 82

SSCT 1982 will be held at the Palace of Culture, Prague, Czechoslovakia, from 12 to 16 July 1982. It will be organized by the Institute of Radio Engineering and Electronics of the Czechoslovak Academy of Sciences and sponsored by the Czechoslovak National Committee of the URSI and the Commission C on Signals and Systems of URSI.

SSCT has a tradition based on the previous conferences called the Summer School on Circuit Theory held in 1965, 1968 and 1971, and the Summer Symposium on Circuit Theory which took place in 1977.

The Organizing Committee postponed the SSCT until the year 1982 because the ECCTD took place in 1980 in Warsaw, Poland, and the next in 1981 will be in The Hague, Netherlands.

SSCT 82 will cover the following areas:

1. Digital signal processing
2. Active and nonconventional analog filters
3. Communication circuits and systems.

Two kinds of papers will be presented at the conference: invited lectures and short contributions. They will all be published in the Proceedings. The working language of the conference will be English.

The next Announcement and Call for Papers will be issued in September this year. The expected deadline for receipt of manuscripts is 31 January 1982.

For further information, contact the

- Conference Secretariat SSCT 82,
Czechoslovak Academy of Sciences,
Lumumbova 1,
182 51 Praha 8, Czechoslovakia.

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NAMES AND ADDRESSES OF URSI OFFICERS
AND OFFICERS OF MEMBER COMMITTEES

The amendments listed below refer to pages 20-62 of URSI Information Bulletin No 215 (December 1980). A full list of names and addresses will be published in the December 1981 issue. Member Committees are invited to notify the URSI Secretariat before 15 November 1981 of any amendments to the information given in Bulletin No 215 and the present Bulletin.

1. URSI Standing Committees

Standing Finance Committee

Chairman: Dr.-Ing. H.J. Albrecht

2. URSI Commissions

Commission A

Australia: Dr. J.McK. Luck, Division of National Mapping, P.O.Box 548, Queanbeyan, NSW 2620.

Commission C

Australia: Dr. J.G. Lucas, Department of Electrical Engineering, University of Sydney, Sydney, NSW 2006.

Commission D

Australia: Dr. G. Rigby, Amalgamated Wireless (Australia) Ltd, Microelectronics Division, 348 Victoria Road, Rydalmere, NSW 2116.

Commission E

Australia: Mr. P.D. Barnes, Radio Frequency Management Division, Department of Communications, P.O. Box 84, O'Connor, ACT 2601.

Commission F

Australia: Mr. E.R. Craig, Telecom Research Laboratories, 31 Winterton Road, Clayton, Vic. 3168.

France: Dr. Ph. Waldteufel, Directeur de l'Institut et Observatoire de Physique du Globe du Puy de Dôme, 12 avenue des Landais, F-63000 Clermont-Ferrand.

Commission G

Australia: Dr. D.G. Cole

France: Dr. M. Crochet

Commission H

Australia: Prof. L.B. Melrose, Department of Theoretical Physics, University of Sydney, Sydney 2006.

France: Dr. F. Lefeuvre, CRPE/CNRS, avenue de la Recherche Scientifique, F - 45045 Orléans Cedex.

Commission J

Australia: Assoc. Prof. A.G. Little

3. URSI Member Committees

Australia

President: Prof. R.H. Frater

South Africa

President: Dr. D.H. Jacobson, Vice-President CSIR, P.O. Box 395, Pretoria 0001.

Secretary: Dr. P. le R. Malherbe, Head, International Relations, Information and Research Services, CSIR, P.O. Box 395, Pretoria 0001.

United Kingdom

President: Prof. A.L. Cullen, Department of Electrical Engineering, University College London, Torrington Place, London WC1E 7JE.

4. Changes of address

CRAWFORD, Dr. F.W., The University of Aston in Birmingham, Gosta Green, Birmingham B4 7ET, UK.

HELLWIG, Dr. H., Frequency and Time Systems Inc., 34 Tozer
Road, Beverly, Mass. 01915, USA.

IWAINSKY, Dr. A., Akademie der Wissenschaften, Zentral-
institut für Kybernetik und Informationsprozesse,
Kurstrasse 33, DDR-1080 Berlin, GDR.

